



**2022 Data Report
for
Eagle Lake, Cass County**

Site ID: 140057

41.8047°N, 86.0306°W

The CLMP is brought to you by:



EGLE MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

MICHIGAN STATE
UNIVERSITY



About this report:

This report is a summary of the data that have been collected through the Cooperative Lakes Monitoring Program. The contents have been customized for your lake. The first page is a summary of the Trophic Status Indicators of your lake (Secchi Disk Transparency, Chlorophyll-a, Spring Total Phosphorus, and Summer Total Phosphorus). Where data are available, they have been summarized for the most recent field season, five years prior to the most recent field season, and since the first year your lake has been enrolled in the program.

If you did not take 8 or more Secchi disk measurements or 4 or more chlorophyll measurements, there will not be summary data calculated for these parameters. These numbers of measurements are required to ensure that the results are indicative of overall summer conditions.

If you enrolled in Dissolved Oxygen/Temperature, the summary page will have a graph of one of the profiles taken during the late summer (typically August or September). If your lake stratifies, we will use a graph showing the earliest time of stratification, because identifying the timing of this condition and the depth at which it occurs is typically the most important use of dissolved oxygen measurements.

The back of the summary page will be an explanation of the Trophic Status Index and where your lake fits on that scale.

The rest of the report will be aquatic plant summaries, Score the Shore results, and larger graphs, including all Dissolved Oxygen/Temperature Profiles that you recorded. For Secchi Disk, Chlorophyll, and Phosphorus parameters, you need to have two years of data for a graph to make logical sense. Therefore if this is the first year you have enrolled in the CLMP, you will not receive a graph for these parameters.

Remember that some lakes see a lot of fluctuation in these parameters from year to year. Until you have eight years worth of data, consider all trends to be preliminary.

To learn more about the CLMP monitoring parameters or get definitions to unknown terms, check out the CLMP Manual, found at: https://micorps.net/wp-content/uploads/2021/03/CLMP-Manual-2019update2_2021.pdf

Thank you!

The CLMP leadership team would like to thank you for all of your efforts over the past year. The CLMP would not exist without dedicated and hardworking volunteers!

The CLMP Leadership Team is made of: Jo Latimore, Erick Elgin, Jean Roth, Tamara Lipsey, Mike Gallagher, Melissa DeSimone, and Paul Steen

Questions?

If you have questions on this report or believe that the tabulated data for your lake in this report are in error please contact:

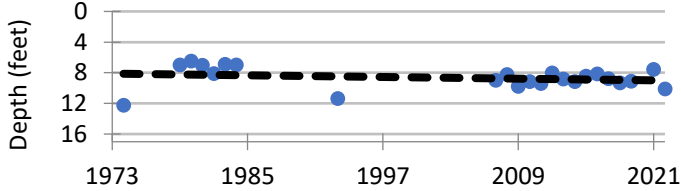
Paul Steen (psteen@hrwc.org), CLMP Data Analyst

Eagle Lake, Cass County 2022 CLMP Results



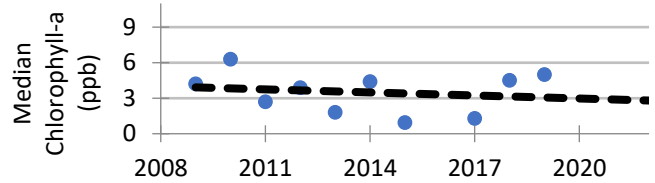
Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2022	19	4.0	32.0	10.1	7.8	44
2017-2021	72	4.0	22.5	10.1	3.1	46
1974-2016	298	3.0	28.0	8.6	3.9	46
2022 All CLMP Lakes	3178	1.0	63.0	11.6	2.5	43



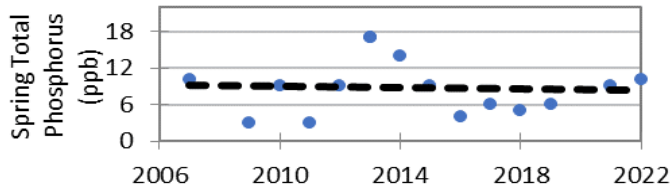
Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2022	3*	2.3	9.9			
2017-2021	18	<1.0	7.6	4.5	1.7	45
2009-2016	37	<1.0	9.9	4.5	2.5	44
2022 All CLMP Lakes	687	< 1.0	43.0	3.7	5.3	43



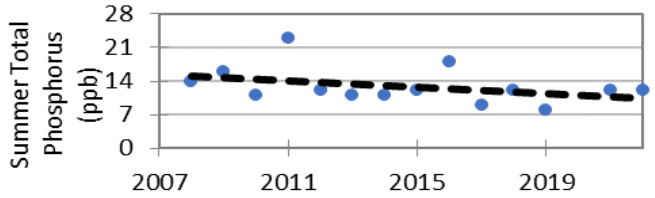
Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2022	1	10.0	10.0	10.0	NA
2017-2021	4	5.0	9.0	6.5	1.7
2007-2016	10	<=3 W	17.0	9.5	5.3
2022 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
2022	1	12.0	12.0	12.0	NA	40
2017-2021	4	8.0	12.0	10.3	2.1	38
2008-2016	9	11.0	23.0	14.2	4.1	42
2022 All CLMP Lakes	234	<= 3	150.0	17.4	15.3	45



Dissolved Oxygen and Temperature Profile

This lake does not have recent (within 5 years) dissolved oxygen/water temperature data available. Consider enrolling in this parameter next year. Fish, insects, mollusks, and crustaceans need dissolved oxygen to live in water. By late summer, many lakes stratify, with cold anoxic water on the bottom and warm, oxygen rich water on the surface. Anoxic (oxygen-depleted) water occurring too close to the surface is a sign of nutrient enrichment. Understanding the pattern of dissolved oxygen and water temperature in a lake is important for assessing nutrient problems as well as the health of the biological community.

Summary

	2022	2017-2021	1974-2016
Average TSI			
Eagle Lake	42	43	44
All CLMP Lakes	44	40	43

With an average TSI score of 42 based on 2022 Secchi transparency and summer total phosphorus data, this lake is rated as an mesotrophic lake.

Long term trends indicate that the trophic status parameters have not changed beyond minor year-to-year variation since monitoring began.

Reminder: 4 chlorophyll measurements are required in order to use the data in graphs and trends.

* = 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.

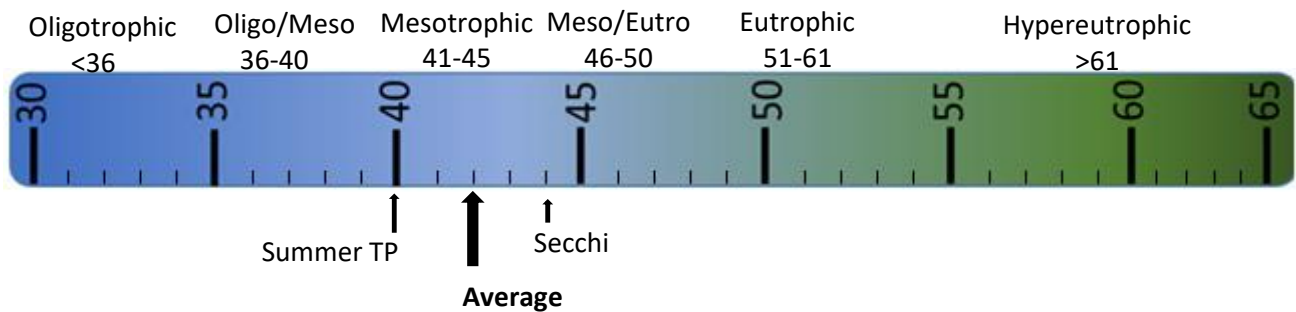
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

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 Eagle Lake in 2022	
Average	42
Secchi Disk	44
Summer TP	40
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 eutrophic lakes. These lakes exhibit extremely high productivity, such as nuisance algae and weed growth.

Eagle Lake, Cass County 2019 Exotic Aquatic Plant Watch Results



The Exotic Aquatic Plant Watch was conducted on Eagle Lake in 2019.

This survey involves sampling at multiple locations around the lake to detect new invaders, and document the extent of known invaders. While notes on other plant species may be recorded during the survey, the effort focuses on four highly invasive species: Eurasian watermilfoil (*Myriophyllum spicatum*), starry stonewort (*Nitellopsis obtusa*), curly-leaf pondweed (*Potamogeton crispus*), European Frogbit (*Hydrocharis morsus-ranae*), and Hydrilla (*Hydrilla verticillata*).

The table below summarizes the results of the 2019 Exotic Aquatic Plant Watch on Eagle Lake.

Eagle Lake, Cass County		
2019 Exotic Aquatic Plant Watch Results		
Survey Date(s): August 9, 13		
<u>Species</u>	<u>Status</u>	<u>Comments</u>
Eurasian watermilfoil	FOUND	Found in 3 of 29 transects surveyed.
Starry stonewort	FOUND	Most that was found was described as dead.
Curly-leaf pondweed	not found	
European Frogbit	not found	
Hydrilla	not found	

Visit the MiCorps Data Exchange (<https://micorps.net>) or contact the lead volunteer on your lake for more details on the survey, including sampling locations, maps, and abundance information, and for information on past surveys.

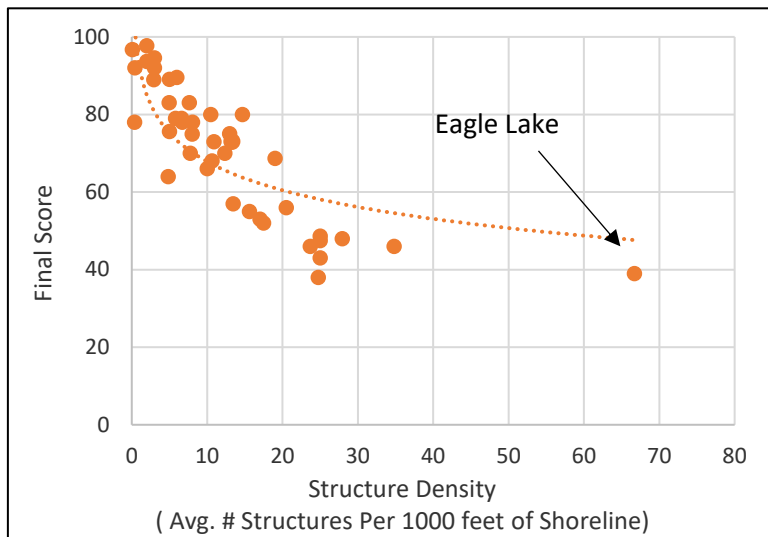
Eagle Lake, Cass County 2015 Score the Shore Results



The Score the Shore Habitat Assessment was conducted on Eagle Lake in 2015.

This assessment involves rating 1000 foot sections of shoreline for aquatic vegetation, shoreline vegetation, erosion, and erosion control practices (like sea walls). Each shoreline section is given three scores ranging from 0-100 for the categories of Littoral, Riparian, and Erosion Management. The three scores are averaged to produce a average section score. Then a total score is given to the entire lake by averaging all of the average section scores. A score of 0 indicates a shoreline that has been extremely disturbed by human impacts and no natural shoreline remains. A score of 100 indicates a shoreline that is nearly pristine.

How does your lake compare to others in the program?



Eagle Lake:	
Number of Sections:	7
Number of Structures:	467
Structure Density:	66.7
Final Score:	39

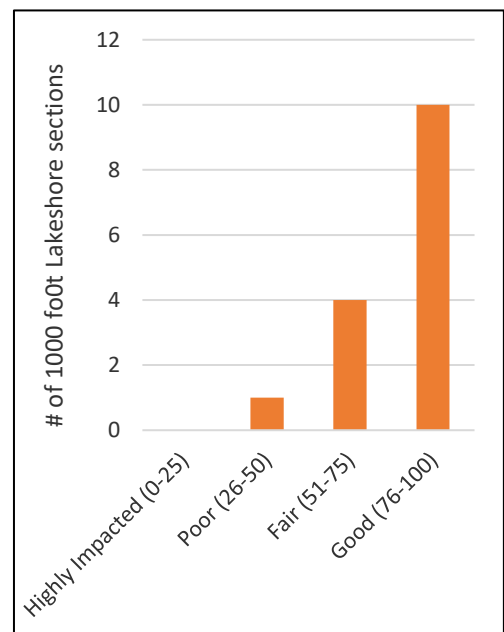
All 42 Participating Lakes from 2015-2018:	
Avg. Number of Sections:	16.3
Avg. Number of Structures:	248.5
Avg. Structure Density:	15.2
Avg. Final Score:	70.5

There is a very tight relationship between Final Score and Structure Density. It will be interesting to see if and how this changes as more lakes go through this scoring process.

Analysis specific to Eagle Lake:

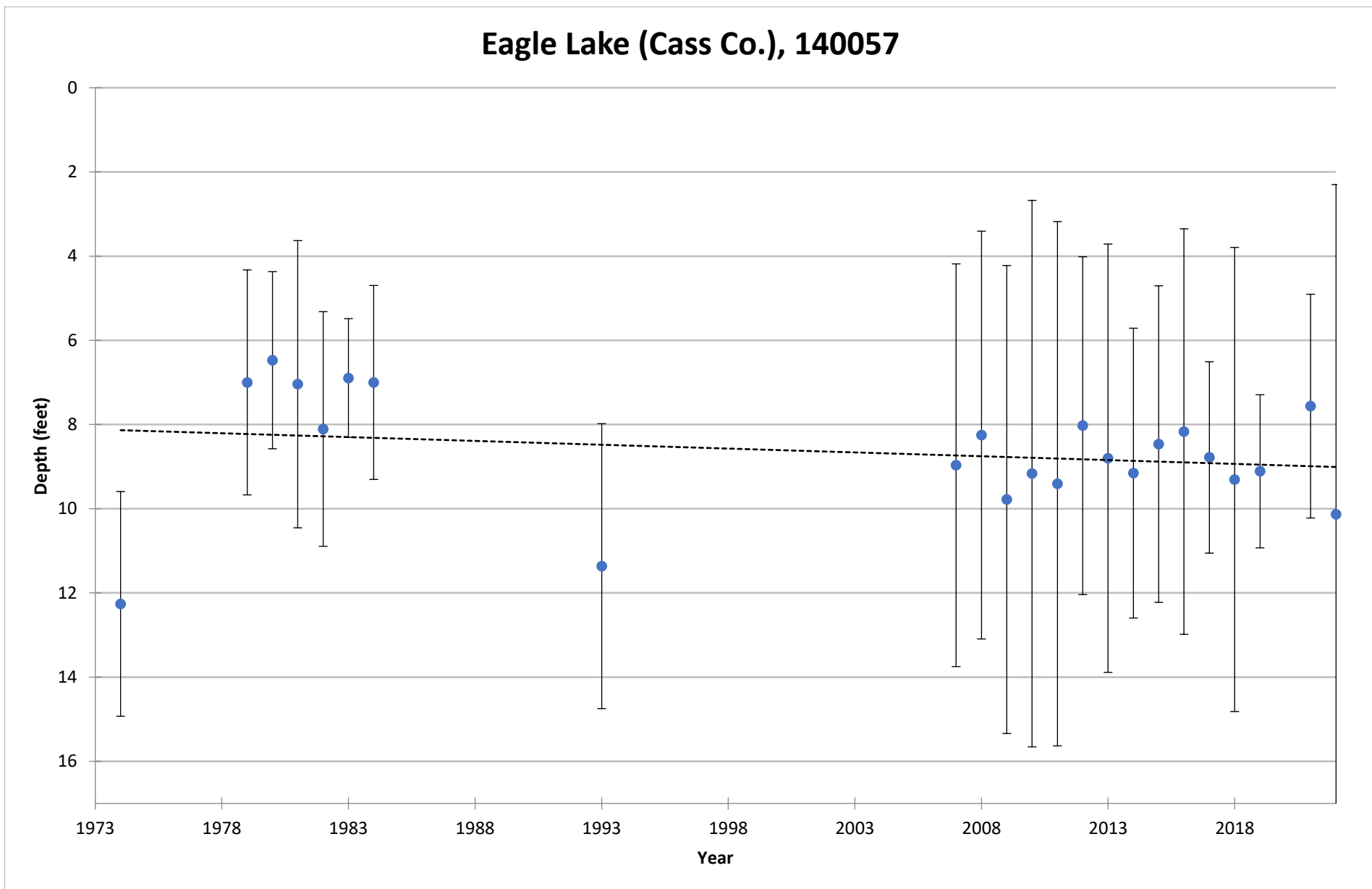
With a very high density of houses and docks on Eagle Lake, it logically follows that the overall lakeshore health is poor. The lake is characterized by sea walls, few unmowed areas, and very little aquatic vegetation.

The weakest point of Eagle Lake was the riparian zone (land adjacent to the water), scoring only a 27 out of 100. Reducing the amount of mowed grass and increasing the amount of unmowed vegetation would be the primary way to boost the overall score of Eagle Lake. Residents should be encourage to plant 20 foot wide strips of native plants along the lakeshore.



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEAN TRANSPARENCY

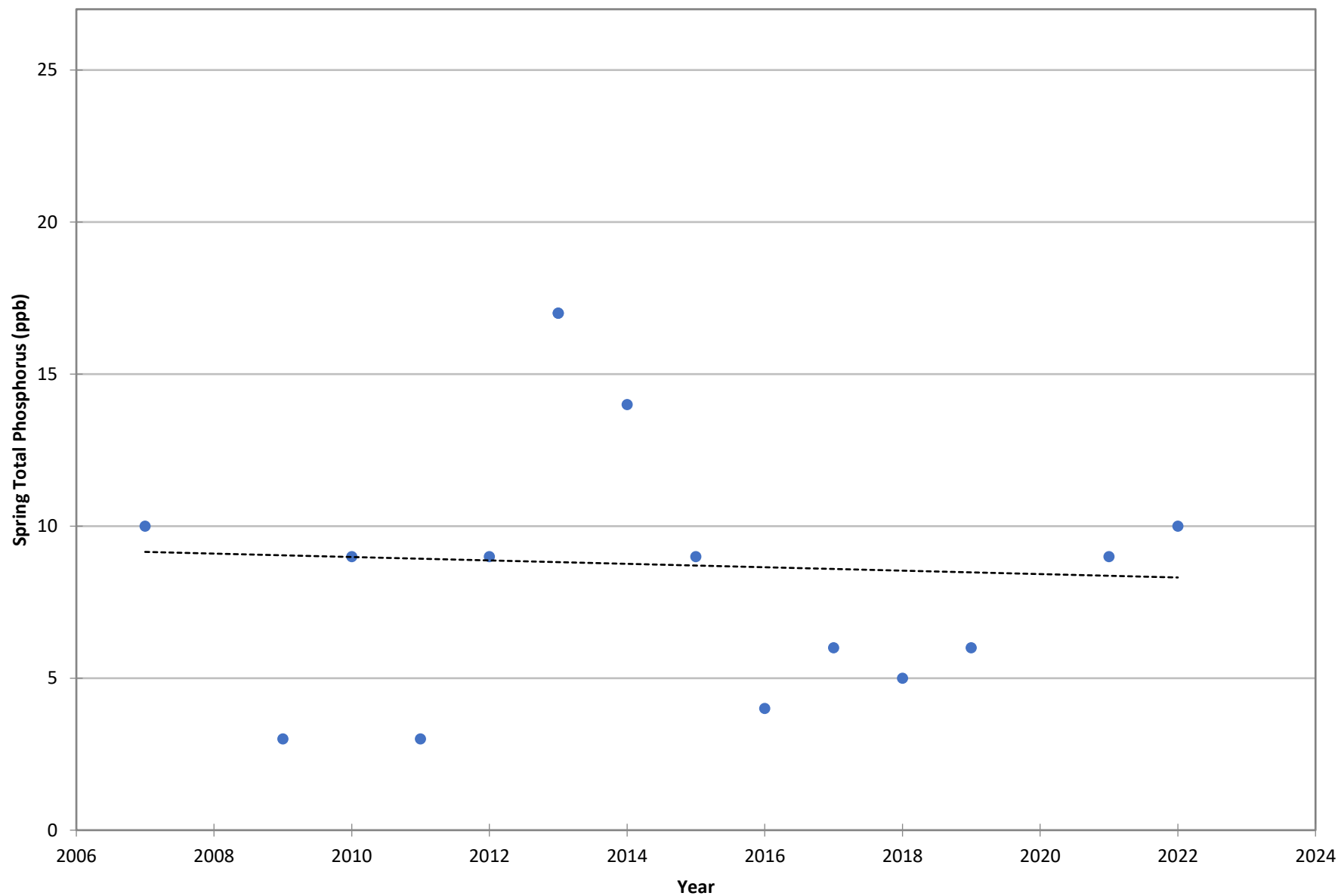
Eagle Lake (Cass Co.), 140057



Vertical bars indicate standard deviation

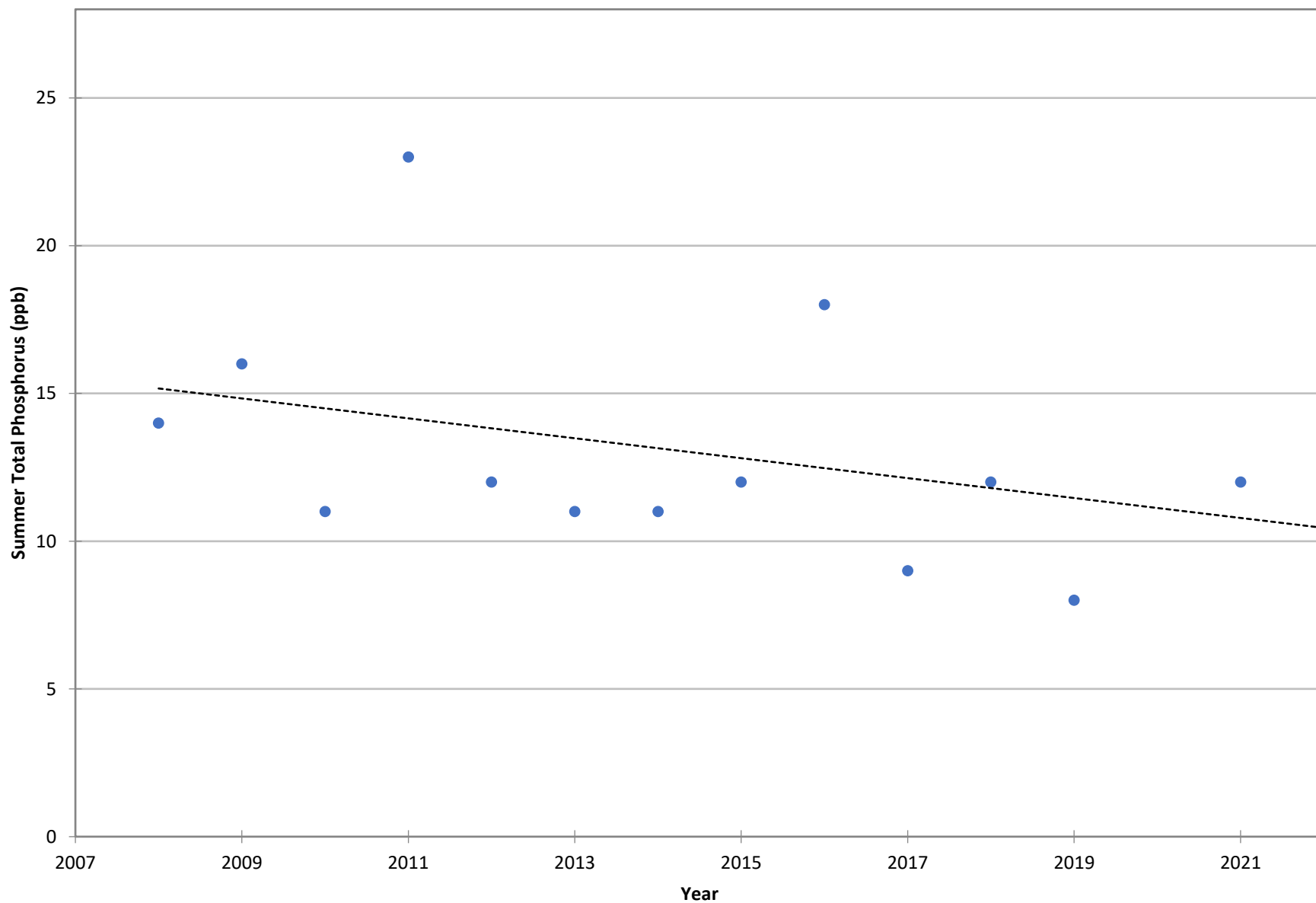
COOPERATIVE LAKES MONITORING PROGRAM
SPRING TOTAL PHOSPHORUS

Eagle Lake (Cass Co.), 140057



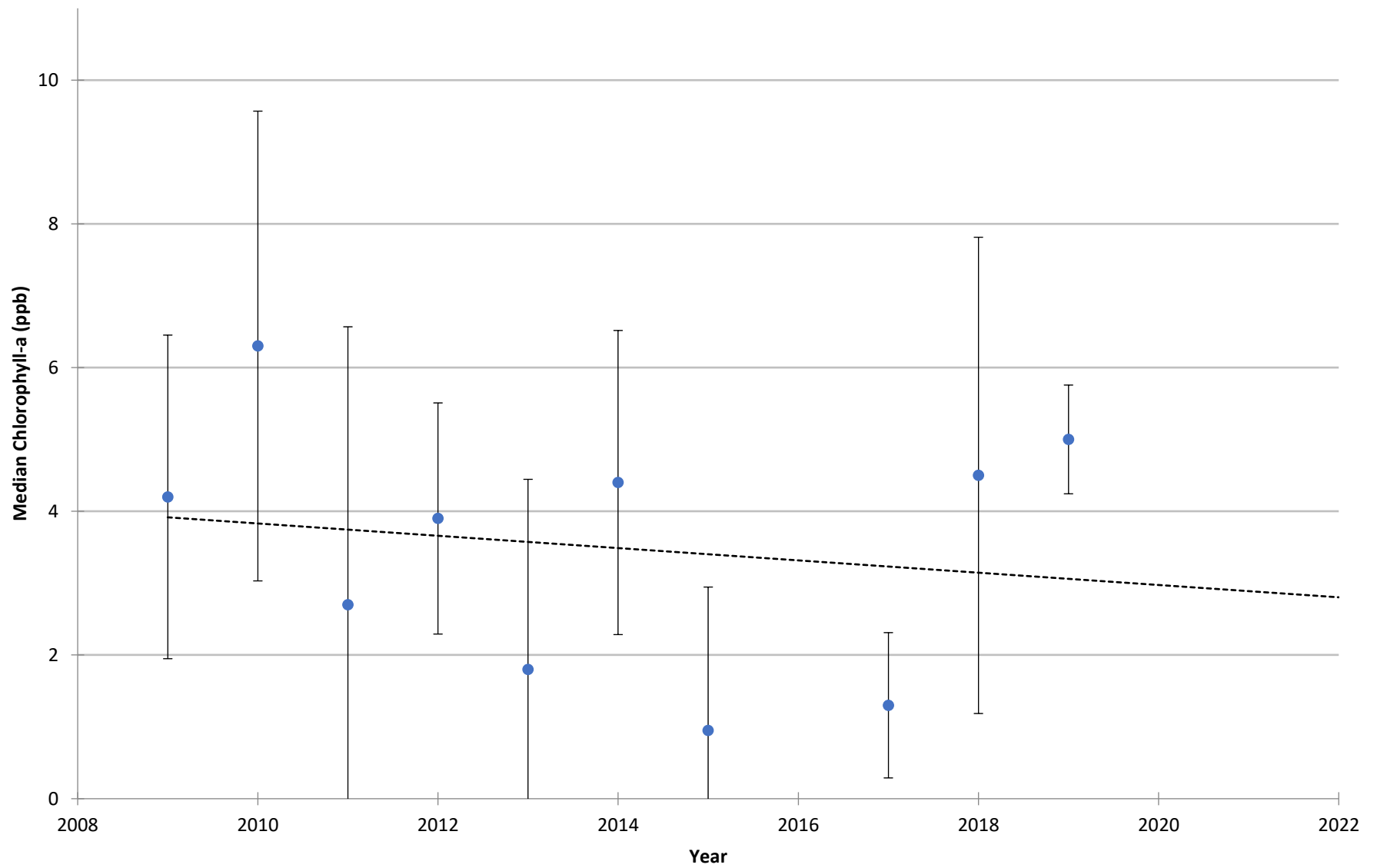
COOPERATIVE LAKES MONITORING PROGRAM
SUMMER TOTAL PHOSPHORUS

Eagle Lake (Cass Co.), 140057



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEDIAN CHLOROPHYLL-A

Eagle Lake (Cass Co.)



Vertical bars indicate standard deviation

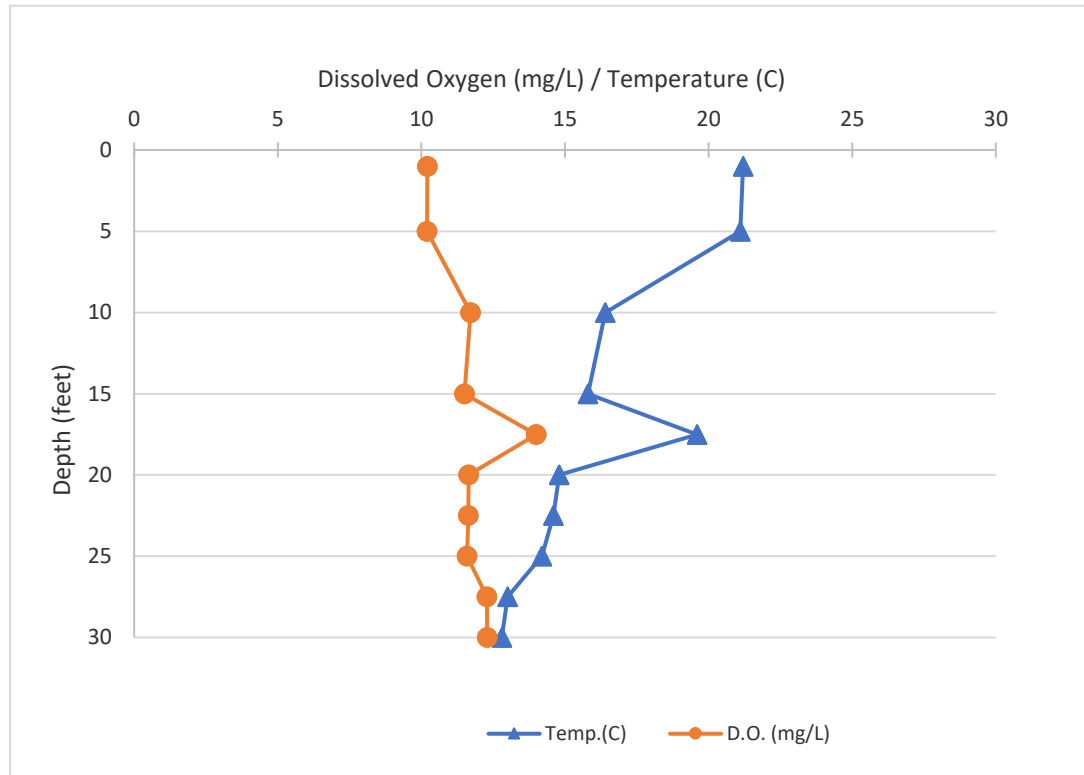
Name: Eagle Lake
 County: Cass
 Site ID: 140057
 Date: 5/12/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	21.2	10.21
1	21.2	10.21
5	21.1	10.2
5	21.1	10.2
10	16.4	11.71
10	16.4	11.71
15	15.8	11.5
15	15.8	11.5
17.5	19.6	14
17.5	19.6	14
20	14.8	11.65
20	14.8	11.65
22.5	14.6	11.64
22.5	14.6	11.64
25	14.2	11.59
25	14.2	11.59
27.5	13	12.28
27.5	13	12.28
30	12.8	12.29
30	12.8	12.29

Lake: Eagle Lake (Cass Co.)

5/12/2022



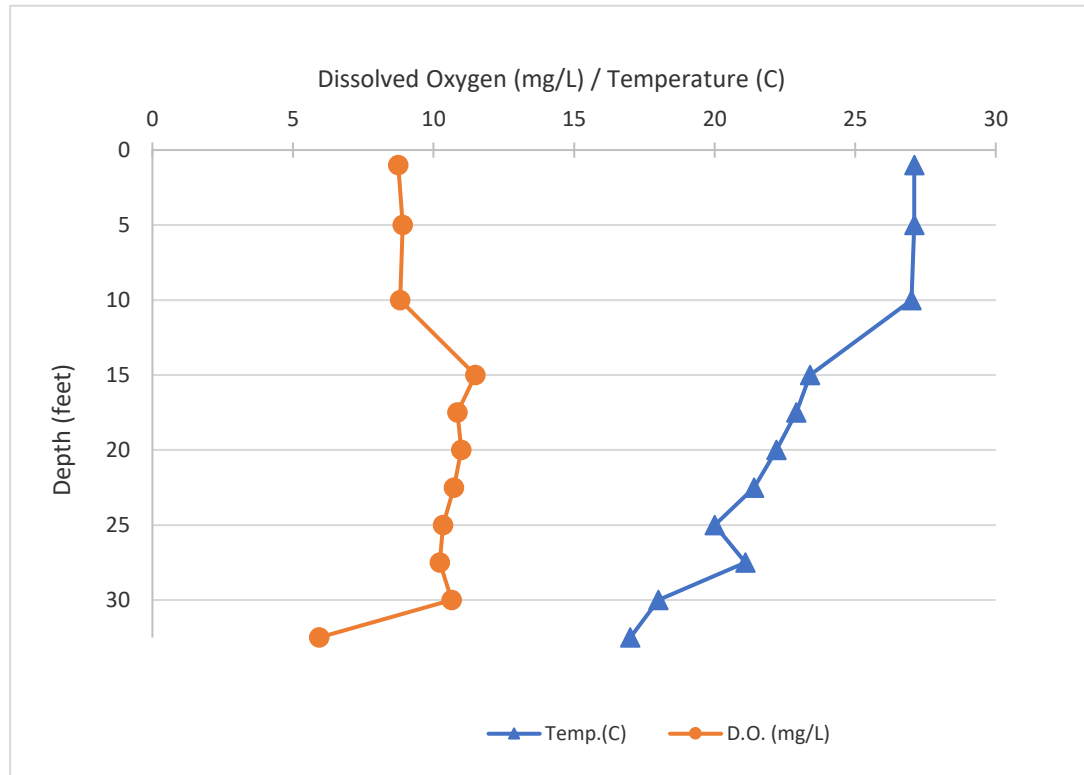
Name: Eagle Lake
County: Cass
Site ID: 140057
Date: 6/16/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	27.1	8.75
5	27.1	8.9
10	27	8.81
15	23.4	11.49
17.5	22.9	10.85
20	22.2	10.99
22.5	21.4	10.73
25	20	10.34
27.5	21.1	10.23
30	18	10.65
32.5	17	5.93

Lake: Eagle Lake (Cass Co.)

6/16/2022



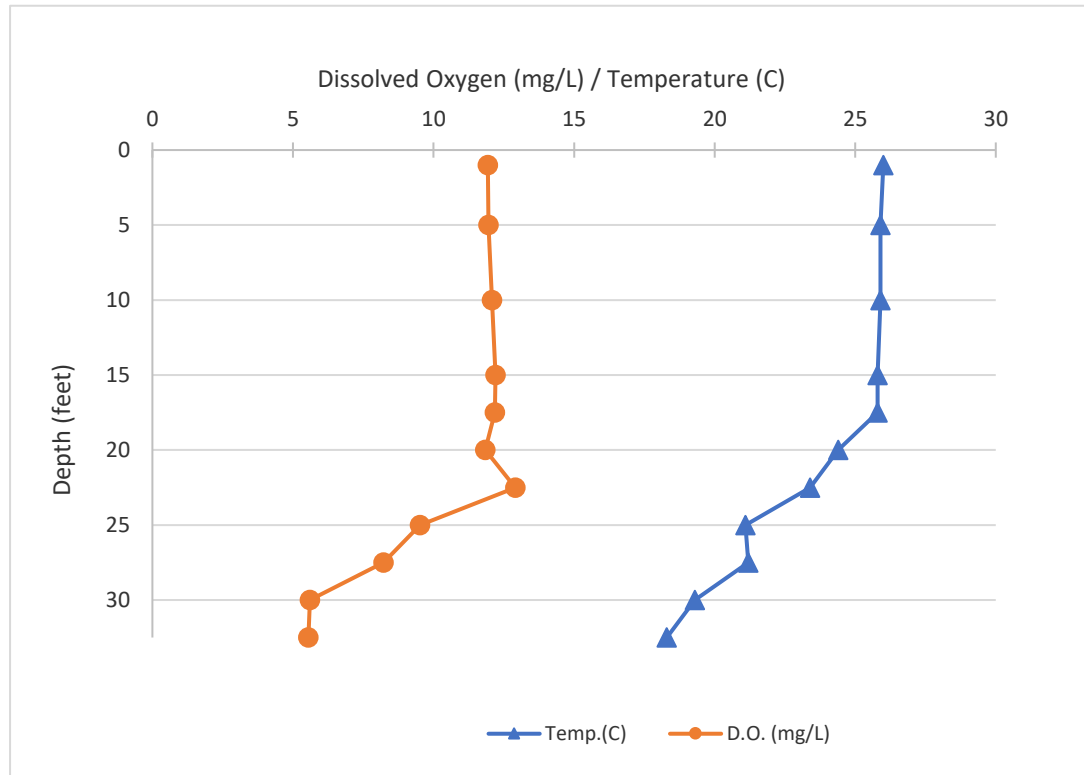
Name: Eagle Lake
County: Cass
Site ID: 140057
Date: 6/30/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26	11.93
5	25.9	11.95
10	25.9	12.08
15	25.8	12.21
17.5	25.8	12.18
20	24.4	11.84
22.5	23.4	12.91
25	21.1	9.52
27.5	21.2	8.22
30	19.3	5.6
32.5	18.3	5.55

Lake: Eagle Lake (Cass Co.)

6/30/2022



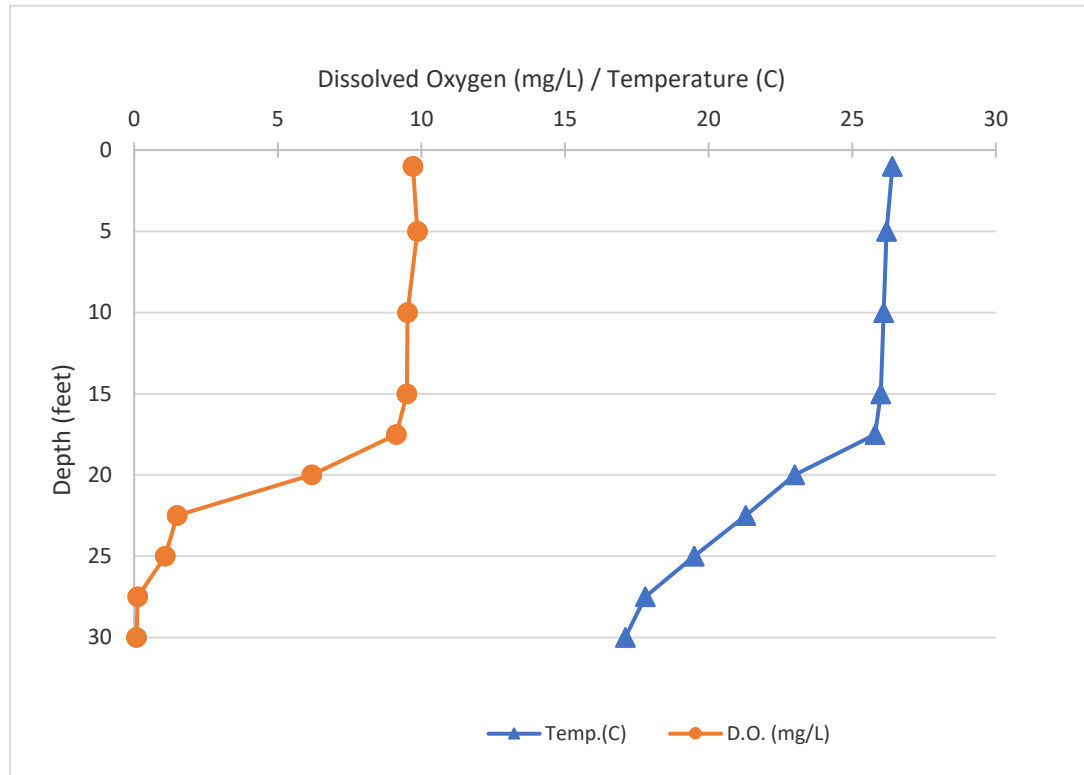
Name: Eagle Lake
 County: Cass
 Site ID: 140057
 Date: 7/14/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26.4	9.71
1	26.4	9.71
5	26.2	9.86
5	26.2	9.86
10	26.1	9.52
10	26.1	9.52
15	26	9.49
15	26	9.49
17.5	25.8	9.13
17.5	25.8	9.13
20	23	6.19
20	23	6.19
22.5	21.3	1.5
22.5	21.3	1.5
25	19.5	1.08
25	19.5	1.08
27.5	17.8	0.13
27.5	17.8	0.13
30	17.1	0.08
30	17.1	0.08

Lake: Eagle Lake (Cass Co.)

7/14/2022



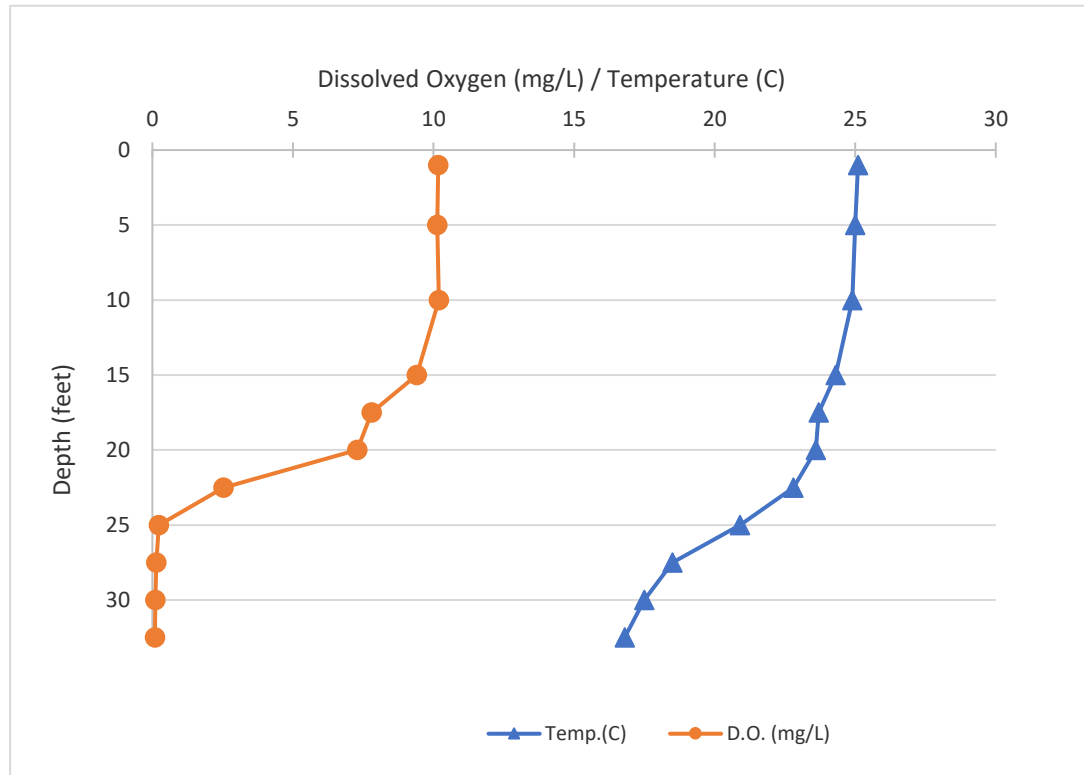
Name: Eagle Lake
County: Cass
Site ID: 140057
Date: 8/19/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	25.1	10.17
5	25	10.13
10	24.9	10.19
15	24.3	9.41
17.5	23.7	7.8
20	23.6	7.29
22.5	22.8	2.53
25	20.9	0.23
27.5	18.5	0.14
30	17.5	0.11
32.5	16.8	0.09

Lake: Eagle Lake (Cass Co.)

8/19/2022



Name: Eagle Lake
County: Cass
Site ID: 140057
Date: 9/22/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	22.6	8.8
5	22.6	8.84
10	22.6	8.87
15	22.6	8.8
17.5	22.5	8.65
20	22.5	8.5
22.5	21.9	6.59
25	22	6.35
27.5	22	5.7
30	20.9	0.3
32.5	20.8	0.07

Lake: Eagle Lake (Cass Co.)

9/22/2022

