Cooperative Lakes Monitoring Program

Michigan Lakes– Ours to Protect

2022 Data Report
for

Star Lake, Manistee County

Site ID: 510280

44.2137°N, 85.9808°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

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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

Star Lake, Manistee County
2022 CLMP Results

Cooperative Lakes Monitoring Program

Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2022	9	5.0	9.0	7.7	1.1	< 48
2022 All CLMP Lakes	2817	1.0	50.0	12.7	2.9	42

The lake is too shallow to use secchi disk as a proper measure of trophic status.

Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2022	5	<1.0	22.0	5.4	8.4	47
2022 All CLMP Lakes	687	< 1.0	43.0	3.7	5.3	43

No graph: Not enough data

Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2022	1	11.0	11.0	11.0	NA
2022 All CLMP Lakes	220	<5	220.0	20.7	21.3

No graph: Not enough data

Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2022	1	9.0	9.0	9.0	NA	36
2022 All CLMP Lakes	234	<= 3	150.0	17.4	15.3	45

No graph: Not enough data

Dissolved Oxygen and Temperature Profile
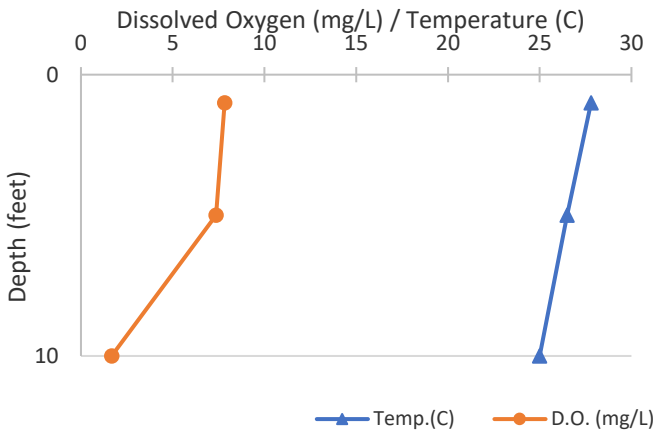
8/12/2022

Summary

Average TSI	2022
Star Lake	41
All CLMP Lakes	44

With an average TSI score of 41 based on 2022 summer total phosphorus and chlorophyll data, this lake is rated as a mesotrophic lake.

Due to its low depth, the lake is able to maintain dissolved oxygen throughout most of the water column for the entire summer. Oxygen gets low at the very bottom of the lake, but there isn't enough depth for a thermocline to properly develop.

Welcome to the CLMP! The longer you stay in the program and the more parameters you monitor, the more interesting this report will become. Once you have eight years of data there will be enough history to analyze the long-term trend.

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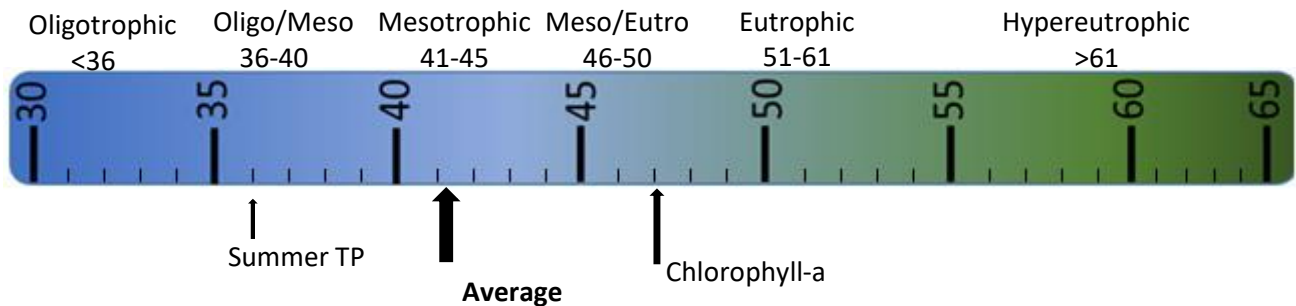
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

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 Star Lake in 2022	
Average	44
Secchi Disk	
Summer TP	36
Chlorophyll-a	47

Oligotrophic <36	Oligo/Meso 36-40	Mesotrophic 41-45	Meso/Eutro 46-50	Eutrophic 51-61	Hypereutrophic >61

Summer TP

Average

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.

Star Lake, Manistee County
2022 Exotic Aquatic Plant Watch Results

Cooperative Lakes
Monitoring Program

The Exotic Aquatic Plant Watch was conducted on Star Lake in 2022.

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 five 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 2022 Exotic Aquatic Plant Watch on Star Lake.

Star Lake, Manistee County

2022 Exotic Aquatic Plant Watch Results

Survey Date(s): August 12

Species	Status	Comments
Eurasian watermilfoil	not found	No invasive plants found in the 4 areas surveyed. No photos submitted for confirmation.
Starry stonewort	not found	
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.

Star Lake, Manistee County
2022 Score the Shore Results

Cooperative Lakes Monitoring Program

The Score the Shore Habitat Assessment was conducted on Star Lake in 2022.

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?
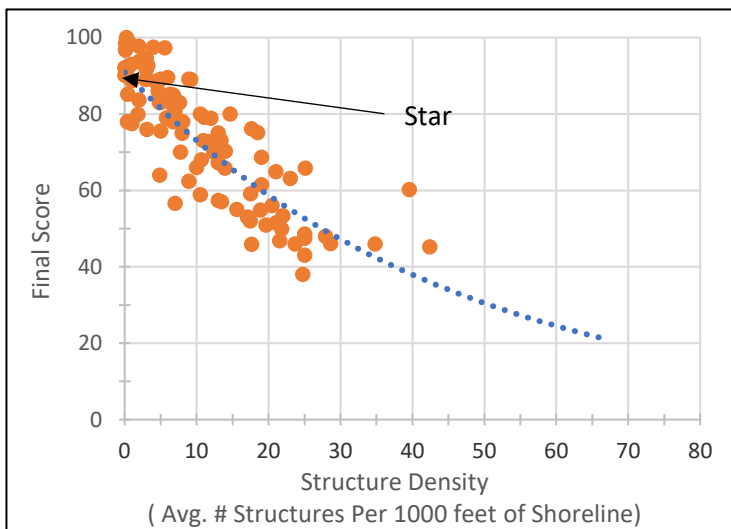
[Star	
Number of Sections:	1
Number of Structures:	1
Structure Density:	1
Final Score:	88.7

All 95 Participating Lakes from 2015-2022:	
Avg. Number of Sections:	16
Avg. Number of Structures:	228
Avg. Structure Density:	12
Avg. Final Score:	73

Note about graph to the left: The dotted line sets your average expectation of the score of your lake. If your lake is lower than the dotted line, then your shoreline health is lower than average compared to *lakes with similar amount of shoreline development*. And vice-versa in regards to a lake above the dotted line.

Analysis specific to Star Lake:

Star Lake is very small, with only 1 section of shoreline, and this makes it unique and not very suited for comparison to other lakes. Based on the Score the Shore data, Star is a healthy lake, rated as Good, with few problems. There are no sea walls or erosive areas on the shoreline, and the riparian zone is primarily unmowed and natural.

With a score of 75, the littoral zone is the weakest part of the habitat. Lake managers could put woody debris in the shallows to provide larger habitat options for birds, fish, reptiles, and amphibians. Based on the scoring, the amount of herbaceous vegetation seems sufficient.

There is not much room for improvement in the lakeshore habitat. Maintaining and preserving the habitat of Star Lake is probably the most important thing residents or managers can do.
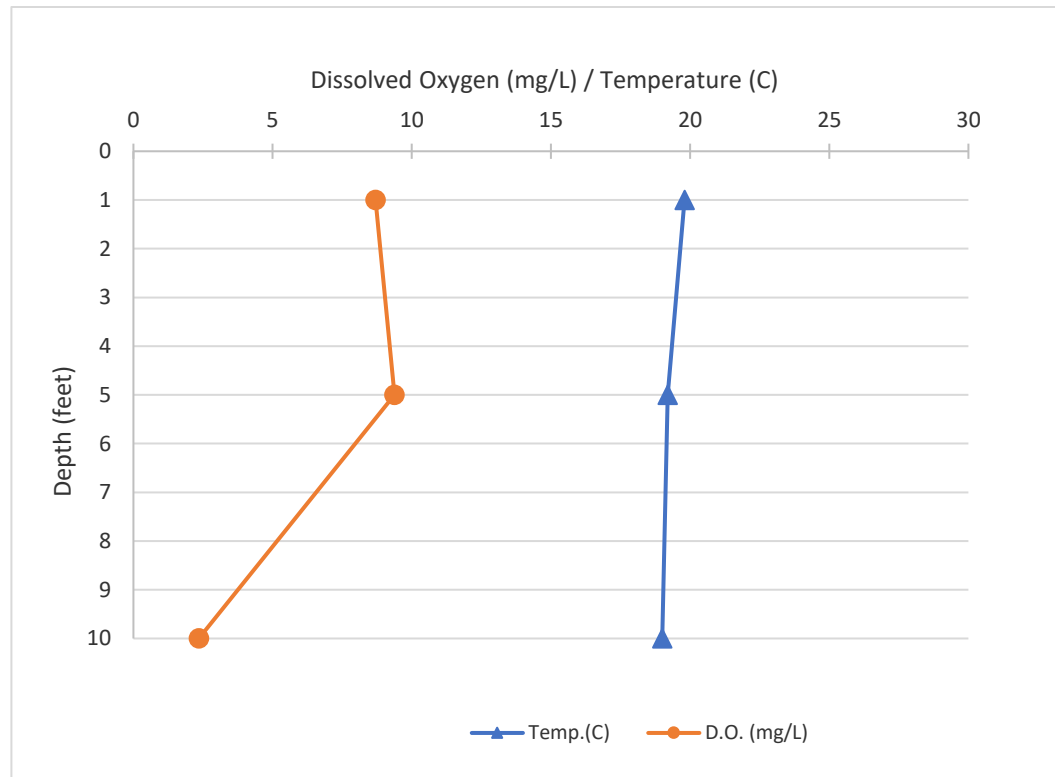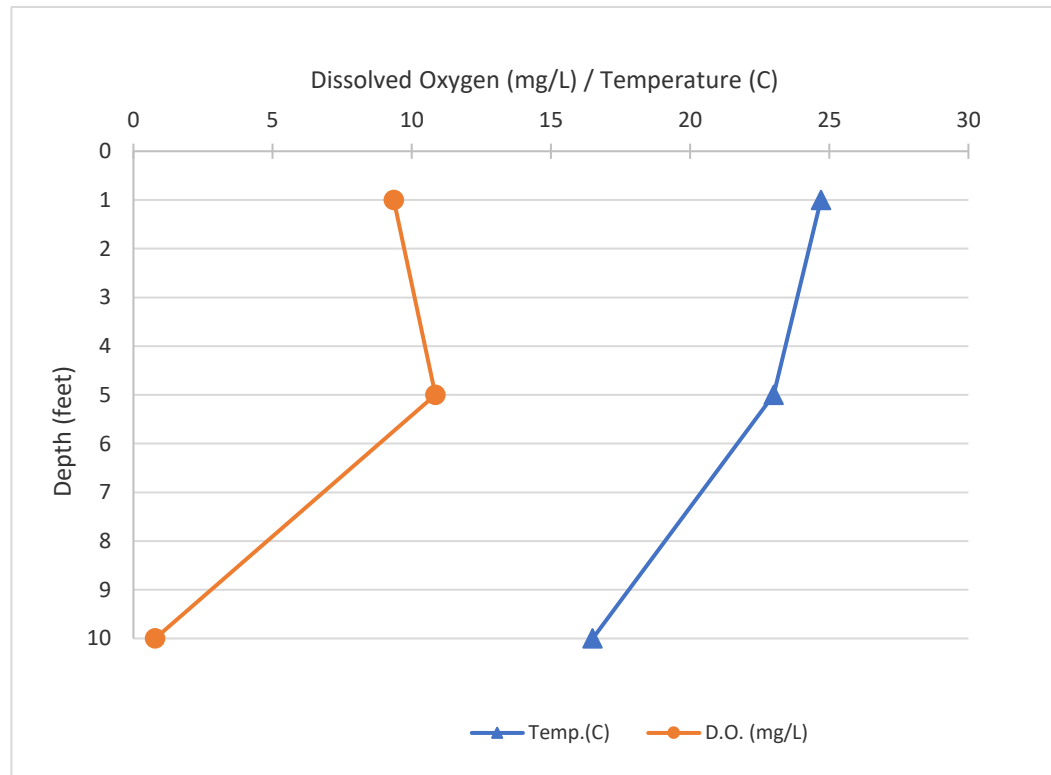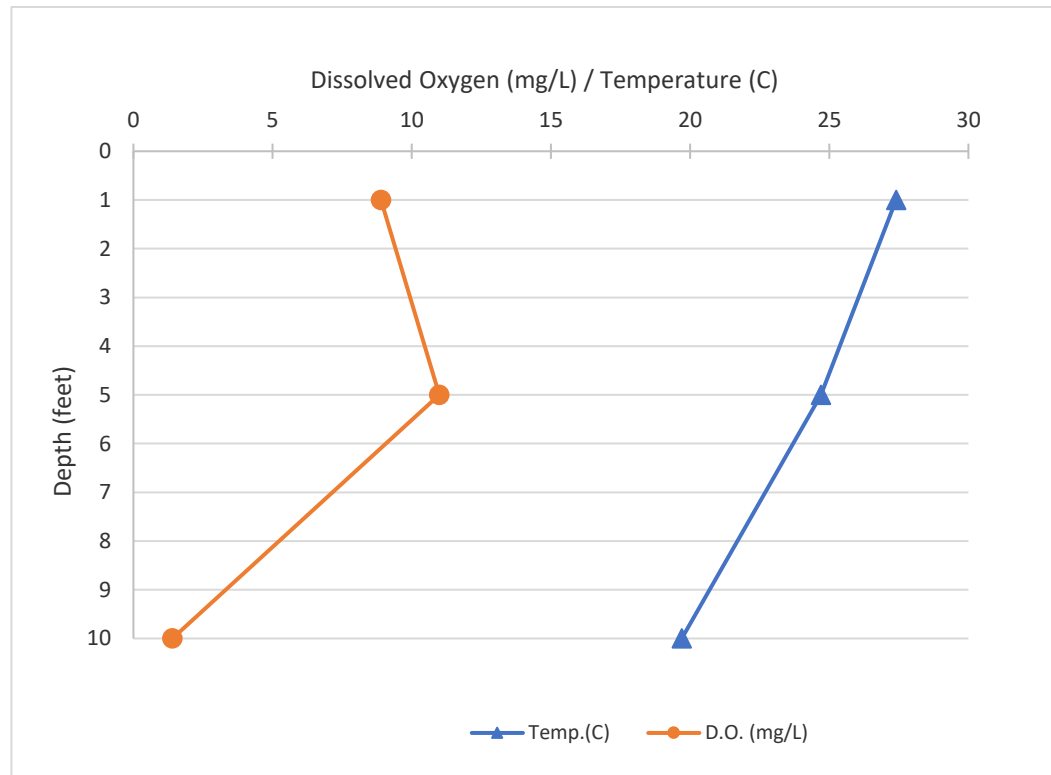
Name: Star Lake
County: Manistee
Site ID: 510280
Date: 5/20/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	19.8	8.7
5	19.2	9.38
10	19	2.35

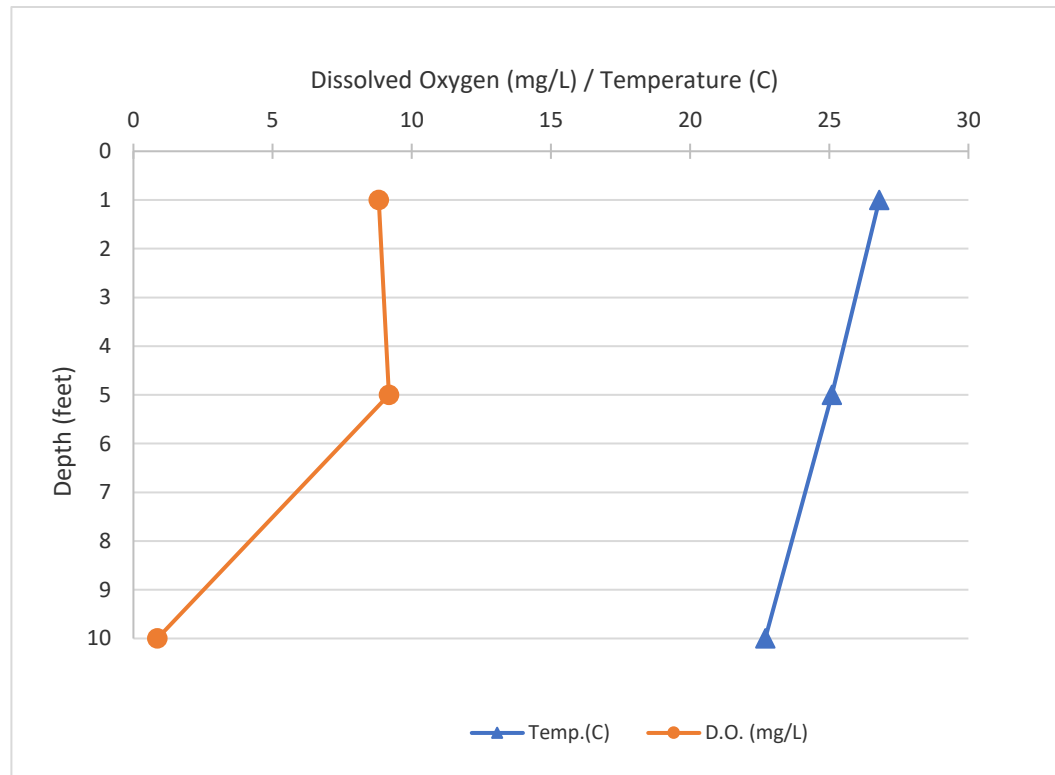**Lake: Star Lake (Manistee Co.)**   **5/20/2022**

Name: Star Lake
County: Manistee
Site ID: 510280
Date: 6/2/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24.7	9.35
5	23	10.85
10	16.5	0.78

Lake: Star Lake (Manistee Co.)   **6/2/2022**

Name: Star Lake
County: Manistee
Site ID: 510280
Date: 6/16/2022

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	27.4	8.9
5	24.7	10.99
10	19.7	1.4

Dissolved Oxygen and Temperature Profile

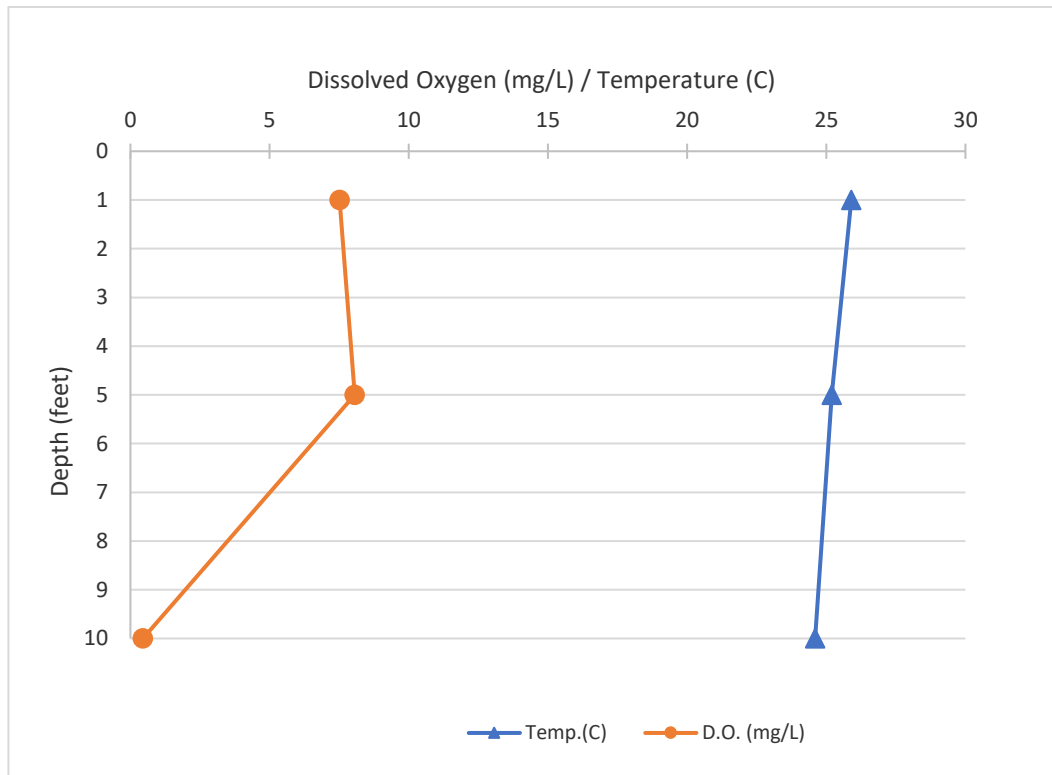**Lake: Star Lake (Manistee Co.)**   **6/16/2022**

Name: Star Lake
County: Manistee
Site ID: 510280
Date: 6/26/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26.8	8.81
5	25.1	9.18
10	22.7	0.86

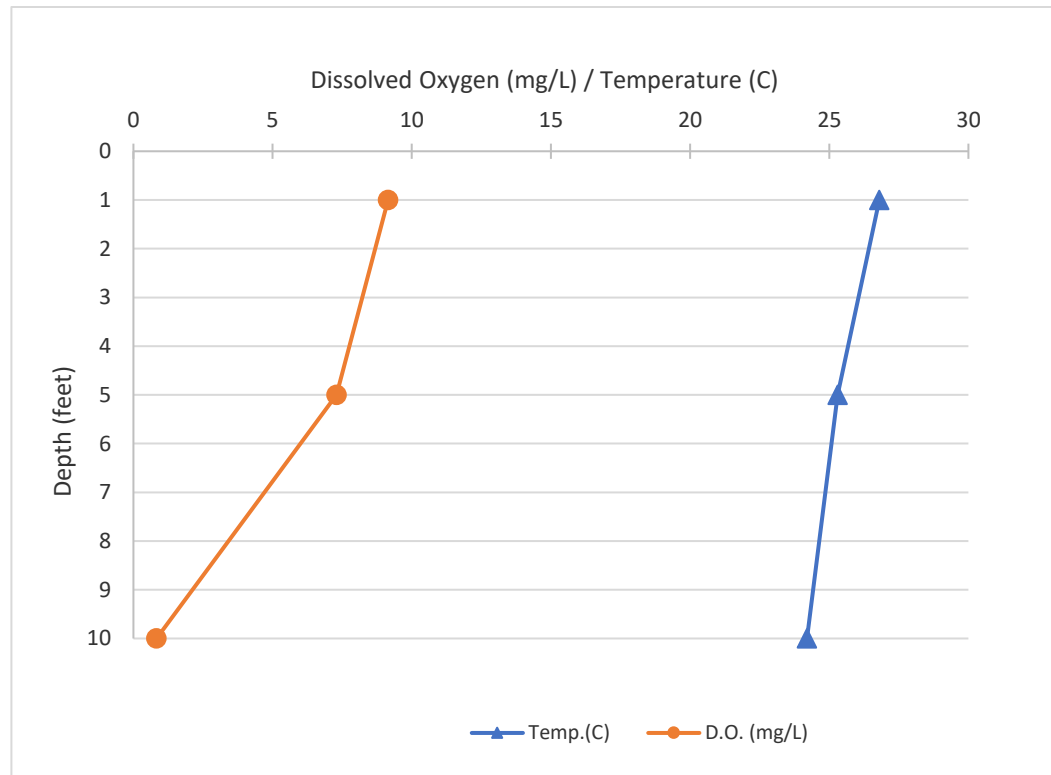**Lake: Star Lake (Manistee Co.)   6/26/2022**

Name: Star Lake
County: Manistee
Site ID: 510280
Date: 7/11/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	25.9	7.51
5	25.2	8.06
10	24.6	0.45

Lake: Star Lake (Manistee Co.)   **7/11/2022**

Name: Star Lake
County: Manistee
Site ID: 510280
Date: 7/24/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26.8	9.15
5	25.3	7.3
10	24.2	0.83

Lake: Star Lake (Manistee Co.)   **7/24/2022**
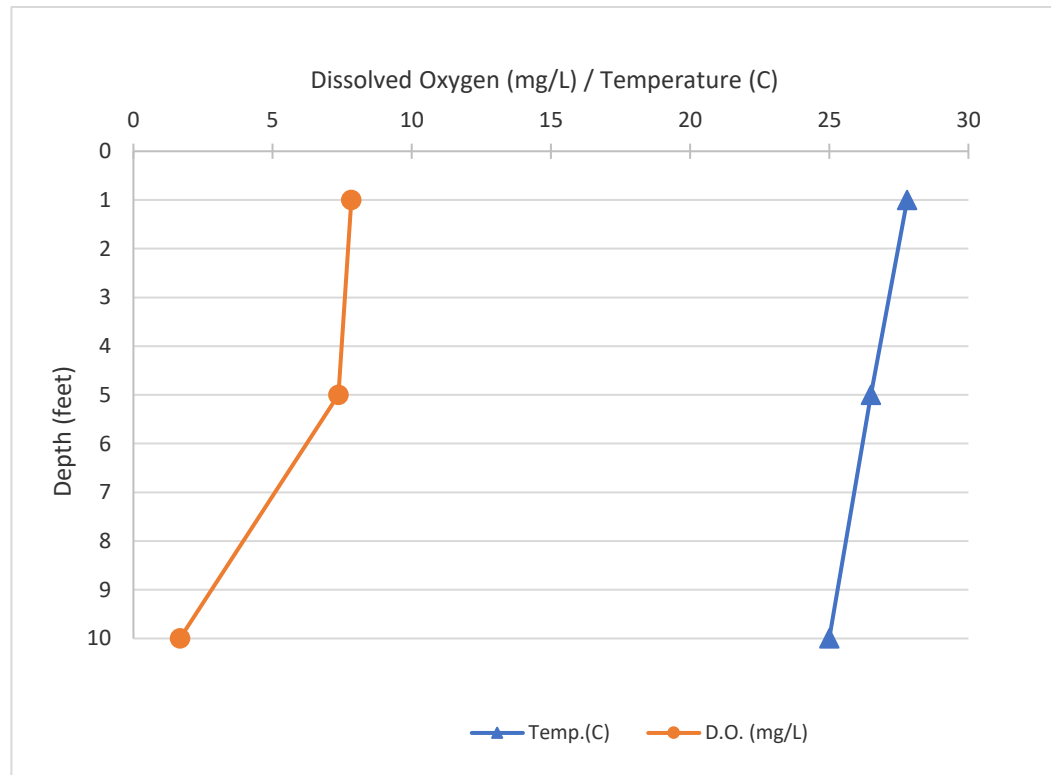
Name: Star Lake
County: Manistee
Site ID: 510280
Date: 8/12/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	27.8	7.83
5	26.5	7.37
10	25	1.67

Lake: Star Lake (Manistee Co.)   **8/12/2022**
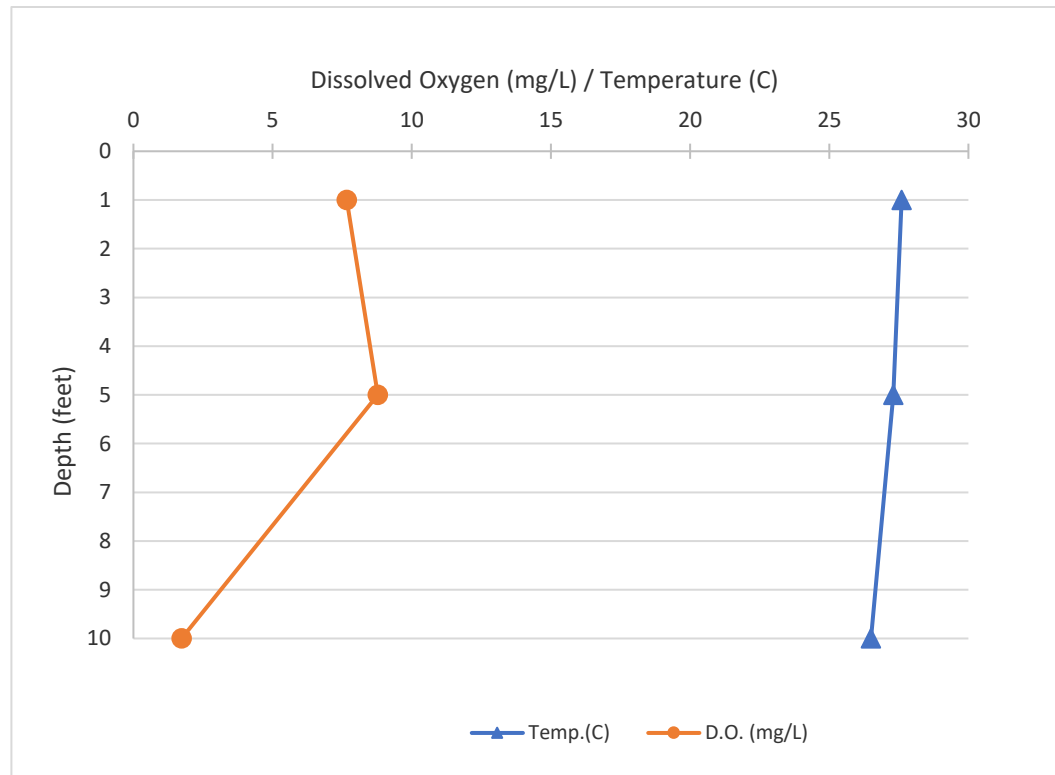
Name: Star Lake
County: Manistee
Site ID: 510280
Date: 9/2/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	27.6	7.67
5	27.3	8.78
10	26.5	1.73

Lake: Star Lake (Manistee Co.)   **9/2/2022**

Name: Star Lake
County: Manistee
Site ID: 510280
Date: 9/12/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	22.7	9
5	22.5	9.4
10	22.6	0.9

Lake: Star Lake (Manistee Co.)   **9/12/2022**