



Big Trout Lake

DNR ID: 18-0315

Vitals

MN Lake ID: 18-0315-00
 County: Crow Wing
 Lake Classification: General Development (GD)
 Major Drainage Basin: Upper Mississippi River
 Latitude/Longitude: 46.71861111/-94.15861111
 Water Body Type: Public
 Invasive Species: None Determined

Physical Characteristics

Surface area (acres): 1,363
 Littoral area (acres): 369
 % Littoral area: 27%
 Max depth (ft): 128 (m): 39.01
 Mean depth (ft): NA
 Lakeshed size (acres): 8,145
 Lakeshed : lake area ratio: 5.9:1
 Inlets / Outlets / Accesses: Connected to Whitefish / 1

Total Phosphorus

Big Trout Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. The data indicate that phosphorus concentrations are lowest in July, and higher in May and September.

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 Big Trout Lake in 2003-2005, and 2007-2008 (Figure 8). Chlorophyll *a* concentrations remained well below 10 ug/L, indicating clear water all summer and no nuisance algae blooms.

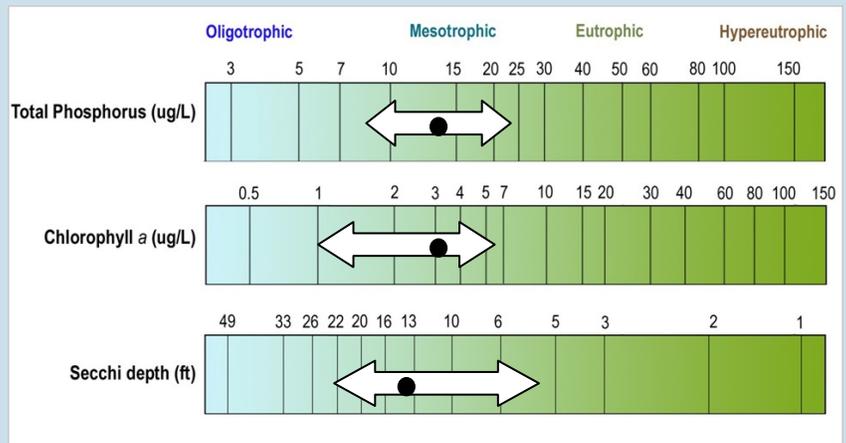
Transparency (Secchi Depth)

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 means for Big Trout Lake range from 11.6-17.7 ft. Transparency was highest in 1993 and 1999. 2007-2008 transparency was lower than the long-term mean.

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 to make them directly comparable, we convert them to a trophic state index (TSI).

The mean TSI for Big Trout Lake falls on the border between oligotrophic and mesotrophic (39-41). There is good agreement between the TSI for phosphorus (40), chlorophyll *a* (41) and transparency (38). Lakes on the oligotrophic/mesotrophic border (TSI 39-41) are characterized by clear water throughout the summer and are excellent for recreation. The bottom of the deep areas of the lake becomes anoxic (no oxygen) during the summer, which is inhospitable to game fish. This occurrence is common in MN lakes.



Big Trout Lake total phosphorus, chlorophyll *a* and transparency historical ranges. The arrow represents the range and the black dot represents the historical mean (Primary Site 16201). Figure adapted after Moore and Thornton, [Ed.]. 1988. Lake and Reservoir Restoration Guidance Manual. (Doc. No. EPA 440/5-88-002)

