Environmental Services
CROW WING COUNTY
BRAINERD, MINNESOTA 56401

Crow Wing County Water Quality Factsheet Series

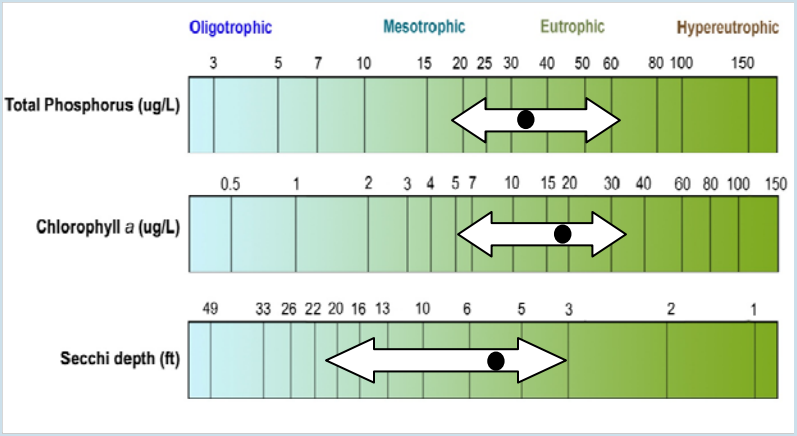
Sibley Lake

DNR ID: 18-0404

Vitals		Physical Characteristics		
MN Lake ID:	18-0404-00	Surface area (acres):	433	
Zoning Authority:	City of Pequot Lakes	Littoral area (acres):	255	
Lake Classification:	General Development (GD)	% Littoral area:	59%	
Major Watershed:	Crow Wing River	Max depth (ft):	40	(m): 12.2
Latitude/Longitude:	46.5930 / -94.3243	Mean depth (ft):	N/A	
Water Body Type:	Public	Inlets / Outlets / Accesses:	2 / 1 / 1	
Invasive Species	None (as of 2012)	Lakeshed to lake area ratio:	8:1	

Total Phosphorus
Sibley Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in 1998, 2003-2004, and 2008-2012. The higher phosphorus readings in spring and fall are most likely due to turnover. The majority of the data points fall into the eutrophic range.

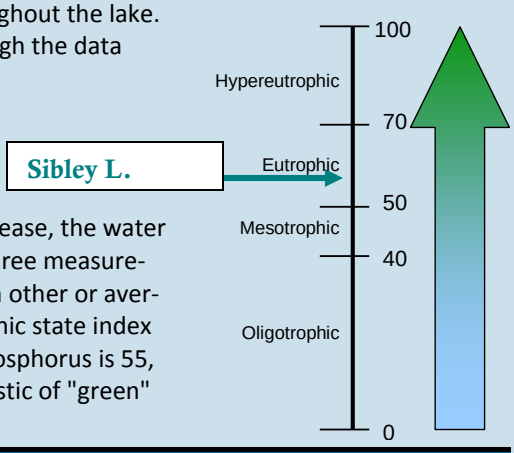
Chlorophyll *a*
Chlorophyll a is the pigment that makes plants and algae green. Chlorophyll *a* is tested in lakes to determine the algae concentration or how "green" the water is. Chlorophyll *a* was evaluated in Sibley from 1988, 2003-2004, 2008-2012. Chlorophyll *a* concentrations remained above 10 ug/L on all but 7 sample dates, indicating green water most of the summer. A majority of the sample dates have chlorophyll a values greater than 20 ug/L, which indicate that nuisance algae blooms are occurring.



Sibley Lake total phosphorus, chlorophyll *a* and transparency historical ranges. The arrow represents the range and the black dot represents the historical mean (Primary Site 201). Figure adapted after Moore and Thornton, [Ed.]. 1988. Lake and Reservoir Restoration Guidance Manual. (Doc. No. EPA 440/5-88-002)

Transparency (Secchi Depth)
Transparency is how easily light can pass through a substance. In lakes, it is how deep sunlight penetrates through the water. Plants and algae need sunlight to grow, so they are only able to grow in areas of lakes where the sun penetrates. Water transparency depends on the amount of particles in the water. An increase in particulates results in a decrease in transparency. The annual mean transparency ranges from 3.7 to 9.8 feet and was relatively uniform throughout the lake. The Sibley Lake transparency trend shows evidence of declining water quality, although the data stops in 2004. There is no current data to see if this declining trend continued.

Trophic State Index (TSI)
Phosphorus (nutrients), chlorophyll *a* (algae concentration) and Secchi depth (transparency) are related. As phosphorus increases, there is more food available for algae, resulting in increased algal concentrations. When algal concentrations increase, the water becomes less transparent and the Secchi depth decreases. The results from these three measurements cover different units and ranges and thus cannot be directly compared to each other or averaged. In order to standardize these three measurements, we convert them to a trophic state index (TSI). The mean TSI (56) for Sibley Lake falls into the eutrophic range. The TSI for phosphorus is 55, chlorophyll *a* is 60, and transparency is 52. Eutrophic lakes (TSI 50-70) are characteristic of "green" water most of the summer.



Local association info: Sibley Lake Association **www.minnesotawaters.org/group/sibley**