



# Cooperative Lakes Monitoring Program

Michigan Lakes— Ours to Protect

## 2015 Data Report for Triangle Lake, Livingston County

Site ID: 470591

42.53008°N, 83.96155°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**

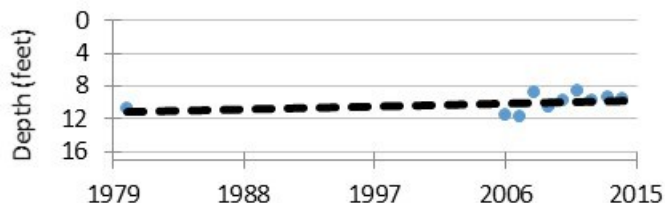
# Triangle Lake, Livingston County

## 2015 CLMP Results



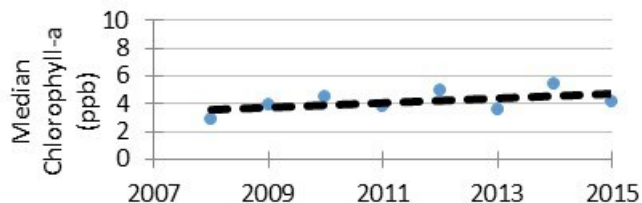
### Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2015	7	6.0	11.0			
2010-2014	54	6.0	15.0	9.4	2.4	45
1980-2009	53	6.0	15.0	10.6	1.9	43
2015 All CLMP Lakes	3018	1.5	42.0	12.6	6.1	42



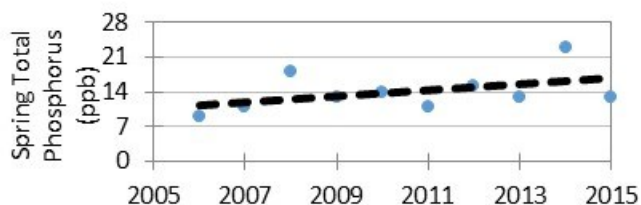
### Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2015	5	<1.0	8.5	4.2	3.6	45
2010-2014	25	<1.0	47.0	4.5	8.2	45
2008-2009	10	<1.0	13.0	4.5	3.3	42
2015 All CLMP Lakes	628	< 1.0	14.0	2.5	2.1	39



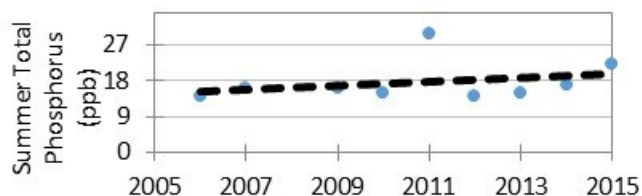
### Spring Total Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2015	1	13	13	13.0	NA
2010-2014	5	11	23	15.2	4.6
2006-2009	4	9	18	12.8	3.9
2015 All CLMP Lakes	131	<= 3	70	11.5	13.7

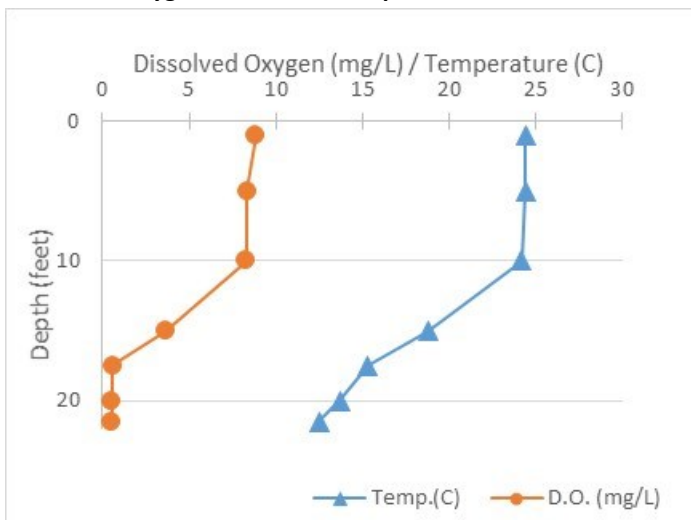


### Summer Total Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2015	1	22	22	22.0	NA	49
2010-2014	5	14	30	18.2	6.7	45
2006-2009	3	14	16	15.3	1.2	44
2015 All CLMP Lakes	173	<= 3	68	13.2	8.1	39



### Dissolved Oxygen and Water Temperature Profile



### Summary

Average TSI	2015	2010-2014	1980-2009
Triangle Lake	47	45	43
All CLMP Lakes	40	NA	NA

With an average TSI score of 47 based on chlorophyll-a and summer total phosphorus, this lake is rated between the mesotrophic and eutrophic lake classification. The lake leans slightly more meso than eutro. Due to the high nutrient level, the lake loses dissolved oxygen in the bottom waters in early summer. Long term monitoring shows slight upward slopes on all of the parameters, indicating a very slow movement toward higher nutrient levels in the lake.

\*= 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).

# Triangle Lake, Livingston County

## 2015 CLMP Aquatic Plant Results



This lake does not have aquatic plant data available for 2015. 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 <http://www.micorps.net/CLMPdocuments.html>.)

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.

# Triangle Lake, Livingston 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.

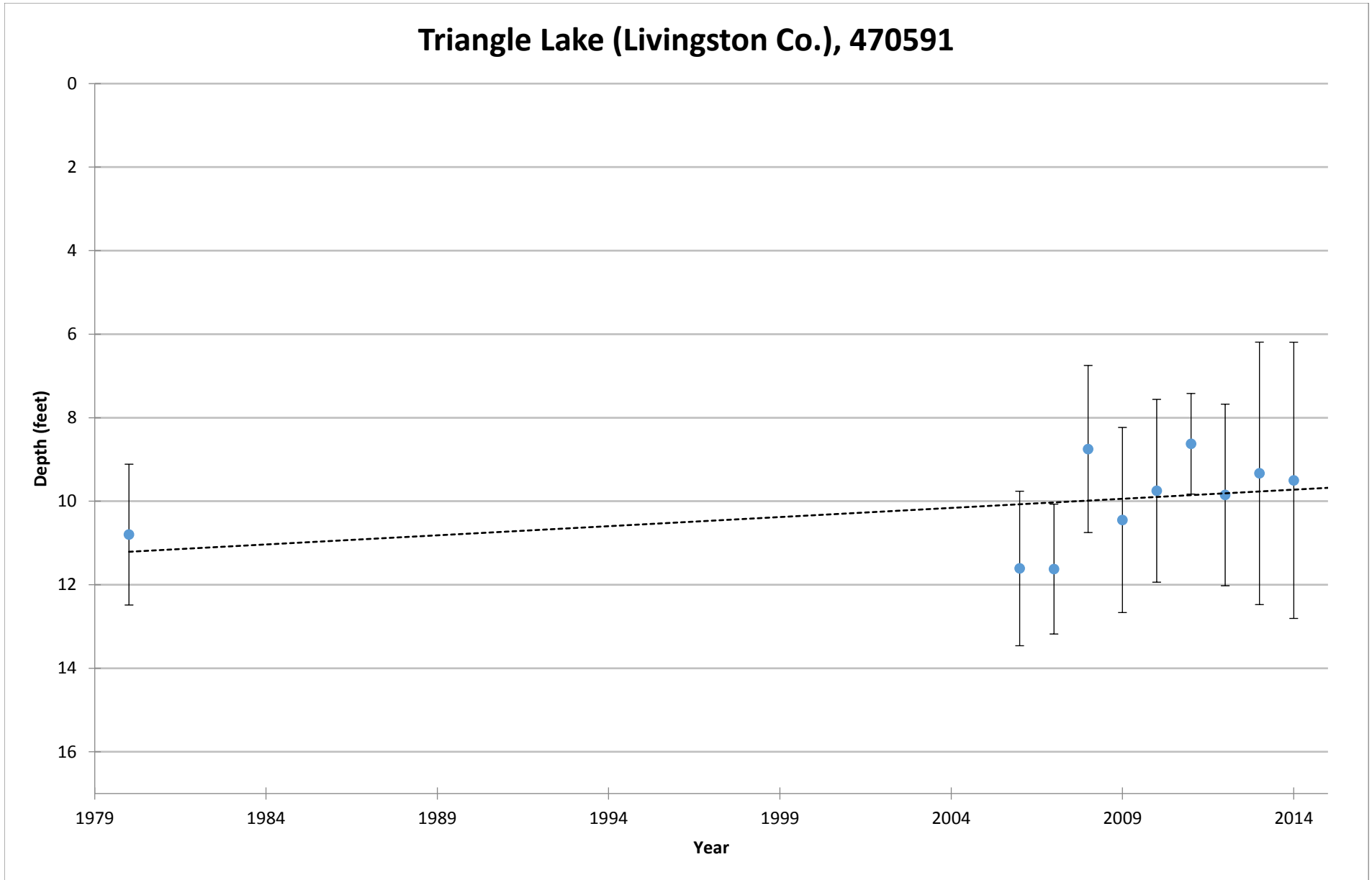
The information gathered during this assessment will allow lake communities to identify high-quality areas that can be protected, as well as opportunities for improvement. Score the Shore data, combined with educational resources describing the value of healthy shorelines and how to restore and maintain 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](http://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](http://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](http://www.mi.gov/deqinlandlakes).

COOPERATIVE LAKES MONITORING PROGRAM  
SUMMER MEAN TRANSPARENCY

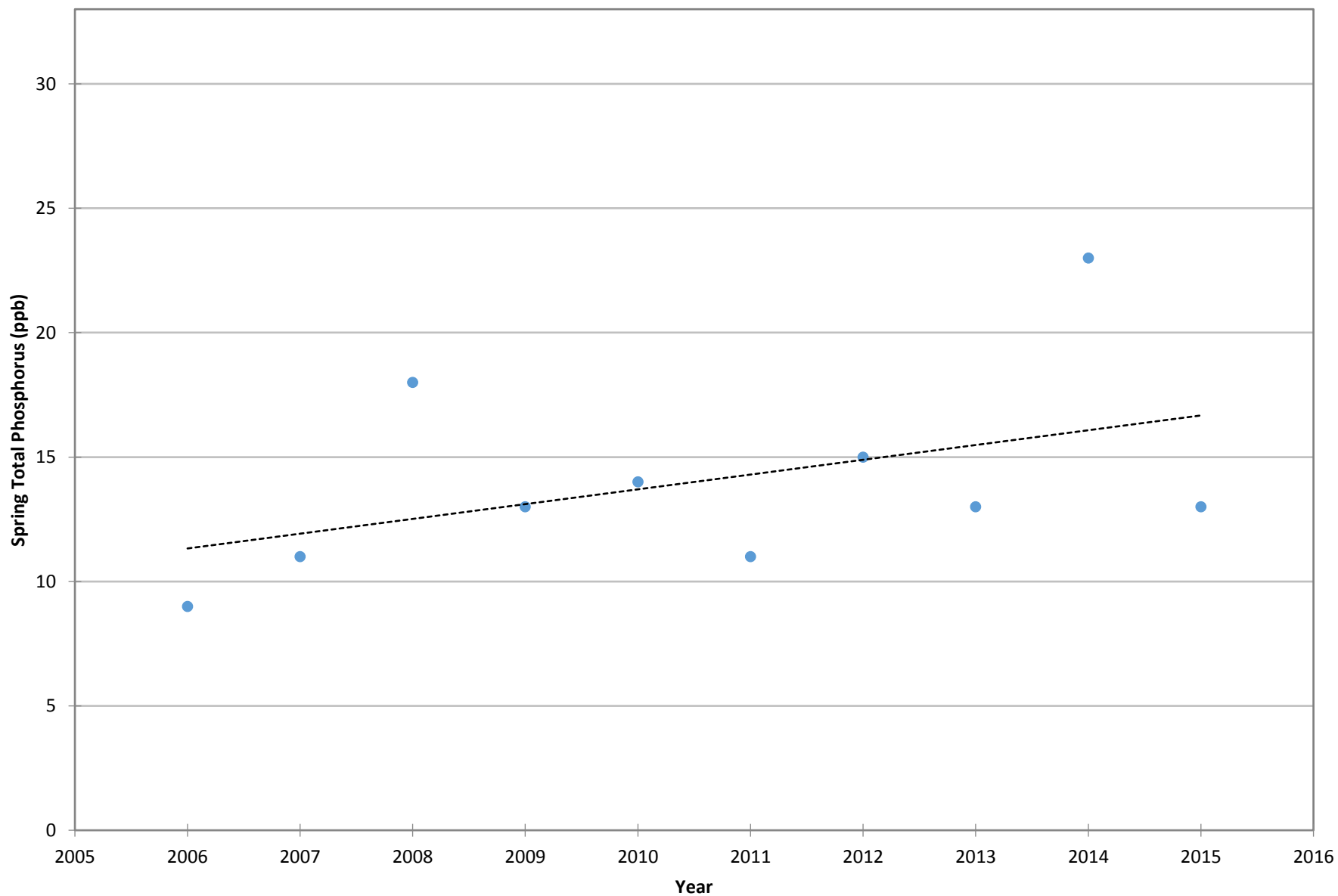
**Triangle Lake (Livingston Co.), 470591**



Vertical bars indicate standard deviation

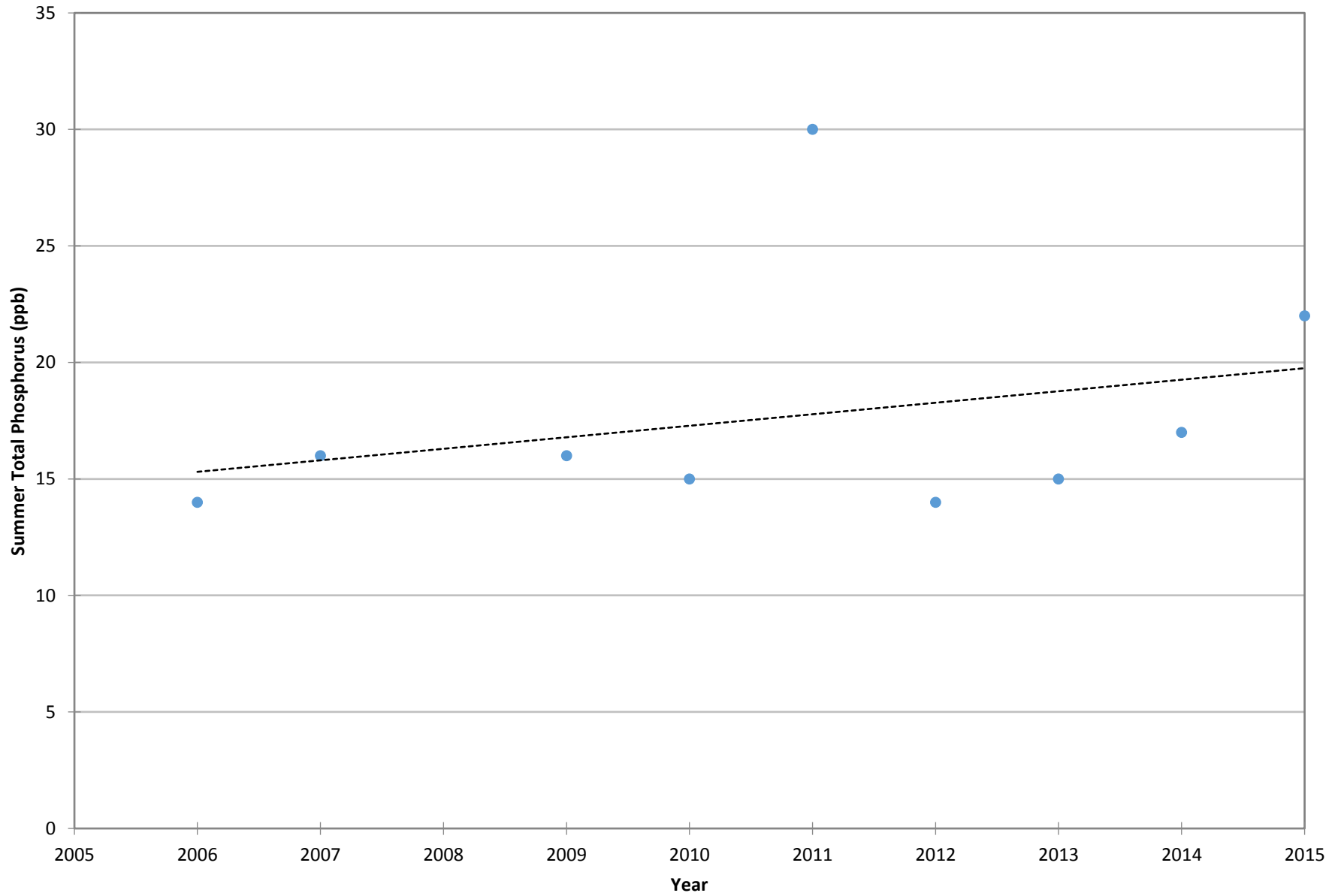
COOPERATIVE LAKES MONITORING PROGRAM  
SPRING TOTAL PHOSPHORUS

**Triangle Lake (Livingston Co.), 470591**



COOPERATIVE LAKES MONITORING PROGRAM  
SUMMER TOTAL PHOSPHORUS

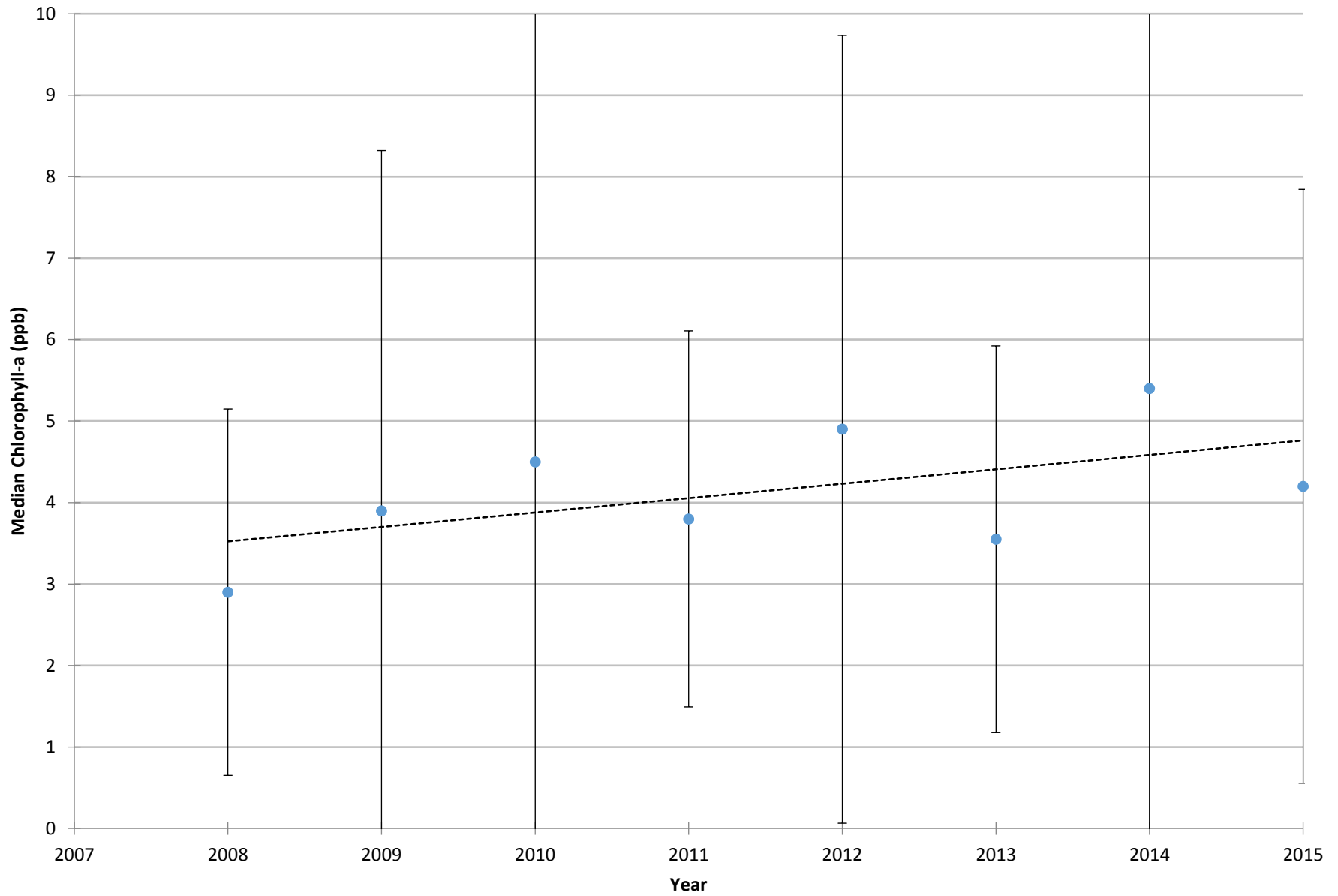
**Triangle Lake (Livingston Co.), 470591**





COOPERATIVE LAKES MONITORING PROGRAM  
SUMMER MEDIAN CHLOROPHYLL-A

**Triangle Lake (Livingston Co.), 470591**



Vertical bars indicate standard deviation