Cooperative Lakes Monitoring Program

Michigan Lakes– Ours to Protect

2023 Data Report for

Cass Lake, Oakland County

Site ID: 630542

42.6031°N, 83.3711°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

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

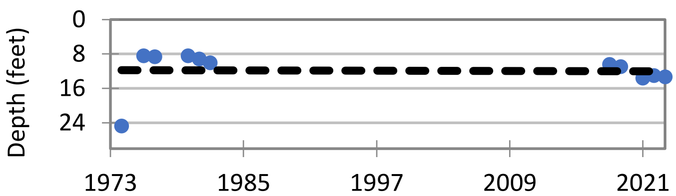
Questions?
If you have questions on this report or believe that the tabulated data for your lake in this report are in error please contact:
Paul Steen (psteen@hrwc.org), CLMP Data Analyst

Site ID: 630542

Cass Lake, Oakland County
2023 CLMP Results

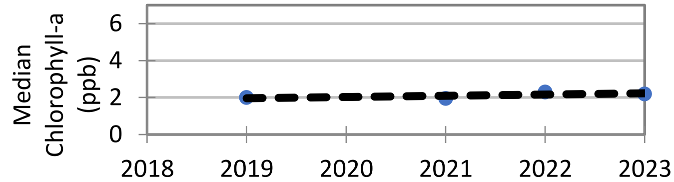
Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2023	16	6.0	21.0	13.3	5.1	40
2018-2022	55	5.5	26.0	12.0	4.0	41
1974-1982	93	5.0	32.0	11.6	2.0	43
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	4.4	2.2	1.4	38
2019-2022	14	<1.0	2.8	2.0	0.9	37
2023 All CLMP Lakes	687	< 1.0	43.0	3.7	5.3	43

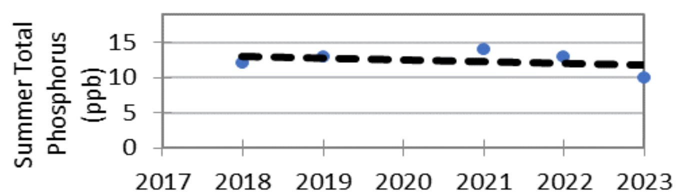


Spring Phosphorus (parts per billion)

Cass Lake does not have spring total phosphorus data available. Consider enrolling in this parameter next year. Phosphorus is one of several essential nutrients that algae need to grow and reproduce. An increase in phosphorus over time is a measure of nutrient enrichment in a lake. A surface water sample taken in the spring, shortly after spring turnover, will be a representative sample for estimating the total amount of phosphorus in the lake.

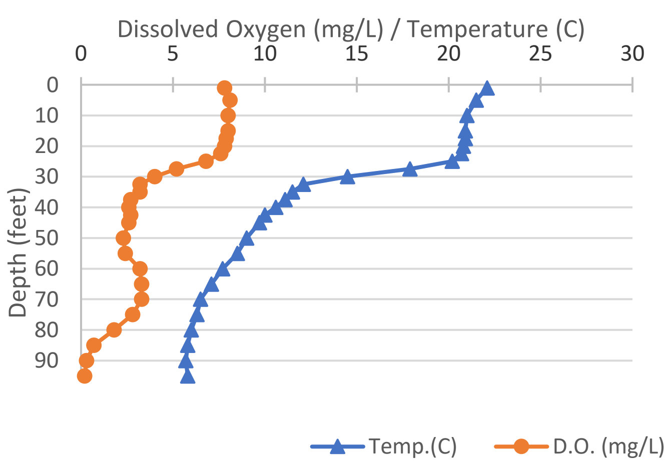
Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2023	1	10.0	10.0	10.0	NA	37
2018-2022	3	12.0	14.0	13.0	1.0	41
2023 All CLMP Lakes	234	<= 3	150.0	17.4	15.3	45



Dissolved Oxygen and Temperature Profile

8/31/23



Summary

Average TSI	2023	2018-2022	1974-1982
Cass Lake	38	40	43
All CLMP Lakes	44	41	45

With an average TSI score of 38 based on 2023 Secchi transparency, chlorophyll-a, and summer total phosphorus data, this lake is rated between the oligotrophic and mesotrophic classification.

The available monitoring data indicates that this lake is stratified by mid-summer, at which time the bottom waters are devoid of oxygen. More data is required to establish the point at which stratification begins during the monitoring season.

There is too little data to assess long term trends. CLMP recommends eight years of consistent monitoring in order to develop a strong data baseline.

** = 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.

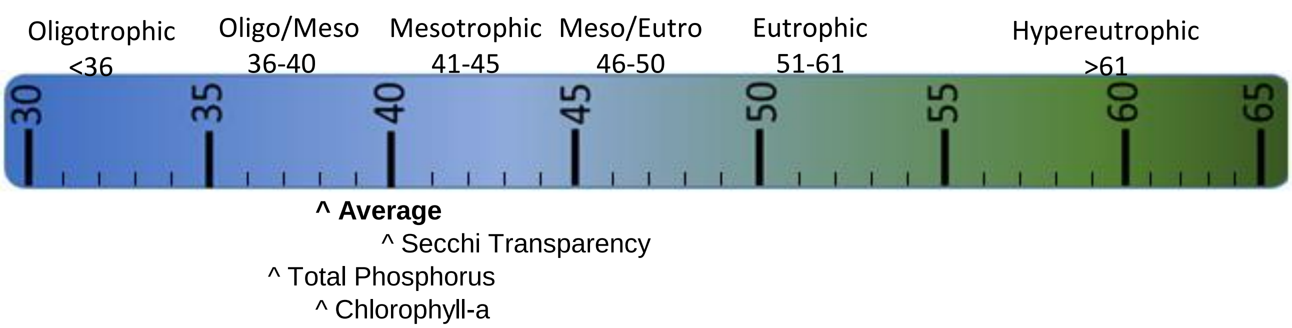
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

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 Cass Lake in 2023	
Average	38
Secchi Disk	40
Summer TP	37
Chlorophyll-a	38



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.

Site ID: 630542

Cass Lake, Oakland County
2019 Exotic Aquatic Plant Watch Results

The Exotic Aquatic Plant Watch was conducted on Cass 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 Cass Lake.

Cass Lake, Oakland County

2019 Exotic Aquatic Plant Watch Results

Survey Date(s): July 23, 27, and August 5

Species	Status	Comments
Eurasian watermilfoil	FOUND	Found in 6 of 28 locations surveyd. Some hybrid (genetics confirmed).
Starry stonewort	FOUND	Found in 4 of 28 locations surveyed.
Curly-leaf pondweed	FOUND	Found in 4 of 28 locations surveyed.
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.

Aquatic Plants

Cass Lake does not have aquatic plant data available.

Why is monitoring aquatic plants important?

A major component of the plant community in lakes is the large, leafy, rooted plants. Compared to the microscopic algae the rooted plants are large. Sometimes they are collectively called the “macrophytes” (“macro” meaning large and “phyte” meaning plant). These macrophytes are the plants that people sometimes complain about and refer to as lake weeds.

Far from being weeds, macrophytes or rooted aquatic plants are a natural and essential part of the lake, just as grasses, shrubs and trees are a natural part of the land. Their roots are a fabric for holding sediments in place, reducing erosion and maintaining bottom stability. They provide habitat for fish, including structure for food organisms, nursery areas, foraging and predator avoidance. Waterfowl, shore birds and aquatic mammals use plants to forage on and within, and as nesting materials and cover.

Though plants are important to the lake, overabundant plants can negatively affect fish populations, fishing and other recreational activities. Rooted plant populations increase in abundance as nutrient concentrations increase in the lake. As lakes become more eutrophic rooted plant populations increase. They are rarely a problem in oligotrophic lakes, only occasionally a problem in mesotrophic lakes, sometimes a problem in eutrophic lakes, and often a problem in hypereutrophic lakes.

However, sometimes a lake is invaded by an aquatic plant species that is not native to Michigan. In these cases, even nutrient poor oligotrophic lakes can be threatened. Some of these exotic plants, like Curly-leaf Pondweed, Eurasian Milfoil, Starry Stonewort, and Hydrilla can be extremely disruptive to the lake’s ecosystem and recreational activities.

To avoid a takeover by exotic plants, it is necessary to use Integrated Pest Management (IPM) strategies: monitoring, early detection, rapid response, maintenance control, and preventive management. For more information on these strategies, check out Integrated Pest Management for Nuisance Exotics in Michigan Inland Lakes (MSU Extension Water Quality Publication WQ-56, available at https://micorps.net/lake-monitoring/clmp-documents/)

The CLMP offers two parameters on aquatic plants. In the Exotic Aquatic Plant Watch, volunteers concentrate on monitoring and early detection of exotic invasive plants only. In Aquatic Plant Identification and Mapping, volunteers identify all native and non-native plants. In both parameters, volunteers create lake maps or use digital tools to georeference where the plants are found.

Score the Shore

Cass Lake does not have Score the Shore results.

Why is the Score the Shore parameter important?

Healthy shorelines are an important and valuable component of the lake ecosystem. The shoreline area is a transition zone between water and land, and should be a very diverse environment that provides habitat for a great variety of fish, plants, birds, and other animals. A healthy shoreline area is also essential for maintaining water quality, slowing runoff, and limiting erosion.

However, Michigan's inland lake shorelines are threatened. Extensive development, often combined with poor shoreline management practices, can reduce or eliminate natural shoreline habitat and replace it with lawn and artificial erosion control such as sea walls and rock. As a result, shoreline vegetation is dramatically altered, habitat is lost, and water quality declines.

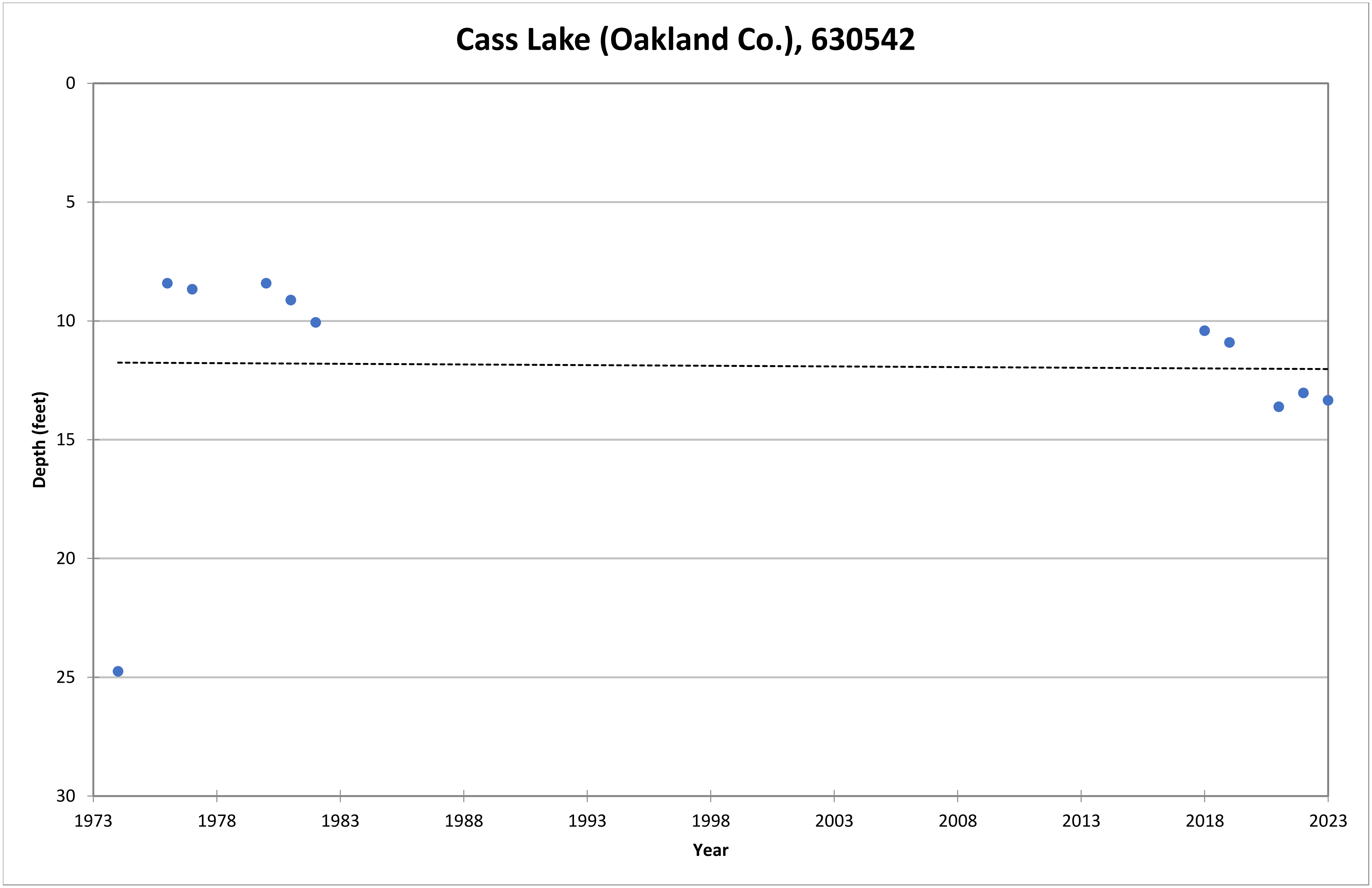
Therefore, in 2019 the MiCorps Cooperative Lakes Monitoring Program introduced a new monitoring program – Score the Shore – that enables volunteers to assess the quality of their lake's shoreline habitat.

The information gathered during this assessment will allow lake communities to identify high-quality areas that can be protected, as well as opportunities for improvement. Score the Shore data, combined with educational resources describing the value of healthy shorelines and how to restore and maintain them, can be incorporated into lake management planning and used for educating lakefront property owners. The Michigan Natural Shoreline Partnership (MNSP) is a collaboration of agencies and professionals that promotes natural shoreline practices to protect Michigan's inland lakes. The MNSP website (www.mishorelinepartnership.org) includes materials and information that can be used in educational efforts. MNSP also offers training for professional educators and landscape contractors, and maintains a list of trained educators who may be available to speak to your community about natural shorelines.

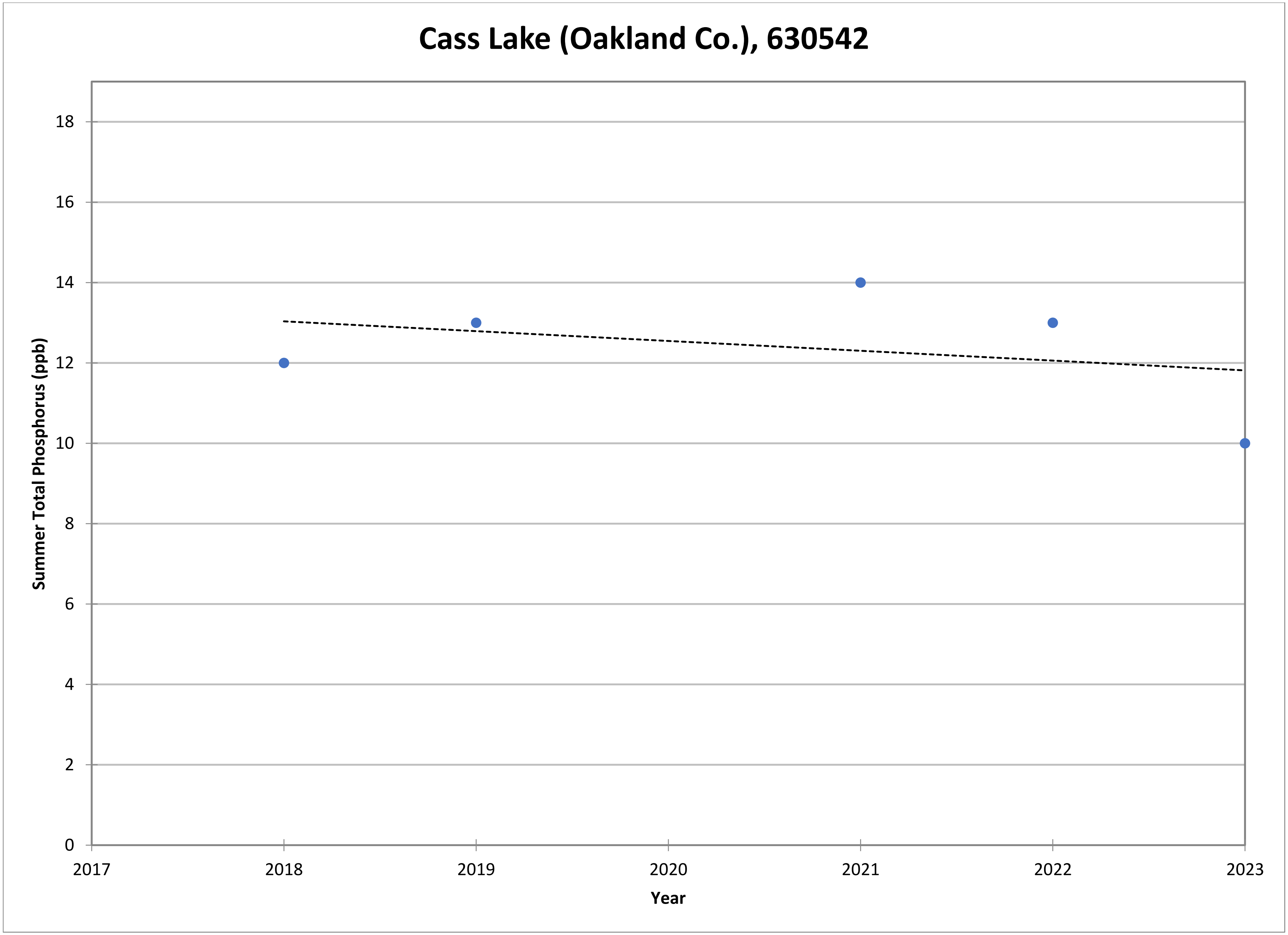
Score the Shore data, just like all CLMP data, will also be available to any interested parties through the MiCorps Data Exchange (www.micorps.net). State agency staff and researchers regularly access CLMP data to better understand and manage Michigan's inland lakes.

Score the Shore is a descriptive process for assessing shoreline quality on Michigan's inland lakes. It is also a valuable educational tool. Score the Shore is not a regulatory program, nor is it intended to tell people what they can and cannot do on their property. The Michigan Department of Environmental Quality's Inland Lakes and Streams Program has responsibility for shoreline protection on public lakes. To learn about their shoreline protection program, including construction permitting and recommendations for shoreline management, visit www.mi.gov/deqinlandlakes.

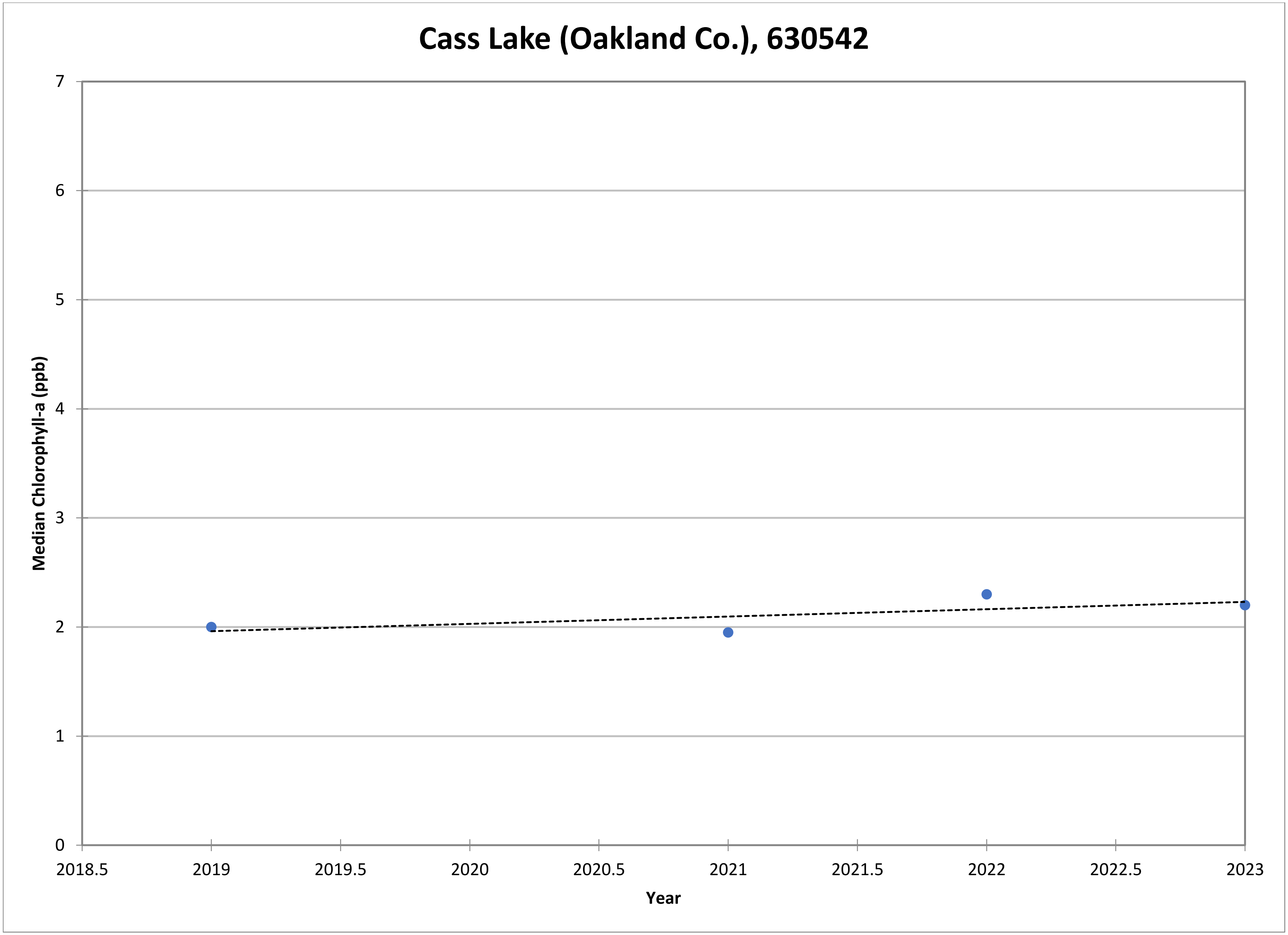
COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEAN TRANSPARENCY



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER TOTAL PHOSPHORUS



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEDIAN CHLOROPHYLL-A

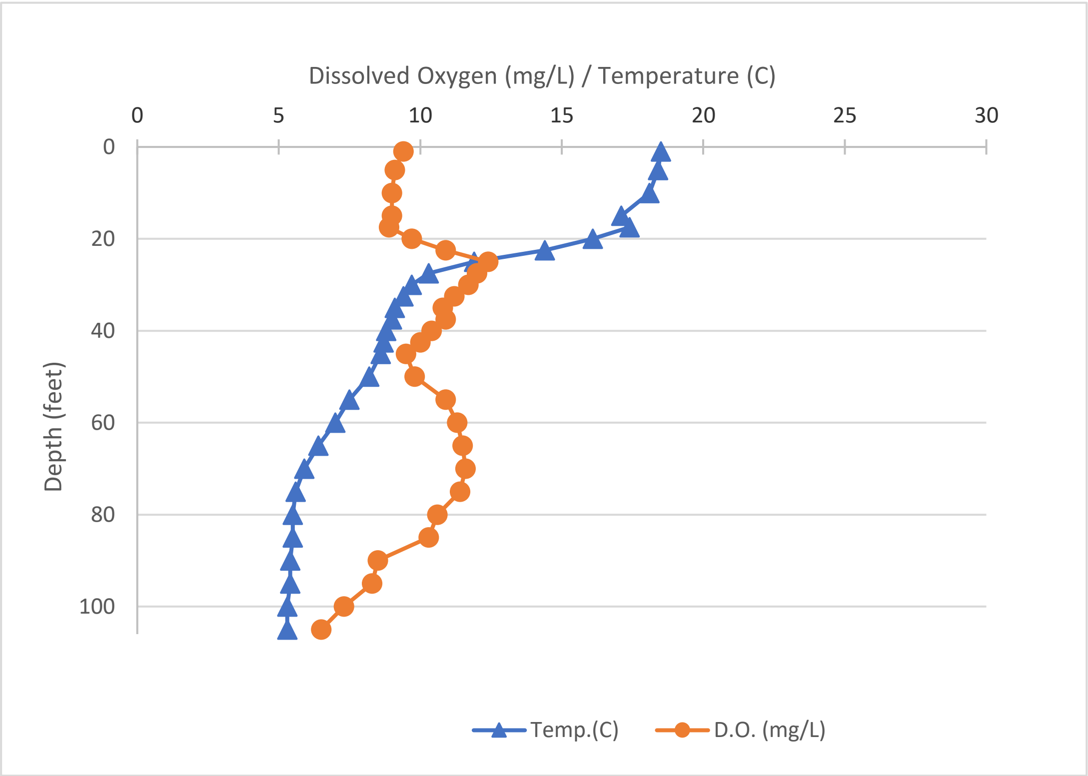


Name: Cass Lake
County: Oakland
Site ID: 630542
Date: 6/14/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	18.5	9.4
5	18.4	9.1
10	18.1	9
15	17.1	9
17.5	17.4	8.9
20	16.1	9.7
22.5	14.4	10.9
25	11.9	12.4
27.5	10.3	12
30	9.7	11.7
32.5	9.4	11.2
35	9.1	10.8
37.5	9	10.9
40	8.8	10.4
42.5	8.7	10
45	8.6	9.5
50	8.2	9.8
55	7.5	10.9
60	7	11.3
65	6.4	11.5
70	5.9	11.6
75	5.6	11.4
80	5.5	10.6
85	5.5	10.3
90	5.4	8.5
95	5.4	8.3
100	5.3	7.3
105	5.3	6.5

Lake: Cass Lake (Oakland Co.) 6/14/2023

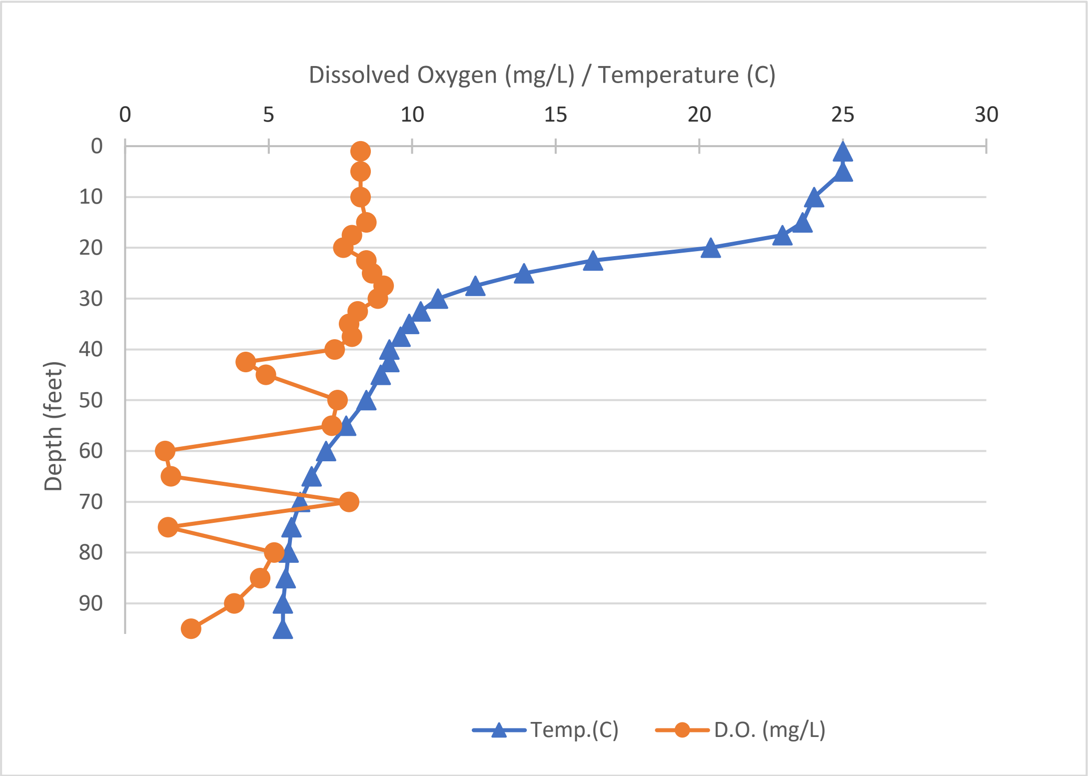


Name: Cass Lake
County: Oakland
Site ID: 630542
Date: 7/20/2023

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	25	8.2
5	25	8.2
10	24	8.2
15	23.6	8.4
17.5	22.9	7.9
20	20.4	7.6
22.5	16.3	8.4
25	13.9	8.6
27.5	12.2	9
30	10.9	8.8
32.5	10.3	8.1
35	9.9	7.8
37.5	9.6	7.9
40	9.2	7.3
42.5	9.2	4.2
45	8.9	4.9
50	8.4	7.4
55	7.7	7.2
60	7	1.4
65	6.5	1.6
70	6.1	7.8
75	5.8	1.5
80	5.7	5.2
85	5.6	4.7
90	5.5	3.8
95	5.5	2.3

Dissolved Oxygen and Temperature Profile

Lake: Cass Lake (Oakland Co.) 7/20/2023

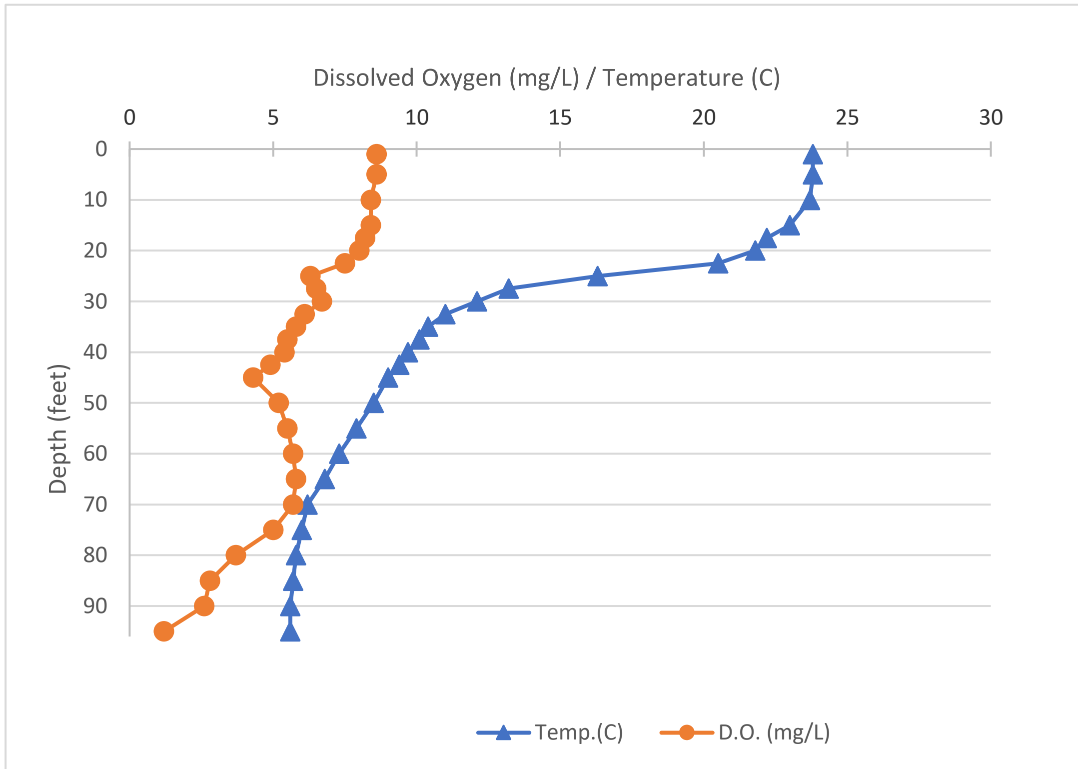


Name: Cass Lake
County: Oakland
Site ID: 630542
Date: 8/10/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23.8	8.6
5	23.8	8.6
10	23.7	8.4
15	23	8.4
17.5	22.2	8.2
20	21.8	8
22.5	20.5	7.5
25	16.3	6.3
27.5	13.2	6.5
30	12.1	6.7
32.5	11	6.1
35	10.4	5.8
37.5	10.1	5.5
40	9.7	5.4
42.5	9.4	4.9
45	9	4.3
50	8.5	5.2
55	7.9	5.5
60	7.3	5.7
65	6.8	5.8
70	6.2	5.7
75	6	5
80	5.8	3.7
85	5.7	2.8
90	5.6	2.6
95	5.6	1.2

Lake: Cass Lake (Oakland Co.) 8/10/2023

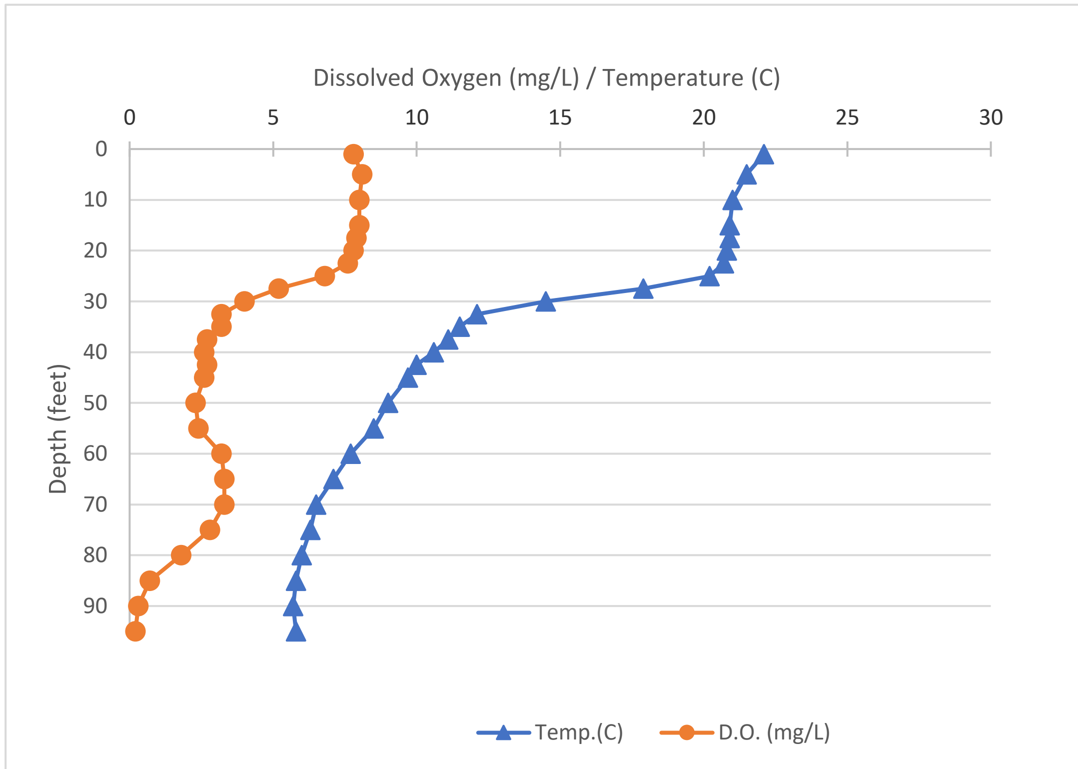


Name: Cass Lake
County: Oakland
Site ID: 630542
Date: 8/31/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	22.1	7.8
5	21.5	8.1
10	21	8
15	20.9	8
17.5	20.9	7.9
20	20.8	7.8
22.5	20.7	7.6
25	20.2	6.8
27.5	17.9	5.2
30	14.5	4
32.5	12.1	3.2
35	11.5	3.2
37.5	11.1	2.7
40	10.6	2.6
42.5	10	2.7
45	9.7	2.6
50	9	2.3
55	8.5	2.4
60	7.7	3.2
65	7.1	3.3
70	6.5	3.3
75	6.3	2.8
80	6	1.8
85	5.8	0.7
90	5.7	0.3
95	5.8	0.2

Lake: Cass Lake (Oakland Co.) 8/31/2023



Name: Cass Lake
County: Oakland
Site ID: 630542
Date: 9/15/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	21.1	8.5
5	21	8.5
10	20.7	8.6
15	20.5	8.4
17.5	20.4	8.1
20	20.3	8.1
22.5	20	7.9
25	19.7	7
27.5	18.7	5.3
30	15.2	2.7
32.5	13.7	1.9
35	11.8	1.6
37.5	11	1.3
40	10.3	1.1
42.5	9.9	0.8
45	9.5	0.9
50	8.8	1
55	8.1	1.8
60	7.5	2.3
65	7	2.6
70	6.5	2.4
75	6.2	1.6
80	6	0.7
85	5.8	0.2
90	5.8	0.1
95	5.7	0.1

Lake: Cass Lake (Oakland Co.) 9/15/2023