Cooperative Lakes Monitoring Program

Michigan Lakes– Ours to Protect

2022 Data Report for Hamilton Lake, Dickinson County

Site ID: 220060

45.7558°N, 87.7827°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

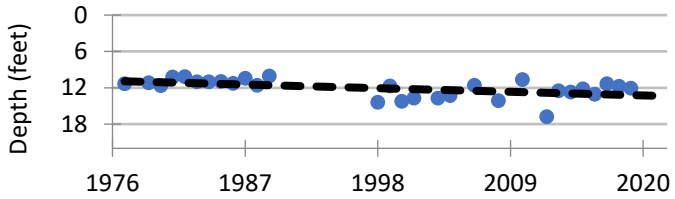
Questions?
If you have questions on this report or believe that the tabulated data for your lake in this report are in error please contact:
Paul Steen (psteen@hrwc.org), CLMP Data Analyst

Site ID: 220060

Hamilton Lake, Dickinson County
2022 CLMP Results

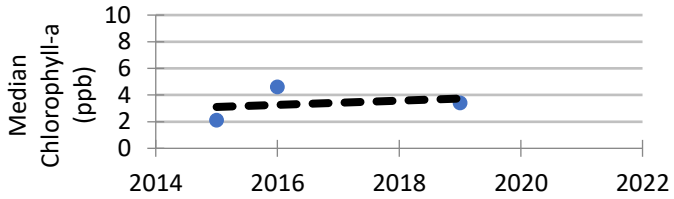
Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2022	7*	10.0	12.5			
1977-2016	445	8.0	20.5	12.1	1.3	41
2022 All CLMP Lakes	3178	1.0	63.0	11.6	2.5	43



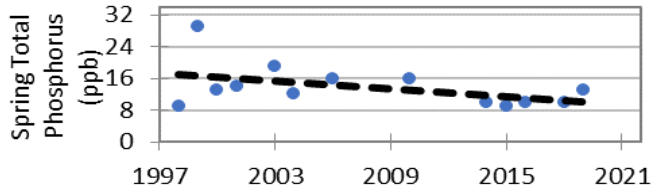
Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2019	4	2.1	5.7	3.4	1.6	43
2014-2018	10	<1.0	12.0	3.4	3.8	42
2022 All CLMP Lakes	687	< 1.0	43.0	3.7	5.3	43



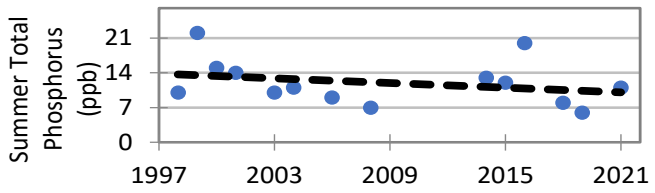
Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2019	1	13.0	13.0	13.0	NA
2014-2018	4	9.0	10.0	9.8	0.5
1998-2013	8	9.0	29.0	16.0	6.0
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
2021	1	11.0	11.0	11.0	NA	39
2016-2020	3	6.0	20.0	11.3	7.6	37
1998-2015	10	7.0	22.0	12.3	4.2	40
2022 All CLMP Lakes	234	<= 3	150.0	17.4	15.3	45



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	2022	2017-2021	1977-2016
Hamilton Lake		40	38
All CLMP Lakes	44	40	42

Data collection was largely missing in 2022, so it is not possible to rank the lake this year.

While the trends for individual parameters are mixed, the overall nutrient levels in the lake are largely unchanged since monitoring began. However, there was not enough data collected in 2022 to assess long term trends compared to values observed in 2022.

** = Minimum # samples not met for average/median/TSI value*

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

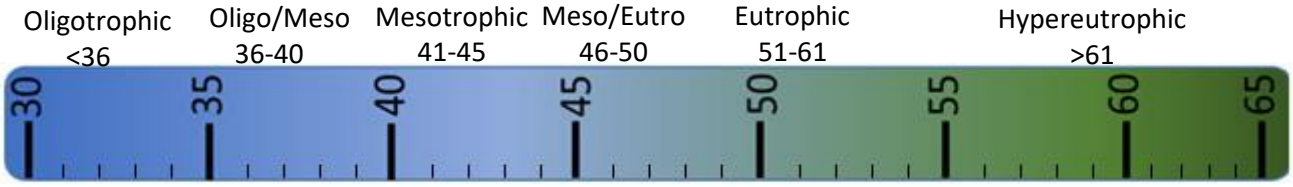
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

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 Hamilton Lake in 2022	
Average	Not enough data
Secchi Disk	
Summer TP	
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.

Site ID: 220060

Hamilton Lake, Dickinson County
2015 CLMP Aquatic Plant Results

The Aquatic Plant Identification and Mapping survey was conducted on Hamilton Lake in 2015.

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 17 locations in Hamilton Lake in 2015. Below is a list of species reported.

Common Name	*Scientific Name*	ID Code	Total # of Observations	Average Density
Eurasian or Hybrid Watermilfoil	*Myriophyllum spicatum; Myriophyllum spicatum x M. sibiricum*	50	14	0.586956522
Water Marigold	*Bidens beckii*	47	3	0.065217391
Watershield	*Brasenia schreberi*	14	1	0.02173913
Coontail	*Ceratophyllum demersum*	41	4	0.130434783
Chara	*Chara spp.*	20	35	2.5
Common Waterweed	*Elodea canadensis*	36	3	0.086956522
Water Stargrass	*Heteranthera dubia*	35	1	0.02173913
Native Watermilfoils	*Myriophyllum spp.*	40	21	1.152173913
Slender Naiad	*Najas flexilis*	21	1	0.02173913
Nitella	*Nitella spp.*	39	3	0.065217391
Yellow Pond Lily	*Nuphar spp.*	13	20	0.869565217
White Water Lily	*Nymphaea odorata*	12	18	0.934782609
Illinois Pondweed	*Potamogeton illinoensis*	46	26	1.217391304
Floating-leaf Pondweed	*Potamogeton natans*	43	5	0.173913043
White-stem Pondweed	*Potamogeton praelongus*	44	10	0.391304348
Fern Pondweed	*Potamogeton robbinsii*	22	2	0.043478261
Flat-stem Pondweed	*Potamogeton zosteriformis*	33	11	0.347826087
Water Bulrush	*Schoenoplectus subterminalis*	7B	2	0.130434783
Soft-stem Bulrush	*Schoenoplectus tabernaemontani*	7	10	0.456521739
Sago Pondweed	*Stuckenia pectinata*	52	1	0.043478261
Small Bladderwort	*Utricularia minor*	48B	15	0.52173913
Common Bladderwort	*Utricularia vulgaris*	48	31	1.195652174

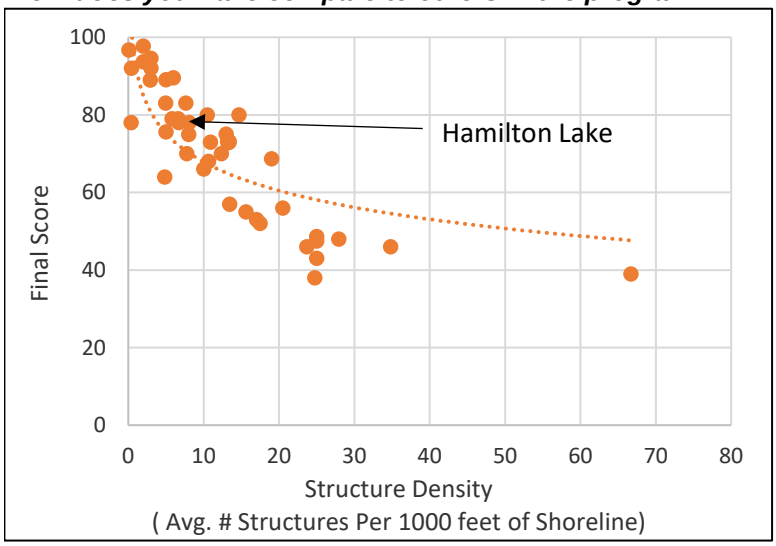
Site ID: 220060

Hamilton Lake, Dickinson County
2016 Score the Shore Results

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

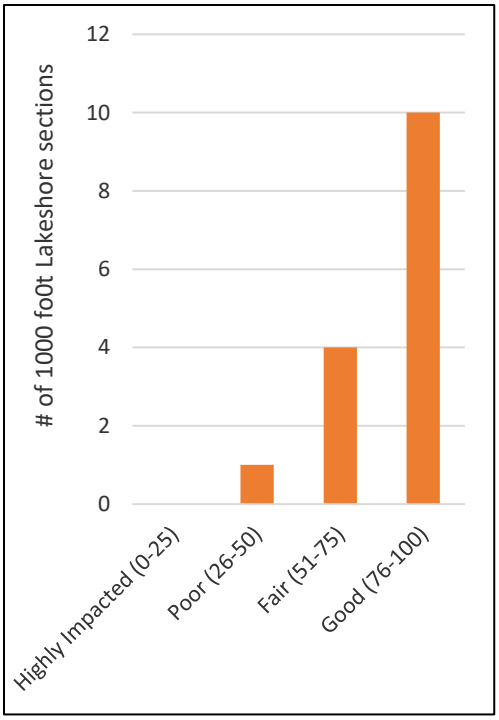
This assessment involves rating 1000 foot sections of shoreline for aquatic vegetation, shoreline vegetation, erosion, and erosion control practices (like sea walls). Each shoreline section is given three scores ranging from 0-100 for the categories of Littoral, Riparian, and Erosion Management. The 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?



Hamilton Lake:	
Number of Sections:	12
Number of Structures:	97
Structure Density:	8.1
Final Score:	78

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



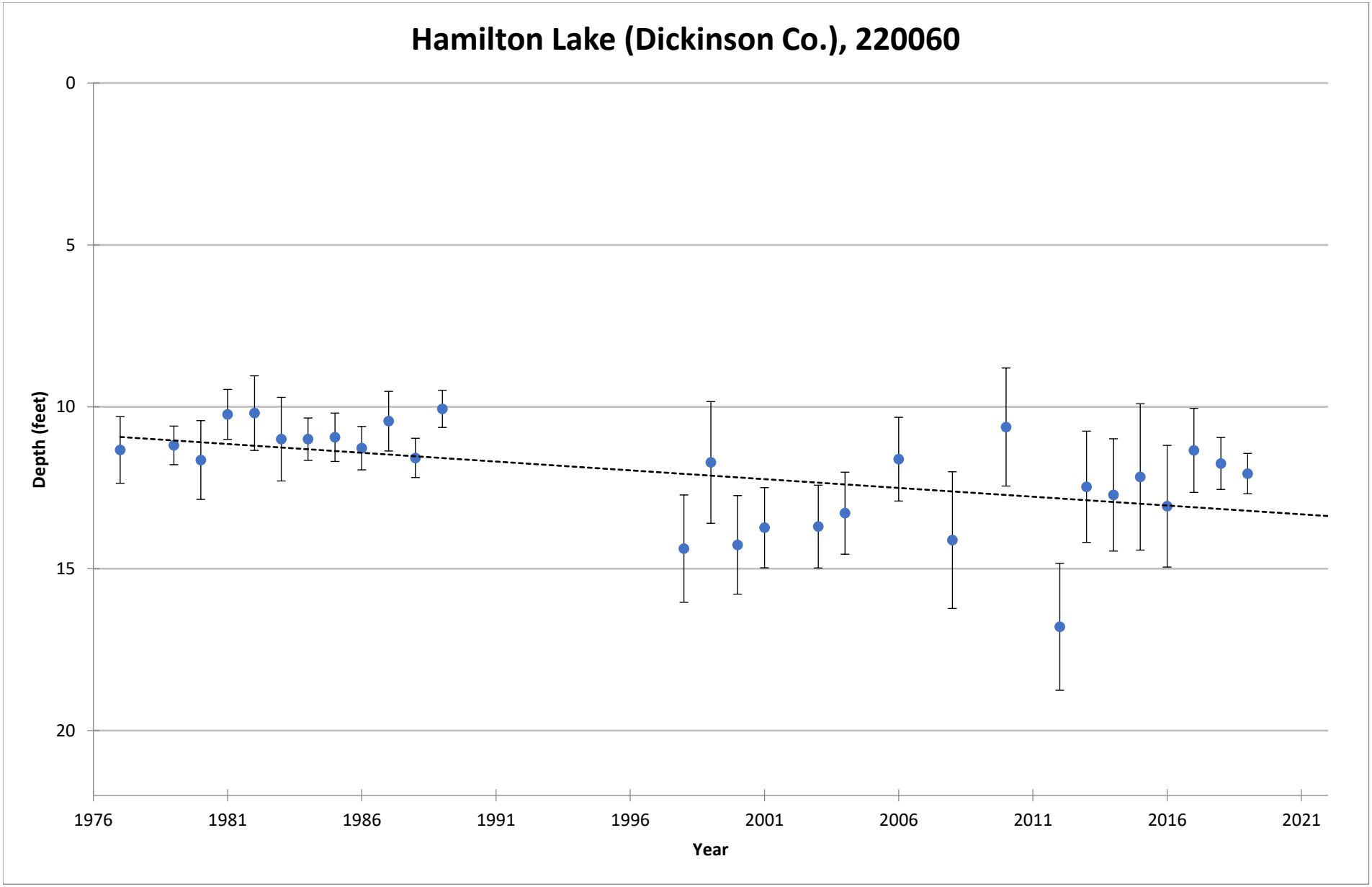
Analysis specific to Hamilton Lake:

Overall, the lakeshore habitat of Hamilton Lake is doing well and scored higher than average when compared to other lakes in the program. The 1000 foot sections mostly scored either Fair or Good: (1 poor, 4 fair, and 7 good.)

All three of the scoring categories came out approximately the same on Hamilton Lake (Average scores: Littoral 74, Riparian 75, Erosion Control 83) This means that there is no particular weakness to the habitat on Hamilton Lake.

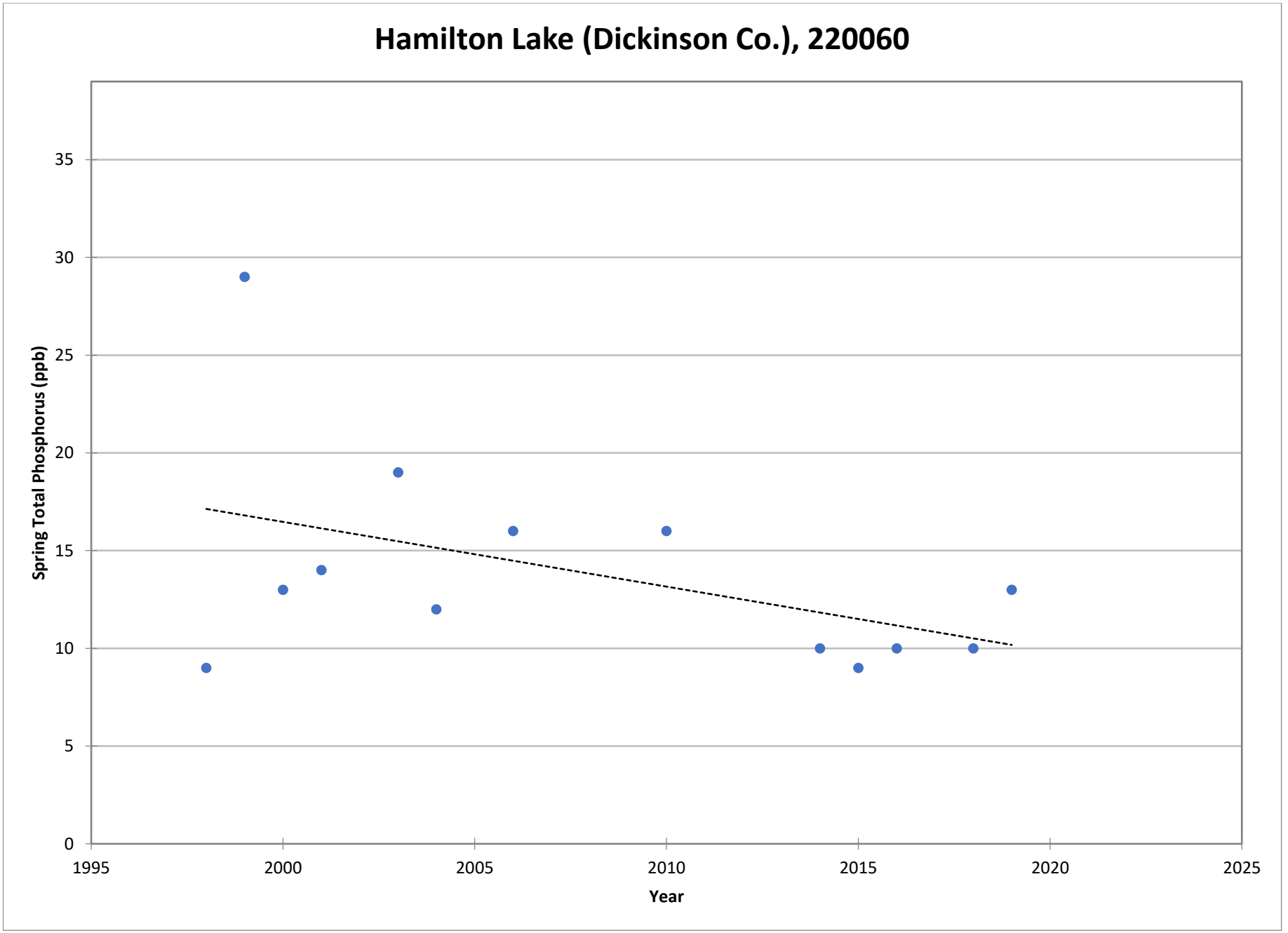
To boost the score of Hamilton Lake, it may be wise to specifically look at section 11, which with a score of 34 was much worse off than the other lake sections. Section 11 scored particularly bad for the riparian zone (score of 18). Reduce the amount of mowed grass and increase the amount of unmowed native vegetation along the lakeshore to boost this aspect of the shoreline habitat.

COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEAN TRANSPARENCY

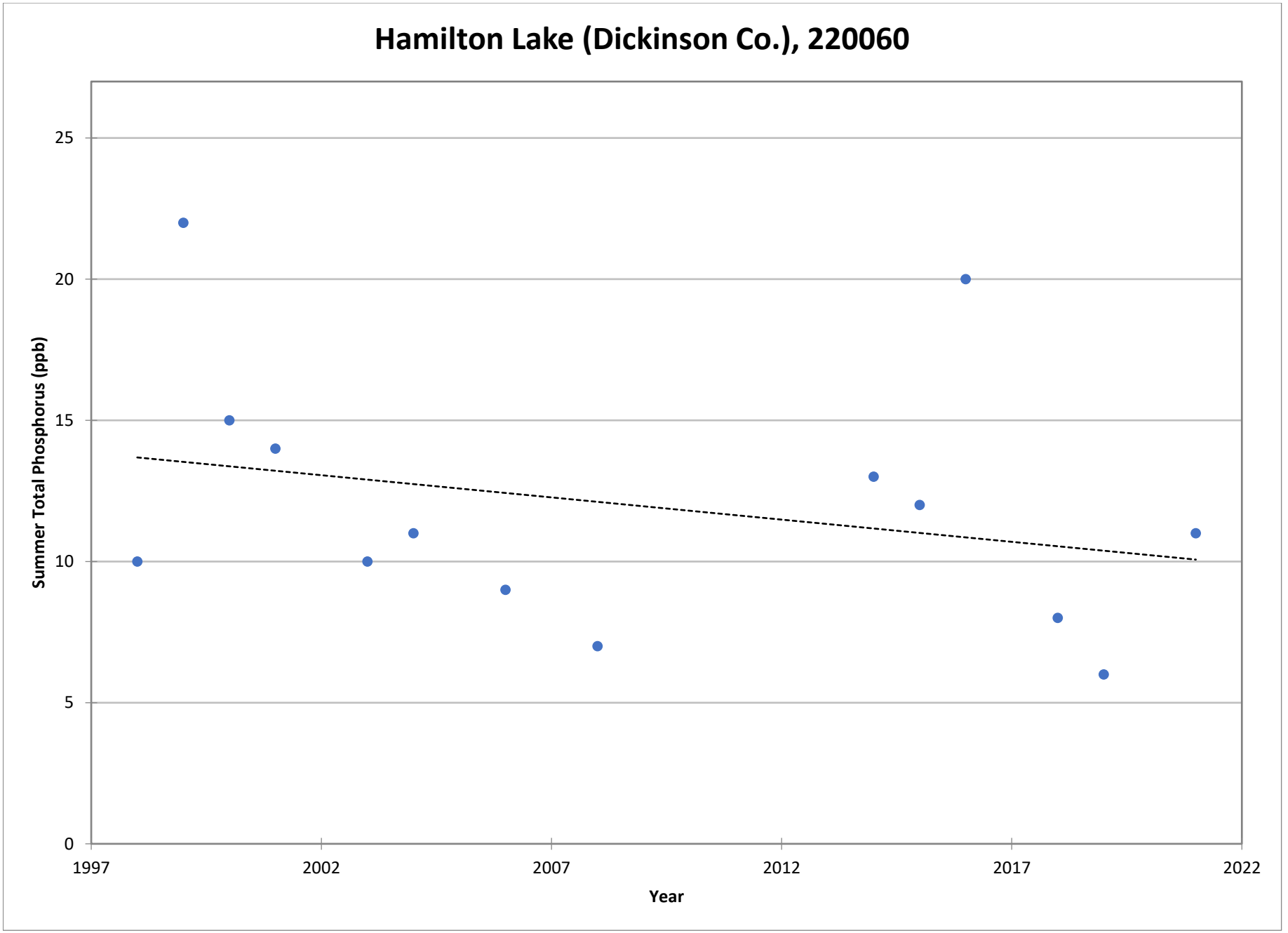


Vertical bars indicate standard deviation

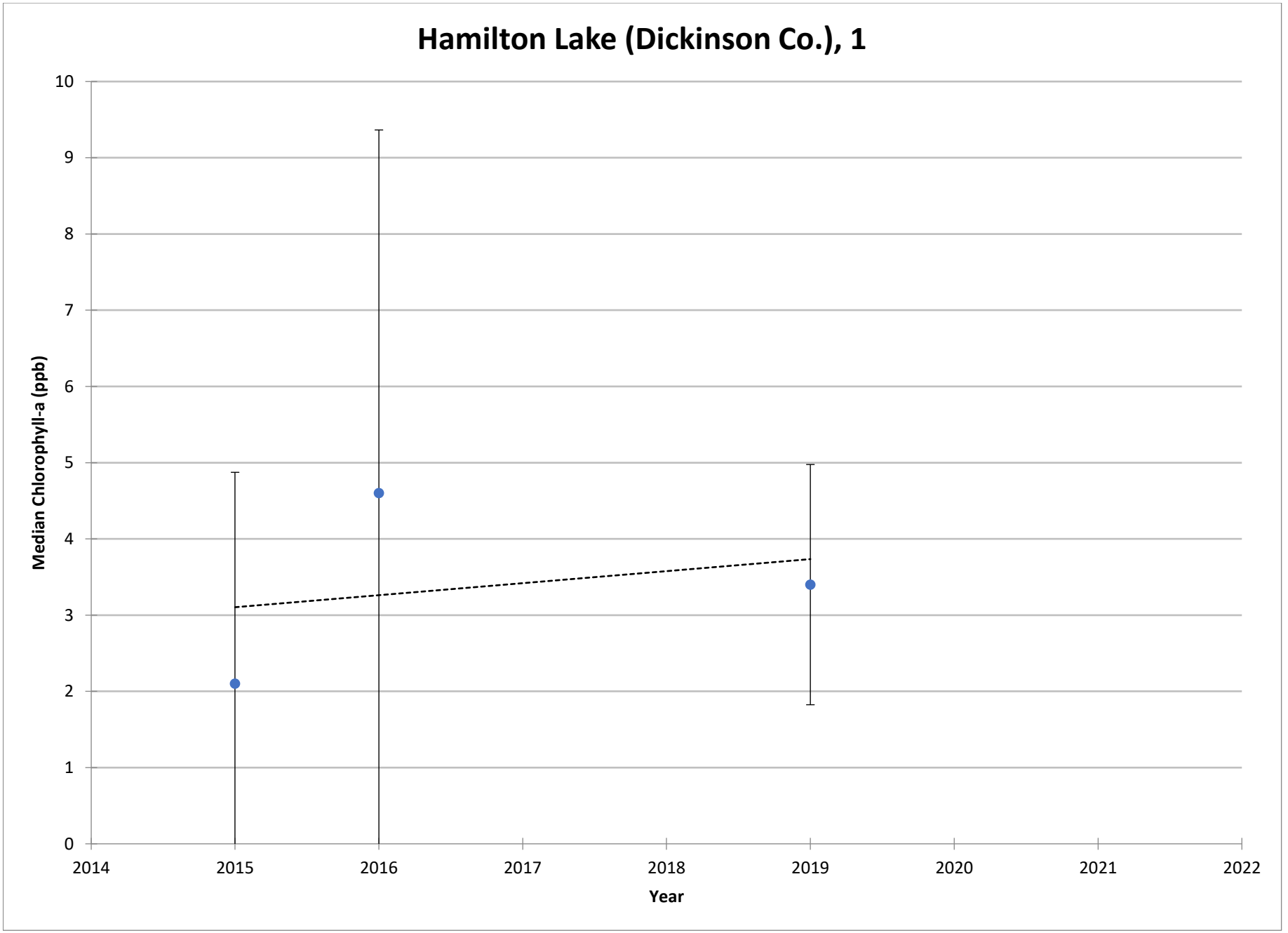
COOPERATIVE LAKES MONITORING PROGRAM
SPRING TOTAL PHOSPHORUS



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER TOTAL PHOSPHORUS



COOPERATIVE LAKES MONITORING PROGRAM
SUMMER MEDIAN CHLOROPHYLL-A



Vertical bars indicate standard deviation