Environmental Services
CROW WING COUNTY
BRAINERD, MINNESOTA 56401

Crow Wing County Water Quality Factsheet Series

Horseshoe Lake

DNR ID: 18-0251

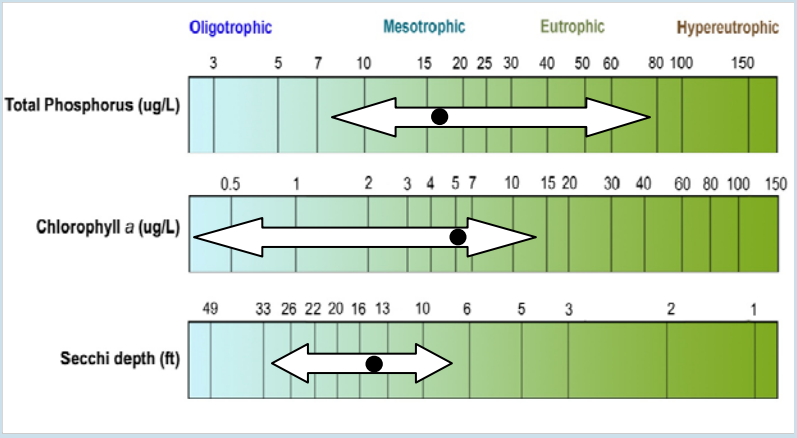
Vitals		Physical Characteristics	
MN Lake ID:	18-0251-00	Surface area (acres):	922
Zoning Authority:	Crow Wing County	Littoral area (acres):	800
Lake Classification:	General Development (GD)	% Littoral area:	87%
Major Watershed:	Pine River	Max depth (ft):	55 (m): 16.8
Latitude/Longitude:	46.5823 / -94.1141	Mean depth (ft):	N/A
Water Body Type:	Public	Inlets / Outlets / Accesses:	0 / 0 / 1
Invasive Species	None (as of 2012)	Lakeshed to lake area ratio:	2:1

Total Phosphorus

Horseshoe Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in Horseshoe in 2002 and 2004-2012. The data do not indicate much seasonal variability. About half of the data points fall into the mesotrophic range and half into the oligotrophic 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 Horseshoe from 2002-2012. Chlorophyll *a* concentrations remained below 10 ug/L on all sample dates except for two, indicating clear water most of the summer.



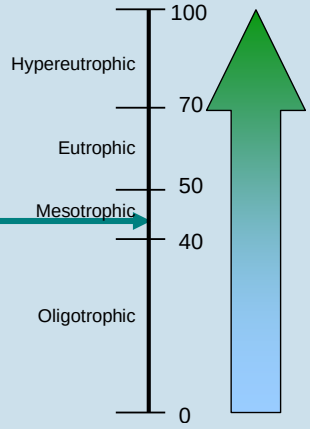
Horseshoe Lake total phosphorus, chlorophyll *a* and transparency historical ranges. The arrow represents the range and the black dot represents the historical mean (Primary Site 205). Figure adapted after Moore and Thornton, [Ed.]. 1988. Lake and Reservoir Restoration Guidance Manual. (Doc. No. EPA 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. The annual mean transparency ranges from 10.4 to 20.3 feet with the transparency throughout the lake appearing to be relatively uniform. Horseshoe shows no evidence of water quality trends. 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 Horseshoe Lake falls into the mesotrophic range. The TSI for phosphorus is 44, chlorophyll *a* is 47, and transparency 38. Mesotrophic lakes (TSI 40-50) are characterized by moderately clear water for most of the summer and can be good walleye lakes.



Local association info: Horseshoe Lake Property Owners Association **Email Kris @ kthavir@juno.com**