Cooperative Lakes Monitoring Program

Michigan Lakes– Ours to Protect

2021 Data Report for Diamond Lake, Osceola County

Site ID: 670066

44.08598°N, 85.4854°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: 670066

Diamond Lake, Osceola County
2021 CLMP Results

Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Avg	Std. Dev	Carlson TSI
2021	8	11.5	18.5	15.3	2.2	38
2021 All CLMP Lakes	2817	1.0	50.0	12.7	2.9	42

No graph: Not enough data

Chlorophyll-a (parts per billion)

Diamond Lake does not have Chlorophyll-a data available. Consider enrolling in this parameter next year. Chlorophyll-a is the green photosynthetic pigment in the cells of plants. The amount of algae in a lake can be estimated by measuring the chlorophyll-a concentration in the water. As an algal productivity indicator, chlorophyll-a is used to determine the trophic status of a lake.

Spring Phosphorus (parts per billion)

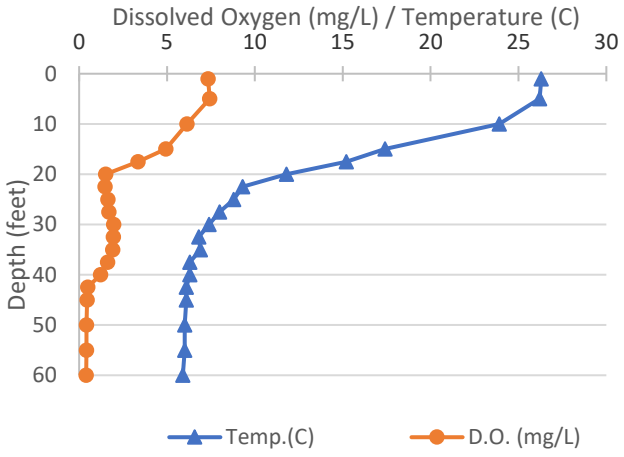
Diamond Lake does not have spring total phosphorus data available. Consider enrolling in this parameter next year. Phosphorus is one of several essential nutrients that algae need to grow and reproduce. An increase in phosphorus over time is a measure of nutrient enrichment in a lake. A surface water 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)

Diamond Lake does not have summer 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 summer (when many lakes are stratified) will be a representative sample for the upper layer of the lake, where most summer algal productivity occurs.

Dissolved Oxygen and Temperature Profile

8/13/2021



Summary

Average TSI	2021	2016-2020	1974-2015
Diamond Lake	38	NA	NA
All CLMP Lakes	42	40	43

With a TSI score of 38 based on 2021 Secchi transparency, this lake is rated between the oligotrophic and mesotrophic lake classification.

The lake keeps some dissolved oxygen in the bottom waters through early summer, but by late summer the lake has stratified and the bottom water is devoid of oxygen.

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.

** = No sample received W= Value is less than the detection limit (<3 ppb) T= Value reported is less than the reporting limit (5 ppb).*

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

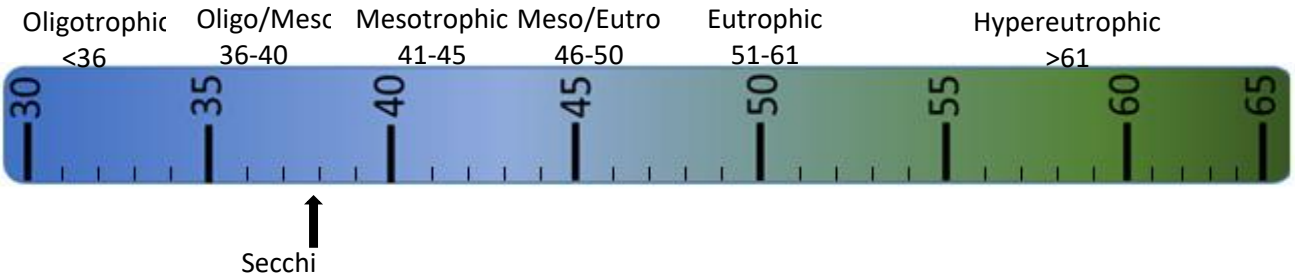
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

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 Diamond Lake in 2021	
Average	
Secchi Disk	38
Summer TP	
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.

Site ID: 670066

Diamond Lake, Osceola County
2021 Exotic Aquatic Plant Watch Results

The Exotic Aquatic Plant Watch was conducted on Diamond Lake in 2021.

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 2021 Exotic Aquatic Plant Watch.

Diamond Lake, Osceola County

2021 Exotic Aquatic Plant Watch Results

Survey Date(s): June 22, 28, 30; July 1, 9

Species	Status	Comments
Eurasian watermilfoil	FOUND	Found at 3 of 6 transects surveyed.
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.

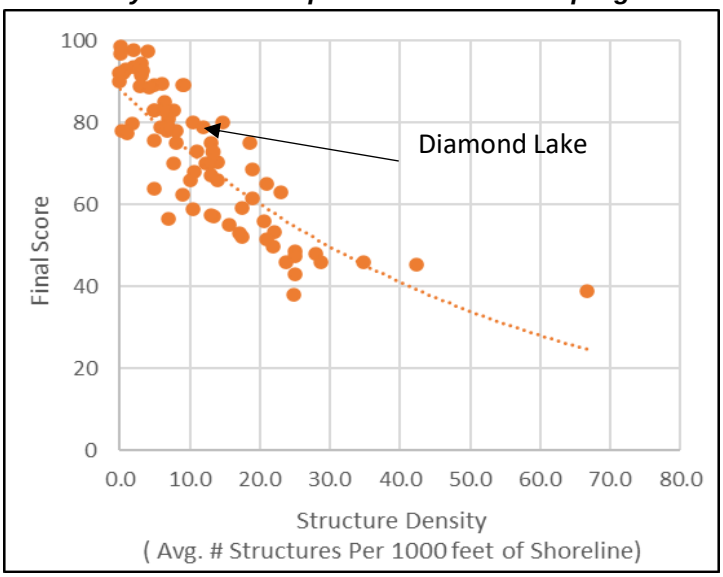
Site ID: 670066

Diamond Lake, Osceola County
2021 Score the Shore Results

The Score the Shore Habitat Assessment was conducted on Diamond Lake in 2021.

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?



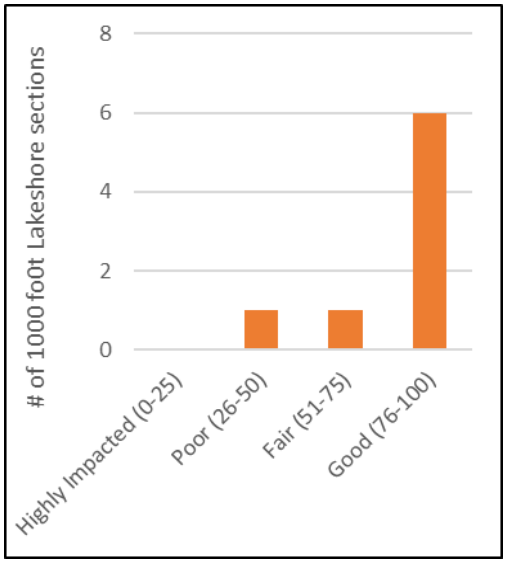
Diamond Lake:	
Number of Sections:	8
Number of Structures:	111
Structure Density:	13.8
Final Score:	78.6

All 78 Participating Lakes from 2015-2021:	
Avg. Number of Sections:	16
Avg. Number of Structures:	214
Avg. Structure Density:	12.2
Avg. Final Score:	72

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 Diamond Lake

Overall, the lakeshore habitat of Diamond Lake is doing well and scored higher than average when compared to other lakes in the program. Most of the 1000 foot sections scored either Good, and there was just one Fair and Poor section.



The lake sections scored highest for erosion control, with an average of 91, meaning that there are a low amount of sea walls, rock rip-rap, and other shoreline erosion structures, and no to few erosional areas of note.

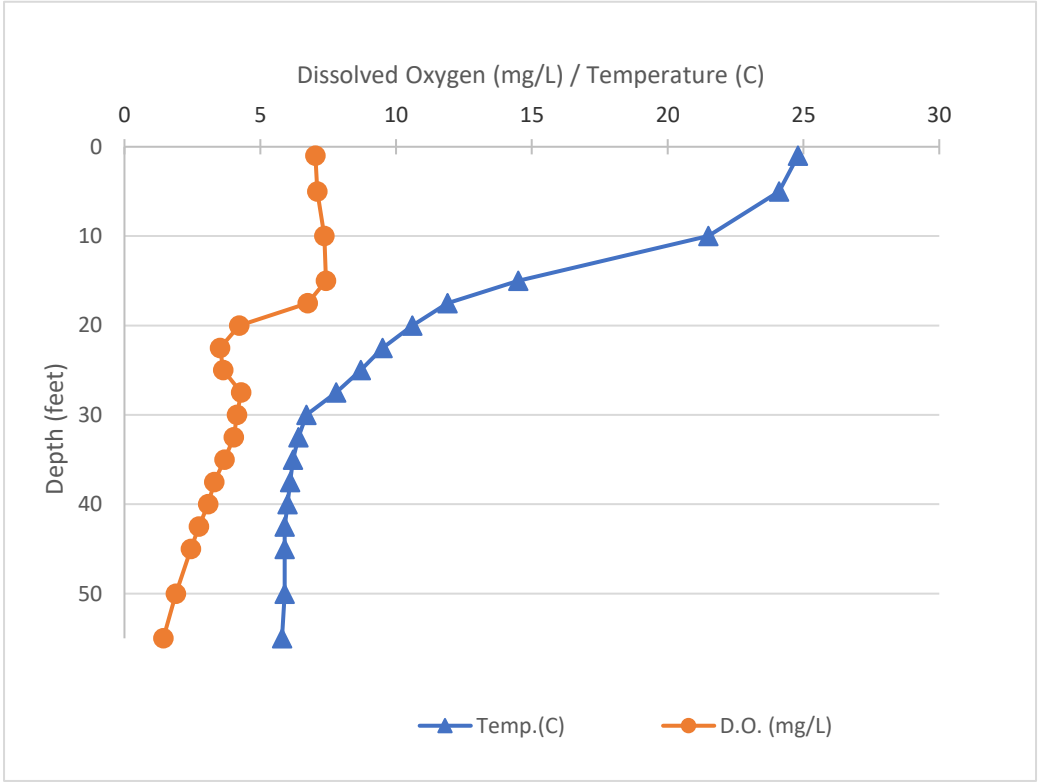
The riparian zone was the weak point in the score (scoring an average of 61). Reduce the amount of mowed grass and increase the amount of unmowed native vegetation along the lakeshore to boost this aspect of the shoreline habitat. Residents could also focus improvements on section 3; as the one section which score Poor, boosting the littoral and riparian habitat here would be the best way to improve the overall score for the lake. You can get plenty of ideas for improving shoreline health from the Michigan Natural Shoreline Partnership (https://www.mishorelinepartnership.org/).

Name: Diamond Lake
County: Osceola
Site ID: 670066
Date: 7/7/2021

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24.8	7.03
5	24.1	7.1
10	21.5	7.36
15	14.5	7.42
17.5	11.9	6.75
20	10.6	4.22
22.5	9.5	3.52
25	8.7	3.64
27.5	7.8	4.3
30	6.7	4.14
32.5	6.4	4.02
35	6.2	3.68
37.5	6.1	3.31
40	6	3.08
42.5	5.9	2.74
45	5.9	2.45
50	5.9	1.89
55	5.8	1.43

Lake: Diamond Lake (Osceola Co.) **7/7/2021**

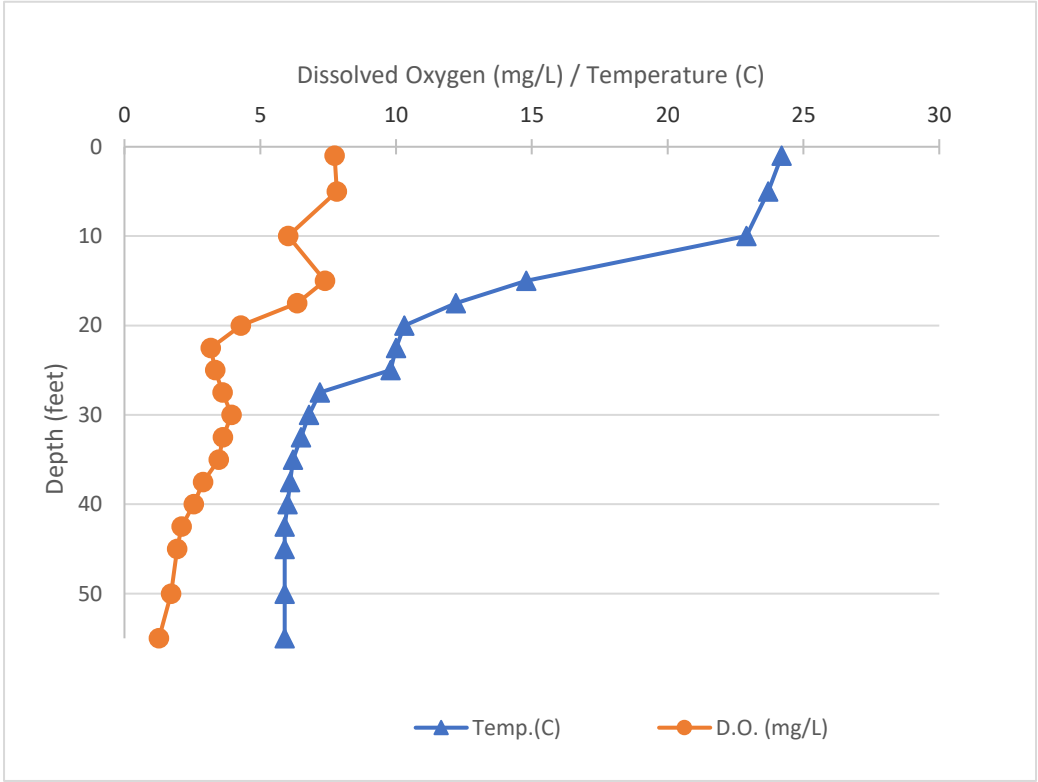


Name: Diamond Lake
County: Osceola
Site ID: 670066
Date: 7/16/2021

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24.2	7.74
5	23.7	7.82
10	22.9	6.03
15	14.8	7.38
17.5	12.2	6.36
20	10.3	4.28
22.5	10	3.18
25	9.8	3.34
27.5	7.2	3.61
30	6.8	3.94
32.5	6.5	3.62
35	6.2	3.47
37.5	6.1	2.9
40	6	2.55
42.5	5.9	2.1
45	5.9	1.94
50	5.9	1.72
55	5.9	1.27

Lake: Diamond Lake (Osceola Co.) **7/16/2021**

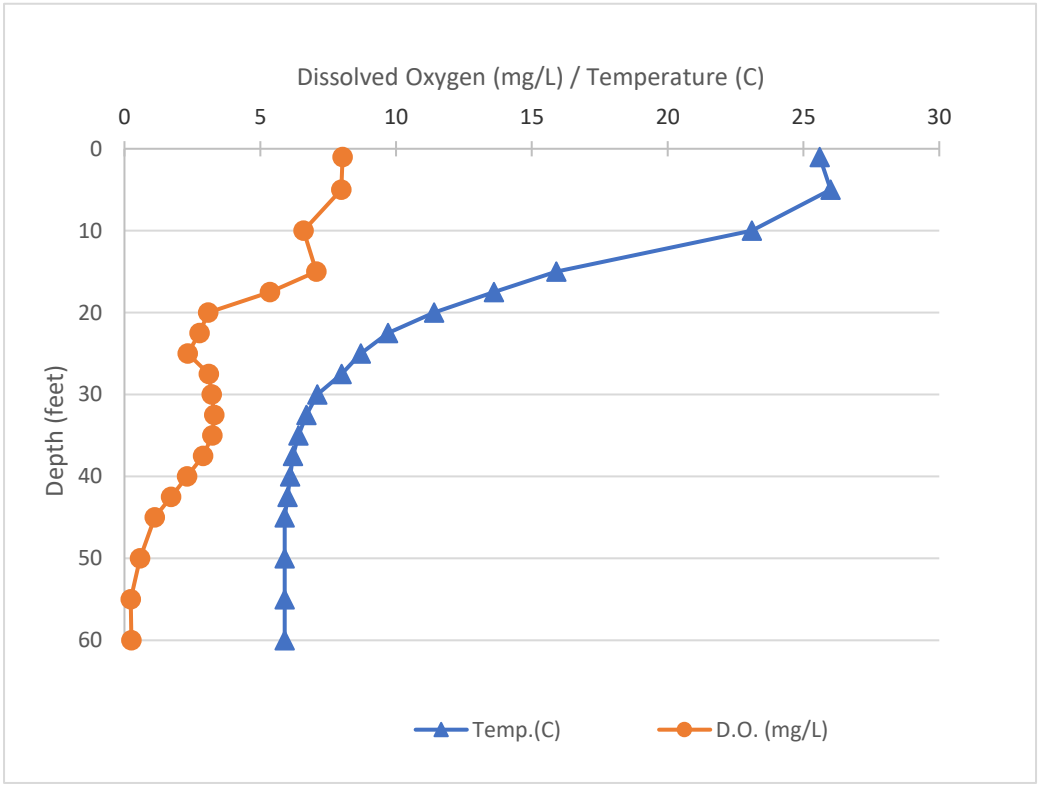


Name: Diamond Lake
County: Osceola
Site ID: 670066
Date: 7/25/2021

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	25.6	8.03
5	26	7.98
10	23.1	6.59
15	15.9	7.06
17.5	13.6	5.36
20	11.4	3.08
22.5	9.7	2.76
25	8.7	2.33
27.5	8	3.11
30	7.1	3.21
32.5	6.7	3.31
35	6.4	3.24
37.5	6.2	2.9
40	6.1	2.31
42.5	6	1.72
45	5.9	1.11
50	5.9	0.57
55	5.9	0.23
60	5.9	0.25

Lake: Diamond Lake (Osceola Co.) **7/25/2021**

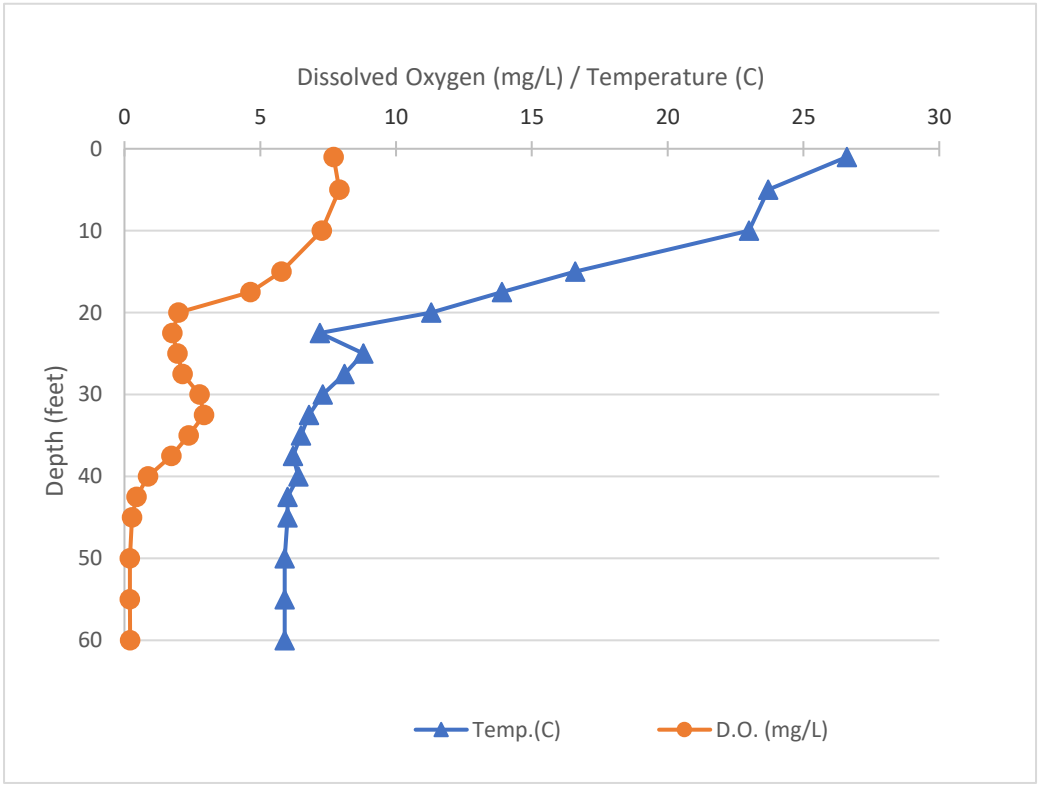


Name: Diamond Lake
County: Osceola
Site ID: 670066
Date: 8/4/2021

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26.6	7.7
5	23.7	7.91
10	23	7.26
15	16.6	5.78
17.5	13.9	4.64
20	11.3	1.99
22.5	7.2	1.76
25	8.8	1.95
27.5	8.1	2.14
30	7.3	2.77
32.5	6.8	2.93
35	6.5	2.36
37.5	6.2	1.73
40	6.4	0.87
42.5	6	0.44
45	6	0.28
50	5.9	0.2
55	5.9	0.2
60	5.9	0.21

Lake: Diamond Lake (Osceola Co.) **8/4/2021**

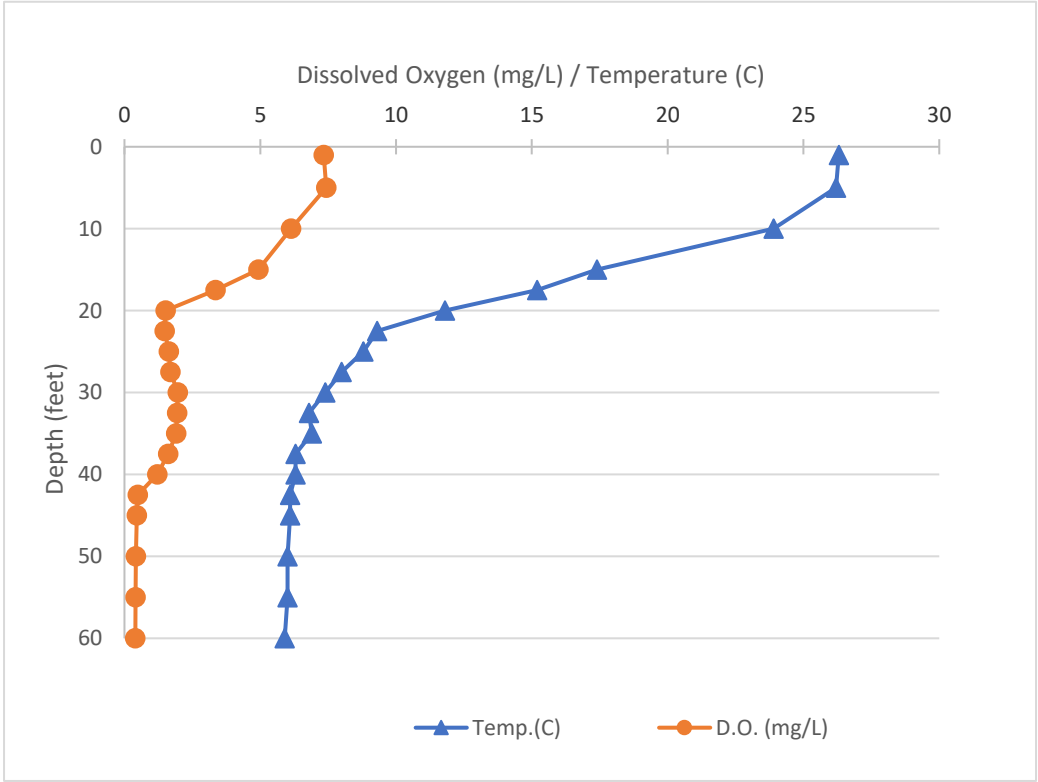


Name: Diamond Lake
County: Osceola
Site ID: 670066
Date: 8/13/2021

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26.3	7.34
5	26.2	7.43
10	23.9	6.14
15	17.4	4.93
17.5	15.2	3.35
20	11.8	1.51
22.5	9.3	1.48
25	8.8	1.63
27.5	8	1.69
30	7.4	1.96
32.5	6.8	1.94
35	6.9	1.91
37.5	6.3	1.61
40	6.3	1.21
42.5	6.1	0.49
45	6.1	0.46
50	6	0.42
55	6	0.41
60	5.9	0.4

Lake: Diamond Lake (Osceola Co.) **8/13/2021**



Name: Diamond Lake
County: Osceola
Site ID: 670066
Date: 8/21/2021

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	27.4	7.35
5	26.7	7.45
10	24.7	6.64
15	18.3	3.79
17.5	15.1	2.09
20	15.4	1.3
22.5	10.1	0.66
25	9.2	1
27.5	8.1	1.33
30	7.3	1.22
32.5	6.7	1.31
35	6.4	0.68
37.5	6.2	0.28
40	6.1	0.33
42.5	6.1	0.22
45	6	0.24
50	6	0.23
55	5.9	0.22
60	5.9	0.22

Lake: Diamond Lake (Osceola Co.) **8/21/2021**