

# Lower Hay Lake

**DNR ID: 18-0378**

## Vitals

MN Lake ID:	18-0378-00
Zoning Authority:	Crow Wing County
Lake Classification:	General Development (RD)
Major Drainage Basin:	Pine River Watershed
Latitude/Longitude:	46.667618 / -94.276027
Water Body Type:	Public
Invasive Species	None

## Physical Characteristics

Surface area (acres):	693
Littoral area (acres):	159
% Littoral area:	23%
Max depth (ft):	100 (m): 30
Mean depth (ft):	N/A
Inlets / Outlets / Accesses:	1 / 1 / 1
Lakeshed to lake area ratio:	4:1

### Total Phosphorus

Lower Hay Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in Lower Hay Lake in 2003-2005, 2007-2010. The data do not indicate much seasonal variability. The majority of the data points fall into the mesotrophic range.

### Chlorophyll *a*

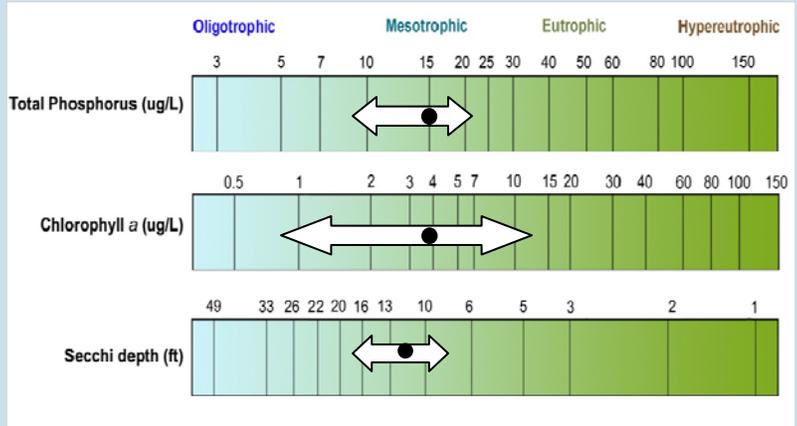
Chlorophyll *a* is the pigment that makes plants and algae green. Chlorophyll *a* is tested in lakes to determine the algae concentration or how "green" the water is. Chlorophyll *a* was evaluated in Lower Hay Lake in 2003-2005, 2007-2010. Chlorophyll *a* concentrations remained below 10 ug/L for all but one sample date, indicating clear water most of the summer.

### 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. The annual mean transparency ranges from 9.3 to 18.7 feet. With the exception of 1989 and 2004 data, the annual means stay relatively close to the long-term mean. The transparency throughout the lake appears to be relatively uniform. The data for all sampling sites for Lower Hay Lake show no trend in transparency. This means the transparency 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 for Lower Hay Lake falls in 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. They are also good for walleye fishing.



Lower Hay 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)

