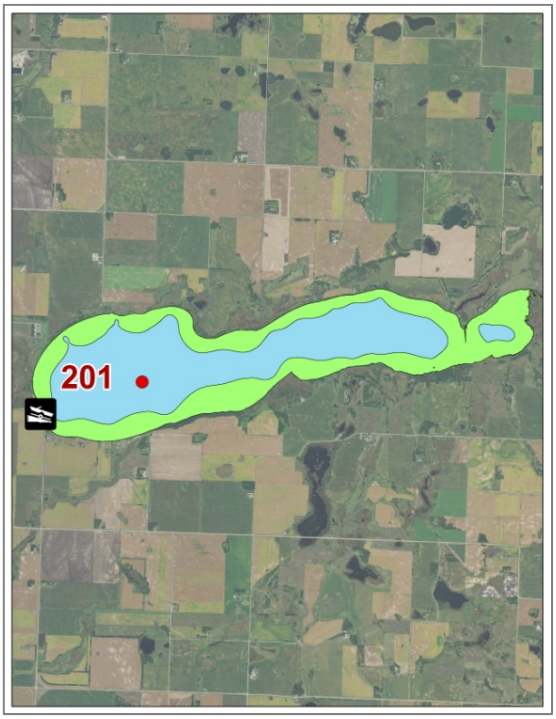
Lake Emily

Pope County

Summary

Lake Emily is a shallow, eutrophic lake. Algae concentration results (chlorophyll a) show that the lake experiences algae blooms every summer. There are no detectable trends in water clarity over the past 20 years. This means that the lake is stable, with no indications of declining water quality. Lake Emily has a good amount of historical water quality monitoring data, which makes a lake evaluation like this possible. Monitoring should continue to enable future water quality analyses. Lake Emily is on the MPCA Impaired Waters List.



Lake Vitals

MN Lake ID:	61-0180-00
Ecoregion:	North Glacial Plains
Major Watershed:	Chippewa River
Surface area (acres):	2311
Littoral area (acres):	2311
% Littoral area:	100%
Max depth:	6 feet
Aquatic Invasive Species:	Eurasian Milfoil, Zebra Mussels

Water Quality Characteristics

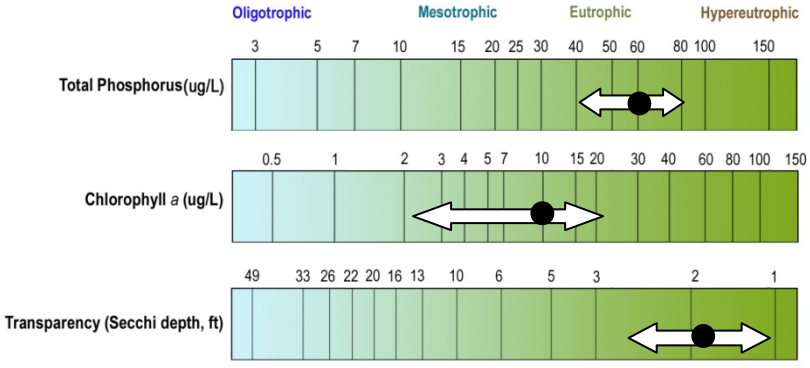
Years monitored: 1993 - 2016

Parameters	Historical	2016
Total Phosphorus Mean (ug/L):	102.2	64.5
Total Phosphorus Min (ug/L):	36.0	44
Total Phosphorus Max (ug/L):	221	85
Number of Observations:	103	2
Chlorophyll-a Mean (ug/L):	38.8	11.6
Chlorophyll-a Min (ug/L):	1	2.7
Chlorophyll-a Max (ug/L):	174	20.5
Number of Observations:	91	2
Secchi Depth Mean (ft):	1.9	1.8
Secchi Depth Min (ft):	0	1
Secchi Depth Max (ft):	6.5	2.5
Number of Observations:	102	2

Trophic State Index

Trophic State: Eutrophic (68)

The figure below shows the minimum and maximum values with the arrows and the mean with the black dot (site 201).



Ecoregion Comparisons

(Primary site only. Comparisons are based on interquartile range, 25th - 75th percentile, for ecoregion reference lakes)

Ecoregion:	North Glacial Plains
Total Phosphorus:	Within expected range
Chlorophyll-a:	Above expected range, which means poorer than expected
Secchi Depth:	Within expected range

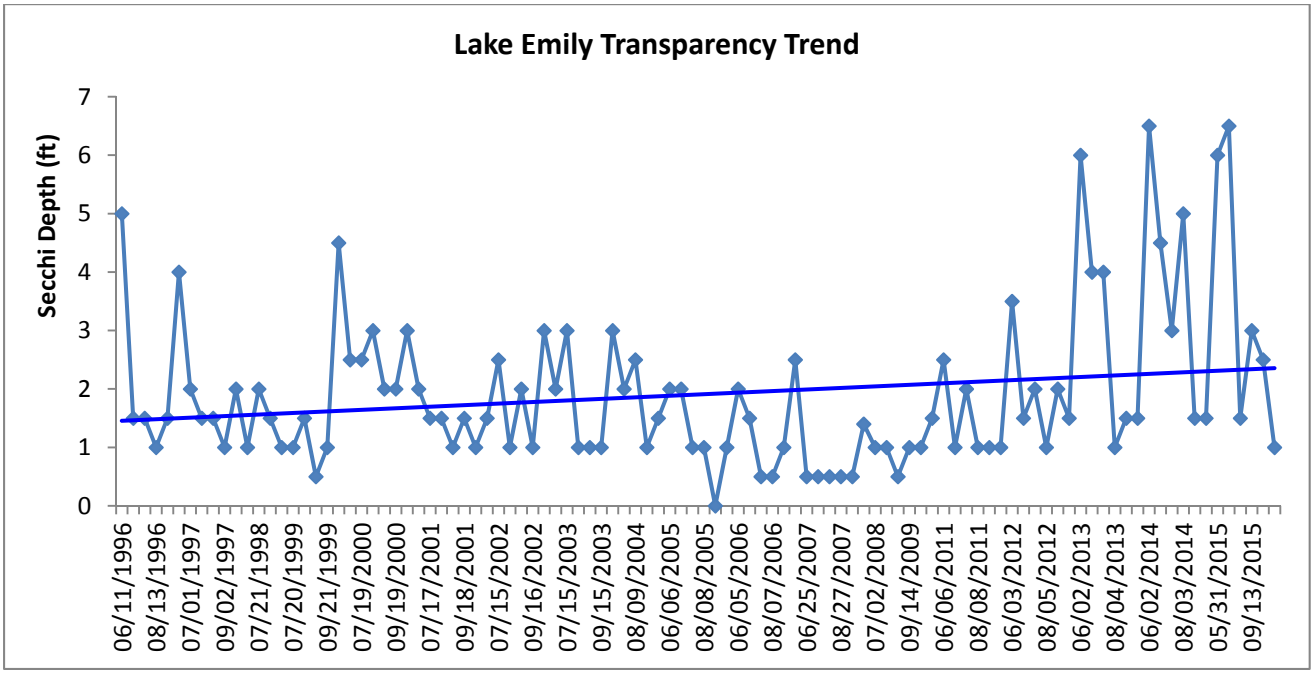
Trend Analysis Report

In assessing water quality, agencies and other lake data users want to know if the amount of algae has been changing over time. Scientists test hypotheses using statistics, and the hypothesis used in a trend analysis is that no trend exists. In other words, we begin with the assumption that there is no trend. We collect data and use statistics to determine the probability of collecting our data if this hypothesis of no trend is indeed true. The output from a statistical test is called the probability value (or p-value for short) of collecting data given the hypothesis of no trend is true. The smaller this probability value, the more likely the null hypothesis of no trend can be rejected. The MPCA has set the acceptable p-value to be less than 10%. In other words, if $p < 0.10$ we reject the hypothesis of no trend and accept that a trend likely exists. Another way to think of this is to say that there is in reality an existing trend, there is a 90% chance we would have collected the data we collected and that a 10% chance that the trend is a random result of the data. For detecting trends, a minimum of 8-10 years of data with four or more readings per season are recommended by the MPCA. Where data does not cover at least eight years or where there are only few samples within a year, trends can be misidentified because there can be different wet years and dry years, water levels, weather, and etc., that affect the water quality naturally.

Lake Emily had enough data to perform a trend analysis for all three parameters (Table 1). The data was analyzed using the Mann Kendall Trend Analysis.

Table 1. Trend analysis for Lake Emily.

Lake Site	Parameter	Date Range	Trend
201	Transparency	1996-2016	No Trend
201	Total Phosphorus	1996-2016	No Trend
201	Chlorophyll-a	1996-2002, 2004-2011, 2013-2016	No Trend



Lake Emily shows no evidence of water quality trends for any of the parameters monitored over the past 20 years. Overall, these trend results show that the water quality in Lake Emily is stable, with no indication of decline. Transparency monitoring should continue so that this trend can be tracked in future years.