



Ruth Lake

DNR ID: 18-0212

Vitals

MN Lake ID: 18-0212-00
 Zoning Authority: City of Emily
 Lake Classification: General Development (GD)
 Major Drainage Basin: Upper Mississippi River
 Latitude/Longitude: 46.75000000 / -93.95861111
 Water Body Type: Public
 Invasive Species: Eurasian Watermilfoil

Physical Characteristics

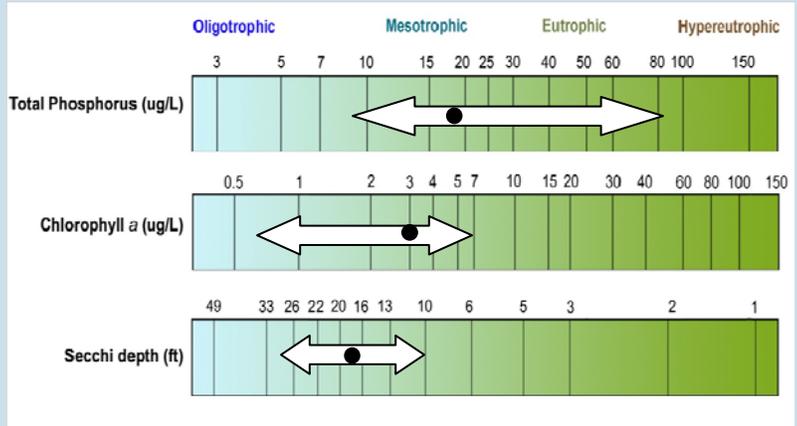
Surface area (acres): 599
 Littoral area (acres): 260
 % Littoral area: 43%
 Max depth (ft): 39 ft (11.9 m)
 Mean depth (ft): N/A
 Inlets / Outlets / Accesses: 0 / 1 / 1
 Lakeshed to lake area ratio: 4:1

Total Phosphorus

Ruth Lake is phosphorus limited, which means that algae and aquatic plant growth is dependent upon available phosphorus. Total phosphorus was evaluated in Ruth Lake in 1994, 2004, 2008-2010, mostly at sampling site 101. The data do not indicate much seasonal variability. The majority of the data points fall into the mesotrophic range. There are some higher phosphorus concentrations in late May.

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 Ruth Lake in 1994, 2004, 2008-2010. Chlorophyll *a* concentrations for all dates at all sites remained below 10 ug/L, indicating clear water most of the summer. There was not much variation between the years monitored, and chlorophyll *a* concentrations remained relatively steady over the summer.



Ruth Lake total phosphorus, chlorophyll *a* and transparency historical ranges. The arrow represents the range and the black dot represents the historical mean (Primary Site 101). 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 annual mean transparency ranges from 8.9 to 24.9 feet. The transparency throughout the lake appears to be relatively uniform, with the best transparency occurring at the deepest spot in the large main basin (sampling site 101). Ruth Lake does not have enough consistent data for a trend analysis.

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 Ruth Lake falls within the mesotrophic category. Mesotrophic lakes (TSI 40-50) are characterized by moderately clear water most of the summer.

