



Gladstone Lake

DNR ID: 18-0338

Vitals		Physical Characteristics	
MN Lake ID:	18-0338-00	Surface area (acres):	437
Zoning Authority:	Crow Wing County	Littoral area (acres):	288
Lake Classification:	General Development (GD)	% Littoral area:	66%
Major Watershed:	Crow Wing River	Max depth (ft):	36 (m): 11
Latitude/Longitude:	46.4785 / -94.2400	Mean depth (ft):	N/A
Water Body Type:	Public	Inlets / Outlets / Accesses:	1 / 1 / 1
Invasive Species	None (as of 2012)	Lakeshed to lake area ratio:	4:1

Total Phosphorus

Gladstone Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in 2003-2004 and 2007. The data show that phosphorus concentrations increase somewhat as the summer progresses. The majority of the data points fall in the mesotrophic range.

Chlorophyll a

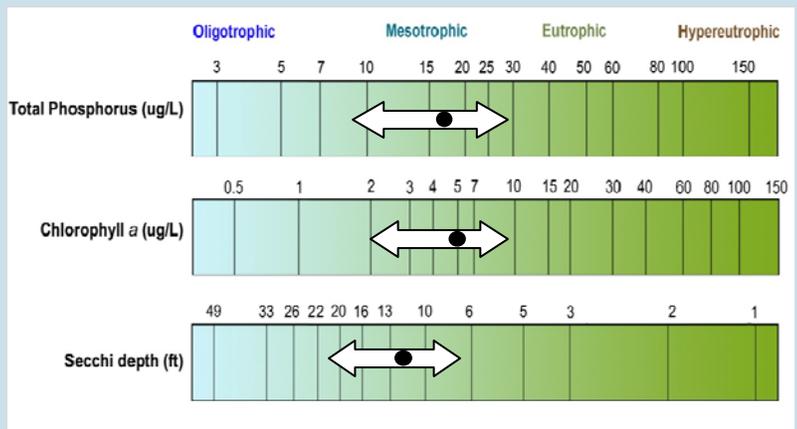
Chlorophyll a is the pigment that makes plants and algae green. Chlorophyll a is tested in lakes to determine the algae concentration or how "green" the water is. Chlorophyll a was evaluated in Gladstone Lake in 2003-2004 and 2007. Chlorophyll a concentrations remained below 10 ug/l, indicating clear water most of the summer.

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 9.0 to 16.3 feet. Gladstone shows no evidence of a trend in transparency data. That means that the water quality is stable.

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 (43) for Gladstone Lake falls into the mesotrophic range. There is good agreement between the TSI for phosphorus (45), chlorophyll a (46) and transparency (41), indicating that these variables are strongly related. Mesotrophic lakes (TSI 40-50) are characterized by moderately clear water for most of the summer.



Gladstone Lake total phosphorus, chlorophyll a and transparency historical ranges. The arrow represents the range and the black dot represents the historical mean (Primary Site 202). Figure adapted after Moore and Thornton, [Ed.]. 1988. Lake and Reservoir Restoration Guidance Manual. (Doc. No. EPA 440/5-88-002)

