



# Rush Lake

**DNR ID: 18-0311**

## Vitals

MN Lake ID:	18-0311-00
Zoning Authority:	Crow Wing Co., City of Crosslake
Lake Classification:	General Development (GD)
Major Drainage Basin:	Upper Mississippi River
Latitude/Longitude:	46.690162, -94.129314
Water Body Type:	Public
Invasive Species	None

## Physical Characteristics

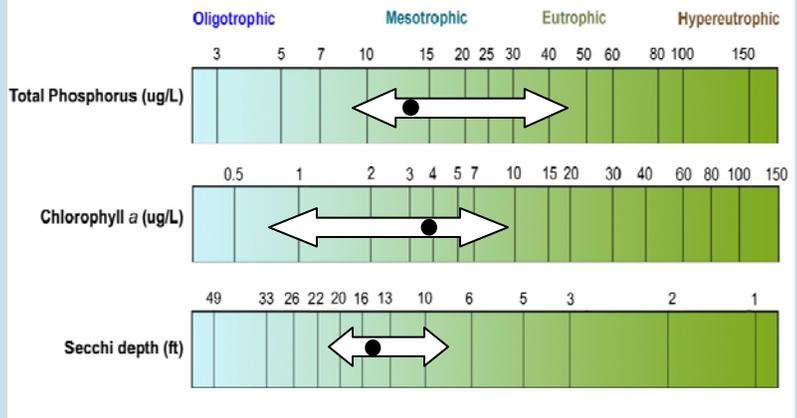
Surface area (acres):	731 (Rush); 116 (Hen)
Littoral area (acres):	444 (Rush); 59 (Hen)
% Littoral area:	61% (Rush); 51% (Hen)
Max depth (ft):	100 ft (Rush); 52 ft (Hen)
Mean depth (ft):	N/A
Inlets / Outlets / Accesses:	1 / 1 / 0
Lakeshed to lake area ratio:	2:1

## Total Phosphorus

Rush Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in Rush Lake in 1989, 1990, 2003, 2005, 2007-2010. The data do not indicate much seasonal variability. The majority of the data points fall within on the oligotrophic / mesotrophic border.

## 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 Rush Lake in 1989, 1990, 2003, 2005, 2007-2010. Chlorophyll *a* concentrations for all dates at all sites remained below 10 ug/L, indicating clear water most of the summer.



Rush Lake total phosphorus, chlorophyll *a* and transparency historical ranges. The arrow represents the range and the black dot represents the historical mean (Primary Site 205). 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 11.7 to 20.5 feet. The transparency throughout the lake appears to be relatively uniform, with the best transparency occurring at one of the deeper spots in the southwest basin (site 203). Site 202 has transparency data dating back to 1976. The earliest data is below the long-term mean. From 1984-1996 most annual means were above the long-term mean. The past decade of annual means data are below the long-term mean. The data indicate a possible slight declining trend in transparency for Rush Lake.

## 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 Rush Lake falls on the border between oligotrophic and mesotrophic (39-41). Lakes on the oligotrophic/mesotrophic border are characteristic of clear water throughout the summer and are excellent for recreation.

