



2024 Data Report for Gull Lake, Kalamazoo County

Site ID: 390210

42.3958°N, 85.4069°W

The CLMP is brought to you by:



Michigan Clean
Water Corps

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:

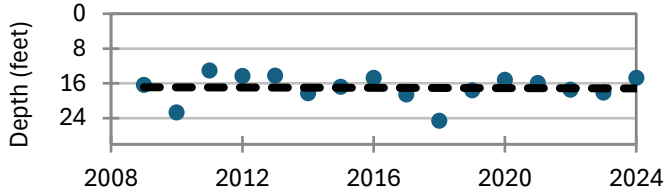
Paul Steen (psteen@hrwc.org), CLMP Data Analyst

Gull Lake, Kalamazoo County 2024 CLMP Results



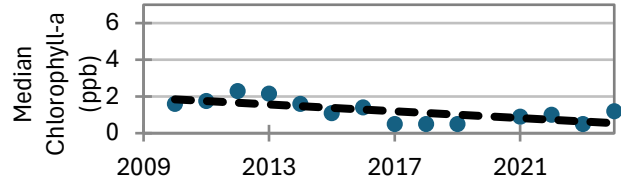
Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2024	12	7.5	34.0	14.8	9.2	38
2019-2023	70	5.0	37.0	16.9	8.0	36
2009-2018	160	6.5	42.5	17.3	7.7	36
2024 All CLMP Lakes	3348	0.5	85.0	11.7	6.2	43



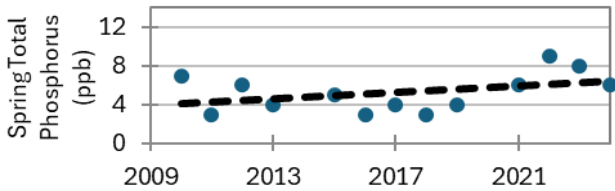
Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2024	5	<1.0	3.3	1.2	1.2	32
2019-2023	18	<1.0	2.9	0.7	0.8	31
2010-2018	42	<1.0	3.4	0.7	0.7	35
2024 All CLMP Lakes	708	< 1.0	63.0	2.8	7.3	41



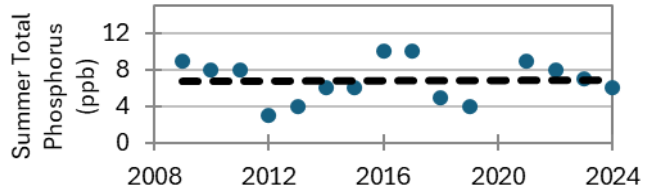
Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2024	1	6.0	6.0	6.0	NA	30
2019-2023	4	<5 T	9.0	6.8	2.2	32
2010-2018	8	<=3 W	7.0	4.4	1.5	32
2024 All CLMP Lakes	259	<= 5	140.0	14.3	39.7	43

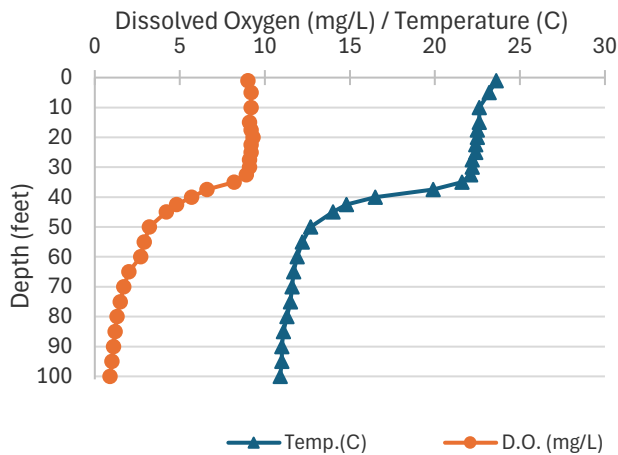


Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2024	1	6.0	6.0	6.0	NA	30
2019-2023	4	<5 T	9.0	7.0	2.2	32
2009-2018	10	<=3 W	10.0	6.9	2.5	32
2024 All CLMP Lakes	261	<= 5	140.0	14.6	11.9	43



Dissolved Oxygen and Temperature Profile



Summary

Average TSI	2024	2019-2023	2009-2018
Gull Lake	34	33	34
All CLMP Lakes	41	42	40

With an average TSI score of 34 based on 2024 Secchi transparency, chlorophyll-a, and summer total phosphorus data, this lake is rated as oligotrophic.

This lake displays a normal stratification pattern. The lake maintains 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.

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

9/15/2024

* = 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.

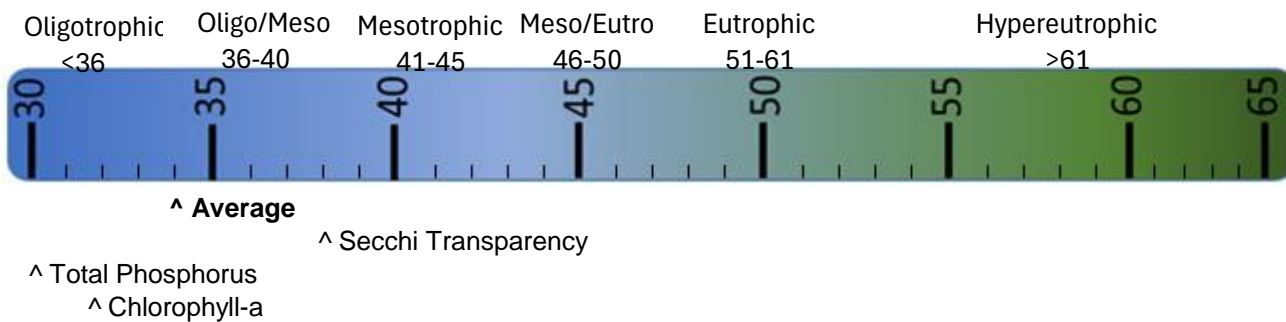
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

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 Gull Lake in 2024	
Average	34
Secchi Disk	38
Summer TP	30
Chlorophyll-a	32



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.

Aquatic Plants

Gull 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/>)

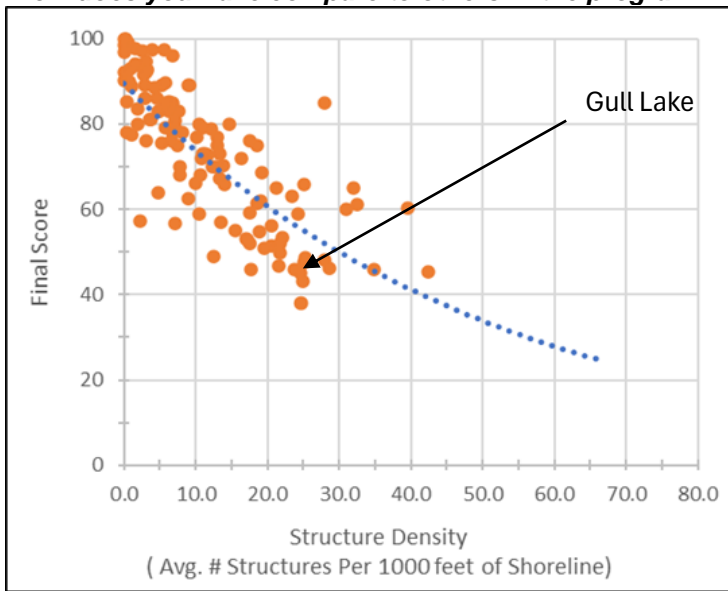
The CLMP offers two parameters on aquatic plants. In the Exotic Aquatic Plant Watch, volunteers concentrate on monitoring and early detection of exotic invasive plants only. In Aquatic Plant Identification and Mapping, volunteers identify all native and non-native plants. In both parameters, volunteers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

Gull Lake, Kalamazoo County 2024 Score the Shore Results

The Score the Shore Habitat Assessment was conducted on Gull Lake in 2024.

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 pristine.

How does your lake compare to others in the program?



Gull Lake	
Number of Sections:	68
Number of Structures:	1668
Structure Density:	24.5
Final Score:	45

All 123 Participating Lakes from 2015-2024:	
Avg. Number of Sections:	16
Avg. Number of Structures:	230
Avg. Structure Density:	12.2
Avg. Final Score:	73.2

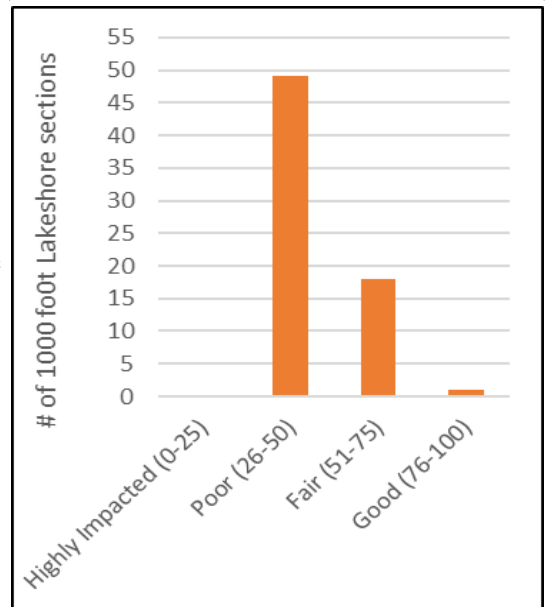
Note about graph to the left: The dotted line sets the average expectation of the score of your lake. If your lake is lower than the dotted line, then your shoreline health is lower than average compared to lakes with similar amount of shoreline development. And vice-versa in regards to a lake above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

Analysis specific to Gull Lake:

Overall, the lakeshore habitat of Gull Lake is below average when compared to the other lakes in the program with similar amount of development. The majority of the lake sections score Poor.

All three of the scoring categories came out approximately the same on Gull Lake (Average scores: Littoral 45, Riparian 36, Erosion Control 54) This means that there is no particular strength to the habitat on Gull Lake; but rather all components of habitat are degraded to some degree.

Addressing the Riparian zone of the lake will give the highest benefit to the total score and the lakeshore habitat in general. 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. You can get plenty of ideas for improving shoreline health from the Michigan Natural Shoreline Partnership. <https://www.shorelinepartnership.org/>



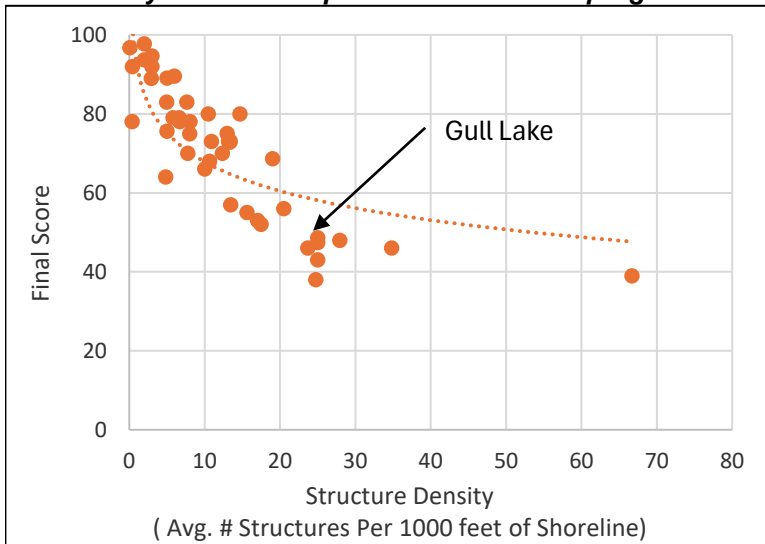
Gull Lake, Kalamazoo County 2016 Score the Shore Results



The Score the Shore Habitat Assessment was conducted on Gull Lake in 2016.

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?



Gull Lake:	
Number of Sections:	68
Number of Structures:	1612
Structure Density:	23.7
Final Score:	46

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 Gull Lake:

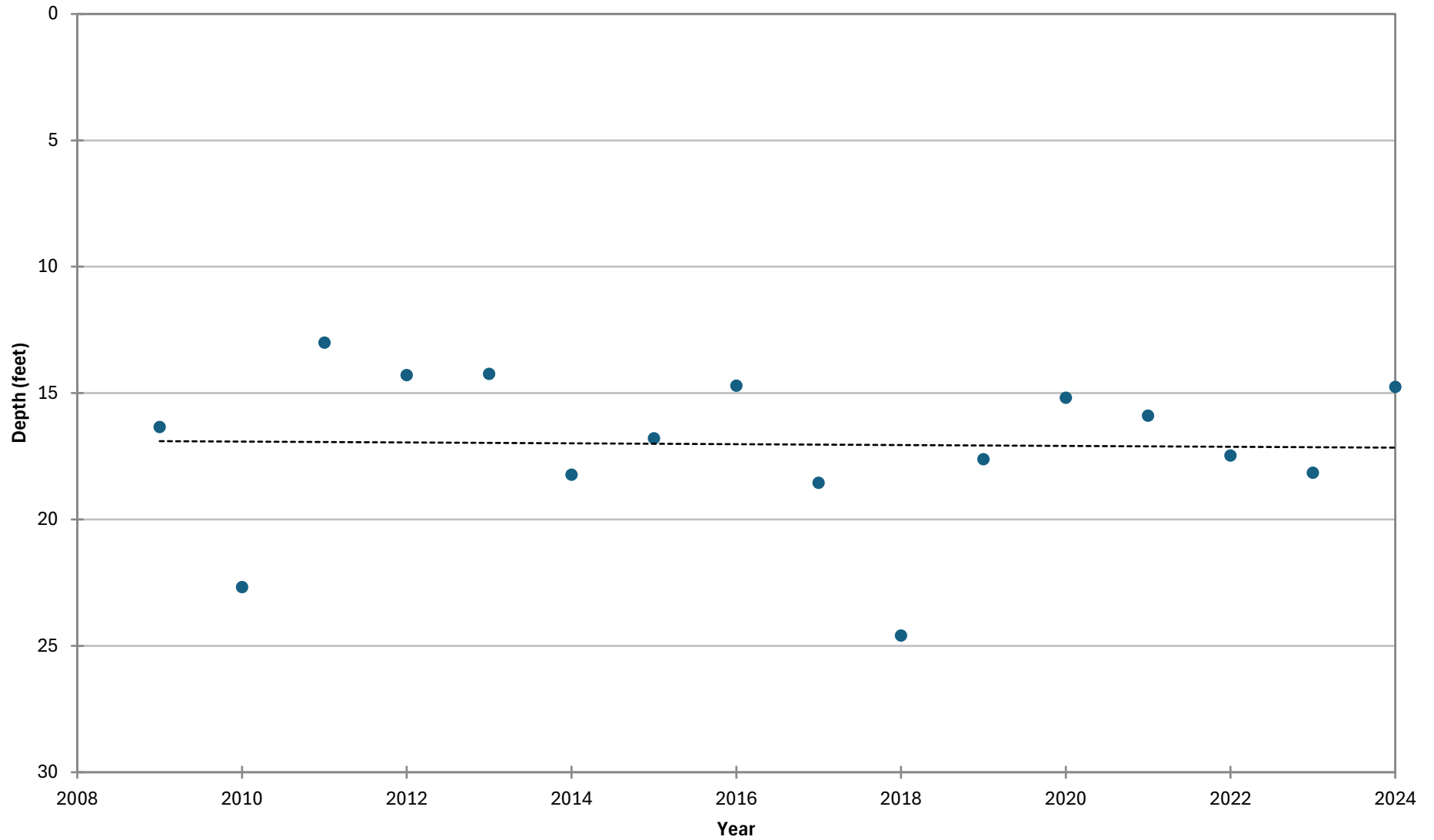
Overall, the lakeshore habitat of Gull Lake is below average when compared to the other lakes in the program. The majority of the lake sections were scored as poor. (46 poor, 19 fair, 3 good).

The riparian zone was the weakest point in Gull Lake's score (scoring an average of 35). Improving this riparian zone will be the best way to improve overall lakeshore health; reduce the amount of mowed grass and increase the amount of unmowed vegetation along the lakeshore to boost this aspect of the shoreline habitat.

The average score for the littoral zone was 46 and the average score for erosion control was 57. Neither of these would be considered a good score, so any education out to lake residents could also discuss these aspects.

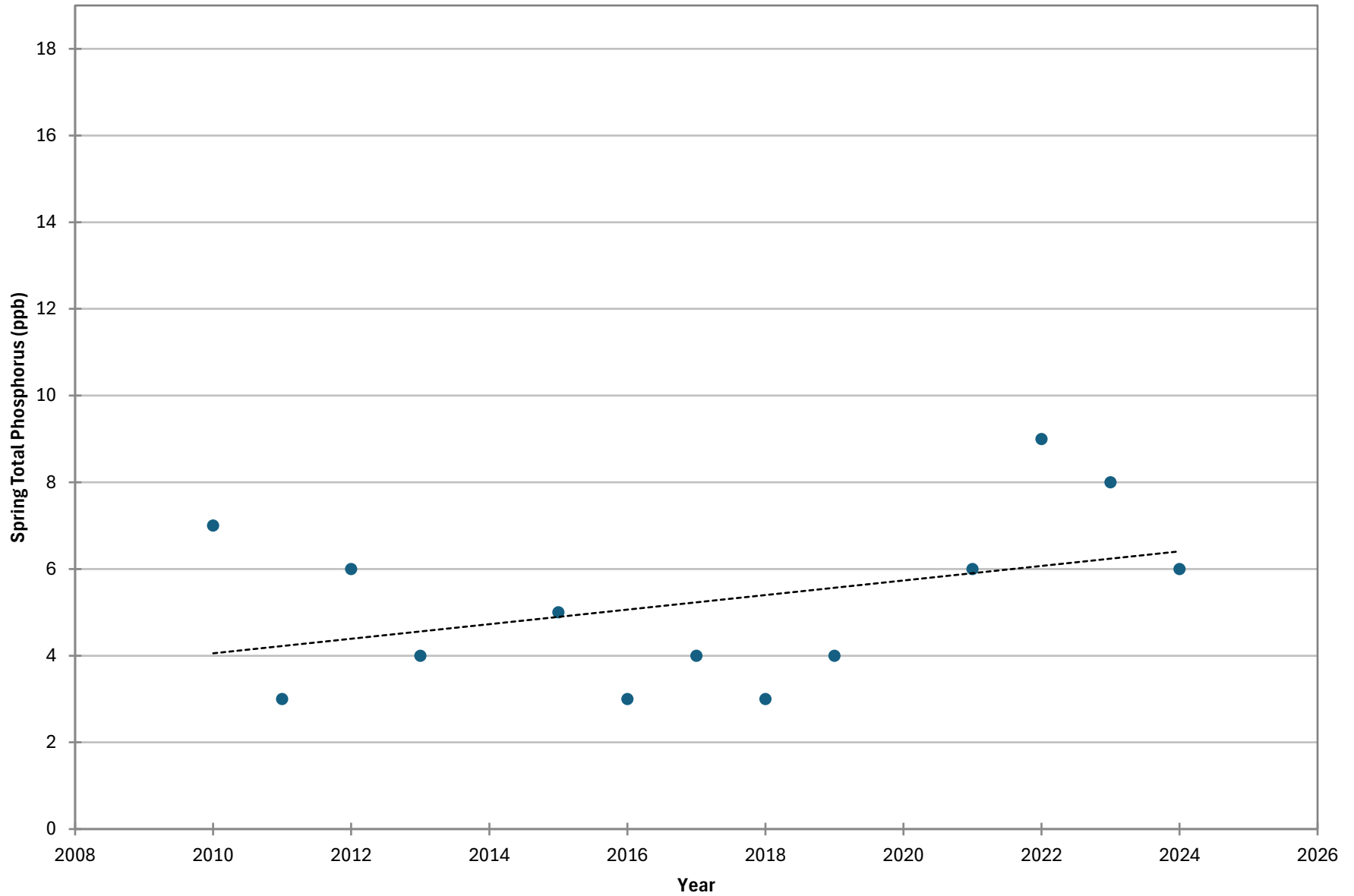
COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEAN TRANSPARENCY

Gull Lake (Kalamazoo Co.), 390210



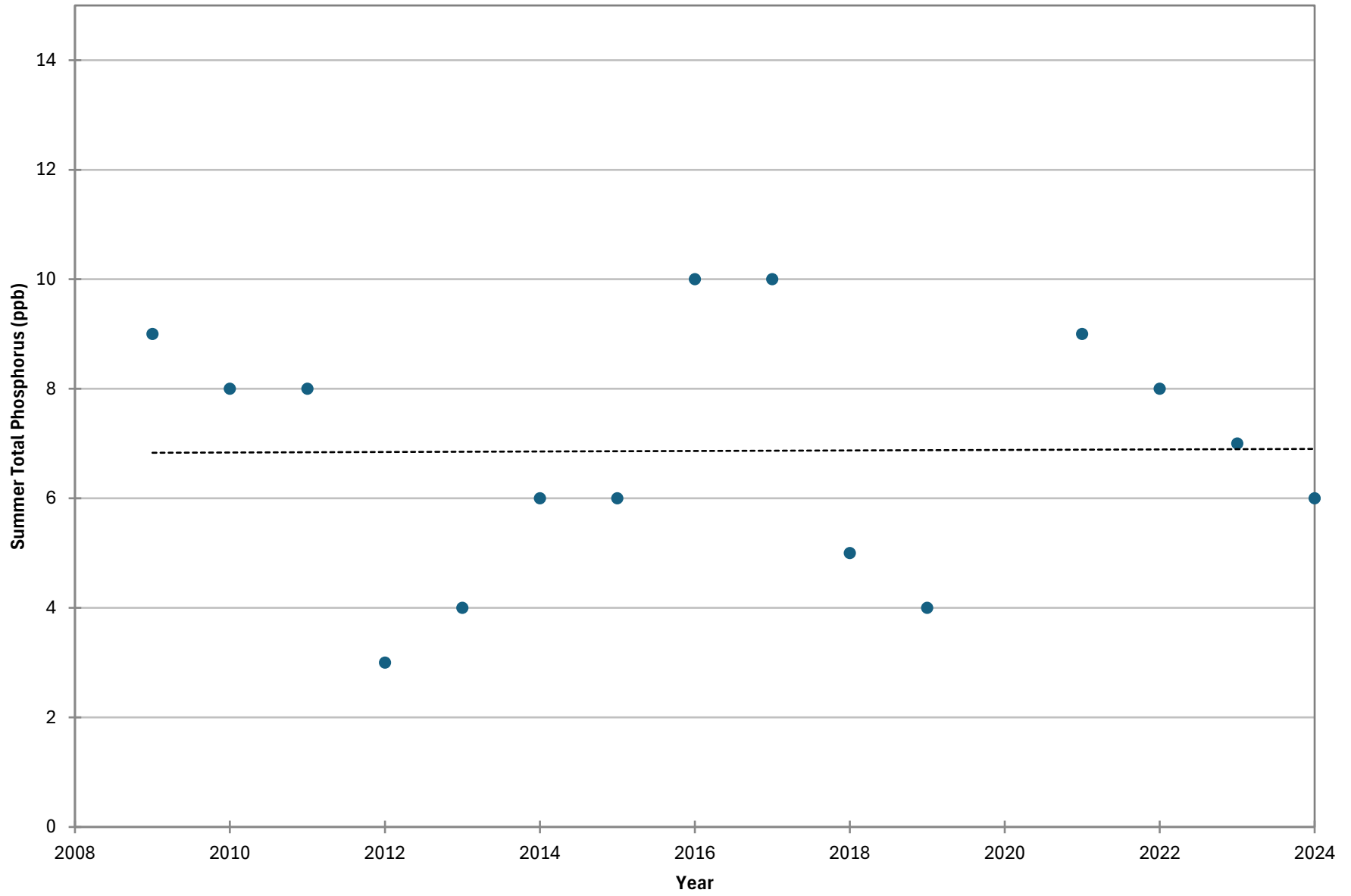
COOPERATIVE LAKES MONITORING PROGRAM
SPRING TOTAL PHOSPHORUS

Gull Lake (Kalamazoo Co.), 390210



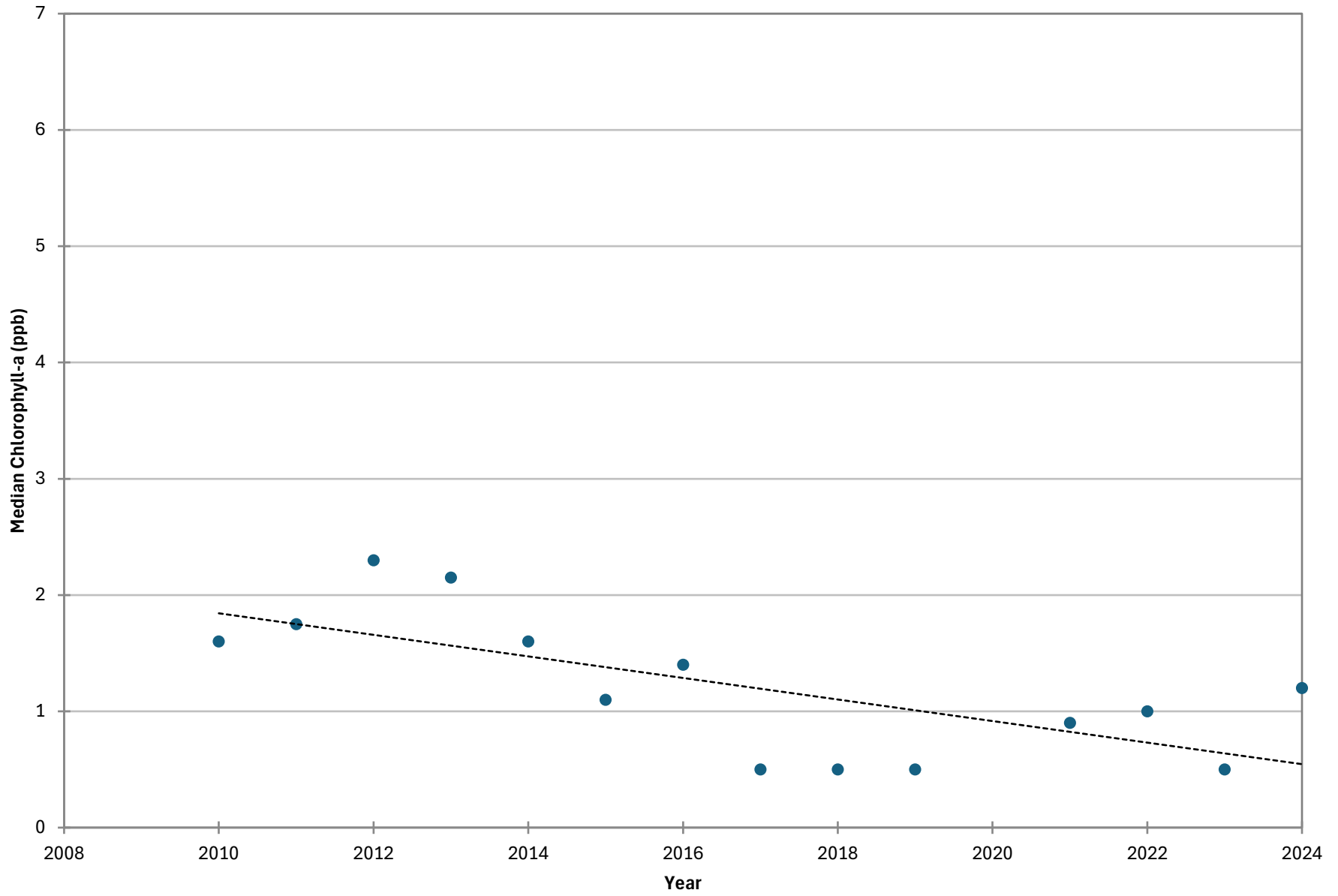
COOPERATIVE LAKES MONITORING PROGRAM
SUMMER TOTAL PHOSPHORUS

Gull Lake (Kalamazoo Co.), 390210



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEDIAN CHLOROPHYLL-A

Gull Lake (Kalamazoo Co.), 390210



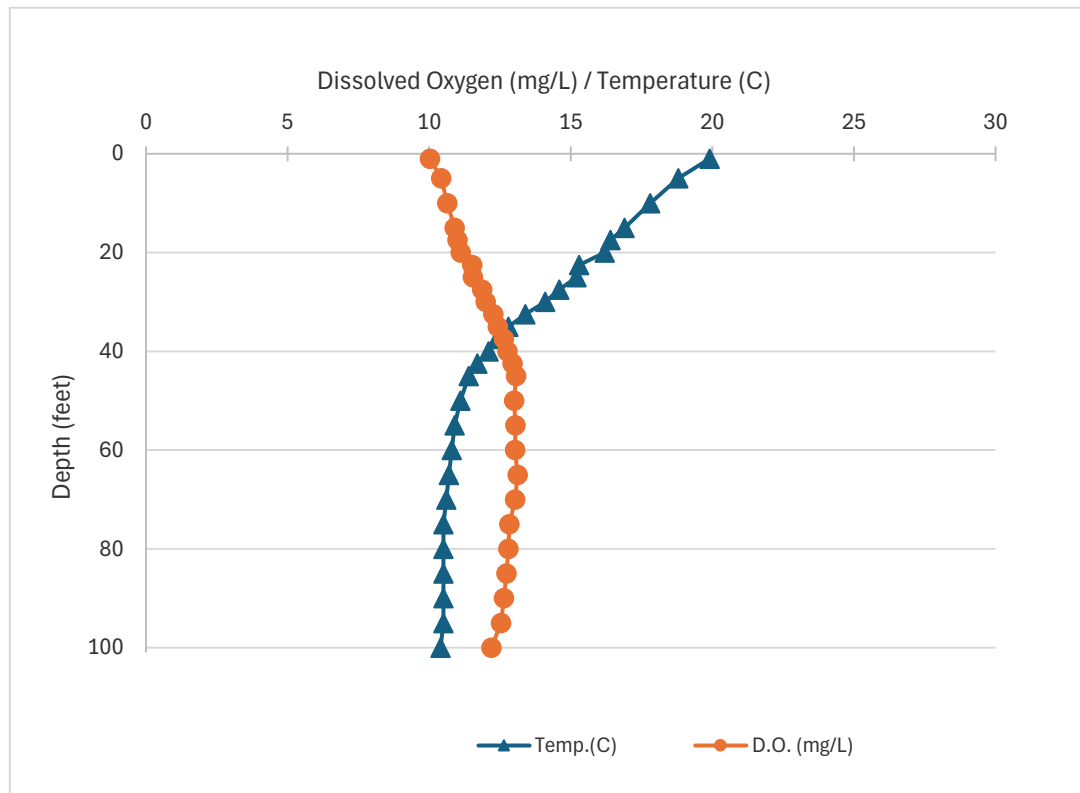
Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 5/18/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	19.9	10.03
5	18.8	10.43
10	17.8	10.64
15	16.9	10.9
17.5	16.4	11
20	16.2	11.11
22.5	15.3	11.52
25	15.2	11.54
27.5	14.6	11.87
30	14.1	11.99
32.5	13.4	12.27
35	12.8	12.43
37.5	12.4	12.64
40	12.1	12.76
42.5	11.7	12.94
45	11.4	13.07
50	11.1	13
55	10.9	13.05
60	10.8	13.04
65	10.7	13.12
70	10.6	13.04
75	10.5	12.83
80	10.5	12.8
85	10.5	12.73
90	10.5	12.64
95	10.5	12.54
100	10.4	12.2

Lake: Gull Lake (Kalamazoo Co.)

5/18/2024



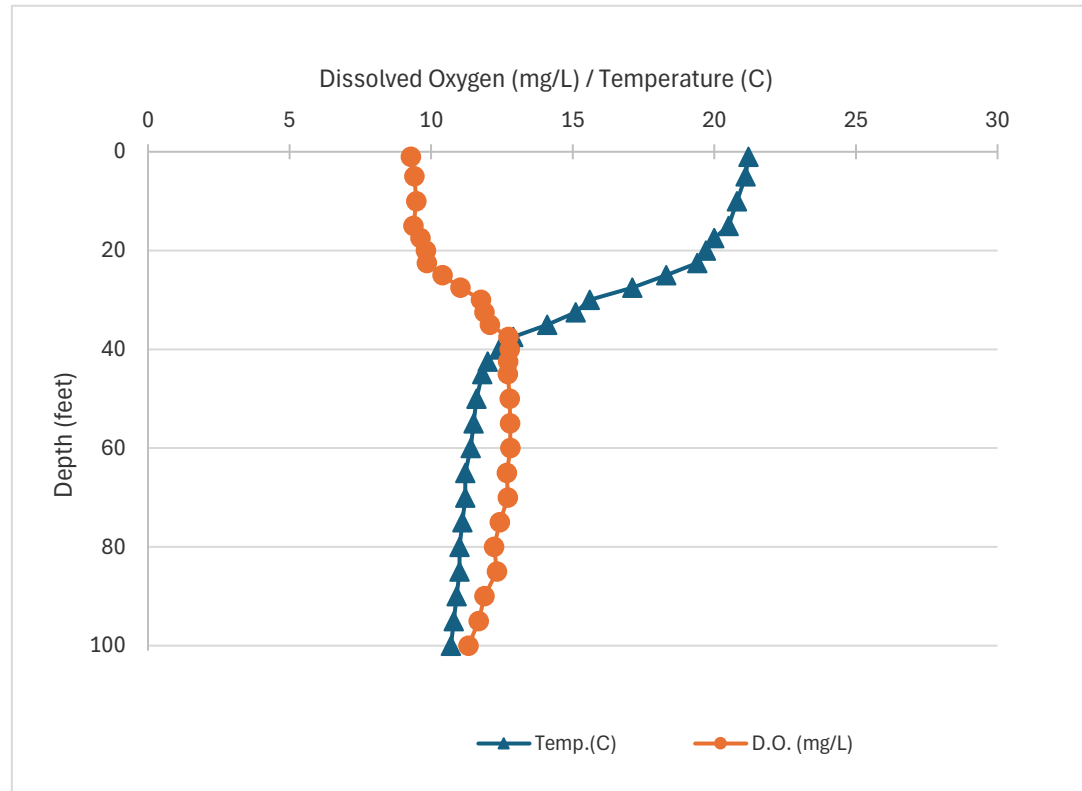
Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 6/3/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	21.2	9.28
5	21.1	9.41
10	20.8	9.48
15	20.5	9.37
17.5	20	9.62
20	19.7	9.81
22.5	19.4	9.85
25	18.3	10.4
27.5	17.1	11.03
30	15.6	11.76
32.5	15.1	11.88
35	14.1	12.08
37.5	12.9	12.73
40	12.4	12.77
42.5	12	12.72
45	11.8	12.71
50	11.6	12.77
55	11.5	12.79
60	11.4	12.8
65	11.2	12.67
70	11.2	12.71
75	11.1	12.43
80	11	12.22
85	11	12.32
90	10.9	11.88
95	10.8	11.68
100	10.7	11.32

Lake: Gull Lake (Kalamazoo Co.)

6/3/2024



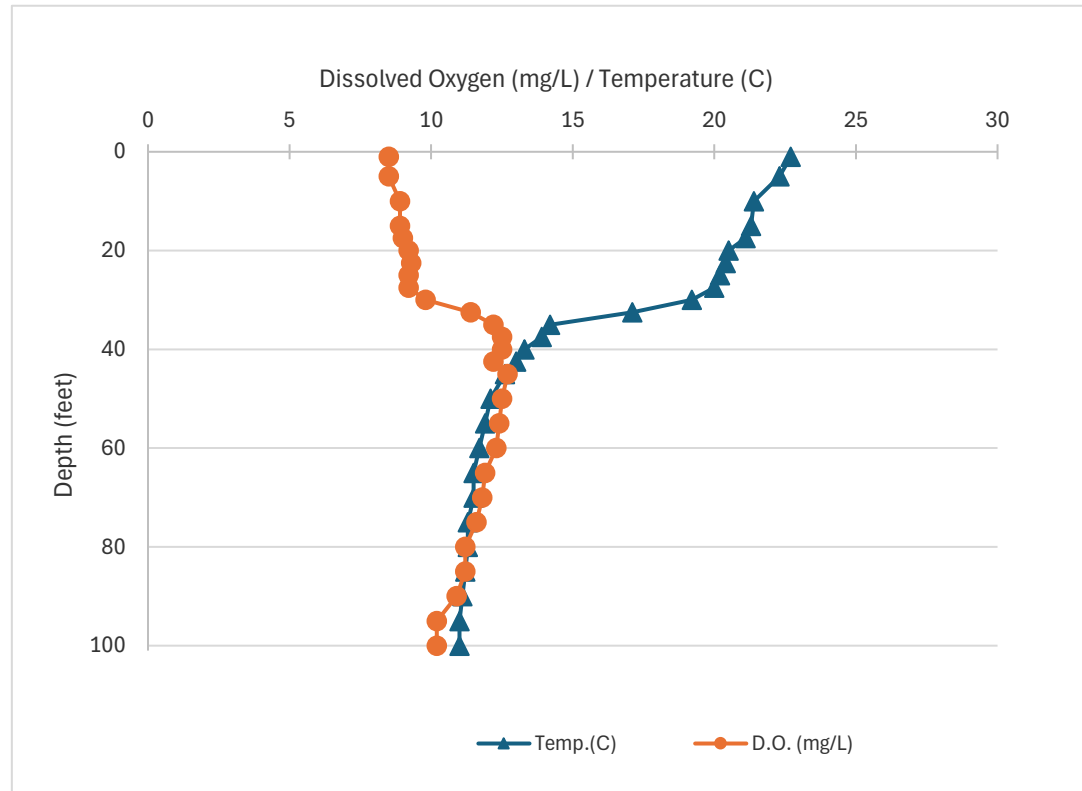
Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 6/14/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	22.7	8.5
5	22.3	8.5
10	21.4	8.9
15	21.3	8.9
17.5	21.1	9
20	20.5	9.2
22.5	20.4	9.3
25	20.2	9.2
27.5	20	9.2
30	19.2	9.8
32.5	17.1	11.4
35	14.2	12.2
37.5	13.9	12.5
40	13.3	12.5
42.5	13	12.2
45	12.6	12.7
50	12.1	12.5
55	11.9	12.4
60	11.7	12.3
65	11.5	11.9
70	11.5	11.8
75	11.3	11.6
80	11.3	11.2
85	11.2	11.2
90	11.1	10.9
95	11	10.2
100	11	10.2

Lake: Gull Lake (Kalamazoo Co.)

6/14/2024



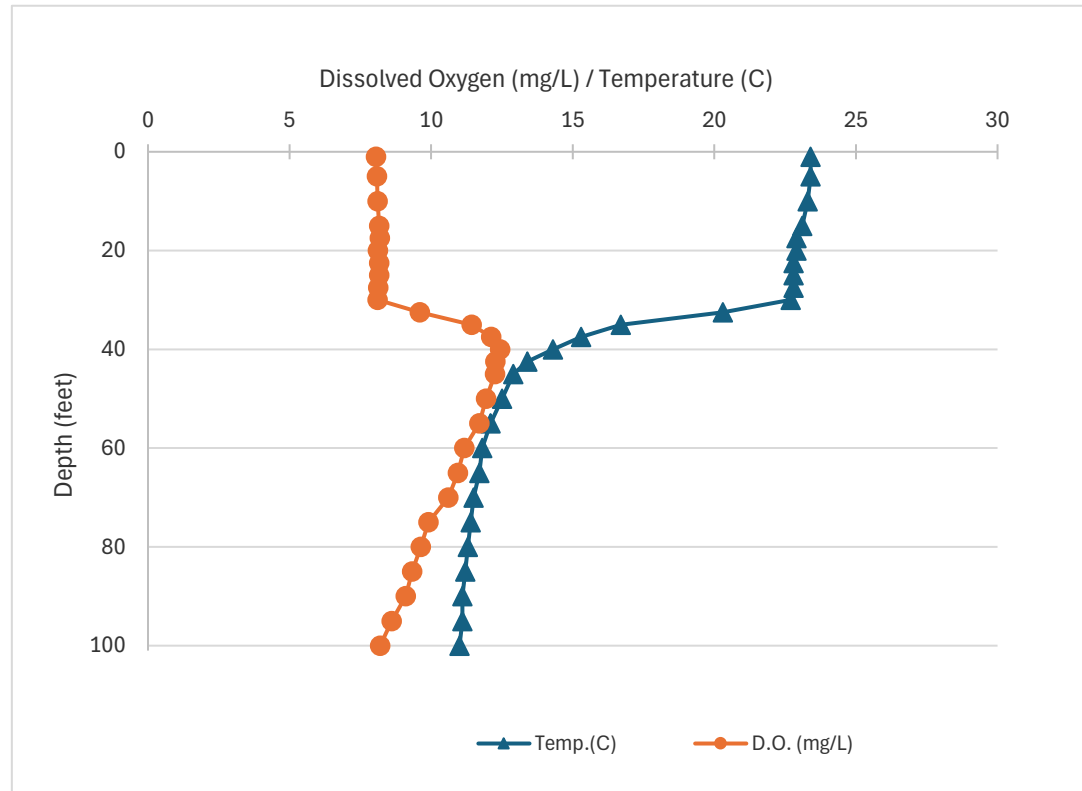
Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 7/12/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23.4	8.05
5	23.4	8.09
10	23.3	8.11
15	23.1	8.16
17.5	22.9	8.19
20	22.9	8.12
22.5	22.8	8.16
25	22.8	8.16
27.5	22.8	8.13
30	22.7	8.11
32.5	20.3	9.6
35	16.7	11.43
37.5	15.3	12.12
40	14.3	12.44
42.5	13.4	12.27
45	12.9	12.26
50	12.5	11.94
55	12.1	11.7
60	11.8	11.17
65	11.7	10.95
70	11.5	10.61
75	11.4	9.9
80	11.3	9.63
85	11.2	9.33
90	11.1	9.1
95	11.1	8.6
100	11	8.2

Lake: Gull Lake (Kalamazoo Co.)

7/12/2024



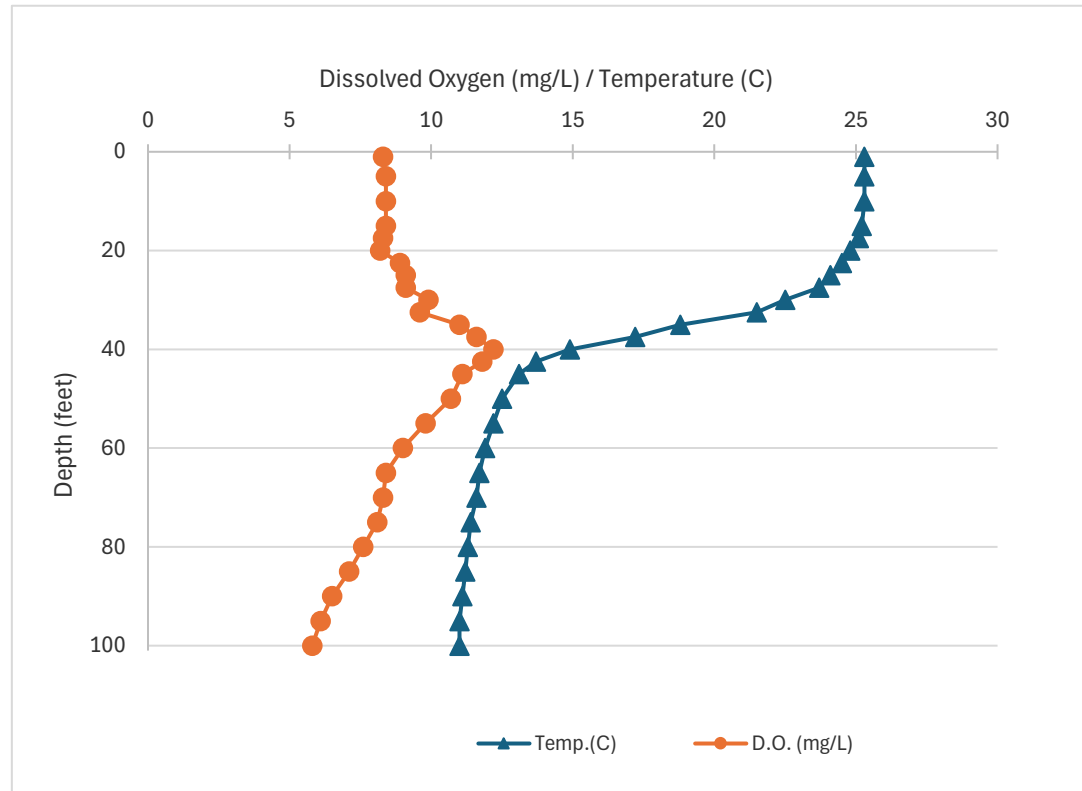
Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 7/19/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	25.3	8.3
5	25.3	8.4
10	25.3	8.4
15	25.2	8.4
17.5	25.1	8.3
20	24.8	8.2
22.5	24.5	8.9
25	24.1	9.1
27.5	23.7	9.1
30	22.5	9.9
32.5	21.5	9.6
35	18.8	11
37.5	17.2	11.6
40	14.9	12.2
42.5	13.7	11.8
45	13.1	11.1
50	12.5	10.7
55	12.2	9.8
60	11.9	9
65	11.7	8.4
70	11.6	8.3
75	11.4	8.1
80	11.3	7.6
85	11.2	7.1
90	11.1	6.5
95	11	6.1
100	11	5.8

Lake: Gull Lake (Kalamazoo Co.)

7/19/2024



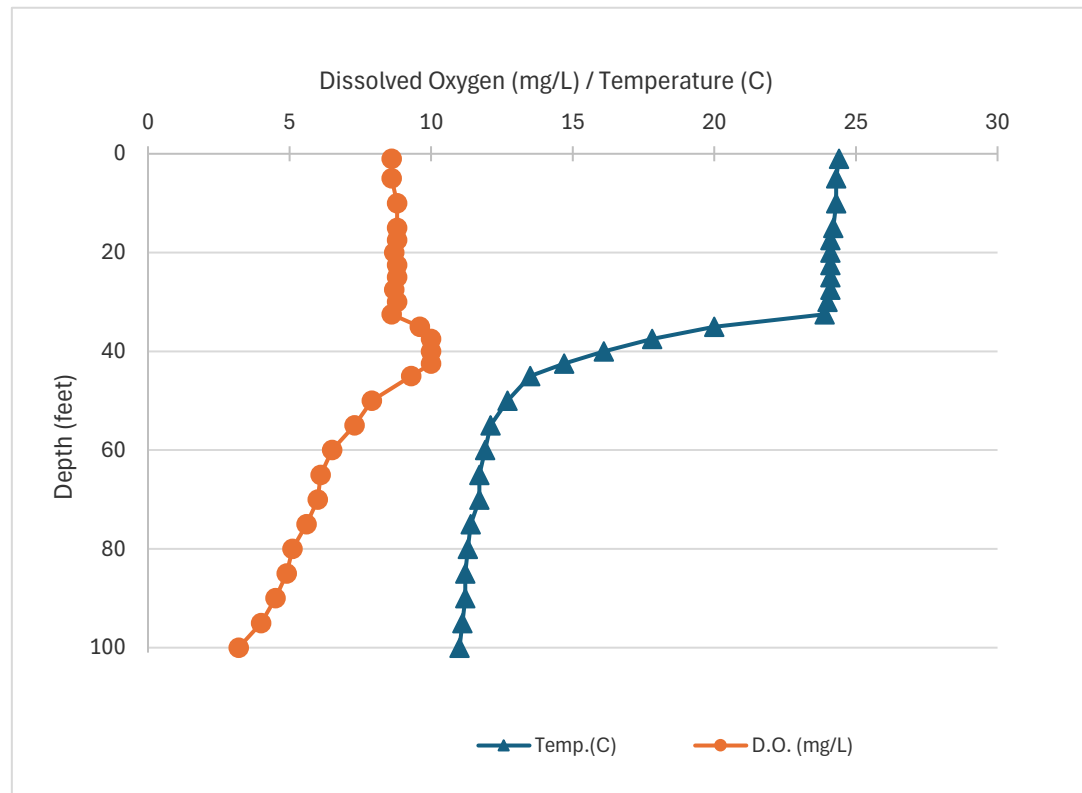
Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 8/12/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24.4	8.6
5	24.3	8.6
10	24.3	8.8
15	24.2	8.8
17.5	24.1	8.8
20	24.1	8.7
22.5	24.1	8.8
25	24.1	8.8
27.5	24.1	8.7
30	24	8.8
32.5	23.9	8.6
35	20	9.6
37.5	17.8	10
40	16.1	10
42.5	14.7	10
45	13.5	9.3
50	12.7	7.9
55	12.1	7.3
60	11.9	6.5
65	11.7	6.1
70	11.7	6
75	11.4	5.6
80	11.3	5.1
85	11.2	4.9
90	11.2	4.5
95	11.1	4
100	11	3.2

Lake: Gull Lake (Kalamazoo Co.)

8/12/2024



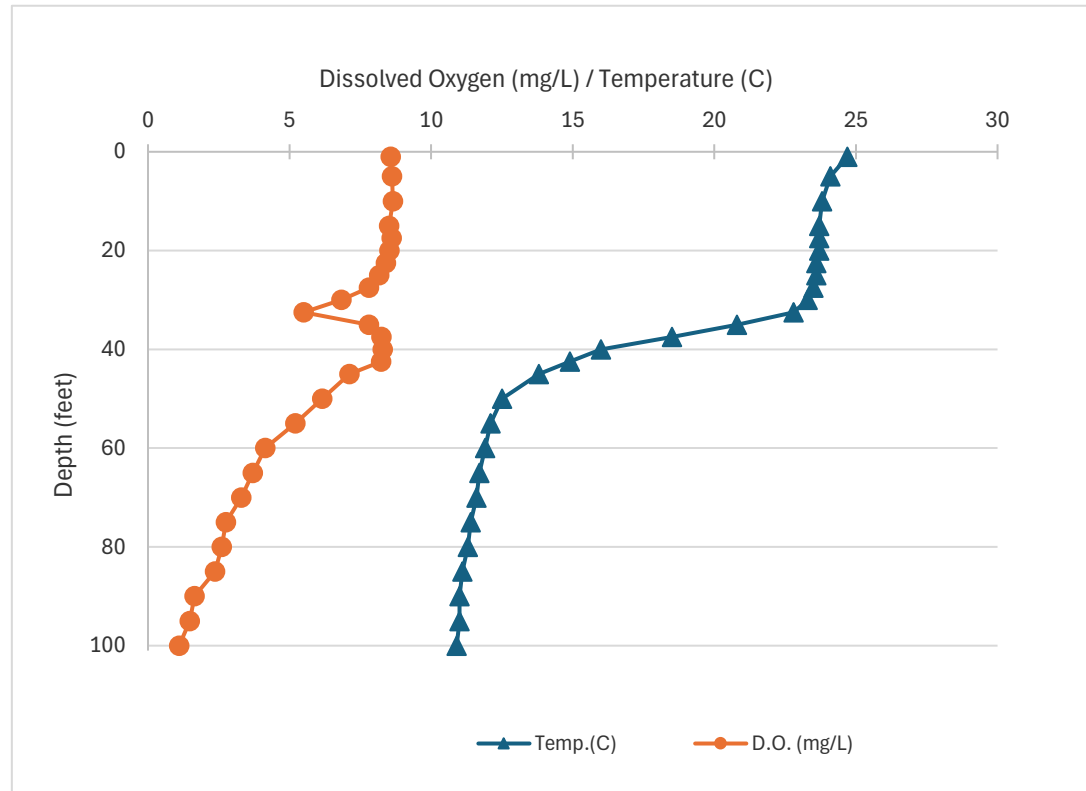
Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 8/22/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24.7	8.57
5	24.1	8.62
10	23.8	8.65
15	23.7	8.52
17.5	23.7	8.61
20	23.7	8.53
22.5	23.6	8.4
25	23.6	8.16
27.5	23.5	7.8
30	23.3	6.83
32.5	22.8	5.5
35	20.8	7.8
37.5	18.5	8.24
40	16	8.29
42.5	14.9	8.23
45	13.8	7.11
50	12.5	6.15
55	12.1	5.2
60	11.9	4.14
65	11.7	3.7
70	11.6	3.29
75	11.4	2.75
80	11.3	2.6
85	11.1	2.37
90	11	1.65
95	11	1.47
100	10.9	1.1

Lake: Gull Lake (Kalamazoo Co.)

8/22/2024



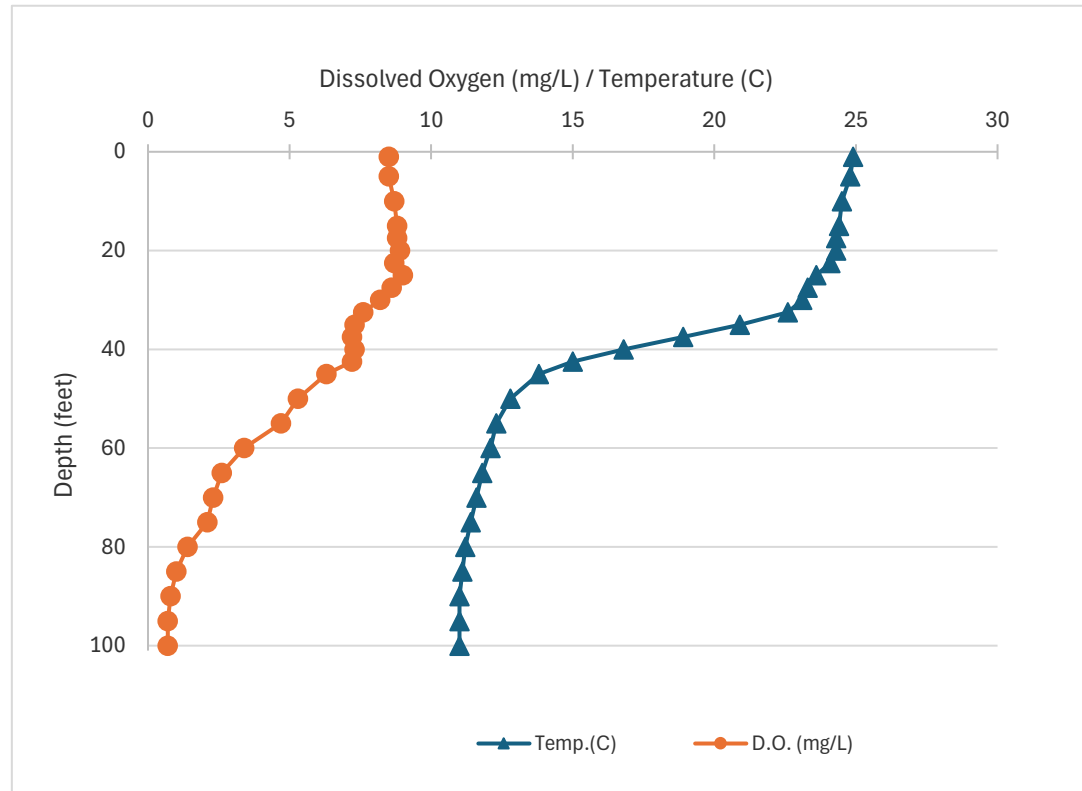
Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 9/3/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24.9	8.5
5	24.8	8.5
10	24.5	8.7
15	24.4	8.8
17.5	24.3	8.8
20	24.3	8.9
22.5	24.1	8.7
25	23.6	9
27.5	23.3	8.6
30	23.1	8.2
32.5	22.6	7.6
35	20.9	7.3
37.5	18.9	7.2
40	16.8	7.3
42.5	15	7.2
45	13.8	6.3
50	12.8	5.3
55	12.3	4.7
60	12.1	3.4
65	11.8	2.6
70	11.6	2.3
75	11.4	2.1
80	11.2	1.4
85	11.1	1
90	11	0.8
95	11	0.7
100	11	0.7

Lake: Gull Lake (Kalamazoo Co.)

9/3/2024



Name: Gull Lake
 County: Kalamazoo
 Site ID: 390210
 Date: 9/15/2024

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23.6	9
5	23.2	9.2
10	22.6	9.2
15	22.6	9.1
17.5	22.5	9.2
20	22.5	9.3
22.5	22.4	9.2
25	22.4	9.2
27.5	22.2	9.1
30	22.2	9.1
32.5	22.1	8.9
35	21.6	8.2
37.5	19.9	6.6
40	16.5	5.7
42.5	14.8	4.8
45	14	4.2
50	12.7	3.2
55	12.2	2.9
60	11.9	2.7
65	11.7	2
70	11.6	1.7
75	11.5	1.5
80	11.3	1.3
85	11.1	1.2
90	11	1.1
95	11	1
100	10.9	0.9

Lake: Gull Lake (Kalamazoo Co.)

9/15/2024

