Cooperative Lakes Monitoring Program

Michigan Lakes– Ours to Protect

2023 Data Report
for

Ransom Lake, Benzie County

Site ID: 100278

44.7131°N, 85.8243°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

Ransom Lake, Benzie County
2023 CLMP Results

Cooperative Lakes
Monitoring Program

Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2023	10	13.0	20.0	15.7	1.9	37
2023 All CLMP Lakes	2817	1.0	50.0	12.7	2.9	42

No graph: Not enough data

Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2023	5	1.9	2.6	2.4	0.3	39
2023 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
2023	1	6.0	6.0	6.0	NA
2023 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
2023	1	<=3 W	<=3 W	<=3 W	NA	27
2023 All CLMP Lakes	234	<= 3	150.0	17.4	15.3	45

No graph: Not enough data

Dissolved Oxygen and Temperature Profile

9/8/2023
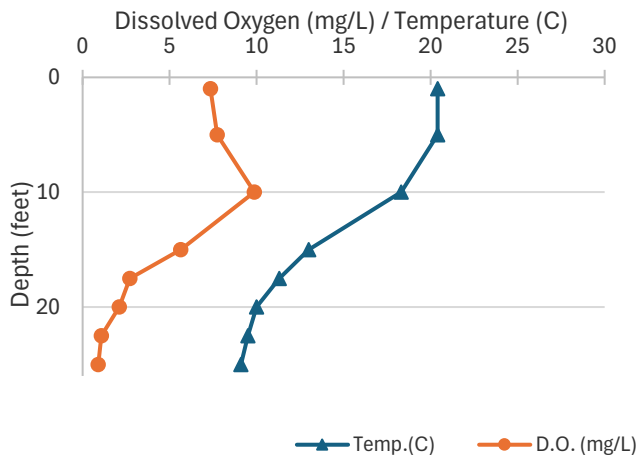
Summary

Average TSI	2023
Ransom Lake	35
All CLMP Lakes	44

Welcome to the CLMP! The longer you stay in the program and the more parameters you monitor, the more interesting this report will become. For now, there is too little data to assess long term trends. CLMP recommends eight years of consistent monitoring in order to develop a strong data baseline.

Based on your 2023 monitoring of Secchi transparency, chlorophyll-a and summer phosphorus, this lake is rated as oligotrophic, with a TSI score of 35.

Your dissolved oxygen and temperature data indicate that the lake retains 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.

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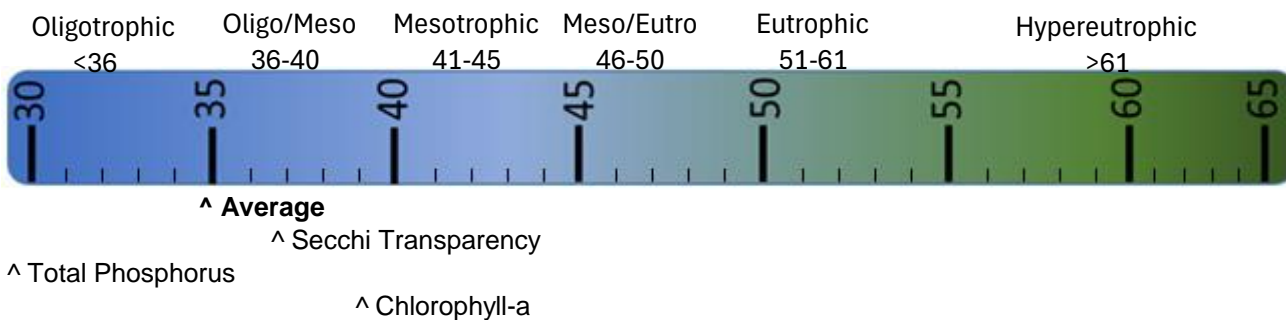
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

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 Ransom Lake in 2023	
Average	35
Secchi Disk	37
Summer TP	27
Chlorophyll-a	39

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

^ **Average**

^ Secchi Transparency

^ Total Phosphorus

^ 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.

Ransom Lake, Benzie County
2023 CLMP Aquatic Plant Results

Cooperative Lakes
Monitoring Program

The Aquatic Plant Mapping survey was conducted on Ransom Lake in 2023.

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 11 locations (4 transects) in Ransom Lake in 2023. Below is a list of species reported, in order of relative abundance. Survey conducted July 13.

Ransom Lake, Benzie County		
2023 Aquatic Plant Mapping: Species Reported		
Common Name	**Latin Name**	**Average Density***
Stonewort	*Chara* sp.	3.64
Variable pondweed	*Potamogeton gramineus*	1.45
White water lily	*Nymphaea odorata*	1.45
Bladderwort	*Utricularia* sp.	1.09
Yellow water lily	*Nuphar variegata*	1.00
Northern manna grass	*Glyceria borealis*	0.73
Waterweed	*Elodea canadensis*	0.73
Floating-leaf pondweed	*Potamogeton natans*	0.54
Flat-stem pondweed	*Potamogeton zosteriformis*	0.36
Sago pondweed	*Stuckenia pectinata*	0.36
Northern watermilfoil	*Myriophyllum sibiricum*	0.27
Bulrush		0.18

^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.

Ransom Lake, Benzie County
2023 Score the Shore Results

Cooperative Lakes
Monitoring Program

The Score the Shore Habitat Assessment was conducted on Ransom Lake in 2023.

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?

Ransom Lake

Final Score

Structure Density
(Avg. # Structures Per 1000 feet of Shoreline)
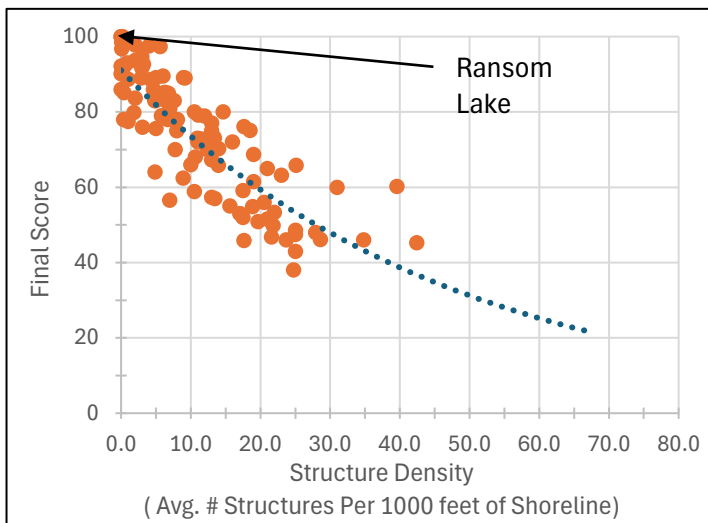
Ransom Lake	
Number of Sections:	5
Number of Structures:	1
Structure Density:	0
Final Score:	100

All 106 Participating Lakes from 2015-2023:	
Avg. Number of Sections:	16
Avg. Number of Structures:	223
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 Ransom Lake:

Ransom Lake is a pristine, untouched lake. 100% percent of the lake sections scored a perfect score. It has only a single dock in it, and is surrounded by natural areas.

Ransom Lake has a littoral zone full of aquatic plants and fallen woody debris, making this an excellent place for fish, birds, turtles, and any other creature that relies on a watery habitat.

There are no notable erosion points on the lake.

Ransom Lake is the first lake in the CLMP (along with Lime Lake, Benzie County) to ever get a perfect score in the Score the Shore analysis.
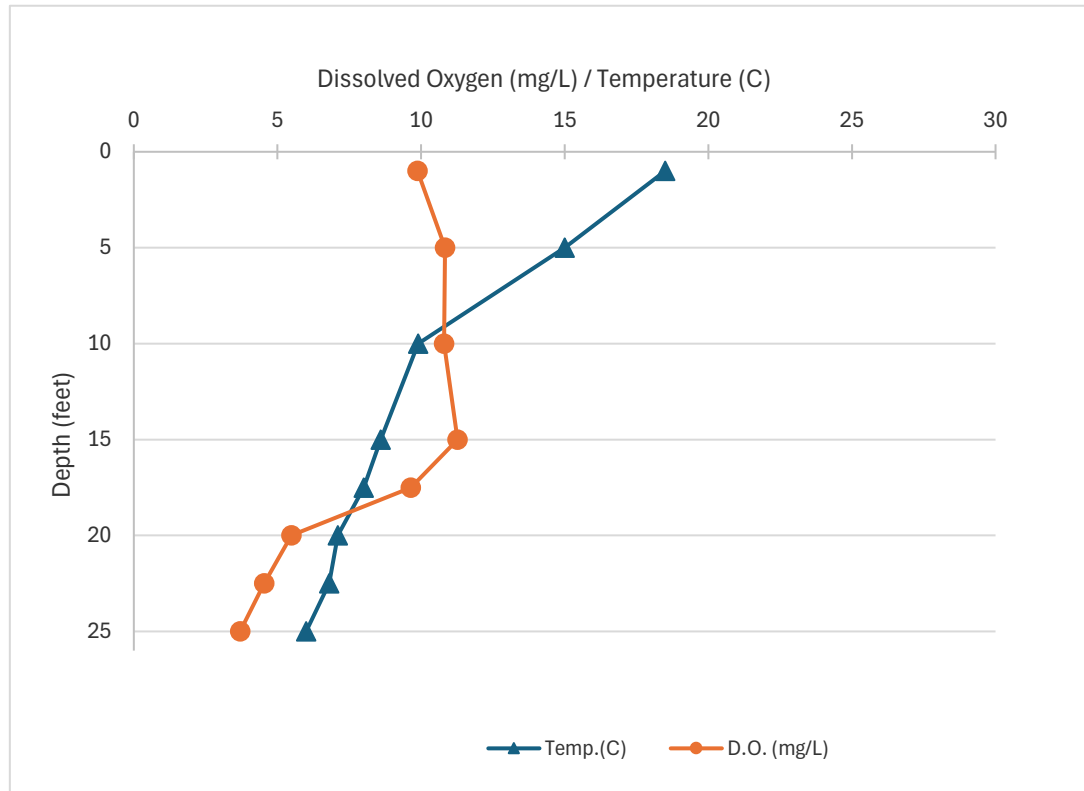

# of 1000 fo0t Lakeshore sections

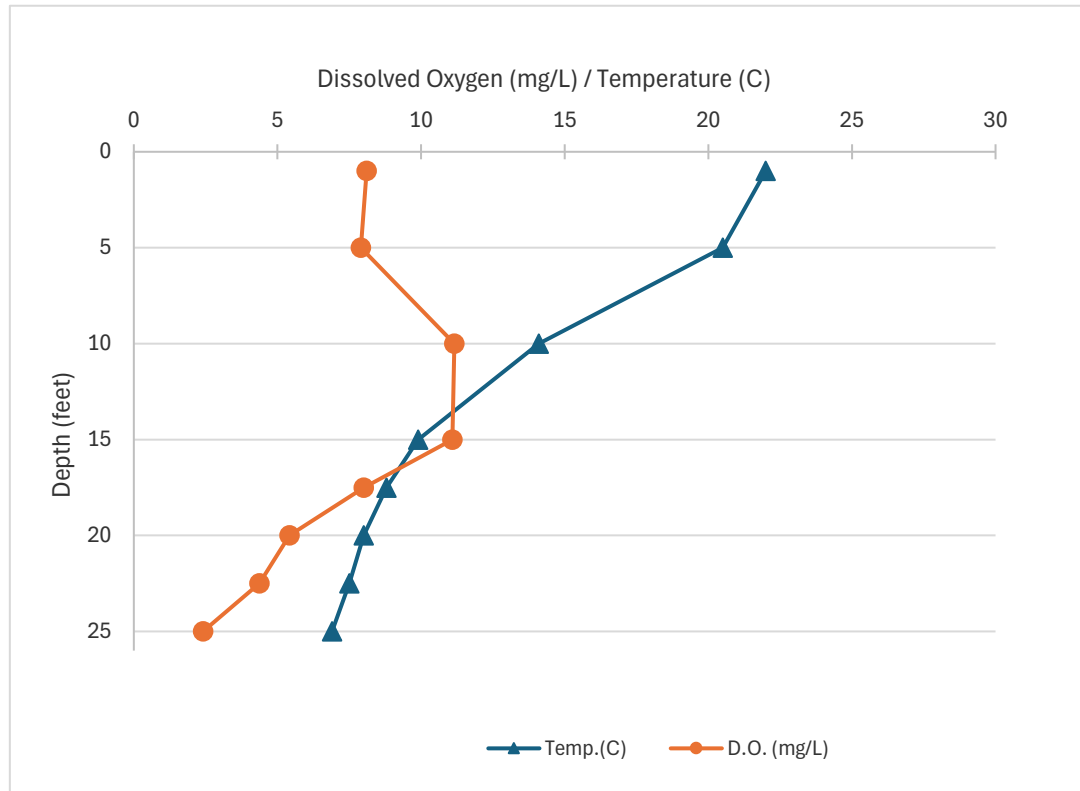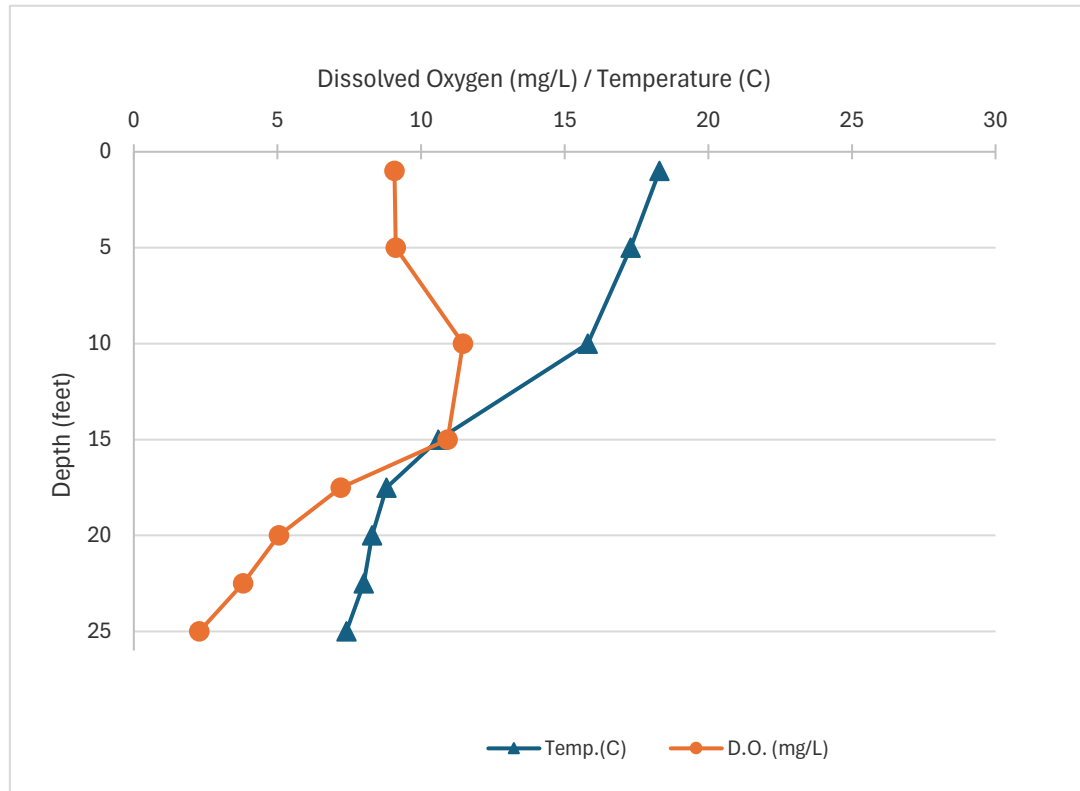Highly Impacted (0-25) Poor (26-50) Fair (51-75) Good (76-100)
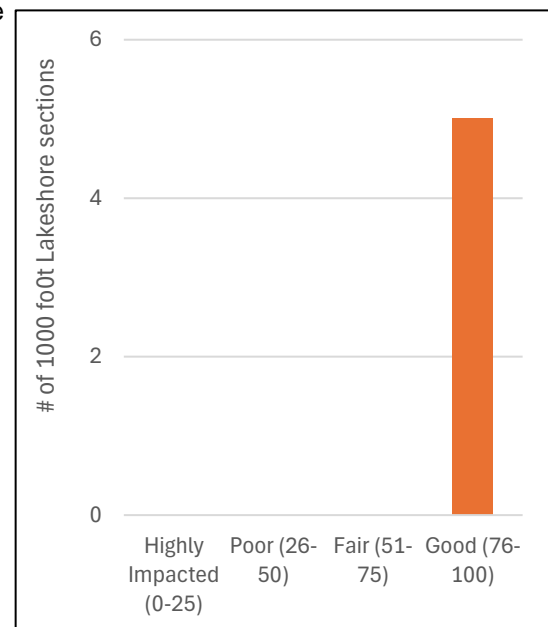
Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 5/12/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	18.5	9.88
5	15	10.84
10	9.9	10.8
15	8.6	11.27
17.5	8	9.64
20	7.1	5.49
22.5	6.8	4.54
25	6	3.7

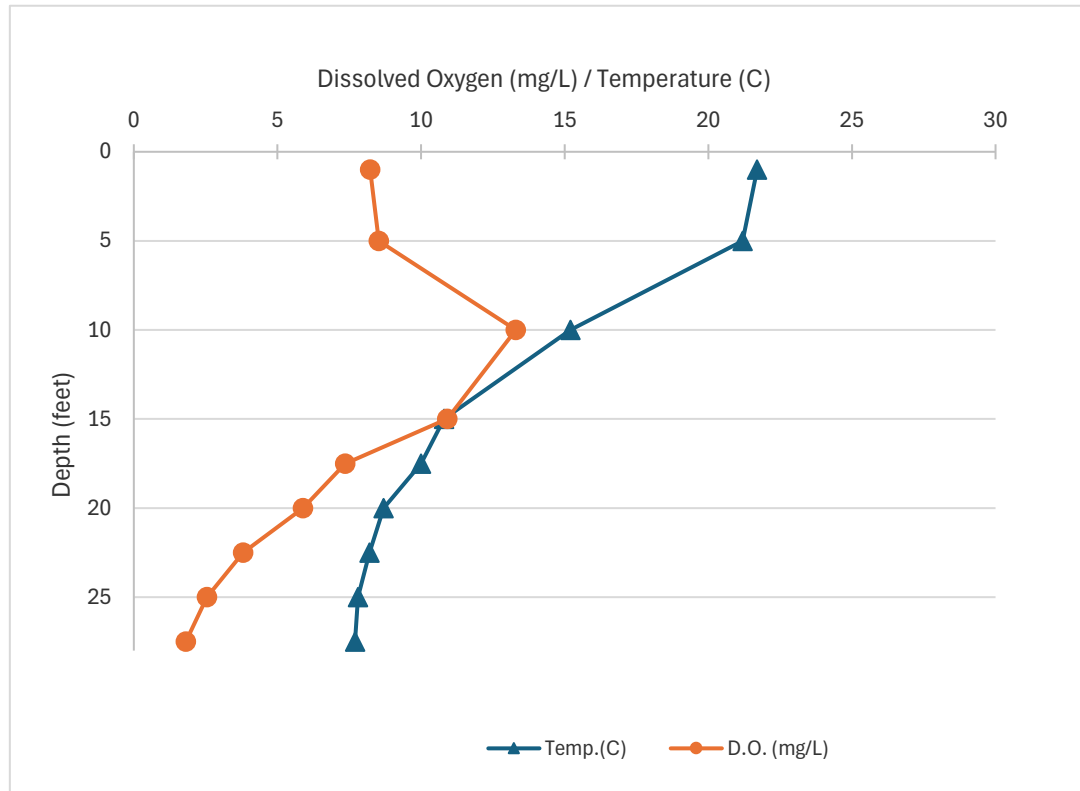**Lake: Ransom Lake (Benzie Co.)**   **5/12/2023**

Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 5/31/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	22	8.11
5	20.5	7.91
10	14.1	11.16
15	9.9	11.09
17.5	8.8	8.01
20	8	5.42
22.5	7.5	4.37
25	6.9	2.41

Lake: Ransom Lake (Benzie Co.) **5/31/2023**

Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 6/16/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	18.3	9.08
5	17.3	9.12
10	15.8	11.46
15	10.6	10.92
17.5	8.8	7.2
20	8.3	5.05
22.5	8	3.8
25	7.4	2.28

Lake: Ransom Lake (Benzie Co.)   **6/16/2023**
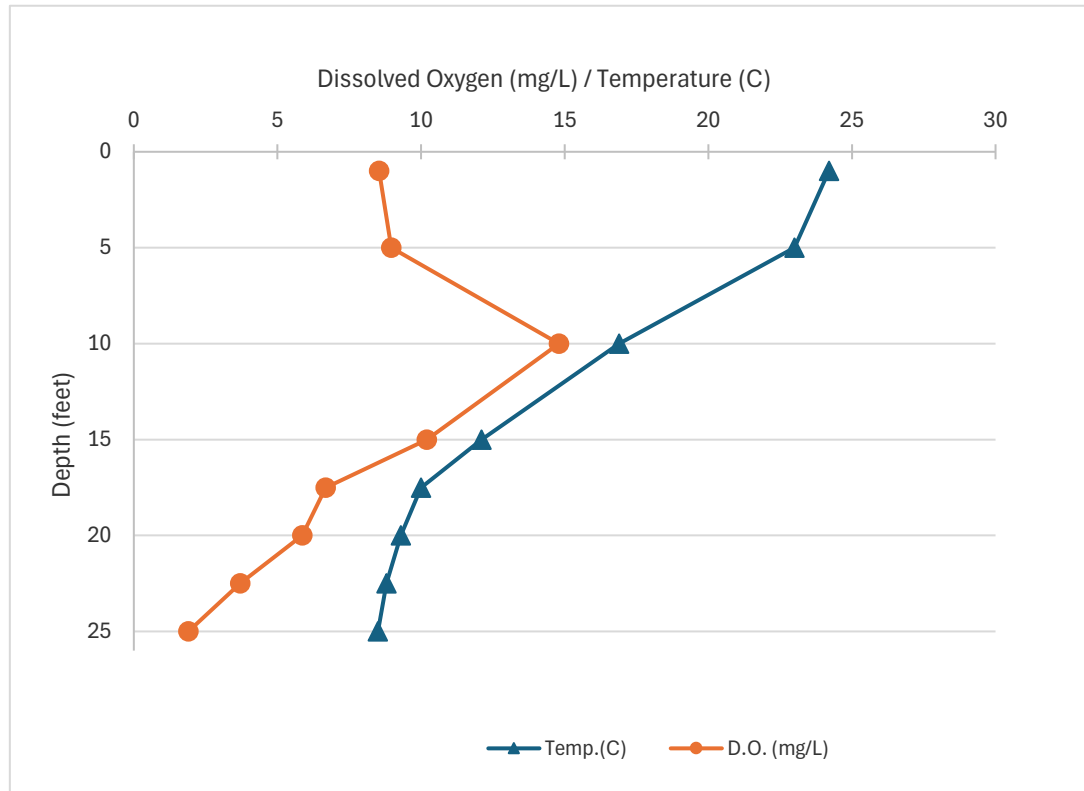
Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 6/28/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	21.7	8.23
5	21.2	8.53
10	15.2	13.3
15	10.8	10.91
17.5	10	7.36
20	8.7	5.89
22.5	8.2	3.81
25	7.8	2.55
27.5	7.7	1.81

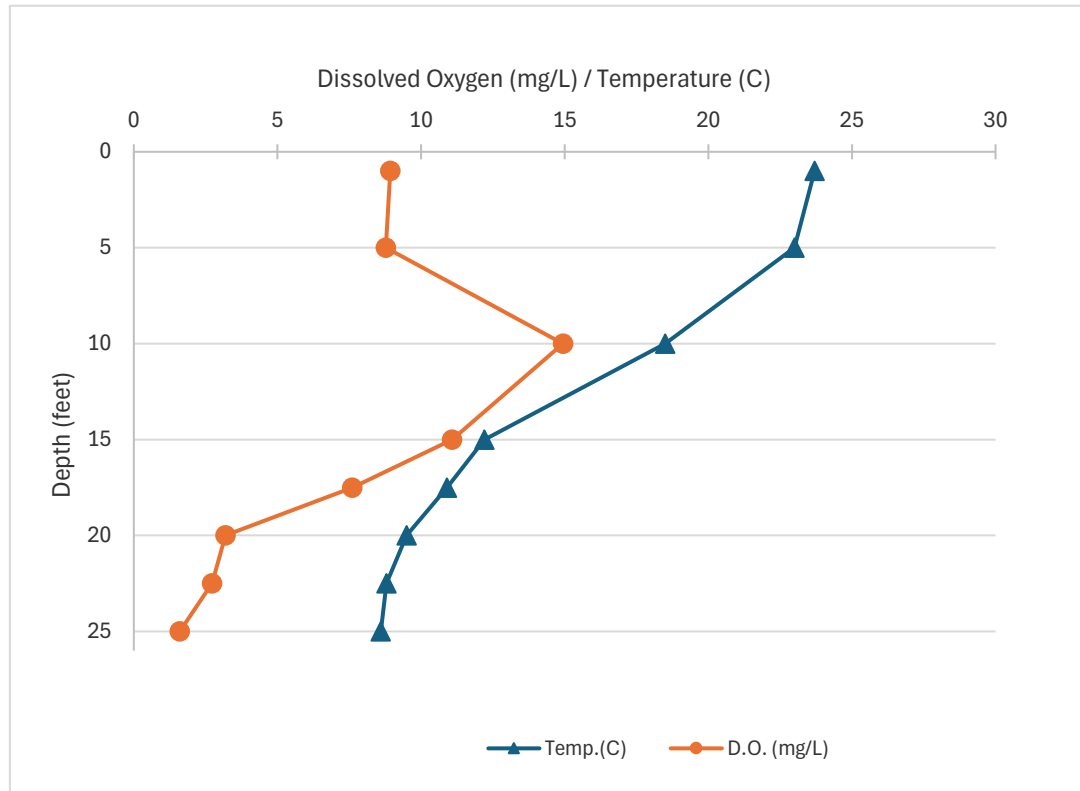**Lake: Ransom Lake (Benzie Co.)**   **6/28/2023**

Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 7/13/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24.2	8.54
5	23	8.96
10	16.9	14.8
15	12.1	10.2
17.5	10	6.68
20	9.3	5.87
22.5	8.8	3.7
25	8.5	1.9

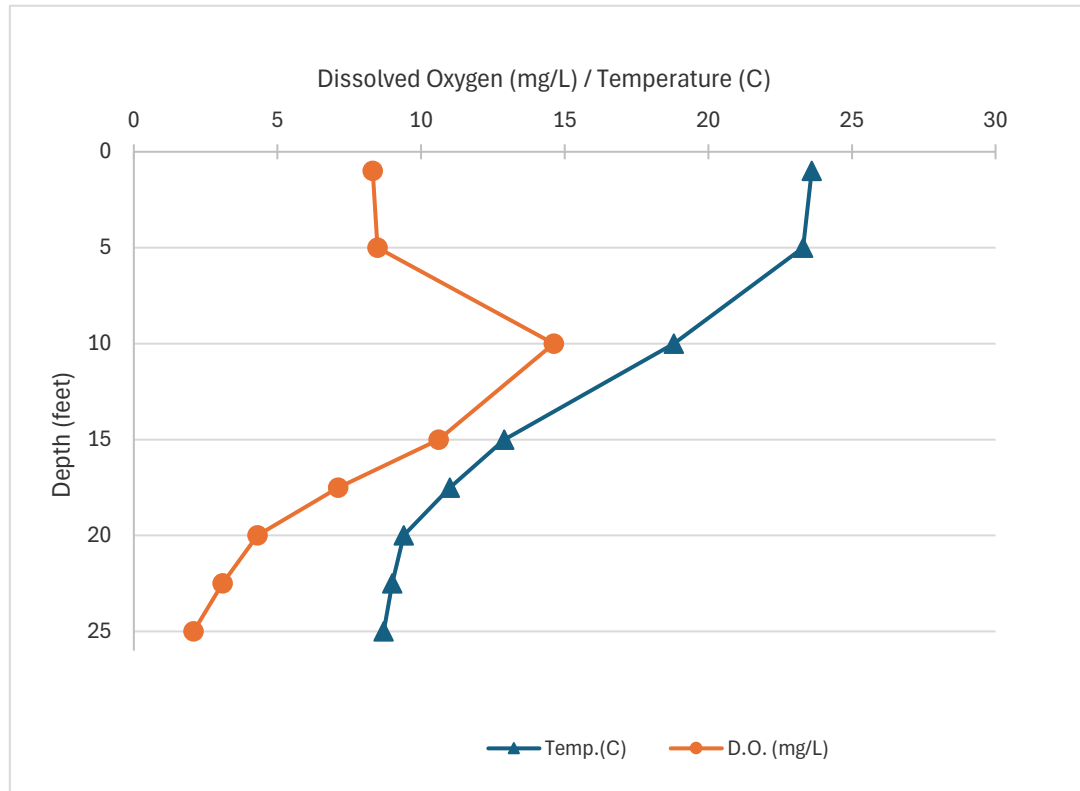**Lake: Ransom Lake (Benzie Co.)**   **7/13/2023**

Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 7/21/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23.7	8.93
5	23	8.77
10	18.5	14.94
15	12.2	11.08
17.5	10.9	7.6
20	9.5	3.19
22.5	8.8	2.72
25	8.6	1.6

Lake: Ransom Lake (Benzie Co.)   **7/21/2023**

Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 8/3/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	23.6	8.32
5	23.3	8.48
10	18.8	14.62
15	12.9	10.61
17.5	11	7.11
20	9.4	4.31
22.5	9	3.09
25	8.7	2.08

Lake: Ransom Lake (Benzie Co.)   8/3/2023

Dissolved Oxygen (mg/L) / Temperature (C)
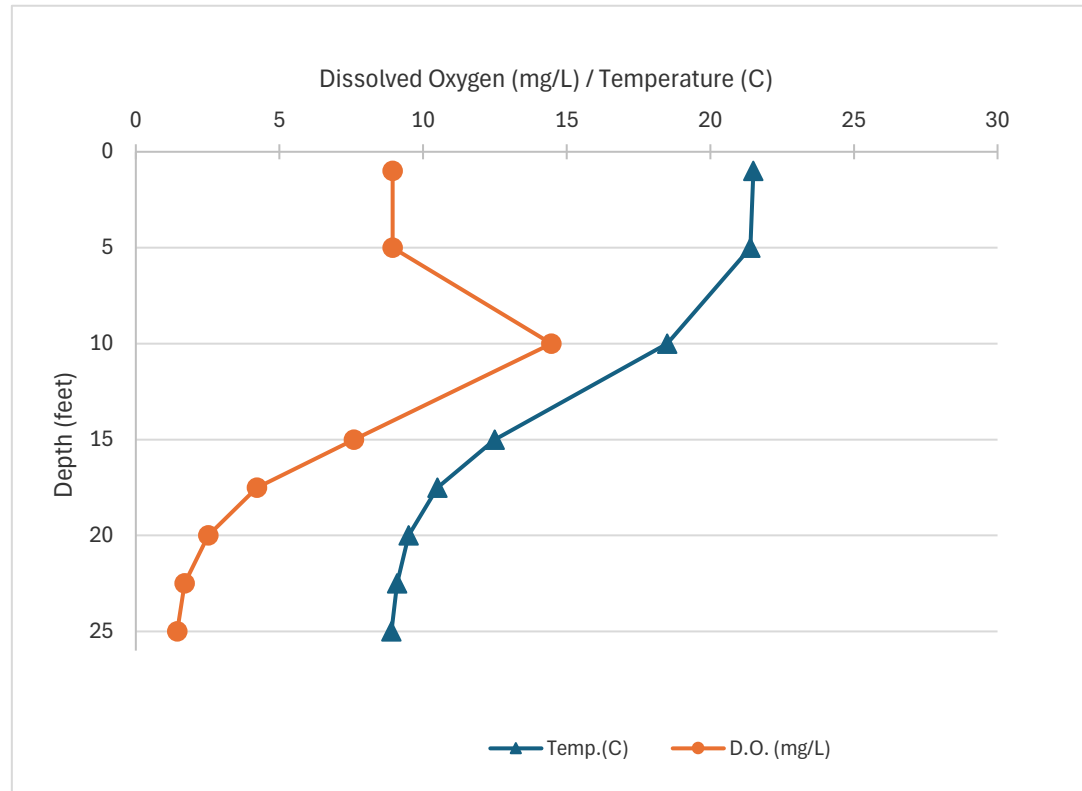
Depth (feet)

Temp.(C)   D.O. (mg/L)

Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 8/16/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	21.5	8.94
5	21.4	8.94
10	18.5	14.47
15	12.5	7.59
17.5	10.5	4.22
20	9.5	2.52
22.5	9.1	1.7
25	8.9	1.44

Lake: Ransom Lake (Benzie Co.)   8/16/2023
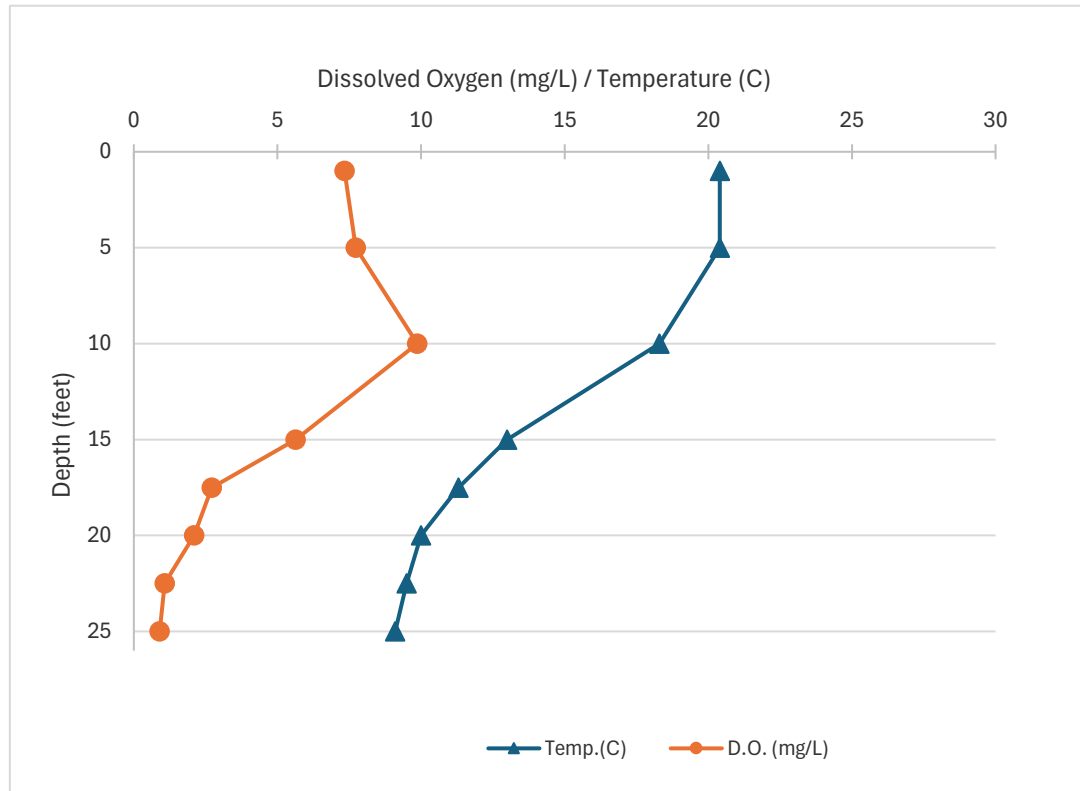
Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 9/8/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	20.4	7.34
5	20.4	7.73
10	18.3	9.87
15	13	5.63
17.5	11.3	2.71
20	10	2.1
22.5	9.5	1.08
25	9.1	0.9

Lake: Ransom Lake (Benzie Co.)   **9/8/2023**

Name: Ransom Lake
County: Benzie
Site ID: 100278
Date: 9/19/2023

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	20.1	7.2
5	20	7.59
10	18	8.97
15	12.9	5.21
17.5	11	2.5
20	9.8	1.9
22.5	9.1	1.02
25	8.9	0.97

Lake: **Ransom Lake (Benzie Co.)** **9/19/2023**