



# Upper South Long Lake DNR ID: 18-0096

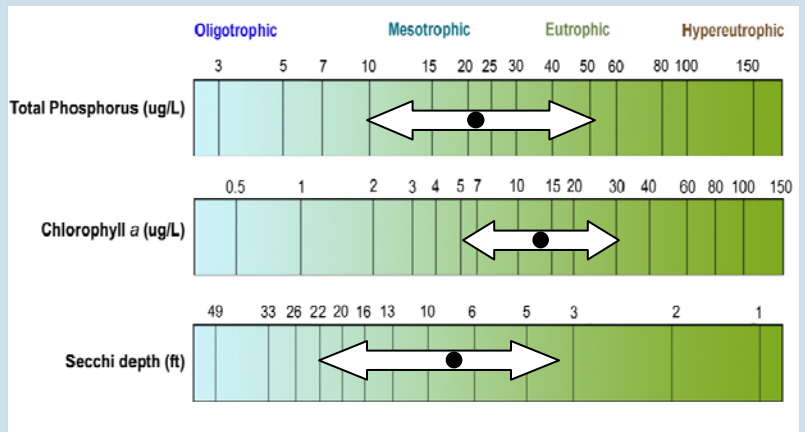
Vitals		Physical Characteristics	
MN Lake ID:	18-0096-00	Surface area (acres):	795
Zoning Authority:	Crow Wing County	Littoral area (acres):	243
Lake Classification:	General Development (GD)	% Littoral area:	30%
Major Drainage Basin:	Upper Mississippi River	Max depth (ft):	47 ft (14 m)
Latitude/Longitude:	46.307921 / -94.035072	Mean depth (ft):	N/A
Water Body Type:	Public	Inlets / Outlets / Accesses:	4 / 1 / 1
Invasive Species	None	Lakeshed to lake area ratio:	4:1

### Total Phosphorus

Upper South Long Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in Upper South Long Lake in 1979, 1980, 1990, 1999, 2001-2005, and 2009-2011. The data do not indicate much seasonal variability. There were 4 results greater than 40 ug/L, because these samples were taken in the spring and fall, they could be related to lake turnover.

### 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 Upper South Long Lake in 1990, 1998, 2000-2005, and 2009-2011. Chlorophyll *a* concentrations reached 10 ug/L most years and 20 ug/L occasionally, signaling algae bloom frequency and severity. Upper South Long Lake has somewhat green water most of the summer.



Upper South Long 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. For all the sites that had more than 20 transparency data points, the mean transparency ranges from 5.8 to 7.3 feet. The transparency throughout the lake appears to be relatively uniform, though the southern half consistently had higher secchi readings than the northern half. Upper South Long Lake transparency shows no significant evidence of a trend in water quality.

### 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 for Upper South Long Lake falls on the border between mesotrophic and eutrophic (49-51).

**Upper South Long L.**

