



Lower Mission Lake

DNR ID: 18-0243

Vitals

MN Lake ID:	18-0243-00
Zoning Authority:	Crow Wing County
Lake Classification:	Recreational Development (RD)
Major Drainage Basin:	Upper Mississippi River
Latitude/Longitude:	46.53055556 / -94.09888889
Water Body Type:	Public
Invasive Species	Curly-leaf pondweed, Eur. Milfoil

Physical Characteristics

Surface area (acres):	724
Littoral area (acres):	487
% Littoral area:	67%
Max depth (ft):	27 (m): 8.2
Mean depth (ft):	N/A
Inlets / Outlets / Accesses:	2 / 1 / 2
Lakeshed to lake area ratio:	4:1

Total Phosphorus

Lower Mission Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in Lower Mission Lake from 1996-1999, 2003-2006, 2008-2010. The data indicate that phosphorus concentrations increase as the summer goes on. This could be due to internal loading since this is a fairly shallow lake. The majority of the data points fall into the eutrophic range.

Chlorophyll *a*

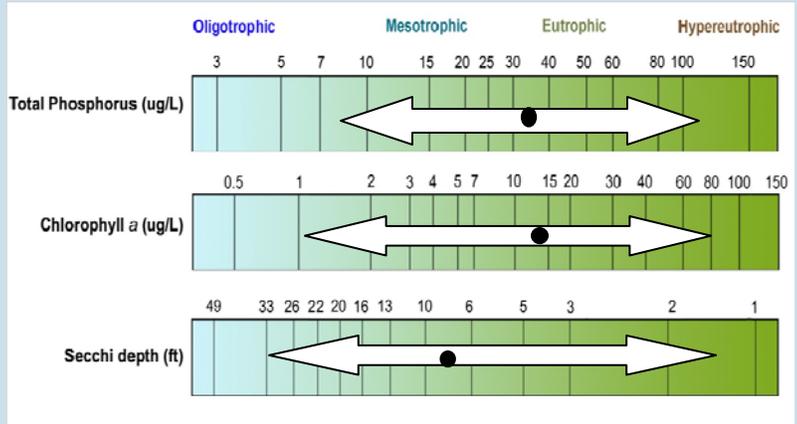
Chlorophyll *a* is the pigment that makes plants and algae green. Chlorophyll *a* is tested in lakes to determine the algae concentration or how "green" the water is. Chlorophyll *a* was evaluated in Lower Mission Lake in 1996-1999, 2003-2006, 2008-2010. Chlorophyll *a* concentrations reached 20 ug/L most years, indicating nuisance algae blooms.

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. At site 203 in the northeastern portion of the lake, annual mean transparency ranges from 6.6 to 12.1 feet. Historically, the mean transparency was high from 2000-2004, and then lower from 2005-2010. It rebounded in 2011. There is a very slight significant long-term improving trend in transparency from 1990-2011. However, in the last decade (2000-2011) there was no evidence of a trend.

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 for Lower Mission Lake falls into the eutrophic range. Eutrophic lakes (TSI 50-70) are characteristic of "green" water most of the summer. "Eu" means true and the root "troph" means nutrients therefore, eutrophic literally means true nutrients or truly nutrient rich (phosphorus).



Lower Mission Lake total phosphorus, chlorophyll *a* and transparency historical ranges. The arrow represents the range and the black dot represents the historical mean (Primary Site 203). Figure adapted after Moore and Thornton, [Ed.]. 1988. Lake and Reservoir Restoration Guidance Manual. (Doc. No. EPA 440/5-88-002)

Lower Mission L.

