



# Smith Lake

**DNR ID: 18-0028**

## Vitals

MN Lake ID:	18-0028-00
Zoning Authority:	Crow Wing County
Lake Classification:	Recreation Development (RD)
Major Drainage Basin:	Upper Mississippi River
Latitude/Longitude:	N/A
Water Body Type:	Public
Invasive Species	None

## Physical Characteristics

Surface area (acres):	480
Littoral area (acres):	181
% Littoral area:	37%
Max depth (ft):	54 ft (16.4 m)
Mean depth (ft):	N/A
Inlets / Outlets / Accesses:	3 / 1 / 0
Lakeshed to lake area ratio:	6:1

## Total Phosphorus

Smith Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in Smith Lake in 2001-2002, 2004. The data show that phosphorus concentrations increase slightly as the summer goes on. The majority of the data points fall into the mesotrophic range.

## Chlorophyll *a*

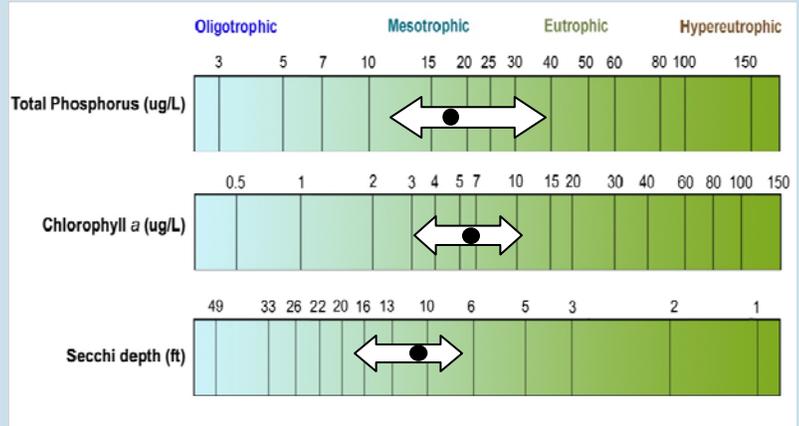
Chlorophyll *a* is the pigment that makes plants and algae green. Chlorophyll *a* is tested in lakes to determine the algae concentration or how "green" the water is. Chlorophyll *a* was evaluated in Smith Lake in 2001-2002, 2004. Chlorophyll *a* concentrations reached 10 ug/L in 2002 and 2004, indicating minor 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. The annual mean transparency for Smith Lake ranges from 8 to 12.2 feet. The transparency throughout the lake appears to be relatively uniform, with the best transparency occurring at the deeper sites in the lake (sampling sites 202 and 203). Smith Lake shows a significant improving trend in transparency from 2000-2011. The transparency has improved an average of approximately 2 feet over this time period.

## 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 Smith Lake falls within the mesotrophic range. Mesotrophic lakes (TSI 40-50) are characterized by moderately clear water most of the summer. "Meso" means middle or mid; therefore, mesotrophic means a medium amount of productivity. Mesotrophic lakes are commonly found in central Minnesota and have clear water with algal blooms in late summer.



Smith 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)

