



2022 Data Report for

Lower Herring Lake, Benzie County

Site ID: 100085

44.5622°N, 86.2106°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:

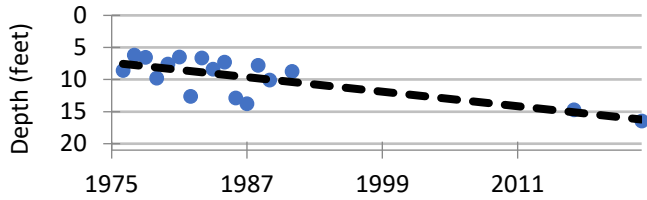
Paul Steen (psteen@hrwc.org), CLMP Data Analyst

Lower Herring Lake, Benzie County 2022 CLMP Results



Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2022	12	9.0	27.0	16.5	5.6	37
1976-2016	279	2.0	28.0	9.3	3.2	46
2022 All CLMP Lakes	3178	1.0	63.0	11.6	2.5	43



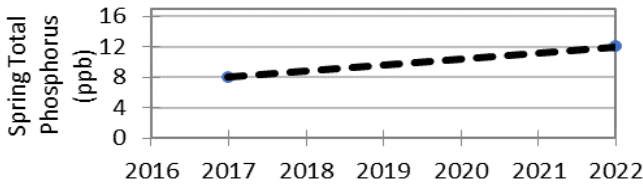
Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2022	5	<1.0	3.2	1.6	1.1	35
2016-2021	8	<1.0	2.4			
2022 All CLMP Lakes	687	< 1.0	43.0	3.7	5.3	43

No graph: Not enough data

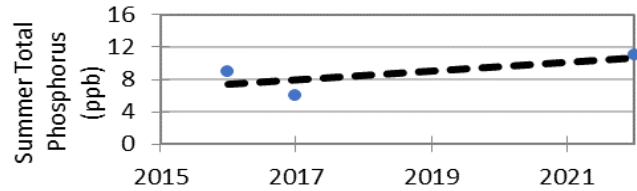
Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2022	1	12.0	12.0	12.0	NA	
2017-2021	1	8.0	8.0	8.0	NA	
2022 All CLMP Lakes	220	<5	220.0	20.7	21.3	

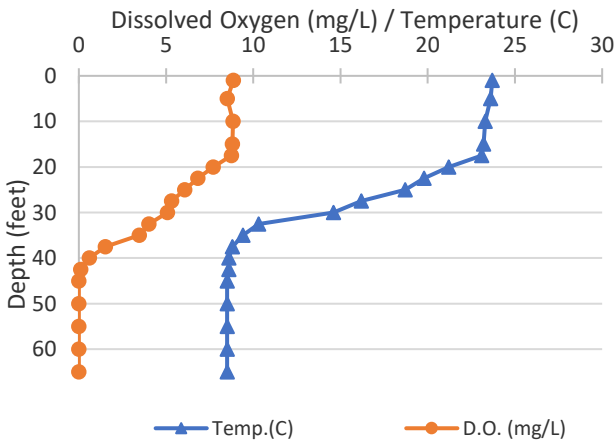


Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2022	1	11.0	11.0	11.0	NA	39
2017	1	6.0	6.0	6.0	NA	30
2016	1	9.0	9.0	9.0	NA	36
2022 All CLMP Lakes	234	<= 3	150.0	17.4	15.3	45



Dissolved Oxygen and Temperature Profile



7/20/2022

Summary

Average TSI	2022	2017-2021	1976-2016
Lower Herring Lake	37	30	46
All CLMP Lakes	44	40	43

With an average TSI score of 37 based on 2022 Secchi transparency and summer total phosphorus data, this lake is rated between the oligotrophic and mesotrophic lake classification. The lake leans slightly more oligotrophic than mesotrophic.

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

Long term monitoring shows a downward slopes on transparency, indicating a slow movement toward lower nutrient levels in the lake.

* = 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.

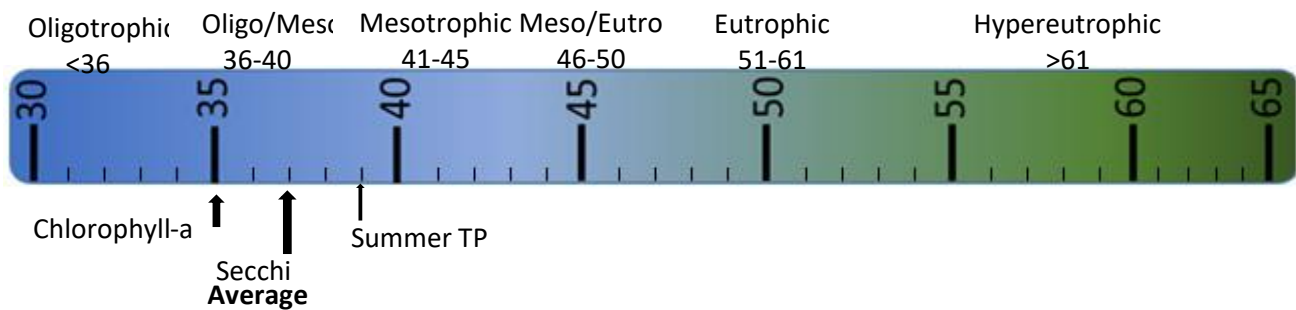
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

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 Lower Herring Lake in 2022	
Average	37
Secchi Disk	37
Summer TP	39
Chlorophyll-a	35



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.

Lower Herring Lake, Benzie County 2022 CLMP Aquatic Plant Results



The Aquatic Plant Mapping survey was conducted on Lower Herring Lake in 2022.

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 34 locations (13 transects) in Lower Herring Lake in 2022. Below is a list of species reported, in order of relative abundance. Survey conducted July 18 - August 15.

Au Sable Lake, Ogemaw County		
2022 Aquatic Plant Mapping: Species Reported		
Common Name	Latin Name	Average Density*
Stonewort	<i>Chara</i> sp.	3.62
Slender naiad	<i>Najas flexilis</i>	1.20
Variable pondweed	<i>Potamogeton gramineus</i>	1.00
Bladderwort	<i>Utricularia</i> sp.	0.85
Water celery	<i>Vallisneria americana</i>	0.82
Eurasian milfoil^	<i>Myriophyllum spicatum</i>	0.59
Illinois pondweed	<i>Potamogeton illinoensis</i>	0.53
Native milfoil	<i>Myriophyllum</i> sp.	0.44
Alpine pondweed	<i>Potamogeton alpinus</i>	0.41
Fries pondweed	<i>Potamogeton friesii</i>	0.41
Sago pondweed	<i>Stuckenia pectinata</i>	0.24
Waterweed	<i>Elodea canadensis</i>	0.21
Clasping-leaf pondweed	<i>Potamogeton richardsonii</i>	0.12
Bluntleaf pondweed	<i>Potamogeton obtusifolius</i>	0.09
^invasive	*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.

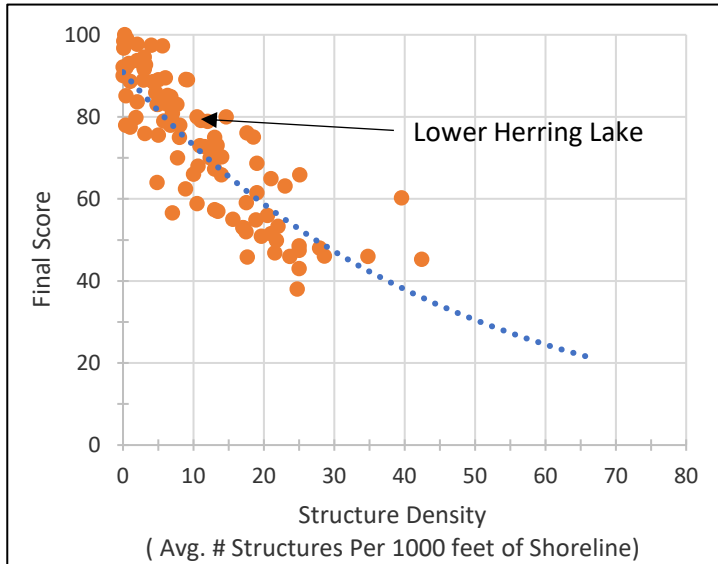
Lower Herring Lake, Benzie 2022 Score the Shore Results



The Score the Shore Habitat Assessment was conducted on Lower Herring 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 an 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?



Lower Herring Lake	
Number of Sections:	19
Number of Structures:	210
Structure Density:	11
Final Score:	79.1

All 97 Participating Lakes from 2015-2022:	
Avg. Number of Sections:	16
Avg. Number of Structures:	228
Avg. Structure Density:	12
Avg. Final Score:	73

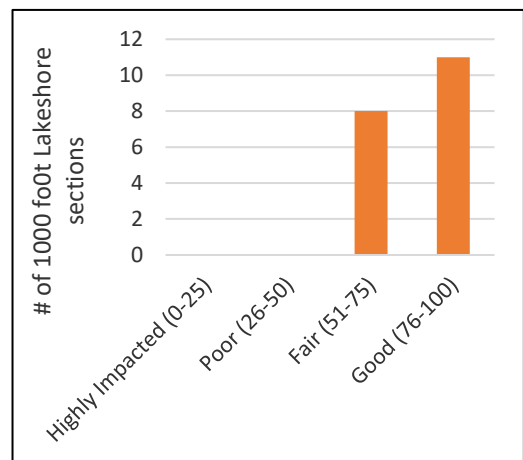
Note about graph to the left: The dotted line sets your average expectation of the score of your lake. If your lake is lower than the dotted line, then your shoreline health is lower than average compared to lakes with similar amount of shoreline development. And vice-versa in regards to a lake above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

Analysis specific to Lower Herring Lake:

Overall, the lakeshore habitat of Lower Herring Lake is doing well and scored higher than average when compared to other lakes in the program with similar amount of development. All of the 1000 foot sections scored either Fair or Good: 8 fair, and 11 good.

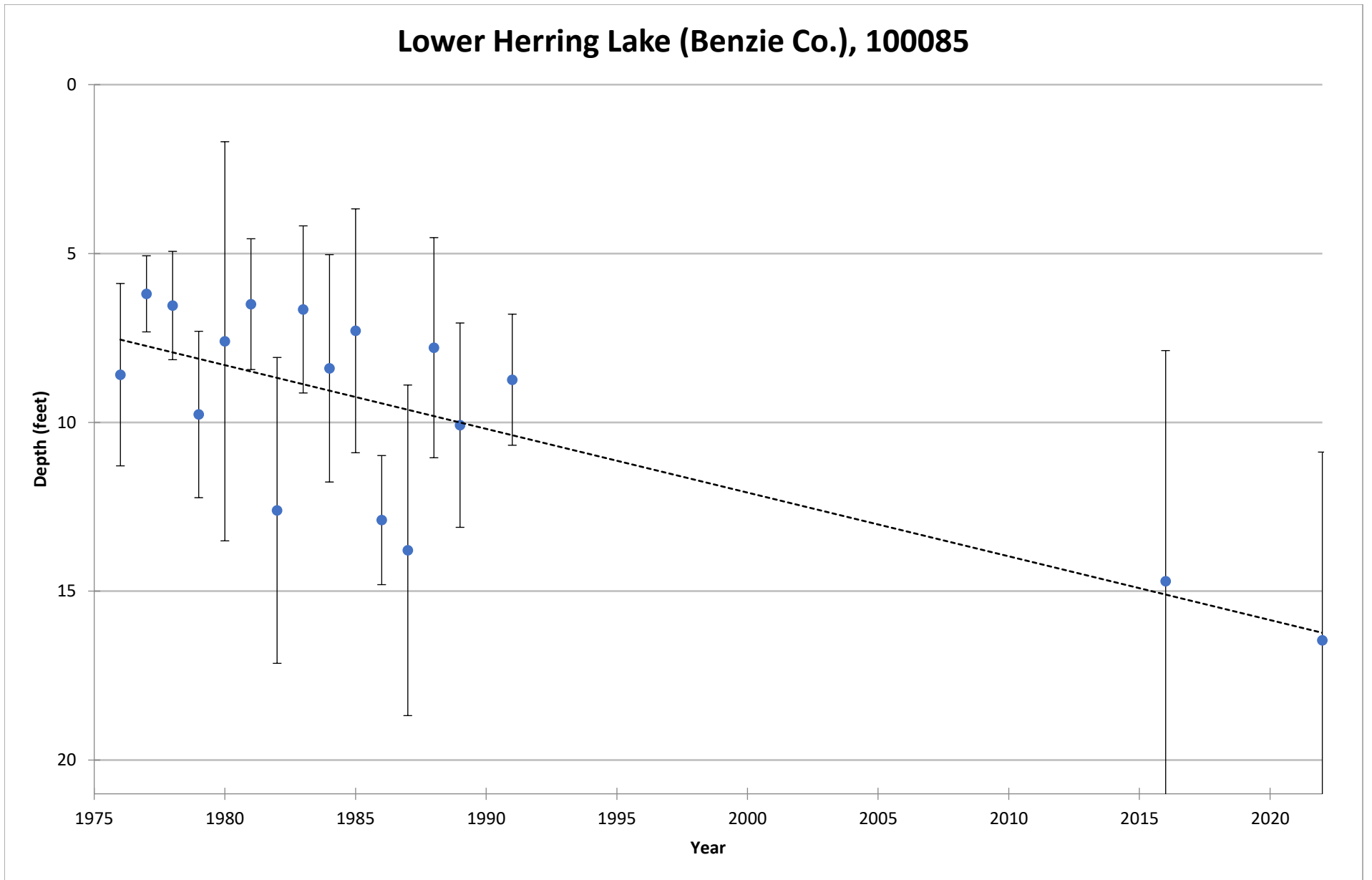
The lake sections scored highest for erosion control, with an average of 88, meaning that there are a low amount of sea walls, rock rip-rap, and other shoreline erosion structures, and no to few erosional areas of note.

The littoral section (avg score of 77) and riparian section (avg score of 72) scored well but have room for improvement. Keep native plants in the shallows and allow unmowed areas to grow on the shoreline. You can get plenty of ideas for improving shoreline health from the Michigan Natural Shoreline Partnership (<https://www.shorelinepartnership.org/>).



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEAN TRANSPARENCY

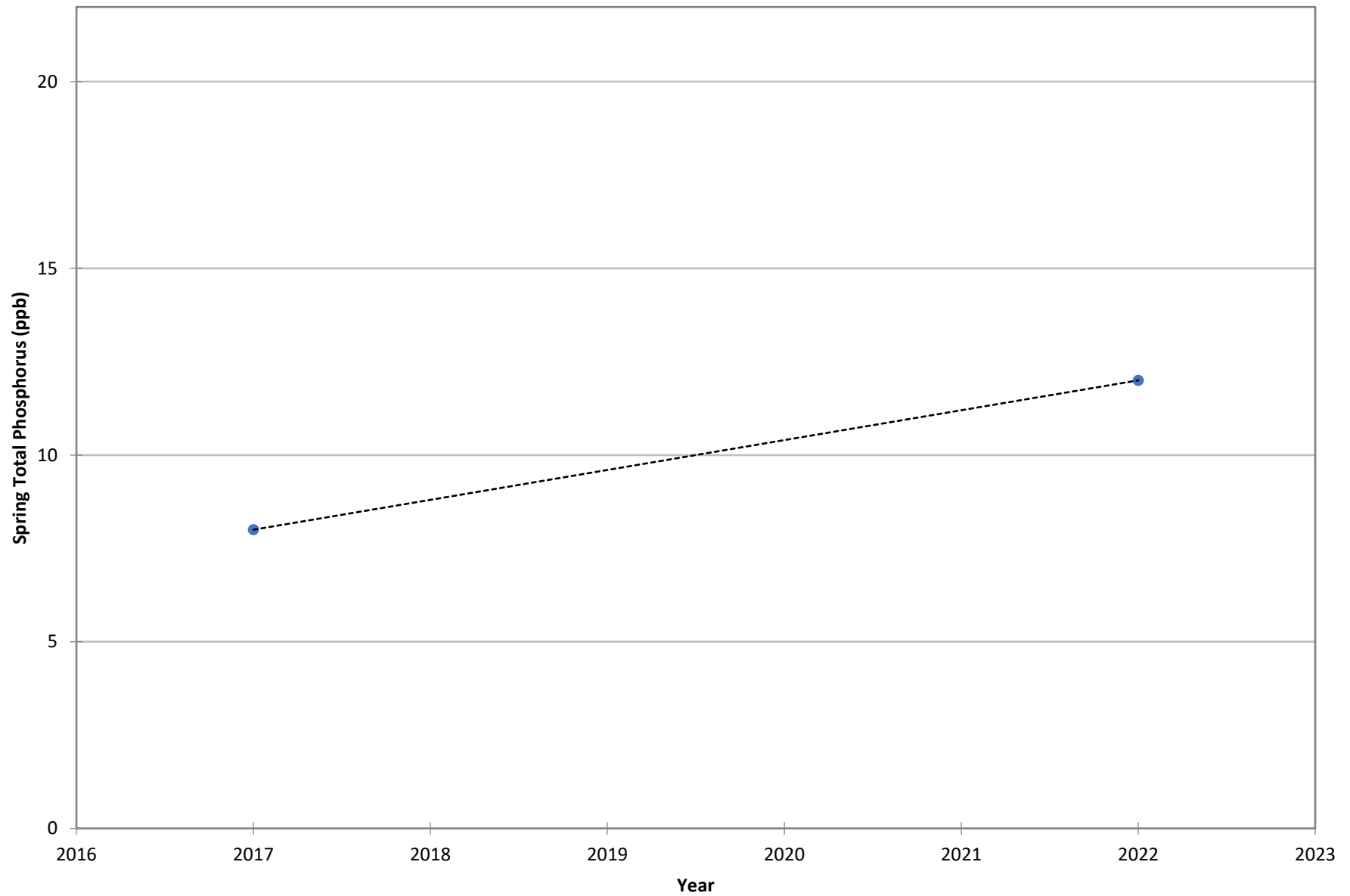
Lower Herring Lake (Benzie Co.), 100085



Vertical bars indicate standard deviation

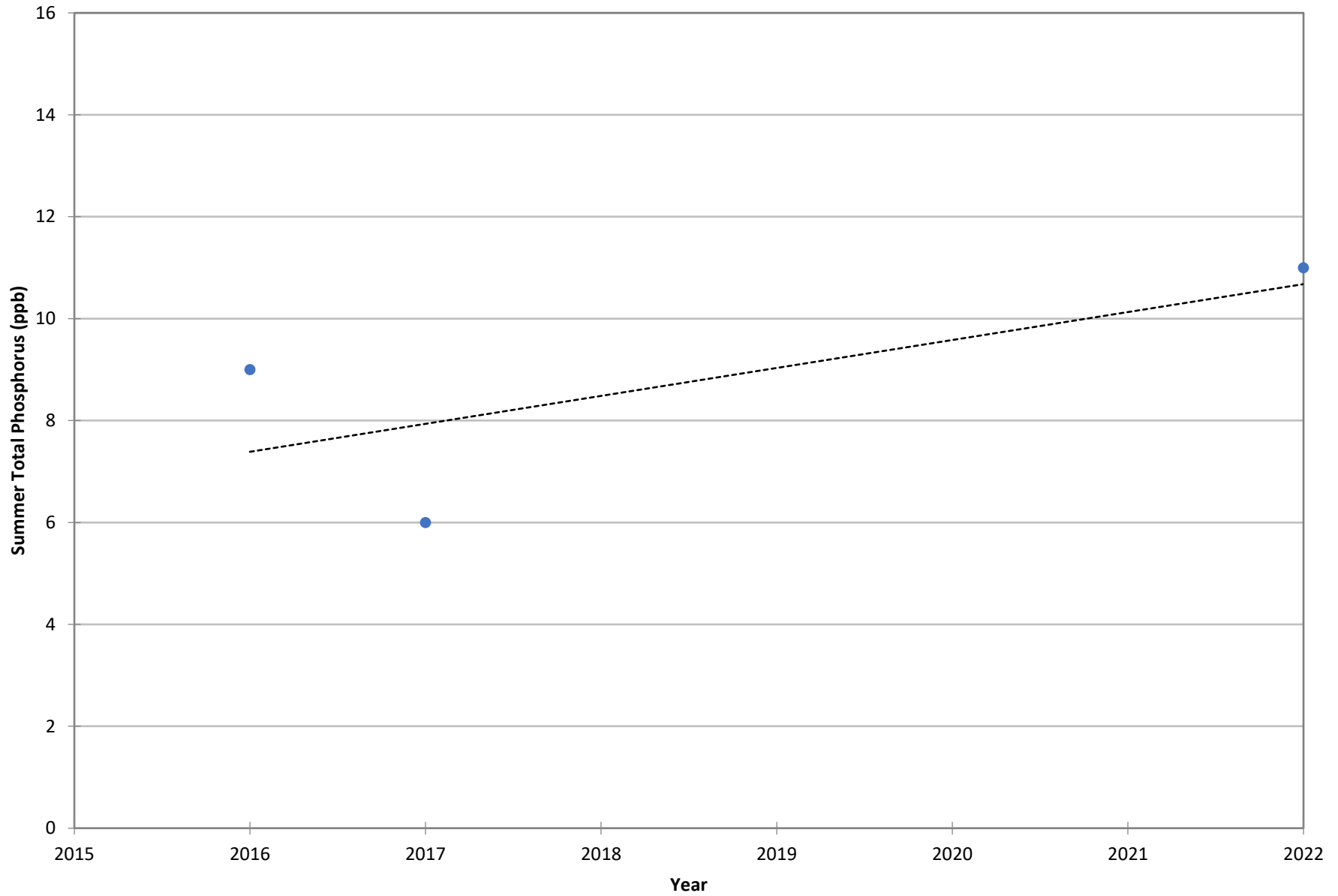
COOPERATIVE LAKES MONITORING PROGRAM
SPRING TOTAL PHOSPHORUS

Lower Herring Lake (Benzie Co.), 100085



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER TOTAL PHOSPHORUS

Lower Herring Lake (Benzie Co.), 100085



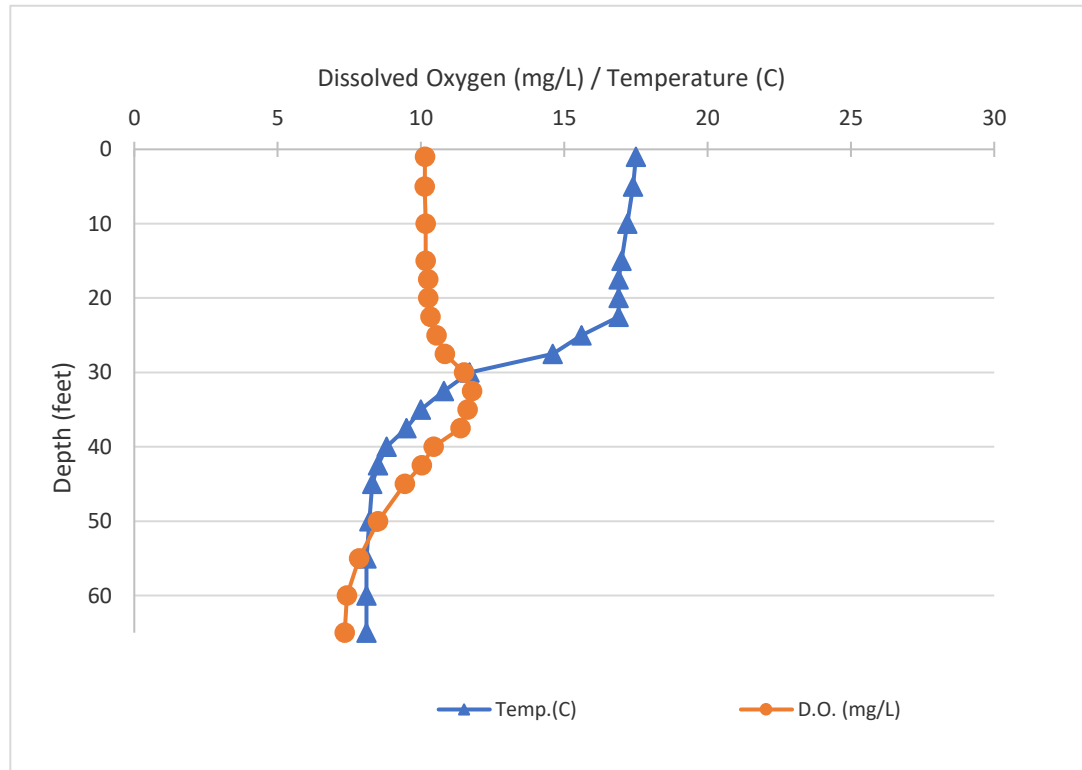
Name: Lower Herring Lake
 County: Benzie
 Site ID: 100085
 Date: 5/31/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	17.5	10.14
5	17.4	10.13
10	17.2	10.17
15	17	10.17
17.5	16.9	10.26
20	16.9	10.26
22.5	16.9	10.33
25	15.6	10.55
27.5	14.6	10.83
30	11.7	11.5
32.5	10.8	11.78
35	10	11.63
37.5	9.5	11.38
40	8.8	10.45
42.5	8.5	10.03
45	8.3	9.44
50	8.2	8.5
55	8.1	7.84
60	8.1	7.42
65	8.1	7.34

Lake: Lower Herring Lake (Benzie Co.)

5/31/2022



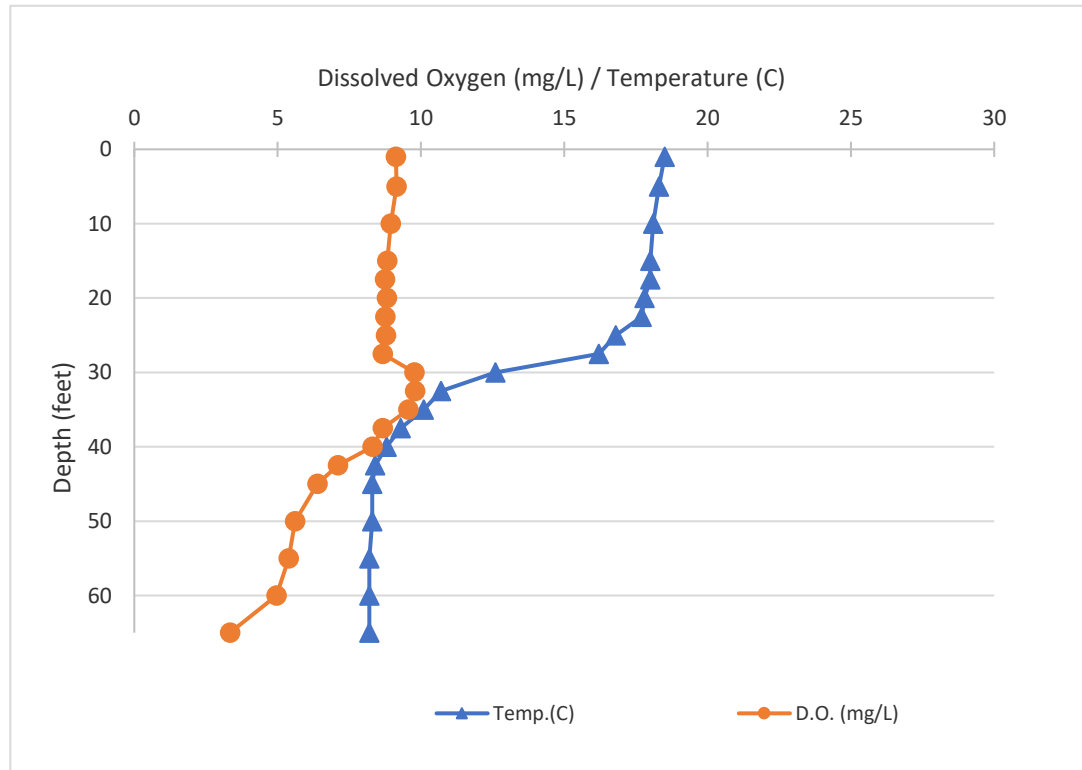
Name: Lower Herring Lake
 County: Benzie
 Site ID: 100085
 Date: 6/8/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	18.5	9.13
5	18.3	9.15
10	18.1	8.95
15	18	8.83
17.5	18	8.75
20	17.8	8.81
22.5	17.7	8.76
25	16.8	8.78
27.5	16.2	8.67
30	12.6	9.77
32.5	10.7	9.8
35	10.1	9.56
37.5	9.3	8.67
40	8.8	8.31
42.5	8.4	7.11
45	8.3	6.39
50	8.3	5.61
55	8.2	5.39
60	8.2	4.96
65	8.2	3.34

Lake: Lower Herring Lake (Benzie Co.)

6/8/2022



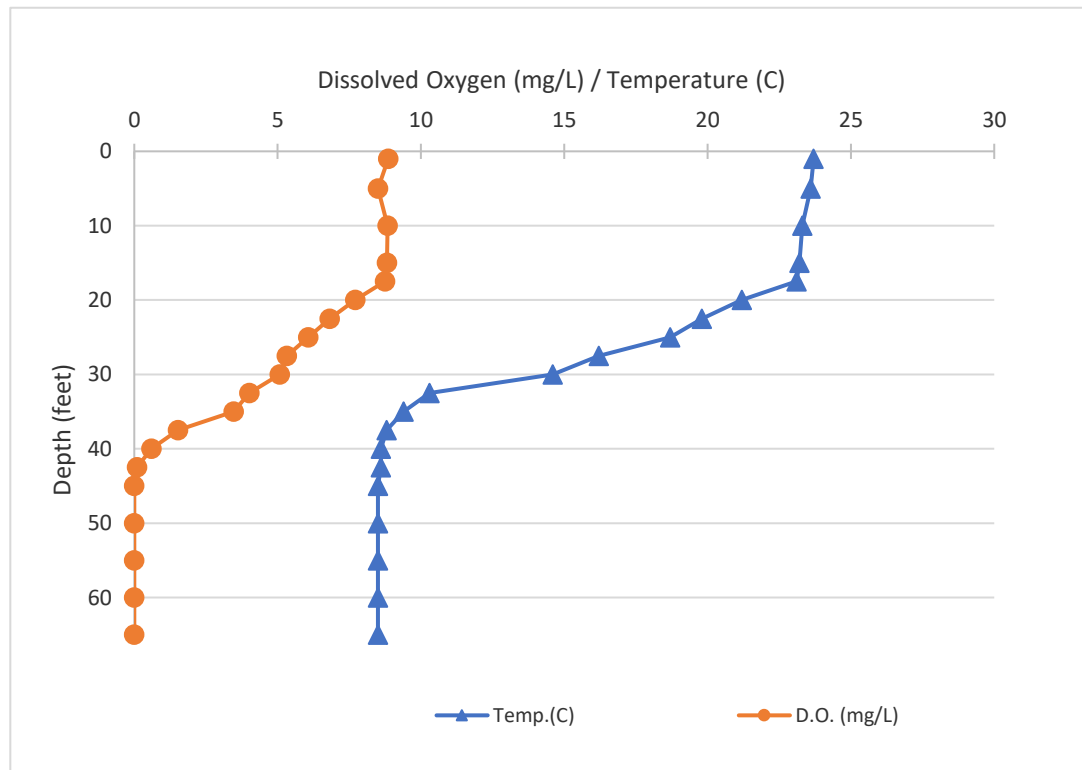
Name: Lower Herring Lake
 County: Benzie
 Site ID: 100085
 Date: 7/20/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23.7	8.86
5	23.6	8.5
10	23.3	8.84
15	23.2	8.81
17.5	23.1	8.75
20	21.2	7.71
22.5	19.8	6.82
25	18.7	6.07
27.5	16.2	5.32
30	14.6	5.07
32.5	10.3	4.02
35	9.4	3.47
37.5	8.8	1.52
40	8.6	0.6
42.5	8.6	0.1
45	8.5	0
50	8.5	0
55	8.5	0
60	8.5	0
65	8.5	0

Lake: Lower Herring Lake (Benzie Co.)

7/20/2022



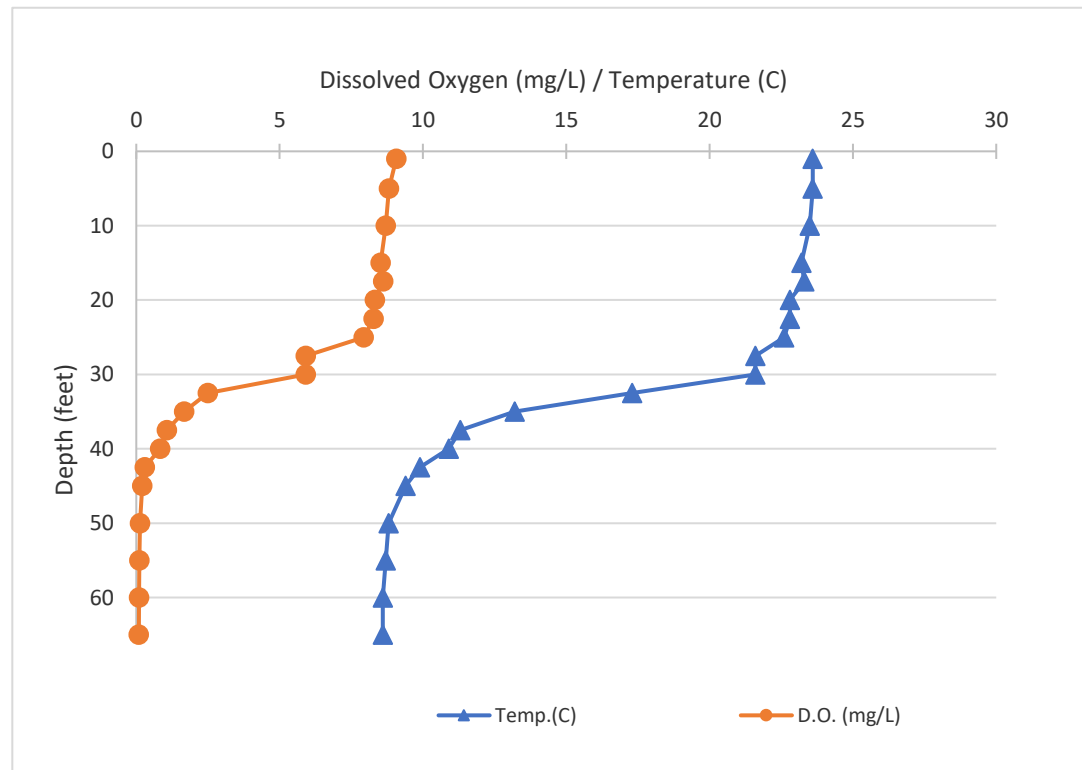
Name: Lower Herring Lake
 County: Benzie
 Site ID: 100085
 Date: 8/15/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23.6	9.07
5	23.6	8.81
10	23.5	8.7
15	23.2	8.53
17.5	23.3	8.61
20	22.8	8.32
22.5	22.8	8.28
25	22.6	7.93
27.5	21.6	5.91
30	21.6	5.91
32.5	17.3	2.5
35	13.2	1.67
37.5	11.3	1.07
40	10.9	0.83
42.5	9.9	0.3
45	9.4	0.21
50	8.8	0.13
55	8.7	0.11
60	8.6	0.1
65	8.6	0.09

Lake: Lower Herring Lake (Benzie Co.)

8/15/2022



Name: Lower Herring Lake
 County: Benzie
 Site ID: 100085
 Date: 9/6/2022

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23	8.34
5	22.9	8.09
10	22.6	8.25
15	22.5	8.25
17.5	22.3	8.13
20	22.3	8.01
22.5	22.2	7.93
25	22	7.61
27.5	21.9	7.36
30	21.9	7.25
32.5	21.7	6.94
35	21.3	5.69
37.5	13.7	2.81
40	12.1	2.12
42.5	10.5	1.66
45	10	1.36
50	10	1.04
55	10	0.88
60	8.8	0.75
65	8.7	0.63

Lake: Lower Herring Lake (Benzie Co.)

9/6/2022

