



Cooperative Lakes Monitoring Program

Michigan Lakes— Ours to Protect

2015 Data Report for Manitou Lake, Shiawassee County

Site ID: 780233

42.92563°N, 84.20300°W

The CLMP is brought to you by:



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 past field season, the past five years, 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). A late summer graph is used because dissolved oxygen is often depleted in the late summer, and identifying 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 the results of the Exotic Plant Watch or Full Plant Mapping, if you participated in that parameter. If you enrolled in the Score the Shore Parameter, a summary will be found after the plant page.

The rest of the report will be 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/CLMP-Manual.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, Scott Brown, Laura Kaminski, and Katherine Hollins.

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

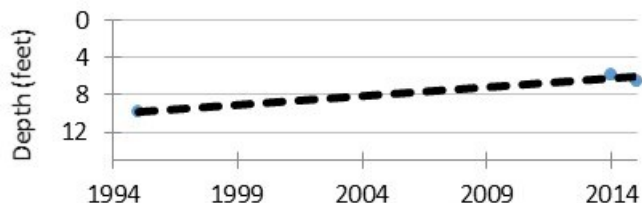
Manitou Lake, Shiawassee County



2015 CLMP Results

Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2015	19	2.5	10.0	6.5	2.0	50
2010-2014	19	4.0	8.0	5.8	0.9	52
1995-2009	8	7.0	12.0	9.8	1.6	44
2015 All CLMP Lakes	3018	1.5	42.0	12.6	6.1	42



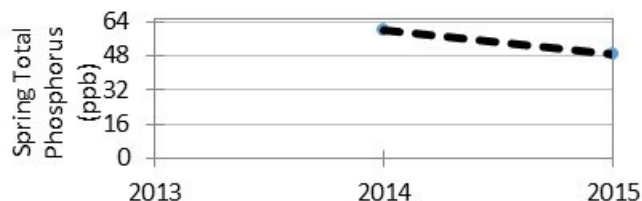
Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2015	5	1.9	15.0	8.7	6.4	52
2015 All CLMP Lakes	628	< 1.0	14.0	2.5	2.1	39

No graph: Not enough data

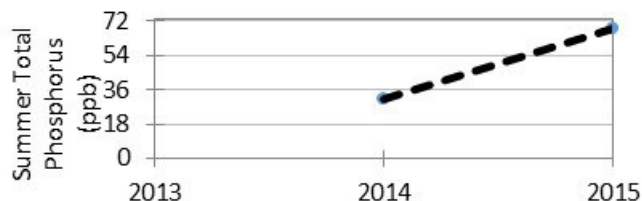
Spring Total Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2015	1	49	49	49.0	NA
2014	1	60	60	60.0	NA
2015 All CLMP Lakes	131	<= 3	70	11.5	13.7

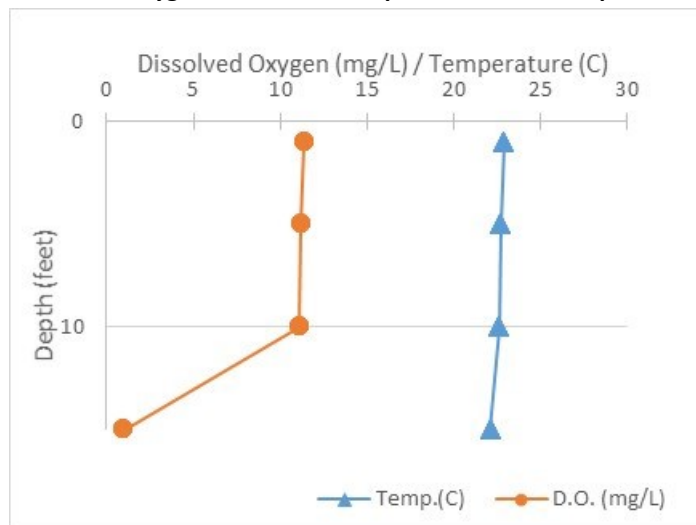


Summer Total Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2015	1	68	68	68.0	NA	65
2014	1	31	31	31.0	NA	54
2015 All CLMP Lakes	173	<= 3	68	13.2	8.1	39



Dissolved Oxygen and Water Temperature Profile: Sept 2015



Summary

	Average TSI	2015	2010-2014	1995-2009
Manitou Lake	56	56	53	44
All CLMP Lakes	40	40	NA	NA

With an average TSI score of 56 based on Secchi transparency, chlorophyll-a, and summer total phosphorus, this lake is rated as an eutrophic lake. Due to the high nutrient level, the lake loses dissolved oxygen in the bottom waters in early summer.

Manitou Lake has seen a big loss of transparency since measurements taken in 1995. This indicates that nutrient levels have greatly increased. More monitoring is needed to determine if these levels are still on the rise.

*= No sample received W= Value is less than the detection limit (<3 ppb) T= Value reported is less than the reporting limit (5 ppb). Result is estimated.
 <1 = Chlorophyll-a: Sample value is less than limit of quantification (<1 ppb).

Lake Manitou, Shiawassee County

2015 Exotic Aquatic Plant Watch Results



The Exotic Aquatic Plant Watch was conducted on Lake Manitou in 2015.

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 four highly invasive species: Eurasian watermilfoil (*Myriophyllum spicatum*), starry stonewort (*Nitellopsis obtusa*), curly-leaf pondweed (*Potamogeton crispus*), and Hydrilla (*Hydrilla verticillata*).

The table below summarizes the results of the 2015 Exotic Aquatic Plant Watch on Lake Manitou.

Lake Manitou, Shiawassee County		
2015 Exotic Aquatic Plant Watch Results		
Survey Date: July 6		
<u>Species</u>	<u>Status</u>	<u>Comments</u>
Eurasian watermilfoil	FOUND	Found at all survey locations
Starry stonewort	Not found	
Curly-leaf pondweed	FOUND	Found in 2 adjacent locations; dense
Hydrilla	Not found	

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.

Manitou Lake, Shiawassee County

2015 Score the Shore Results



This lake does not have shoreline habitat assessment results for 2015. Consider enrolling in this parameter next year!

Why is the Score the Shore parameter important?

Healthy shorelines are an important and valuable component of the lake ecosystem. The shoreline area is a transition zone between water and land, and is a very diverse environment that provides habitat for a great variety of fish, plants, birds, and other animals. A healthy shoreline area is also essential for maintaining water quality, slowing runoff, and limiting erosion.

However, Michigan's inland lake shorelines are threatened. Extensive development, often combined with poor shoreline management practices, can reduce or eliminate natural shoreline habitat and replace it with lawn and artificial erosion control such as sea walls and rock. As a result, shoreline vegetation is dramatically altered, habitat is lost, and water quality declines.

Therefore, in 2015 the MiCorps Cooperative Lakes Monitoring Program introduced a new monitoring program – Score the Shore – that enables volunteers to assess the quality of their lake's shoreline habitat.

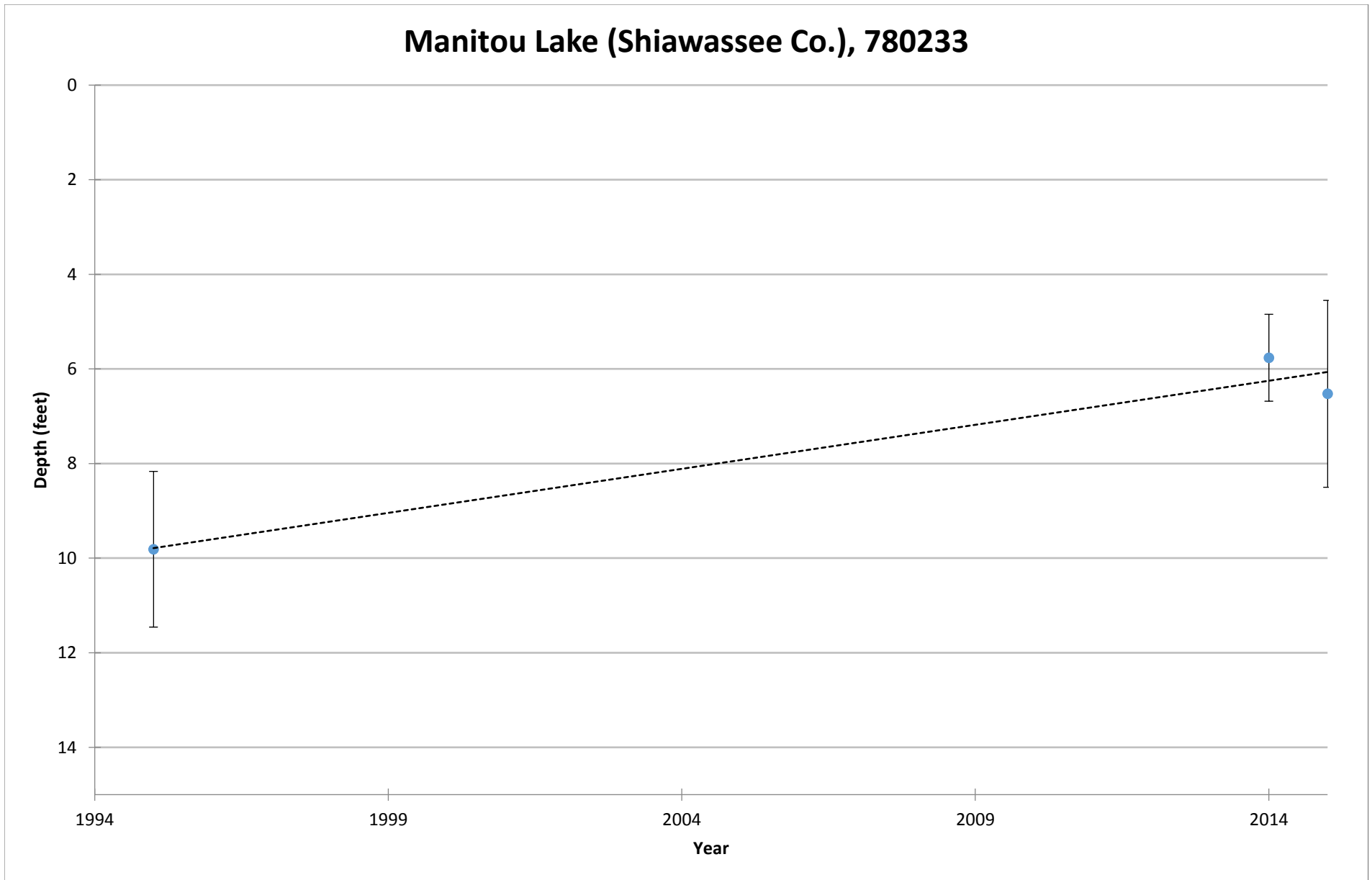
The information gathered during this assessment will allow lake communities to identify high-quality areas that can be protected, as well as opportunities for improvement. Score the Shore data, combined with educational resources describing the value of healthy shorelines and how to restore and maintain them, can be incorporated into lake management planning and used for educating lakefront property owners. The Michigan Natural Shoreline Partnership (MNSP) is a collaboration of agencies and professionals that promotes natural shoreline practices to protect Michigan's inland lakes. The MNSP website (www.mishorelinepartnership.org) includes materials and information that can be used in educational efforts. MNSP also offers training for professional educators and landscape contractors, and maintains a list of trained educators who may be available to speak to your community about natural shorelines.

Score the Shore data, just like all CLMP data, will also be available to any interested parties through the MiCorps Data Exchange (www.micorps.net). State agency staff and researchers regularly access CLMP data to better understand and manage Michigan's inland lakes.

It is important to understand that Score the Shore is a descriptive process for assessing shoreline quality on Michigan's inland lakes. It is also a valuable educational tool. Score the Shore is not a regulatory program, nor is it intended to tell people what they can and cannot do on their property. The Michigan Department of Environmental Quality's Inland Lakes and Streams Program has responsibility for shoreline protection on public lakes. To learn about their shoreline protection program, including construction permitting and recommendations for shoreline management, visit www.mi.gov/deqinlandlakes.

COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEAN TRANSPARENCY

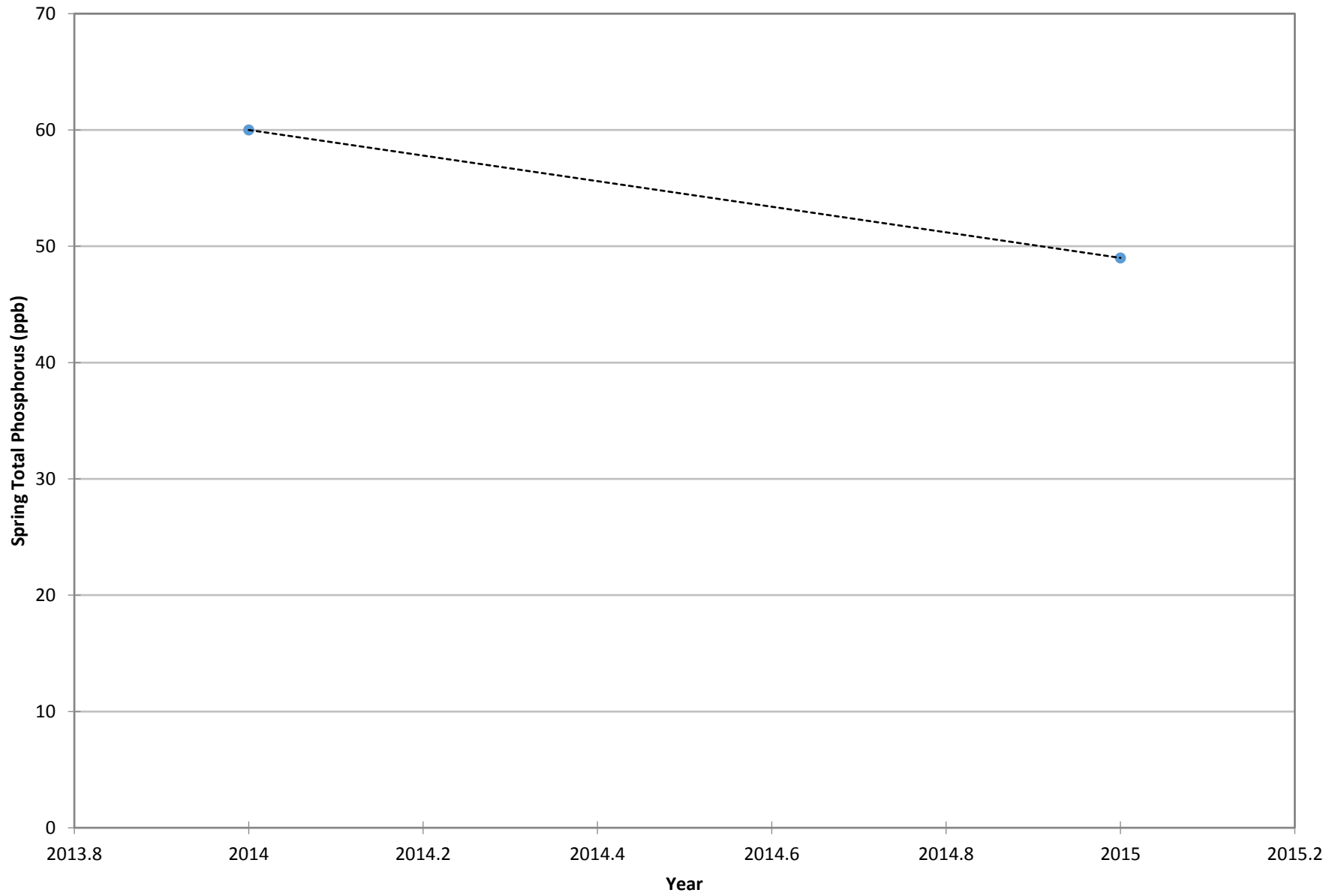
Manitou Lake (Shiawassee Co.), 780233



Vertical bars indicate standard deviation

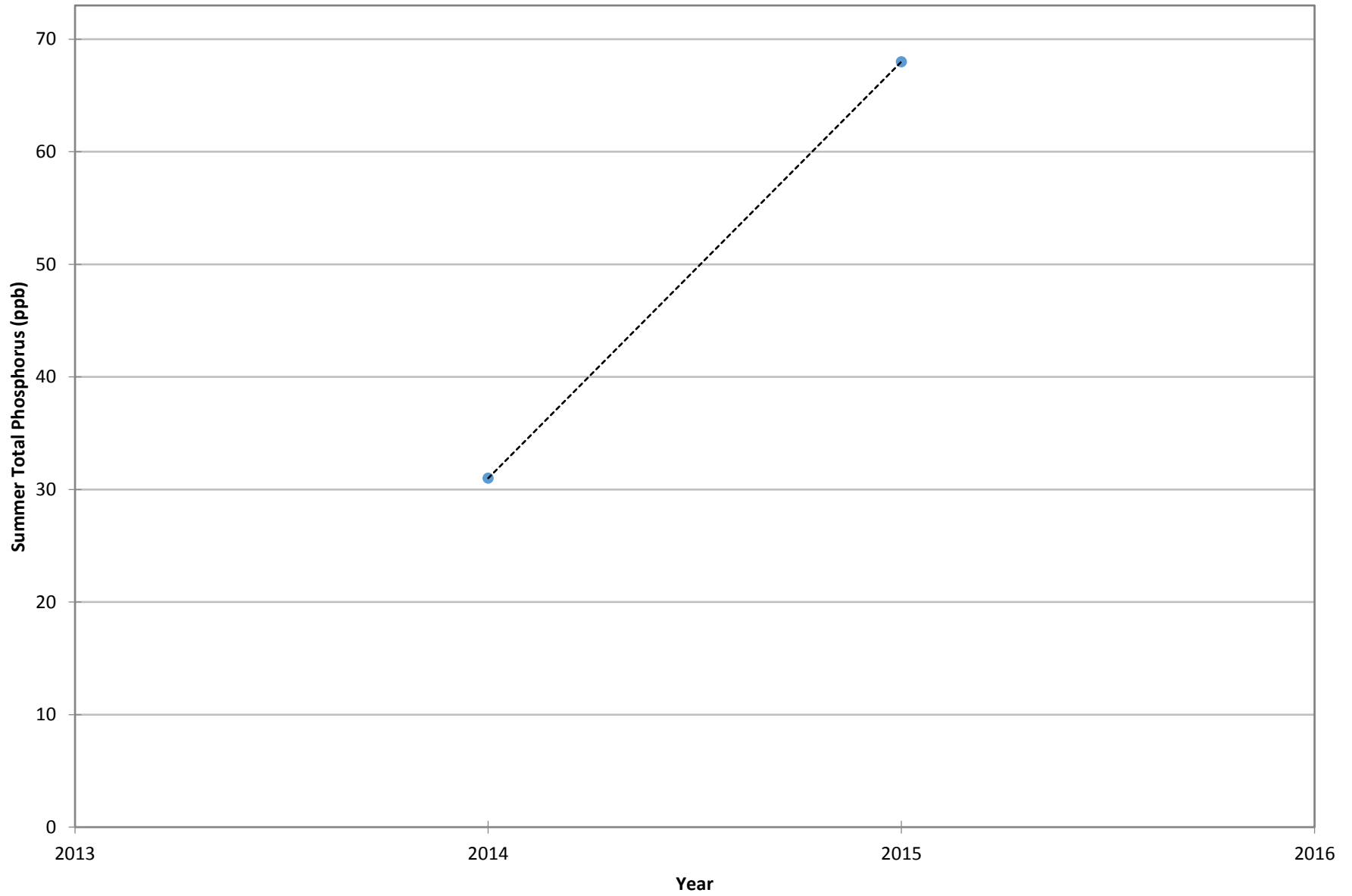
COOPERATIVE LAKES MONITORING PROGRAM
SPRING TOTAL PHOSPHORUS

Manitou Lake (Shiawasse Co.), 780233



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER TOTAL PHOSPHORUS

Manitou Lake (Shiawassee Co.), 780233



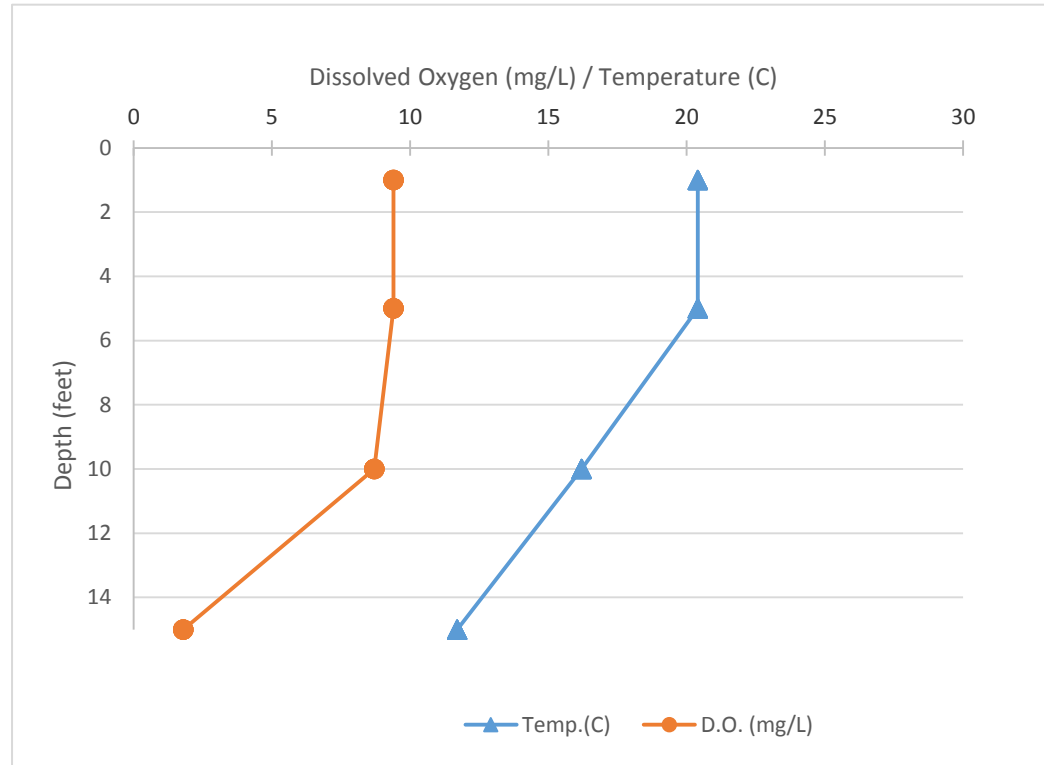
Name: Manitou
 County: Shiawassee
 Site ID: 780233
 Date: 5/18/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	20.4	9.4
1	20.4	9.4
1	20.4	9.4
1	20.4	9.4
1	20.4	9.4
5	20.4	9.4
5	20.4	9.4
5	20.4	9.4
5	20.4	9.4
5	20.4	9.4
10	16.2	8.7
10	16.2	8.7
10	16.2	8.7
10	16.2	8.7
10	16.2	8.7
15	11.7	1.8
15	11.7	1.8
15	11.7	1.8
15	11.7	1.8
15	11.7	1.8

Lake: Manitou (Shiawassee Co.)

5/18/2015



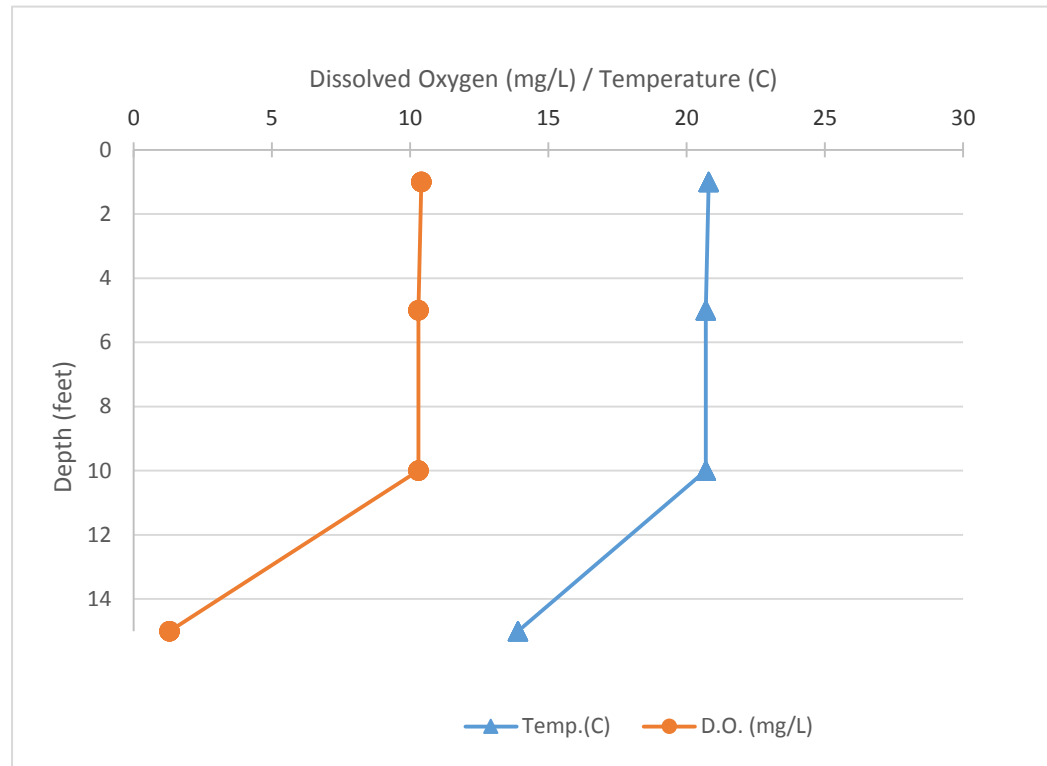
Name: Manitou
County: Shiawassee
Site ID: 780233
Date: 5/26/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	20.8	10.4
1	20.8	10.4
1	20.8	10.4
1	20.8	10.4
1	20.8	10.4
5	20.7	10.3
5	20.7	10.3
5	20.7	10.3
5	20.7	10.3
5	20.7	10.3
10	20.7	10.3
10	20.7	10.3
10	20.7	10.3
10	20.7	10.3
10	20.7	10.3
15	13.9	1.3
15	13.9	1.3
15	13.9	1.3
15	13.9	1.3
15	13.9	1.3

Lake: Manitou (Shiawassee Co.)

5/26/2015



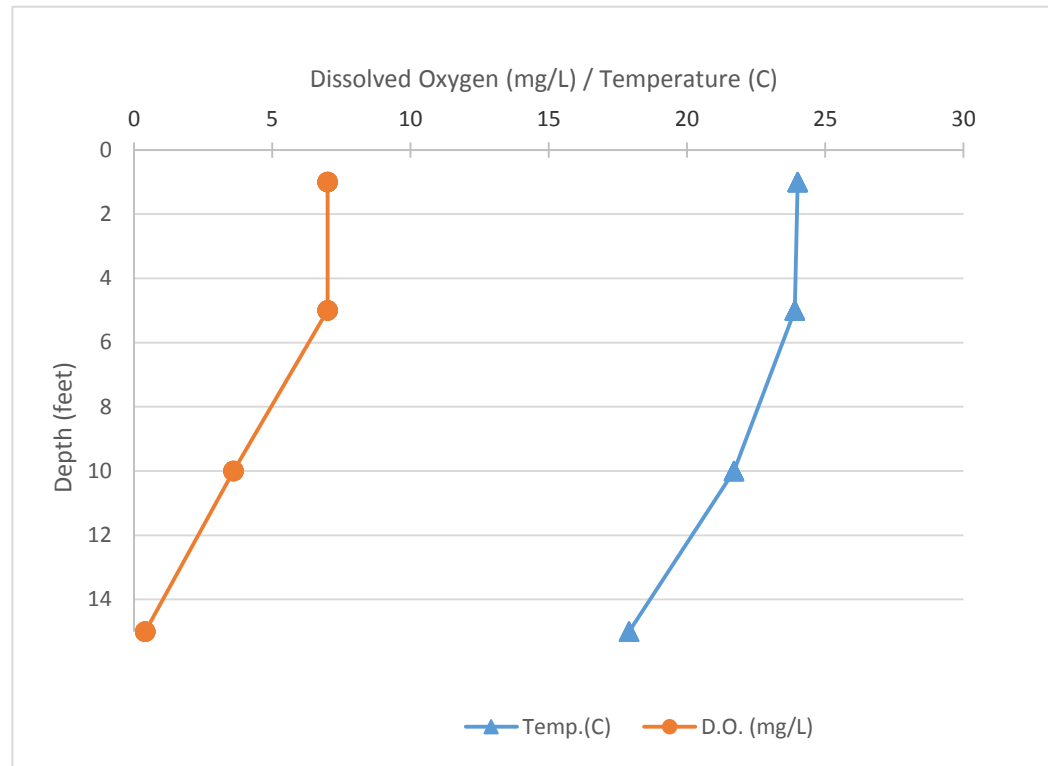
Name: Manitou
 County: Shiawassee
 Site ID: 780233
 Date: 6/18/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24	7
1	24	7
1	24	7
1	24	7
1	24	7
5	23.9	7
5	23.9	7
5	23.9	7
5	23.9	7
5	23.9	7
10	21.7	3.6
10	21.7	3.6
10	21.7	3.6
10	21.7	3.6
10	21.7	3.6
15	17.9	0.4
15	17.9	0.4
15	17.9	0.4
15	17.9	0.4
15	17.9	0.4

Lake: Manitou (Shiawassee Co.)

6/18/2015



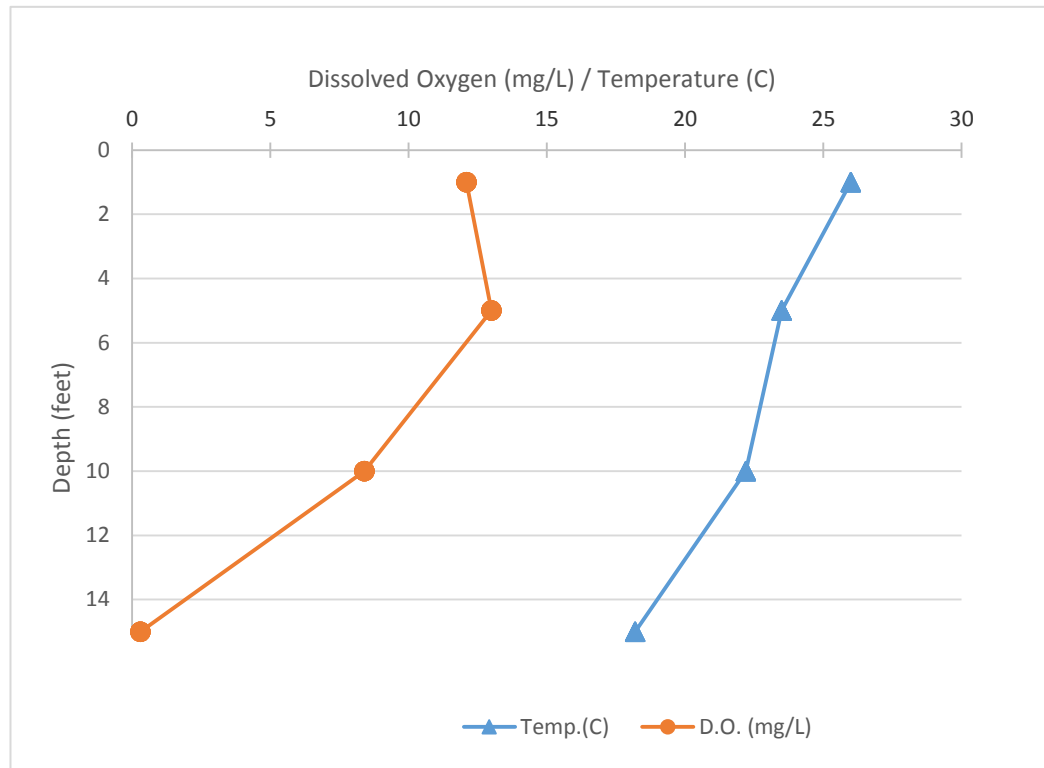
Name: Manitou
 County: Shiawassee
 Site ID: 780233
 Date: 7/10/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26	12.1
1	26	12.1
1	26	12.1
1	26	12.1
1	26	12.1
5	23.5	13
5	23.5	13
5	23.5	13
5	23.5	13
5	23.5	13
10	22.2	8.4
10	22.2	8.4
10	22.2	8.4
10	22.2	8.4
10	22.2	8.4
15	18.2	0.3
15	18.2	0.3
15	18.2	0.3
15	18.2	0.3
15	18.2	0.3

Lake: Manitou (Shiawassee Co.)

7/10/2015



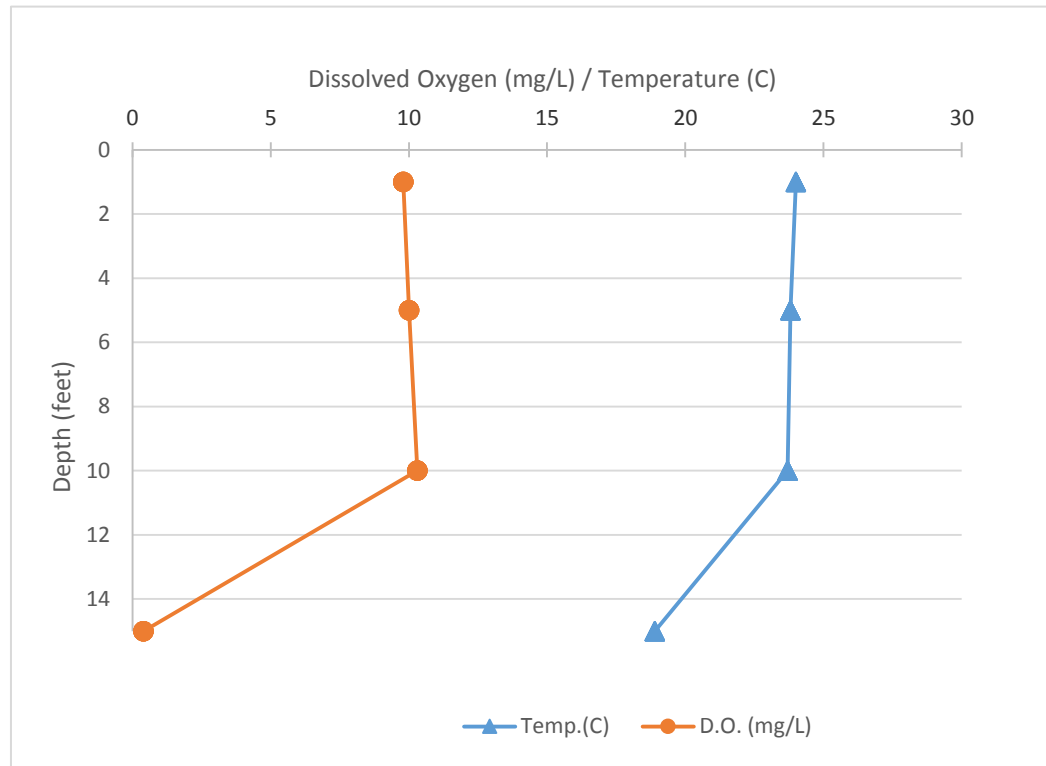
Name: Manitou
County: Shiawassee
Site ID: 780233
Date: 7/17/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	24	9.8
1	24	9.8
1	24	9.8
1	24	9.8
1	24	9.8
5	23.8	10
5	23.8	10
5	23.8	10
5	23.8	10
5	23.8	10
10	23.7	10.3
10	23.7	10.3
10	23.7	10.3
10	23.7	10.3
10	23.7	10.3
15	18.9	0.4
15	18.9	0.4
15	18.9	0.4
15	18.9	0.4
15	18.9	0.4

Lake: Manitou (Shiawassee Co.)

7/17/2015



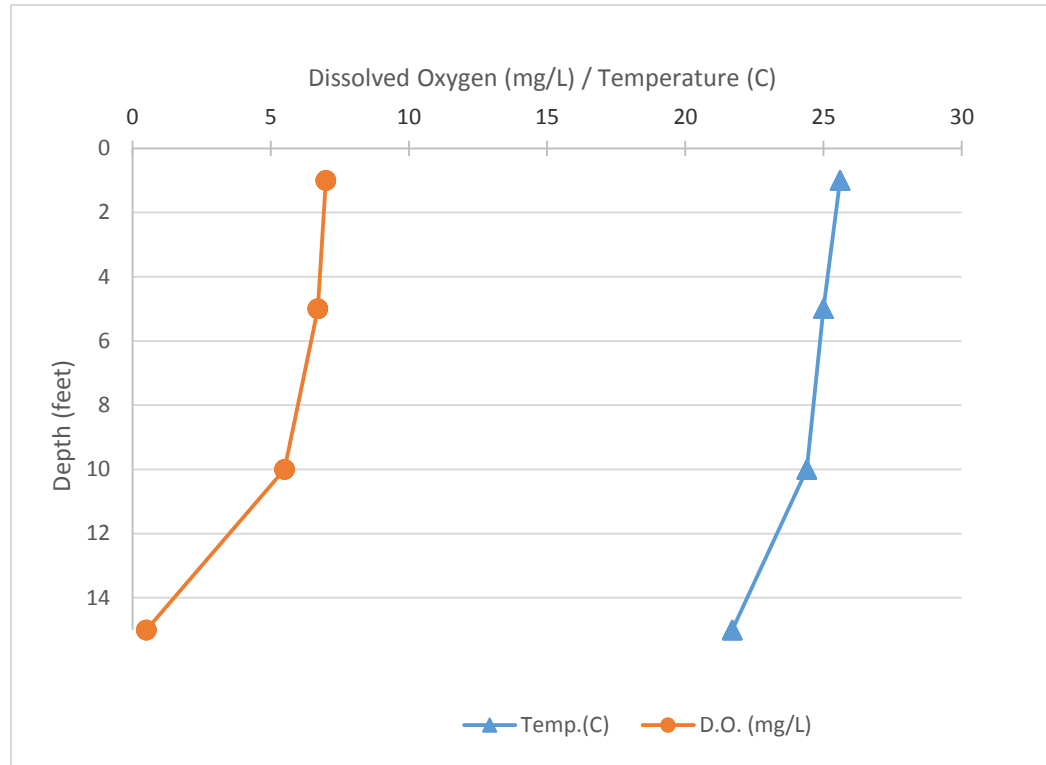
Name: Manitou
County: Shiawassee
Site ID: 780233
Date: 8/14/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	25.6	7
1	25.6	7
1	25.6	7
1	25.6	7
1	25.6	7
5	25	6.7
5	25	6.7
5	25	6.7
5	25	6.7
5	25	6.7
10	24.4	5.5
10	24.4	5.5
10	24.4	5.5
10	24.4	5.5
10	24.4	5.5
15	21.7	0.5
15	21.7	0.5
15	21.7	0.5
15	21.7	0.5
15	21.7	0.5

Lake: Manitou (Shiawassee Co.)

8/14/2015



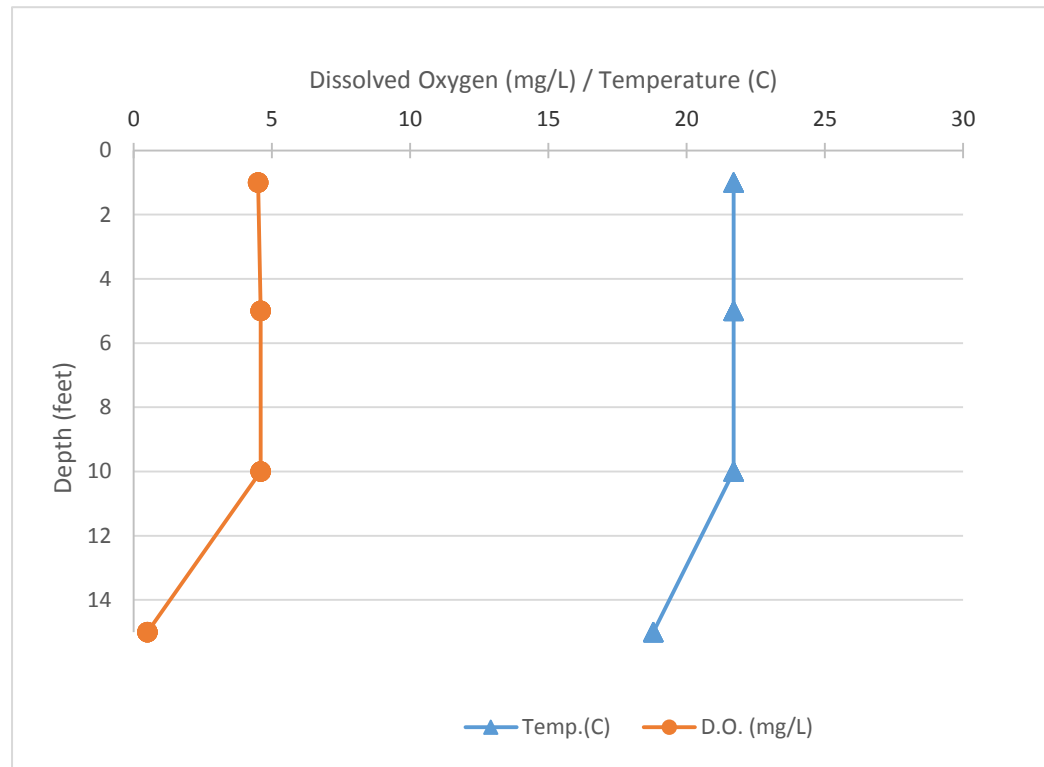
Name: Manitou
 County: Shiawassee
 Site ID: 780233
 Date: 8/27/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	21.7	4.5
1	21.7	4.5
1	21.7	4.5
1	21.7	4.5
1	21.7	4.5
5	21.7	4.6
5	21.7	4.6
5	21.7	4.6
5	21.7	4.6
5	21.7	4.6
10	21.7	4.6
10	21.7	4.6
10	21.7	4.6
10	21.7	4.6
10	21.7	4.6
15	18.8	0.5
15	18.8	0.5
15	18.8	0.5
15	18.8	0.5
15	18.8	0.5

Lake: Manitou (Shiawassee Co.)

8/27/2015



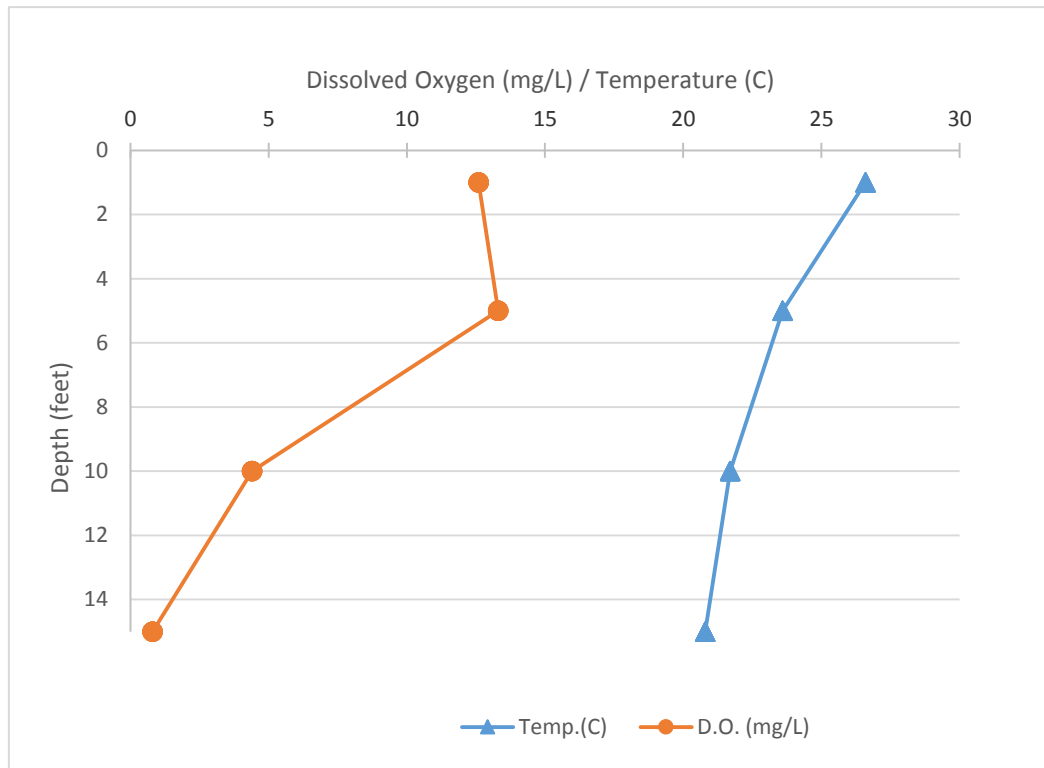
Name: Manitou
 County: Shiawassee
 Site ID: 780233
 Date: 9/1/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	26.6	12.6
1	26.6	12.6
1	26.6	12.6
1	26.6	12.6
1	26.6	12.6
5	23.6	13.3
5	23.6	13.3
5	23.6	13.3
5	23.6	13.3
5	23.6	13.3
10	21.7	4.4
10	21.7	4.4
10	21.7	4.4
10	21.7	4.4
10	21.7	4.4
15	20.8	0.8
15	20.8	0.8
15	20.8	0.8
15	20.8	0.8
15	20.8	0.8

Lake: Manitou (Shiawassee Co.)

9/1/2015



Name: Manitou
 County: Shiawassee
 Site ID: 780233
 Date: 9/11/2015

Dissolved Oxygen and Temperature Profile

Depth (ft)	Temp.(C)	D.O. (mg/L)
1	22.9	11.4
1	22.9	11.4
1	22.9	11.4
1	22.9	11.4
1	22.9	11.4
5	22.7	11.2
5	22.7	11.2
5	22.7	11.2
5	22.7	11.2
5	22.7	11.2
10	22.6	11.1
10	22.6	11.1
10	22.6	11.1
10	22.6	11.1
10	22.6	11.1
15	22.1	1
15	22.1	1
15	22.1	1
15	22.1	1
15	22.1	1

Lake: Manitou (Shiawassee Co.)

9/11/2015

