

MINNEWASKA

MN Lake ID: 61-0130-00



POPE SOIL & WATER

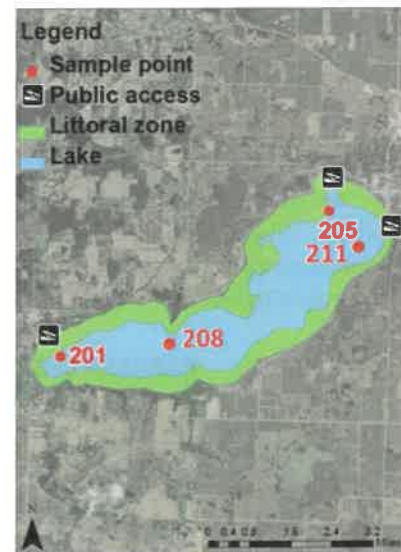


SUMMARY

Lake Minnewaska is a moderately deep mesotrophic lake. Algae concentration results (chlorophyll-a) show that the lake experiences some algae blooms every summer. In the past few years, the transparency has increased and the amount of algae in the water has decreased. This could be due to zebra mussels filtering the water column and redepositing the nutrients onto the lake bottom. Monitoring should continue to enable future water quality analyses such as nutrient loading, runoff modeling, and the State of Minnesota's Phosphorous sensitivity modeling.

LAKE VITALS

ECOREGION:	North Central Hardwood Forest
MAJOR WATERSHED:	Chippewa River
SURFACE AREA (ACRES):	8,050.3
LITTORAL AREA (ACRES):	3,290.84
% LITTORAL DEPTH:	40.9%
MAX DEPTH (FT):	32
AQUATIC INVASIVE SPECIES:	Zebra Mussels, Eurasian Milfoil, Starry Stonewort



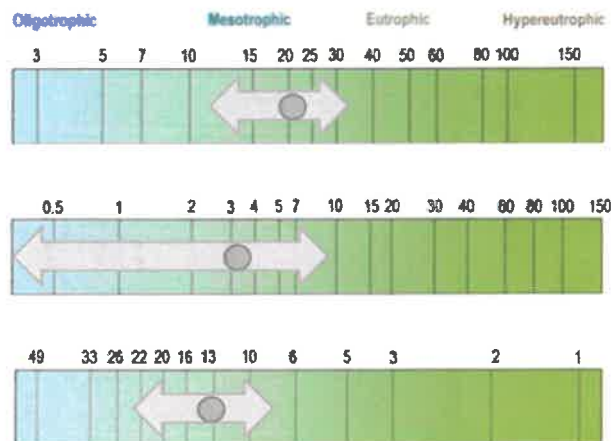
WATER QUALITY CHARACTERISTICS

YEARS MONITORED: 1996 - 2014, 2015 - 2021

PARAMETERS	201	205	208	211
TOTAL PHOSPHORUS MIN (UG/L):	12	14	12	13
TOTAL PHOSPHORUS MAX (UG/L):	65	65	32	33
NUMBER OF OBSERVATIONS:	98	98	35	35
TOTAL PHOSPHORUS MEAN (UG/L):	28.8	28.8	20.3	20
CHLOROPHYLL-A MIN (UG/L):	0.5	0.5	-0.9	0
CHLOROPHYLL-A MAX (UG/L):	28	34	9	16
NUMBER OF OBSERVATIONS:	86	86	34	34
CHLOROPHYLL-A MEAN (UG/L):	8.5	8.8	3.2	3.9
SECCHI DEPTH MIN (FT):	4.5	3.5	8	7.5
SECCHI DEPTH MAX (FT):	23	19	23	19
NUMBER OF OBSERVATIONS:	97	98	34	34
SECCHI DEPTH MEAN (FT):	9.4	8.7	13.7	12.7

TROPHIC STATE INDEX

Mesotrophic (42) - Site 208



ECOREGION COMPARISONS

ECOREGION: North Central Hardwood Forest

TOTAL PHOSPHORUS:	Within 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

SITES 208 & 211

PARAMETERS	TOTAL PHOSPHORUS (UG/L)	CHLOROPHYLL-A (UG/L)	SECCHI DEPTH (FT)
MIN:	14	< 1	8
MAX:	33	16	23
NUMBER OF OBSERVATIONS:	10	10	10
MEAN:	21.5	4.7	13.8

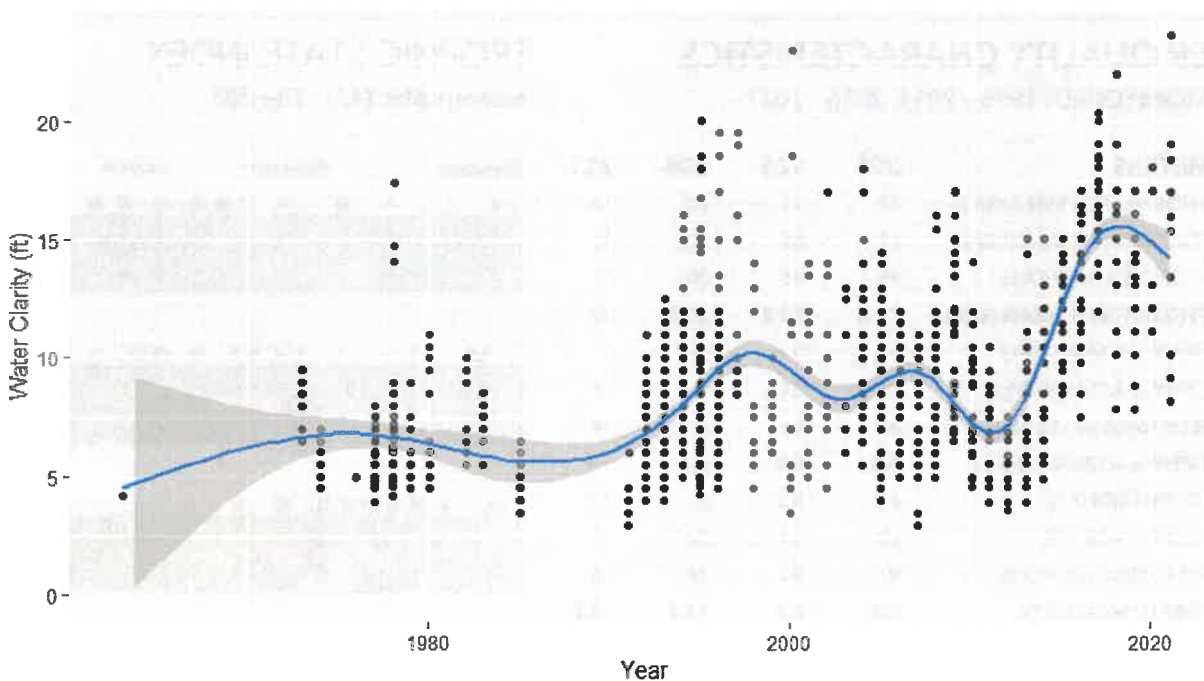
TROPHIC STATE INDEX: 43.3

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
N/A	Transparency	1996-2021	Improving with 80% confidence
N/A	Total phosphorus	1996-2021	Improving with 90% confidence
N/A	Chlorophyll-A	1996-2021	No significant trend exists

LAKE MINNEWASKA TRANSPARENCY TREND



GRAPH SOURCE: MINNESOTA POLLUTION CONTROL AGENCY

Lake Minnewaska's data suggests changes in water quality. There is evidence of a declining transparency trend from 1996-2014, but no trend from 2015-2020. It is likely that zebra mussels have improved water transparency in Lake Minnewaska by consuming algae particles and redepositing them onto the lake bottom. Chlorophyll-a has also decreased due to zebra mussels grazing. The current trends in transparency and algae concentration do not align with the phosphorus levels. Monitoring should continue so that these trends can be tracked in future years, as these effects may not persist long term.