

LAKE EMILY

MN Lake ID: 61-0180-00



POPE SOIL & WATER



SUMMARY

Lake Emily is a shallow, eutrophic lake. Nutrient levels are very high in the lake, and aquatic plant and algae growth is generally abundant. Algae concentration results (chlorophyll-a) show that the lake experiences algae blooms every summer. There is a statistically significant transparency trend of improving water clarity over the past 20 years. Lake Emily has adequate historical water quality monitoring data, which makes a lake evaluation like this possible. Monitoring should continue to enable future water quality analyses and detect trends of improvement or decline. Lake Emily is on the MPCA Impaired Waters List.

LAKE VITALS

ECOREGION:	Northern Glaciated Plains
MAJOR WATERSHED:	Chippewa River
SURFACE AREA (ACRES):	2,316.33
LITTORAL AREA (ACRES):	2,311.05
% LITTORAL DEPTH:	99.8%
MAX DEPTH (FT):	6
AQUATIC INVASIVE SPECIES:	Eurasian Milfoil, Zebra Mussels



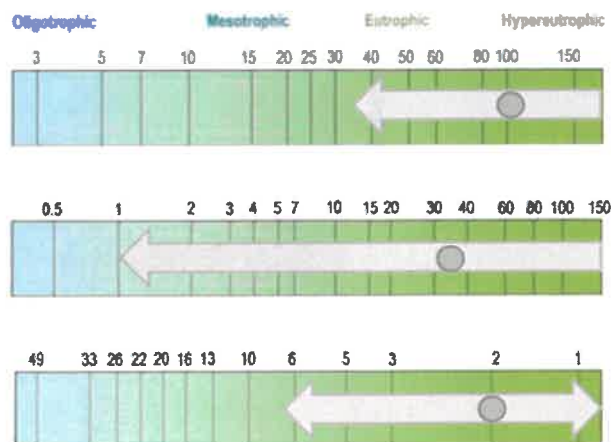
WATER QUALITY CHARACTERISTICS

YEARS MONITORED: 1996 - 2021

PARAMETERS	201
TOTAL PHOSPHORUS MIN (UG/L):	35
TOTAL PHOSPHORUS MAX (UG/L):	308
NUMBER OF OBSERVATIONS:	123
TOTAL PHOSPHORUS MEAN (UG/L):	101.9
CHLOROPHYLL-A MIN (UG/L):	1
CHLOROPHYLL-A MAX (UG/L):	174
NUMBER OF OBSERVATIONS:	111
CHLOROPHYLL-A MEAN (UG/L):	35.8
SECCHI DEPTH MIN (FT):	0
SECCHI DEPTH MAX (FT):	6.5
NUMBER OF OBSERVATIONS:	122
SECCHI DEPTH MEAN (FT):	2

TROPHIC STATE INDEX

Eutrophic (66.7)



ECOREGION COMPARISONS

ECOREGION: Northern Glaciated Plains

TOTAL PHOSPHORUS:	Better Than Expected Range
CHLOROPHYLL-A:	Within Expected Range
SECCHI DEPTH:	Within Expected Range

PRIMARY SITE ONLY. COMPARISONS ARE BASED ON INTERQUARTILE RANGE, 25TH - 75TH PERCENTILE, FOR ECOREGION REFERENCE LAKES.



2021 WATER QUALITY CHARACTERISTICS

SITE 201

PARAMETERS	TOTAL PHOSPHORUS (UG/L)	CHLOROPHYLL-A (UG/L)	SECCHI DEPTH (FT)
MIN:	42	4	1
MAX:	137	40	4.5
NUMBER OF OBSERVATIONS:	5	5	5
MEAN:	85	22.8	2

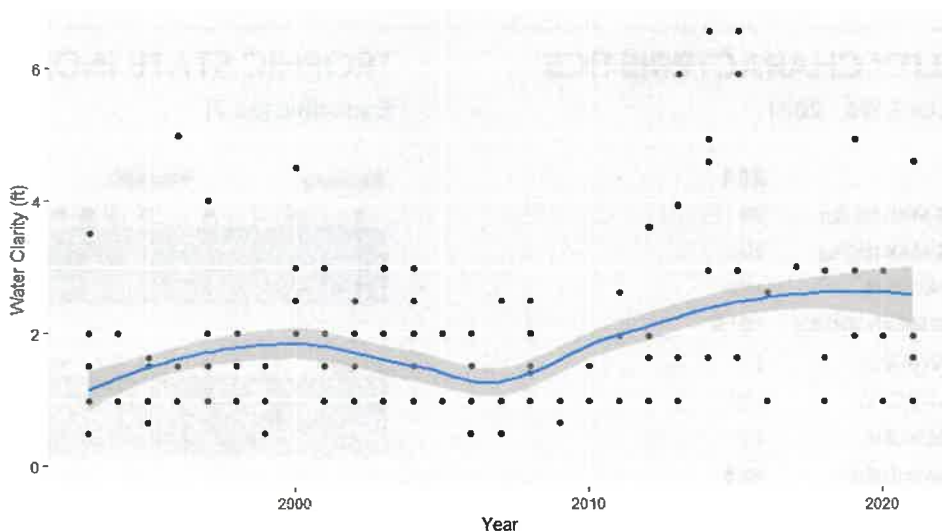
TROPHIC STATE INDEX: 64.8

TREND ANALYSIS REPORT

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, etc., that affect the water quality naturally. The data was analyzed using the Mann Kendall Trend Analysis.

SITE	PARAMETERS	DATE RANGE	TREND
201	Transparency	1996-2021	Improving with 90% confidence
201	Total phosphorus	1996-2021	Improving with 80% confidence
201	Chlorophyll-A	1996-2021	No significant trend exists

LAKE EMILY TRANSPARENCY TREND



GRAPH SOURCE: MINNESOTA POLLUTION CONTROL AGENCY

Lake Emily shows evidence of an improving trend in transparency with 90% confidence. There is not a statistically significant change in the total phosphorus or chlorophyll-a concentrations. This pattern can occur in certain lakes infested with zebra mussels. Zebra mussels can filter out much of the algae if algae levels are relatively low, below 15 ug/l. When algae levels reach the zebra mussels grazing capacity (25 ug/l), algae reproduction surpasses algae consumption, and levels are minimally affected by the zebra mussel's grazing. This is reflected in the data as unusually low algae levels in May and June that can rise dramatically to historical levels in mid to late summer. The zebra mussel's grazing clears up the water column when algae levels are low, greatly improving some clarity observations. Clarity is much closer to historical observations mid-summer due to the algae breaking out of the zebra mussel's biological control. Lake Emily was first listed on the Minnesota Department of Natural Resources infested waters list in 2012. The first year the species was confirmed was 2016. The trend analysis above illustrates the increased transparency after the lake was listed as infested in 2012, with secchi readings beyond five and six feet in the following years. Continued monitoring is necessary to gain a greater understanding of Lake Emily's water chemistry post zebra mussel infestation. This observed clarity improvement due to zebra mussels can be temporary. Average water clarity improved significantly from 2013-2019, but clarity was back around 1 to 2 feet in 2020 and 2021.