



2016 Data Report
for
Norway Lake, Dickinson County

Site ID: 220061

46.070281°N, 87.837504°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 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 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 Michele Leduc-Lapierre

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

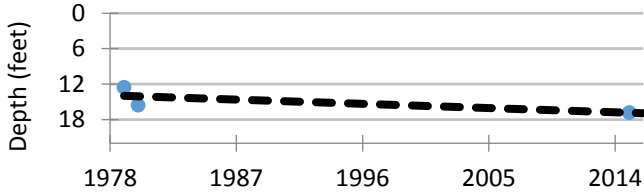
Norway Lake, Dickinson County

2016 CLMP Results



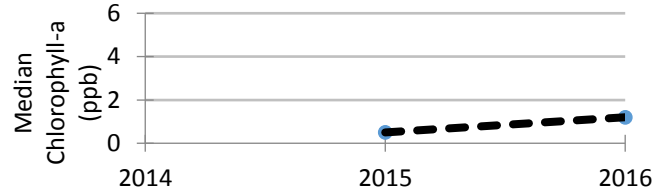
Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2016	8	10.0	21.0	14.8	3.7	38
2015	10	13.0	20.5	16.8	2.1	36
1979-1980	24	11.0	18.0	14.0	1.2	39
2016 All CLMP Lakes	3116	1.0	56.0	12.9	2.8	41



Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2016	5	<1.0	3.2	1.2	1.0	32
2015	5	<1.0	4.9	<1.0	1.9	<31
2016 All CLMP Lakes	628	<1.0	28.0	1.8	4.3	36



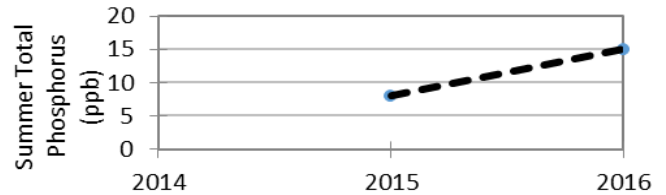
Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2016	1	14	14	14.0	NA
2016 All CLMP Lakes	168	<= 3	74.0	9.5	7.8

No graph: Not enough data

Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2016	1	15.0	15.0	15.0	NA	43
2015	1	8.0	8.0	8.0	NA	34
2016 All CLMP Lakes	173	<= 3	250.0	15.1	21.7	43



Dissolved Oxygen and Temperature Profile

This lake does not have recent (within 5 years) dissolved oxygen/water temperature data available. Consider enrolling in this parameter next year. Fish, insects, mollusks, and crustaceans need dissolved oxygen to live in water. By late summer, many lakes stratify, with cold anoxic water on the bottom and warm, oxygen rich water on the surface. Anoxic (oxygen-depleted) water occurring too close to the surface is a sign of nutrient enrichment. Understanding the pattern of dissolved oxygen and water temperature in a lake is important for assessing nutrient problems as well as the health of the biological community.

Summary

Average TSI	2016	2015	1979-1980
Norway Lake	38	34	39
All CLMP Lakes	40	40	44

With an average TSI score of 38 based on Secchi transparency, chlorophyll-a, and summer total phosphorus, this lake is rated between the oligotrophic and mesotrophic lake classification. 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. Reminder: 8 Secchi measurements are required in order to use the data in graphs and trends.

* = 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.
 <1.0 = Chlorophyll-a: Sample value is less than limit of quantification (<1 ppb).

Norway Lake, Dickinson County 2016 CLMP Aquatic Plant Results



Norway Lake does not have aquatic plant data available for 2016. Consider enrolling in an aquatic plant parameter next year.

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.

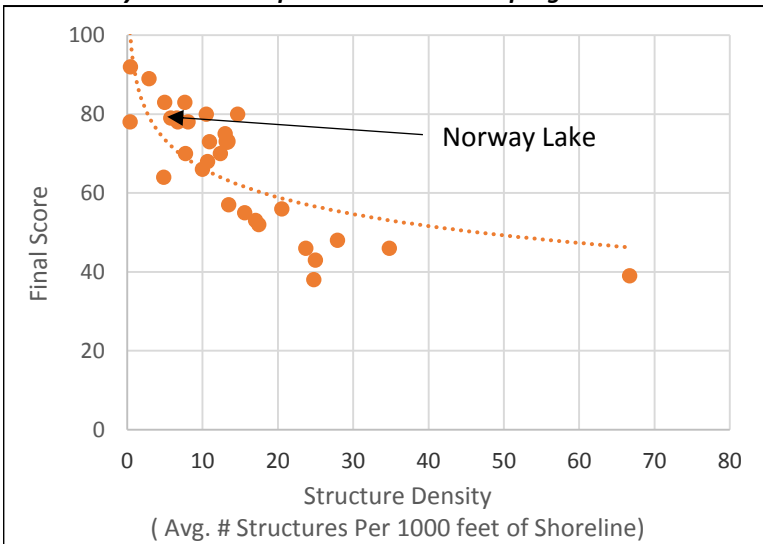
Norway Lake, Dickinson County 2016 Score the Shore Results



The Score the Shore Habitat Assessment was conducted on Norway 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?



Norway Lake:	
Number of Sections:	5
Number of Structures:	33
Structure Density:	6.6
Final Score:	79

All 31 Participating Lakes in 2015 and 2016:	
Avg. Number of Sections:	16
Avg. Number of Structures:	233
Avg. Structure Density:	14.6
Avg. Final Score:	66

There is a very tight relationship between Final Score and Structure Density. It will be interesting to see if and how this changes as more lakes go through this scoring process.

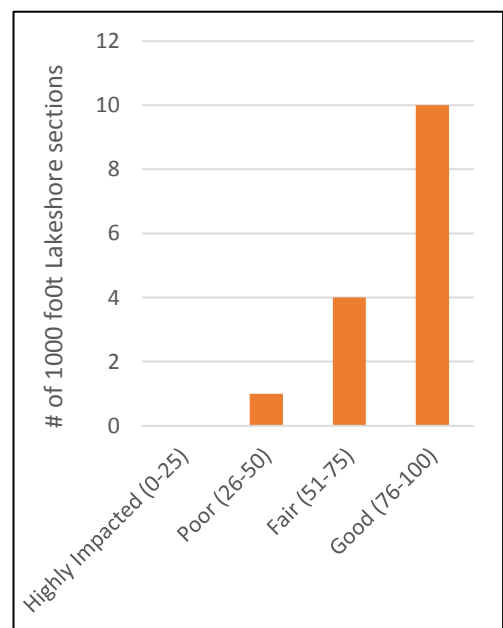
Analysis specific to Norway Lake:

Overall, the lakeshore habitat of Norway Lake is doing well and scored higher than average when compared to other lakes in the program. All of the 1000 foot sections scored either Fair or Good: 2 fair, and 3 good.

The lake scored highest for erosion control, with an average of 87, meaning that there are a low amount of sea walls, rock rip-rap, and other shoreline erosion structures.

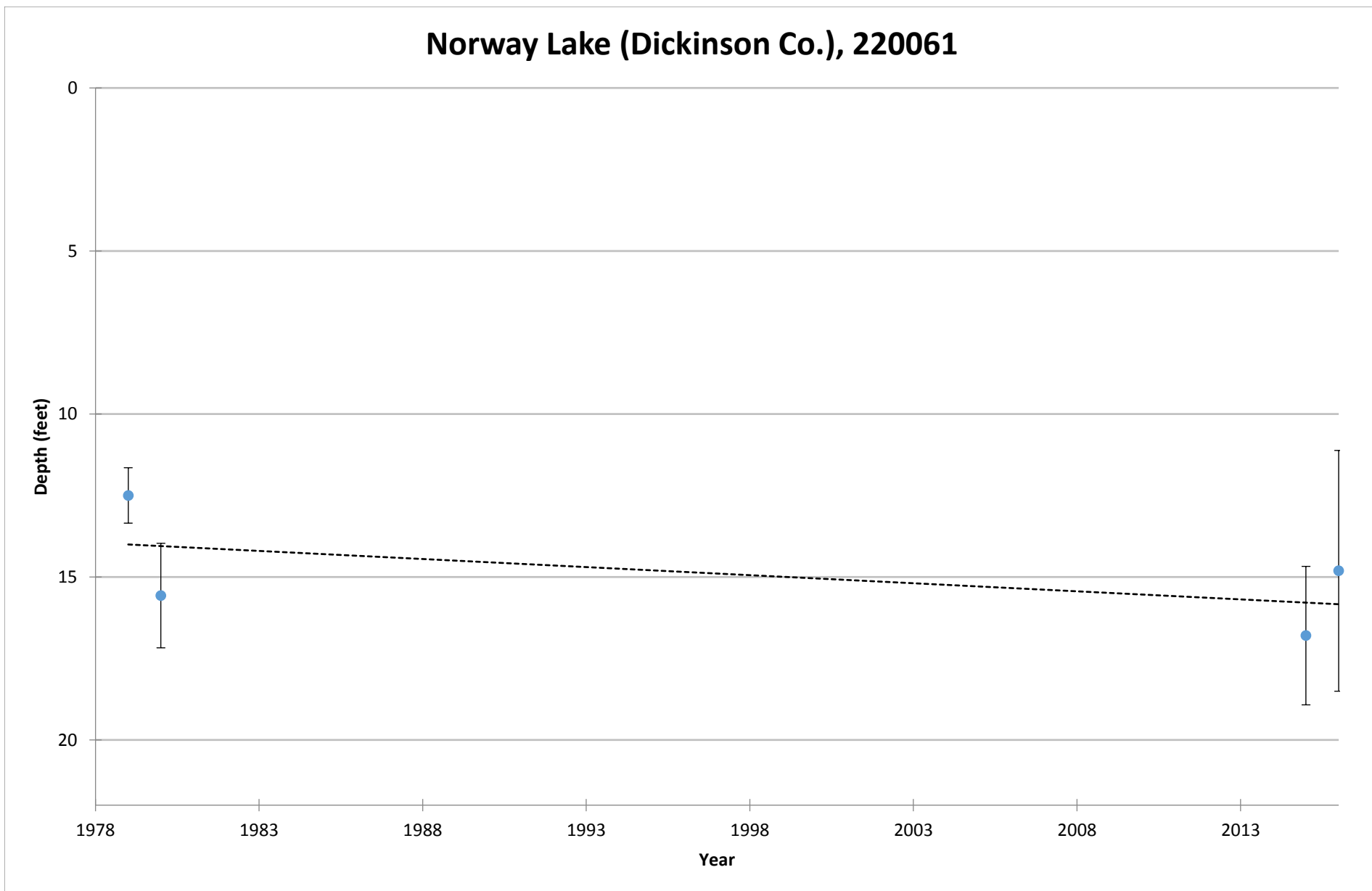
It also did well for the littoral zone (79), meaning that (in general) erosion was low, fallen trees were present, and aquatic vegetation was present.

The riparian zone was the weak point in Norway Lake (scoring an average of 71). While 71 is not bad, there is room for improvement. 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.



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEAN TRANSPARENCY

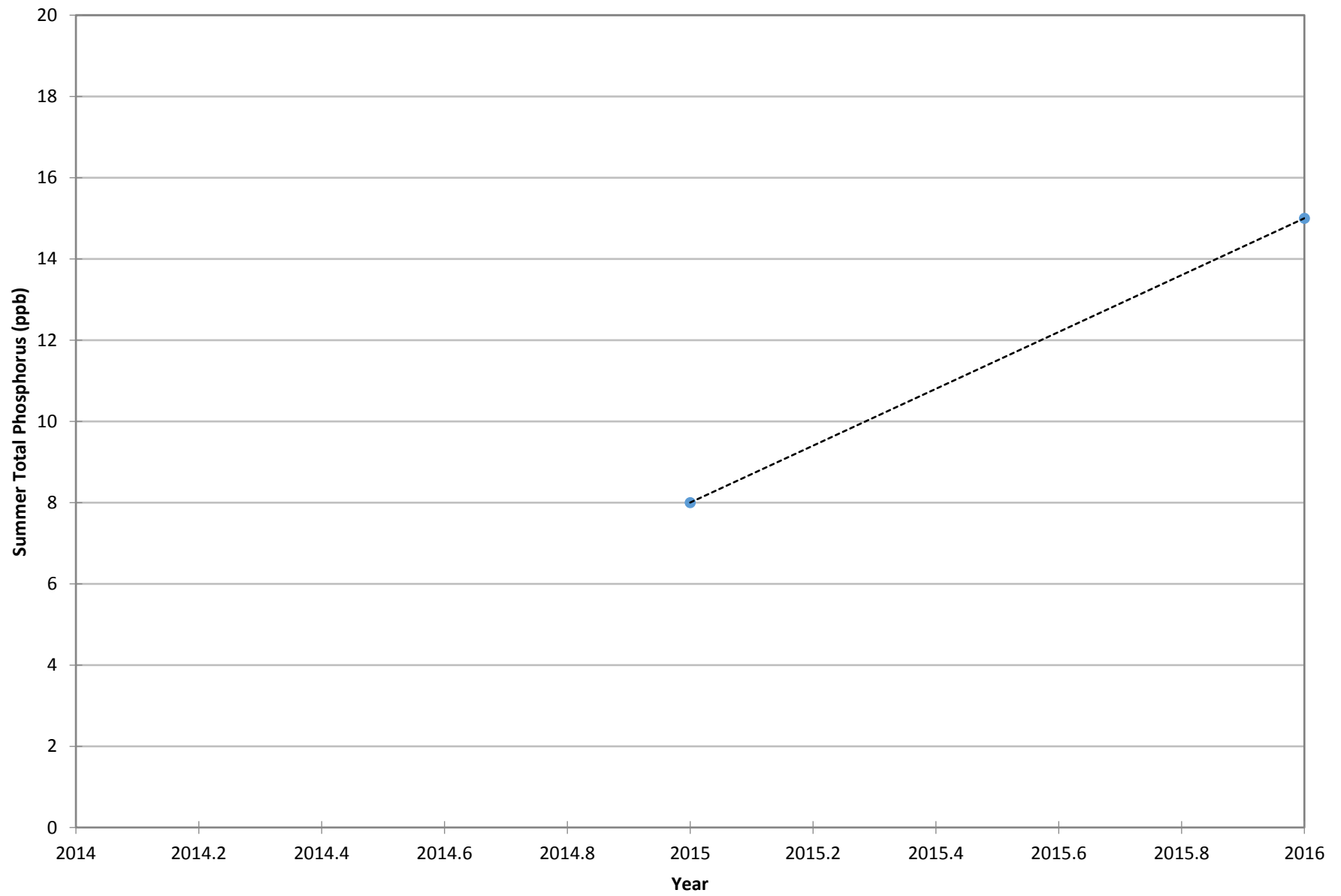
Norway Lake (Dickinson Co.), 220061



Vertical bars indicate standard deviation

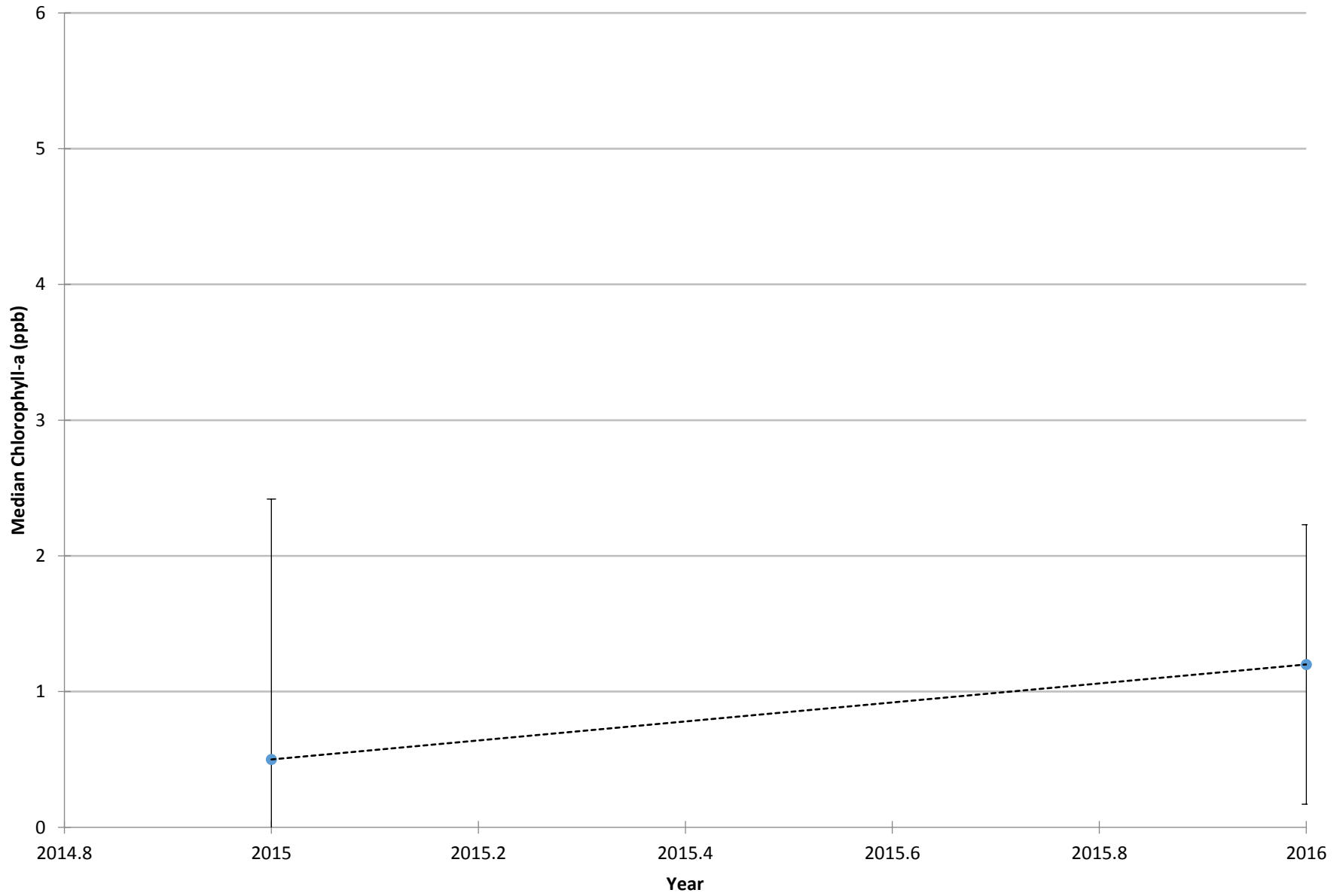
COOPERATIVE LAKES MONITORING PROGRAM
SUMMER TOTAL PHOSPHORUS

Norway Lake (Dickinson Co.), 220061



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEDIAN CHLOROPHYLL-A

Norway Lake (Dickinson Co.), 220061



Vertical bars indicate standard deviation