



**2018 Data Report
for
Brush Lake, Newaygo County**

Site ID: 620338

43.63812°N, 85.68765°W

The CLMP is brought to you by:



Michigan Clean
Water Corps



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://cdn.cloud1.cemah.net/wp-content/uploads/sites/63/2018/03/CLMP_Manual_2018.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: Marcy Knoll Wilmes, Jean Roth, Jo Latimore, Paul Steen, Mike Gallagher, Laura Kaminski, and Erick Elgin

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), MiCorps Program Manager

Brush Lake, Newaygo County 2018 CLMP Results



Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2018	8	10.5	16.5	14.2	1.9	39
2018 All CLMP Lakes	2949	2.0	52.0	12.3	2.7	42

No graph: Not enough data

Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2018	5	1.3	11.0	4.2	4.0	45
2018 All CLMP Lakes	580	< 1.0	66.0	2.1	4.8	38

No graph: Not enough data

Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2018	1	14.0	14.0	14.0	NA
2018 All CLMP Lakes	193	<= 3	110.0	12.8	12.5

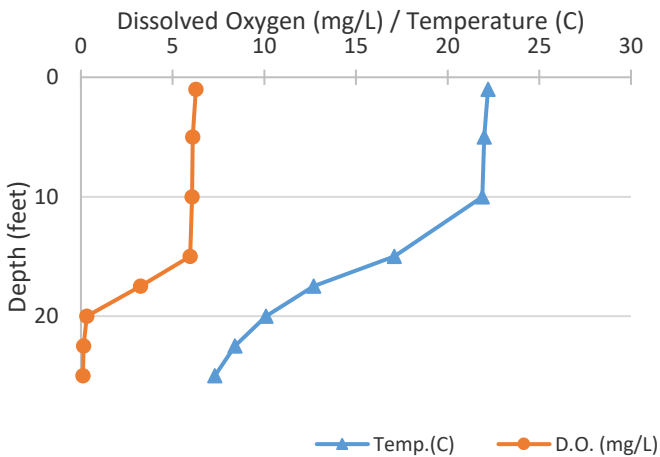
No graph: Not enough data

Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2018	1	9.0	9.0	9.0	NA	36
2018 All CLMP Lakes	248	<= 3	84.0	14.1	10.4	42

No graph: Not enough data

Dissolved Oxygen and Temperature Profile 8/31/2018



Summary

Average TSI	2018
Brush Lake	40
All CLMP Lakes	41

With an average TSI score of 40 based on 2018 Secchi transparency, chlorophyll-a, and summer total phosphorus data, this lake is rated between the oligotrophic and mesotrophic lake classification. The lake leans slightly more mesotrophic than oligotrophic.

The lake keeps some dissolved oxygen in the bottom waters through mid-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.

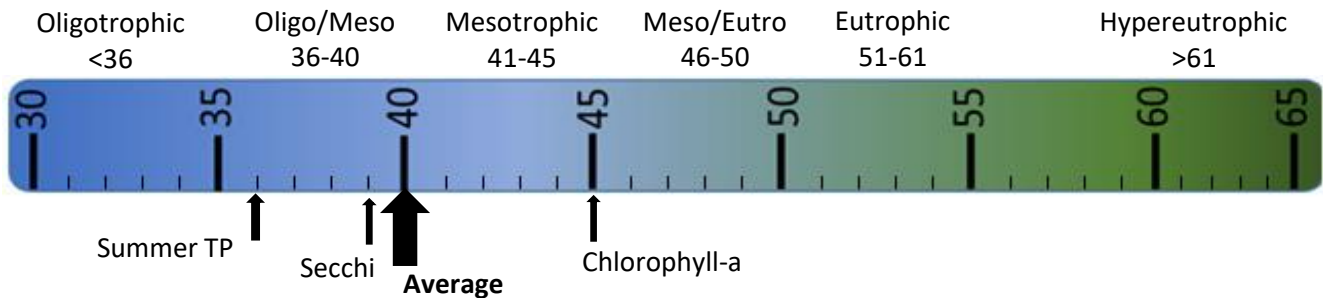
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual: https://cdn.cloud1.cemah.net/wp-content/uploads/sites/63/2018/03/CLMP_Manual_2018.pdf

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 Brush Lake in 2018	
Average	40
Secchi Disk	39
Summer TP	36
Chlorophyll-a	45



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.

Brush Lake, Newaygo County 2018 CLMP Aquatic Plant Results



The Aquatic Plant Identification and Mapping survey was conducted on Brush Lake in 2018.

This survey involves intensive sampling at multiple locations and depths around the lake produce a complete map of all aquatic plants present in a lake. A great deal of effort is involved both on the lake and back on shore to identify plants, compile data, and develop a detailed plant map, but the result is an extremely valuable record of the plant community of the lake.

Aquatic plants were sampled from a total of 7 transects (21 sites) in Brush Lake in 2018. Below is a list of species reported in order of relative abundance. Survey conducted July 24, 2018.

Brush Lake, Newaygo County		
2018 Aquatic Plant Identification and Mapping: Species Reported		
<u>Common Name</u>	<u>Latin name</u>	<u>Average Density*</u>
Bladderwort	<i>Utricularia</i> sp.	3.1
White water lily	<i>Nymphaea odorata</i>	2.5
Watershield	<i>Brasenia schreberi</i>	2.3
Bulrushes		2.0
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	1.9
Coontail	<i>Ceratophyllum demersum</i>	1.4
Flat-stem pondweed	<i>Potamogeton zosteriformis</i>	1.0
Yellow water lily	<i>Nuphar</i> sp.	0.3
Native milfoil	<i>Myriophyllum</i> sp.	0.3
Arrowhead	<i>Sagittaria</i> sp.	0.2
Waterweed	<i>Elodea canadensis</i>	0.1
Illinois pondweed	<i>Potamogeton illinoensis</i>	0.1

*Lakewide. Scale: 0 (absent) - 5 (dense)

Visit the MiCorps Data Exchange (www.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.

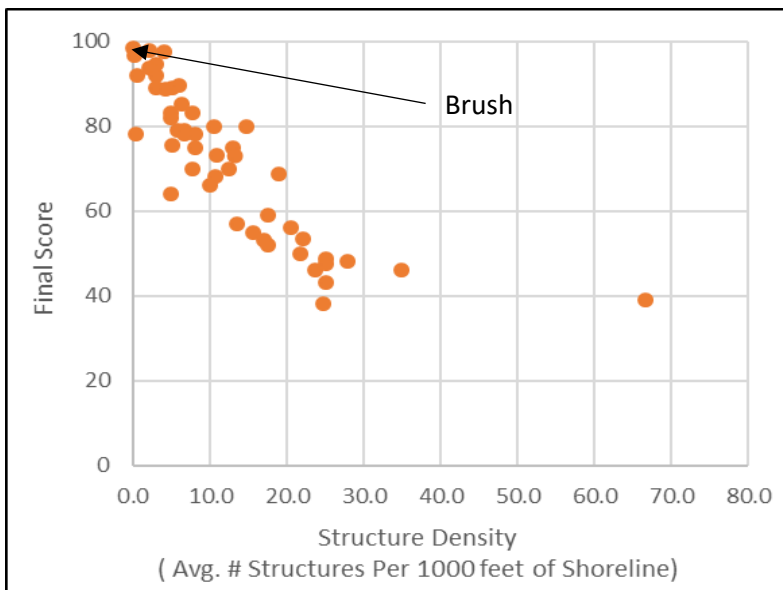
Brush Lake, Newaygo County 2018 Score the Shore Results



The Score the Shore Habitat Assessment was conducted on Brush Lake in 2018.

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?

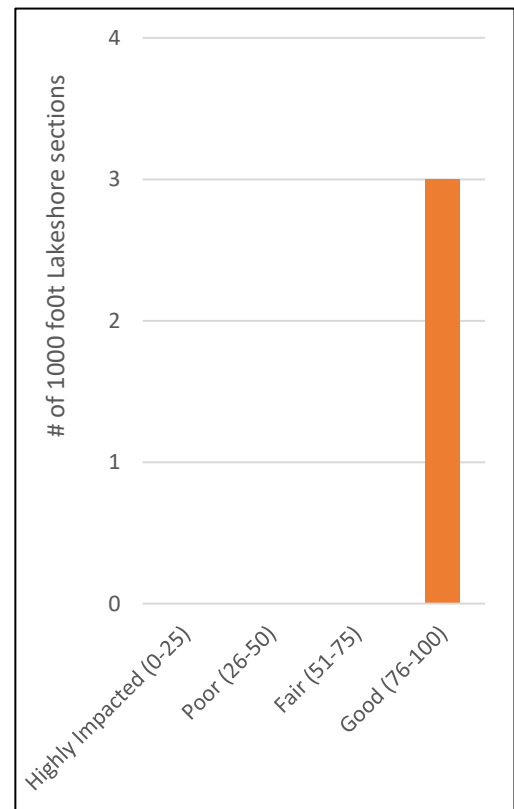


Brush Lake:	
Number of Sections:	3
Number of Structures:	0
Structure Density:	0
Final Score:	98.5

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

Analysis specific to Brush Lake:

Brush Lake has the highest rated lakeshore habitat off all the lakes enrolled in the program since 2015, with a score of 98.5. The lakeshore is virtually pristine; in fact based on the scoring rubrick, the only reason the lake did not score a perfect 100 was that there was not as much downed trees near the lakeshore as possible. Still, as it is unlikely that the trees are being manually removed, this is a variation that likely naturally changes over time.



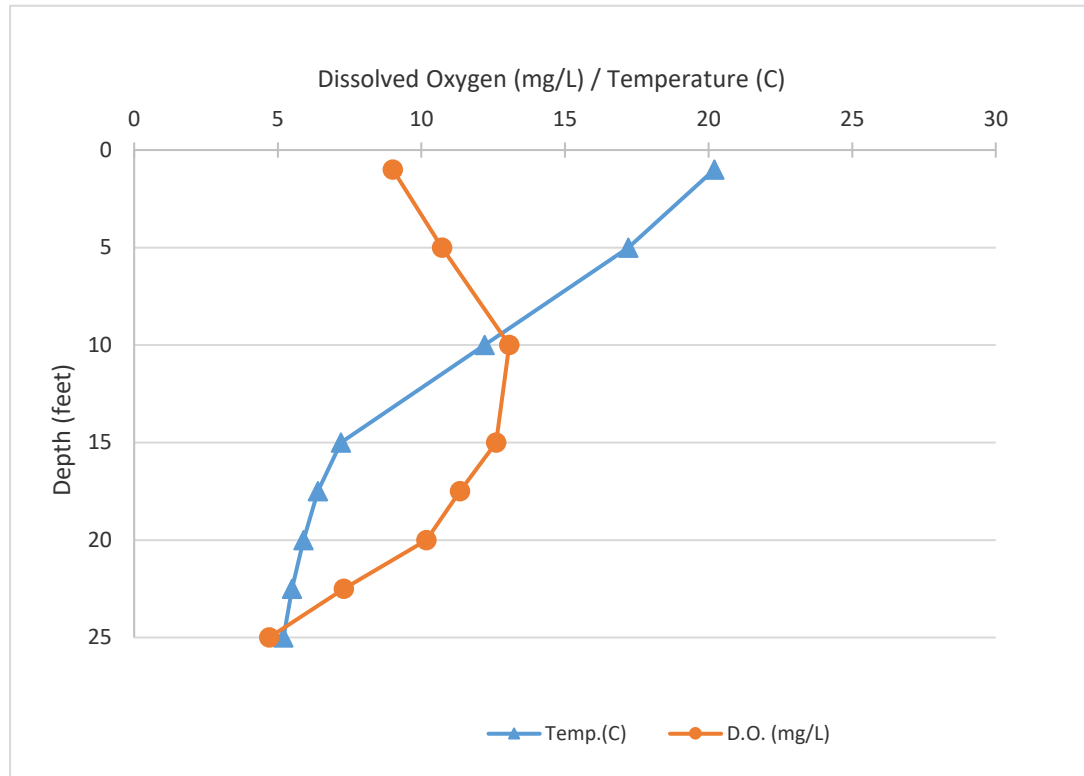
Name: Brush Lake
County: Newaygo
Site ID: 620338
Date: 5/17/2018

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	20.2	9
5	17.2	10.72
10	12.2	13.06
15	7.2	12.6
17.5	6.4	11.35
20	5.9	10.18
22.5	5.5	7.3
25	5.2	4.7

Lake: Brush Lake (Newaygo Co.)

5/17/2018



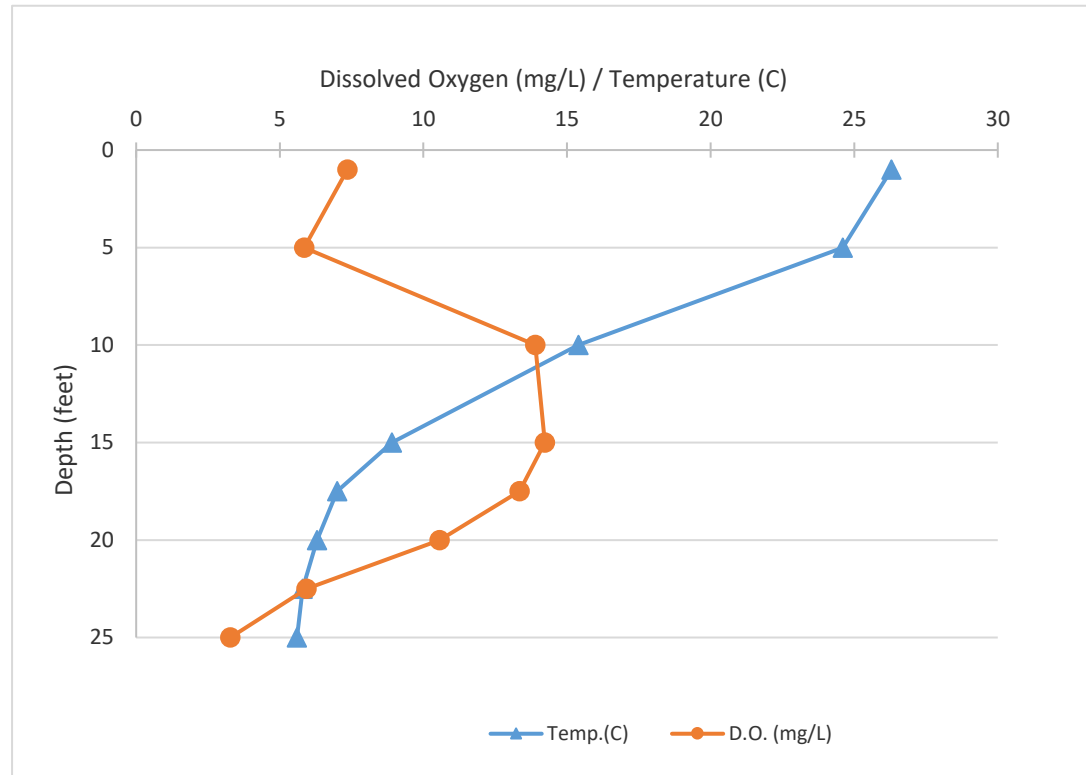
Name: Brush Lake
County: Newaygo
Site ID: 620338
Date: 6/1/2018

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26.3	7.36
5	24.6	5.85
10	15.4	13.9
15	8.9	14.23
17.5	7	13.35
20	6.3	10.56
22.5	5.8	5.93
25	5.6	3.28

Lake: Brush Lake (Newaygo Co.)

6/1/2018



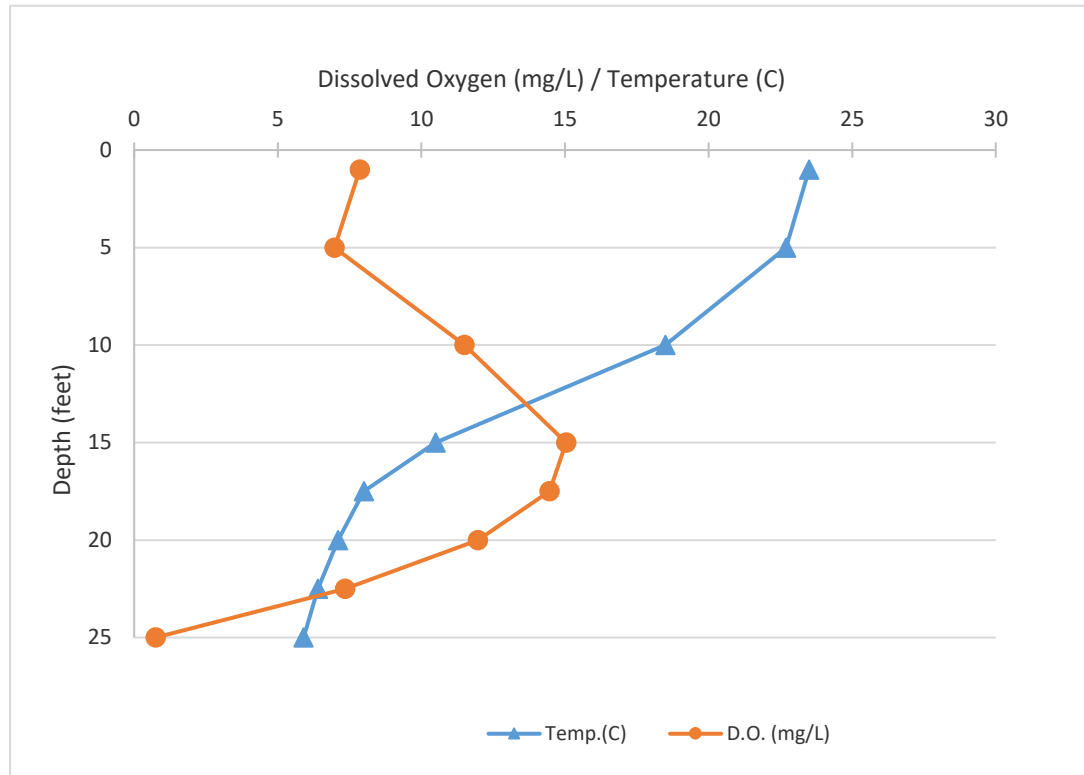
Name: Brush Lake
County: Newaygo
Site ID: 620338
Date: 6/14/2018

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23.5	7.86
5	22.7	6.98
10	18.5	11.5
15	10.5	15.04
17.5	8	14.46
20	7.1	11.97
22.5	6.4	7.34
25	5.9	0.75

Lake: Brush Lake (Newaygo Co.)

6/14/2018



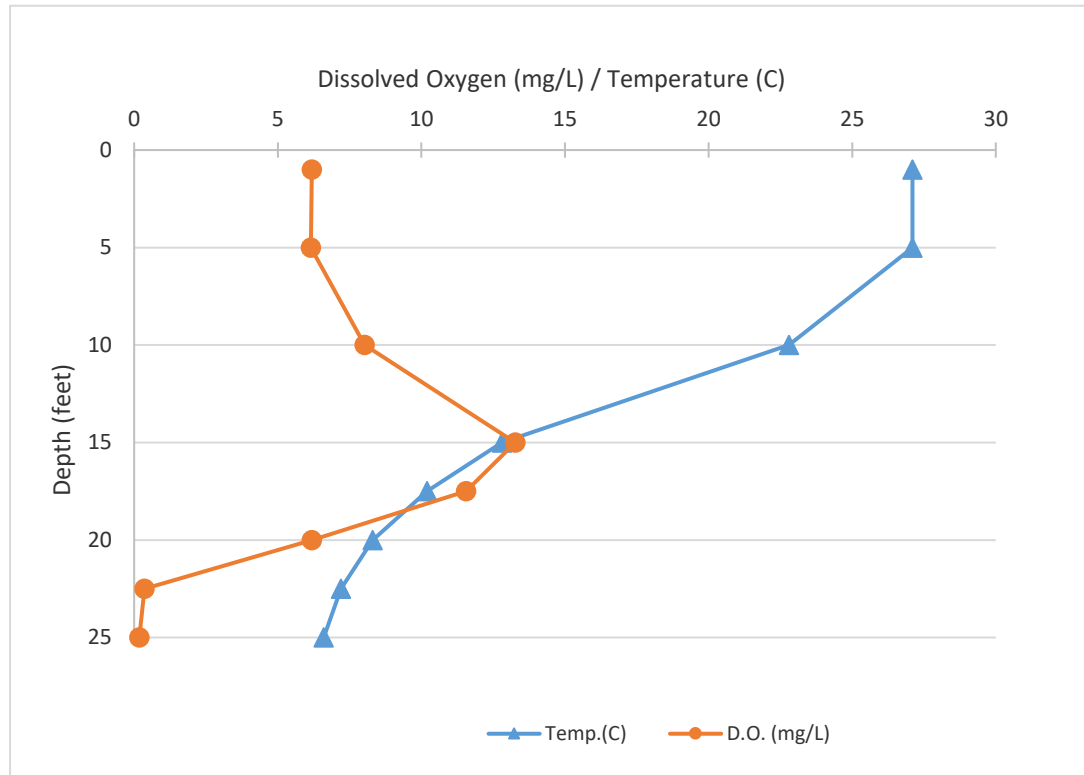
Name: Brush Lake
County: Newaygo
Site ID: 620338
Date: 7/17/2018

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	27.1	6.19
5	27.1	6.15
10	22.8	8.03
15	12.8	13.27
17.5	10.2	11.56
20	8.3	6.19
22.5	7.2	0.36
25	6.6	0.18

Lake: Brush Lake (Newaygo Co.)

7/17/2018



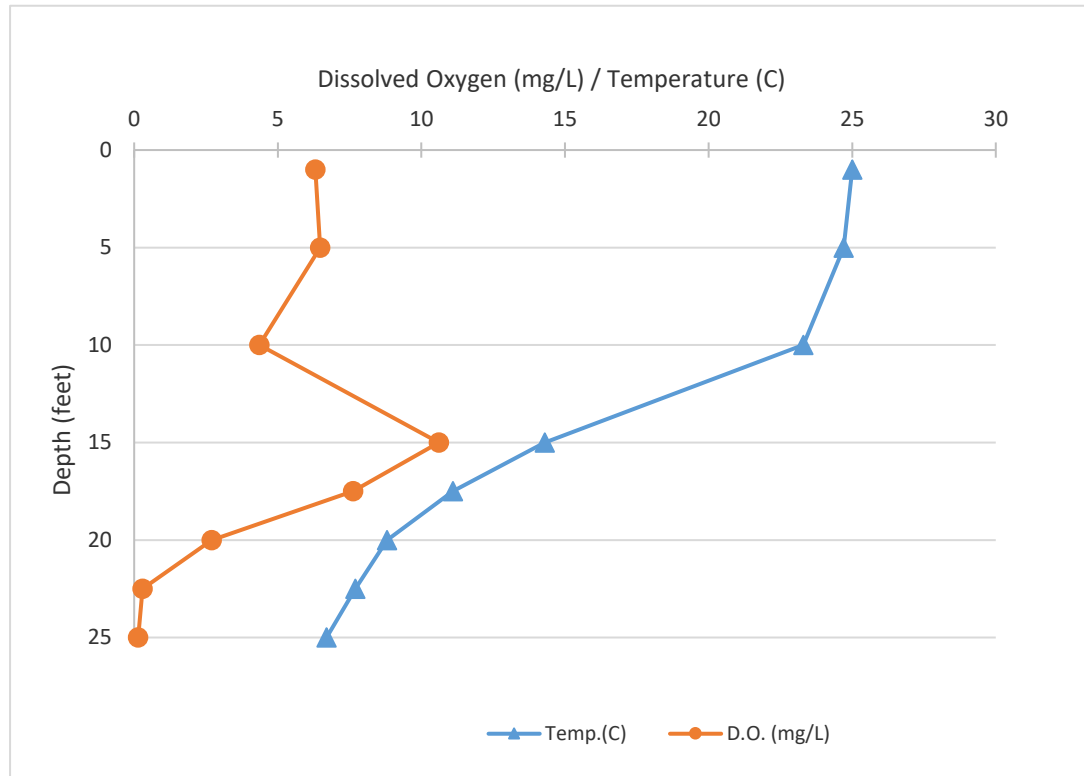
Name: Brush Lake
County: Newaygo
Site ID: 620338
Date: 8/3/2018

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	25	6.31
5	24.7	6.48
10	23.3	4.36
15	14.3	10.61
17.5	11.1	7.62
20	8.8	2.7
22.5	7.7	0.29
25	6.7	0.14

Lake: Brush Lake (Newaygo Co.)

8/3/2018



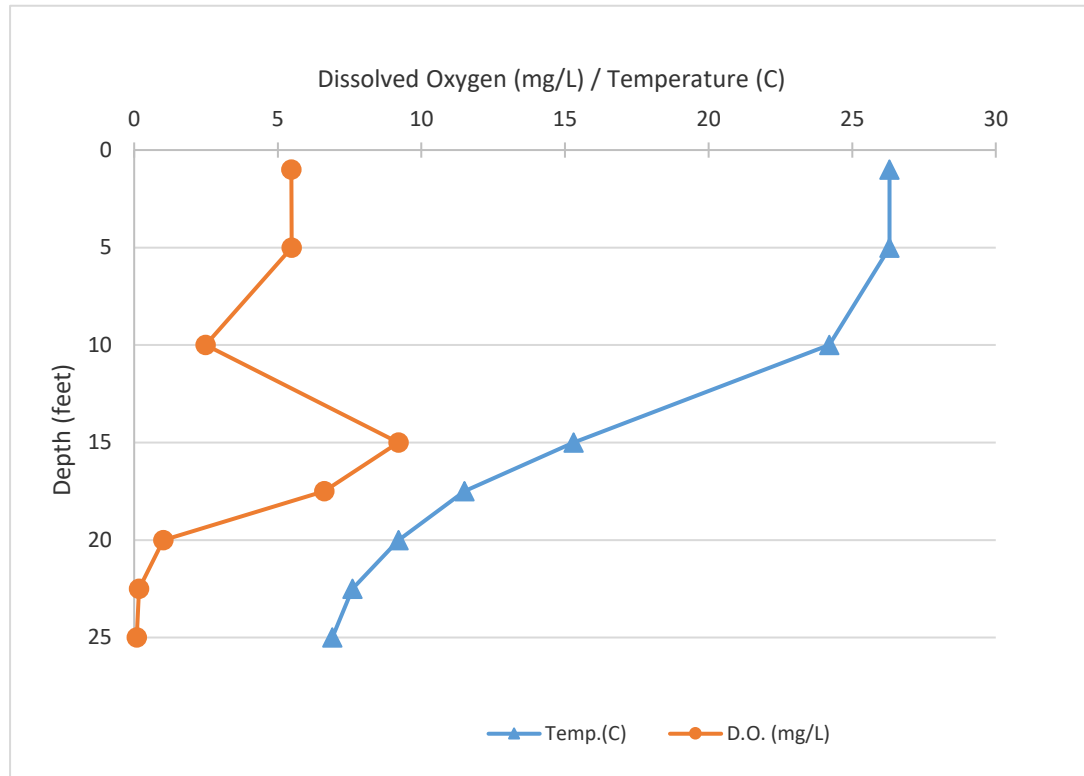
Name: Brush Lake
County: Newaygo
Site ID: 620338
Date: 8/17/2018

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26.3	5.47
5	26.3	5.48
10	24.2	2.49
15	15.3	9.2
17.5	11.5	6.62
20	9.2	1.02
22.5	7.6	0.17
25	6.9	0.09

Lake: Brush Lake (Newaygo Co.)

8/17/2018



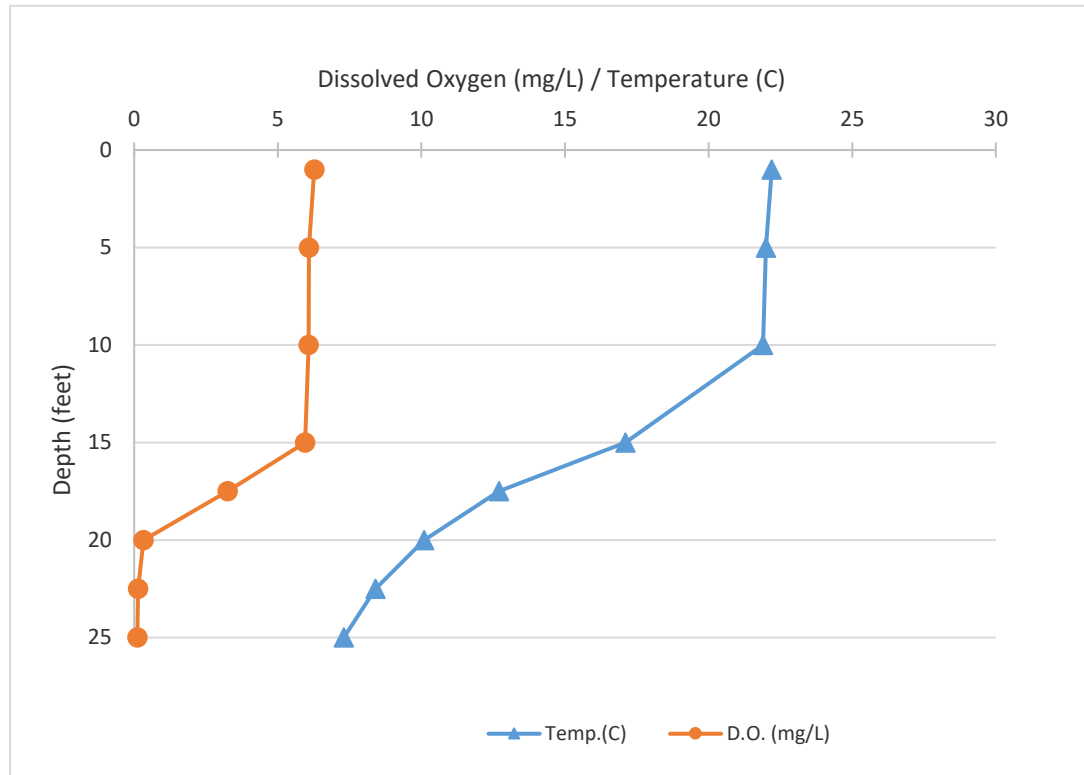
Name: Brush Lake
County: Newaygo
Site ID: 620338
Date: 8/31/2018

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	22.2	6.27
5	22	6.09
10	21.9	6.07
15	17.1	5.95
17.5	12.7	3.26
20	10.1	0.32
22.5	8.4	0.14
25	7.3	0.11

Lake: Brush Lake (Newaygo Co.)

8/31/2018



Name: Brush Lake
County: Newaygo
Site ID: 620338
Date: 9/13/2018

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	22.2	6.57
5	21.4	6.51
10	20.8	4.7
15	17.7	3.27
17.5	13.2	0.7
20	10.7	0.19
22.5	8.4	0.14
25	7.5	0.09

Lake: Brush Lake (Newaygo Co.)

9/13/2018

