



Gull Lake

DNR ID: 11-0305

Vitals

MN Lake ID:	11-0305-00
County:	Crow Wing, Cass
Ecoregion:	Northern Lakes and Forest
Major Drainage Basin:	Upper Mississippi River
Latitude/Longitude:	46.41666667/-94.37527778
Water Body Type:	Public
Invasive Species	Curly-leaf pondweed in upper gull chain

Physical Characteristics

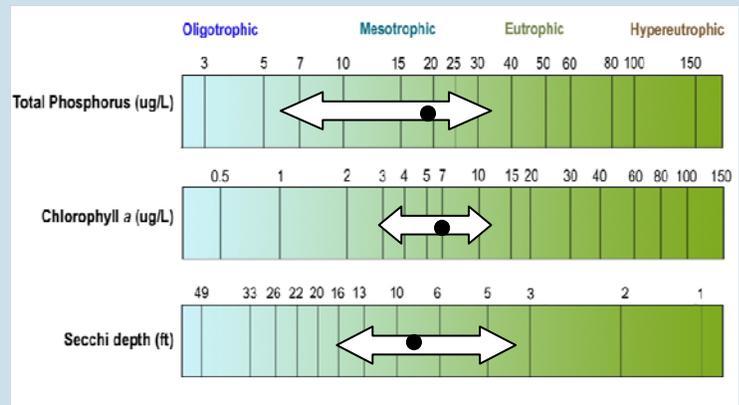
Surface area (acres):	9,947
Littoral area (acres):	2,825
% Littoral area:	28%
Max depth (ft):	80 (m): 24.3
Mean depth (ft):	32 (m) 9.8
Lakeshed size (acres):	21,281
Lakeshed : lake area ratio	2.1:1
Inlets / Outlets / Accesses	2 / 1 / 4

Total Phosphorus

Gull Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in Gull Lake in 1976-1978, 1989, 1991-1992, 2004, 2007 and 2008. The data indicate a slight increase in phosphorus toward the end of the summer. Site 206, in Booming Out Bay, has slightly higher phosphorus concentrations than the main basin. Steamboat Bay (201) and Wilson Bay (209) have similar phosphorus concentrations to the main basin (101).

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 Gull Lake in 1976-1978, 1989, 1991-1992, 2004, 2007 and 2008. Chlorophyll a concentrations for Wilson Bay (209) remained below 10 ug/L, indicating clear water most of the summer. At the remaining sites, the chlorophyll a concentrations exceeded 10 ug/L, which indicates mild algae blooms toward the end of the summer.



Gull Lake total phosphorus, chlorophyll a and transparency historical ranges. The arrow represents the range and the black dot represents the historical mean (Primary Site 101). 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 means for Gull range from 6.7-12.9 ft. Transparency was highest in 1999-2000 and 2004-2005. Gull Lake transparency ranges from 4.5 to 20 feet throughout the summer. Gull Lake transparency is highest in early June, declines steadily throughout the summer, and then rebounds somewhat in late September-early October.

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. In order to standardize these three measurements to make them directly comparable, we convert them to a trophic state index (TSI). The mean TSI (46) for Gull Lake falls in the mesotrophic range. Mesotrophic lakes (TSI 40-50) are characterized by moderately clear water most of the summer.

