

June 2024

Nelson Lake

(47.06641 N, -101.20778 W)

Oliver County

- Nelson Lake is a Lake in central North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/nelsonoliver2020.pdf>)
- There are two public boat ramps on Nelson lake (see locations at the map link above).
- The Nelson Lake watershed drains about 31,084 acres. Land cover in the watershed is mostly rangeland, followed by agricultural land. Agriculture is dominated by wheat, soybeans, and corn (Table 1).
- Nelson Lake is a Class III, warm-water fishery, which are “capable of supporting natural reproduction and growth of warm water fishes (e.g., largemouth bass and bluegill) and associated aquatic biota.”
- Nelson lake is managed for largemouth bass, and bluegill. The lake was last stocked in 2020 with largemouth bass. Largemouth bass, black crappie, white crappie, bluegill, and common carp were found during the last ND Game and Fish survey(2023).
- Nelson Lake was last sampled in 2006.

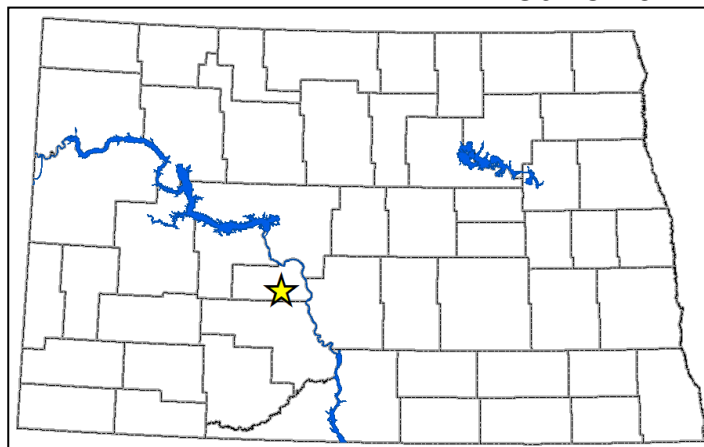


Figure 1. Location of Nelson Lake within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASSCDL, 2021). Value listed of crop type represents percentage of total production

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	24.4%	8.35%
Wheat	1.0%	2.6%
Soybeans	4.4%	1.6%
Corn	4.1%	<1.0%
Trees	1.0%	4.2%
Rangeland	65.5%	63.7%
Water	4.2%	12.9%
Bare	5.0%	10.8%

Temperature and Dissolved Oxygen

- Nelson Lake stayed stratified throughout most of the sampling season, with warm, well-oxygenated water at the top of the water column, and warm, low-oxygen water near the bottom. Nelson Lake stays warmer year round as it is used as a cooling lake for a power plant.
- Thermal stratification took place in May, June, and July. The greatest temperature change in the water column during these months was 3.5 degrees Celsius (°C), 2.3°C, and 3.9°C (Figure 2).
- Dissolved oxygen concentrations were relatively high at the surface, but anoxic were present near the bottom (Figure 2).

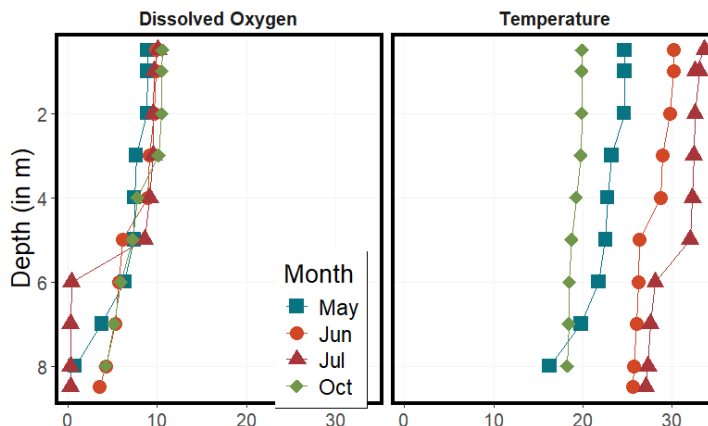


Figure 2. 2023 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L⁻¹)

Trophic State Indices

- Trophic state is a measure used by scientists to assess the condition (where lower scores indicate better water quality) of a lake using three common measures: total phosphorus (TP), Secchi disk transparency and chlorophyll-a concentration.
- Nelson Lake is a eutrophic lake (Figure 3) that has high nutrient concentrations and moderate algal and plant growth.
- Trophic state in 2023 was relatively similar to historical condition.

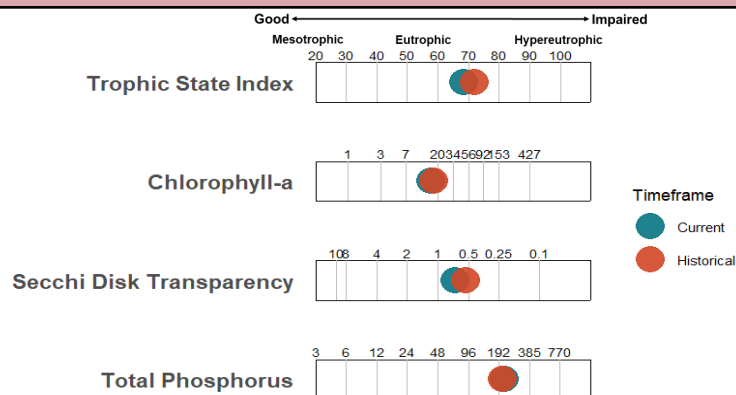


Figure 3. Trophic state indices for 2016 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2023 was greater than the historical median and the Missouri Plateau Level IV Ecoregion where Nelson Lake is located (Figure 4).
- 2023 median concentration of dissolved TN was less than TN.
- Median TP concentration in 2023 was greater than the historical and ecoregion medians (Figure 4).
- 2023 median concentration of dissolved phosphorus was less than TP.

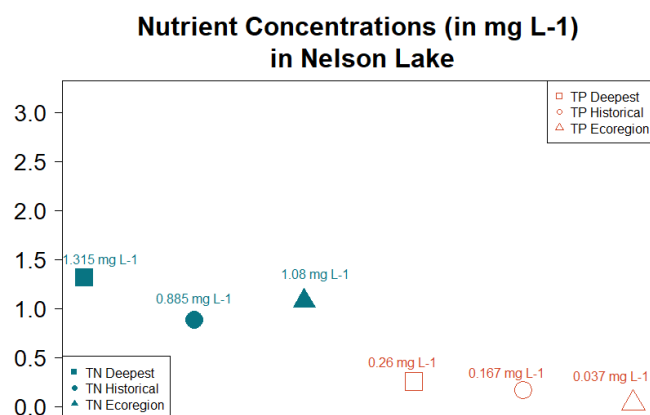


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2023 and historical samples and from all Ecoregion natural lakes and reservoirs.

Measure	2023 Median	Historical Median	Ecoregion Median
Alkalinity	306 mg L ⁻¹	353 mg L ⁻¹	201 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	322 mg L ⁻¹	350 mg L ⁻¹	217 mg L ⁻¹
Calcium (Ca ²⁺)	80.3 mg L ⁻¹	74.8 mg L ⁻¹	47.5 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	25.5 mg L ⁻¹	37 mg L ⁻¹	11 mg L ⁻¹
Conductivity	1745 µS cm ⁻¹	1955 µS cm ⁻¹	823.5 µS cm ⁻¹
Dissolved Solids	1215 mg L ⁻¹	1350 mg L ⁻¹	521.5 mg L ⁻¹
Magnesium (Mg ²⁺)	72.1 mg L ⁻¹	71.15 mg L ⁻¹	24.7 mg L ⁻¹
Sodium (Na ⁺)	230.5 mg L ⁻¹	267 mg L ⁻¹	94.4 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	611 mg L ⁻¹	686 mg L ⁻¹	206 mg L ⁻¹

- Sulfate is the dominant anion in Nelson Lake, while sodium is the dominant cation (Table 2).
- 2023 median concentrations of most cations and anions are similar to historical medians for the lake and greater than the ecoregion medians (Table 2).

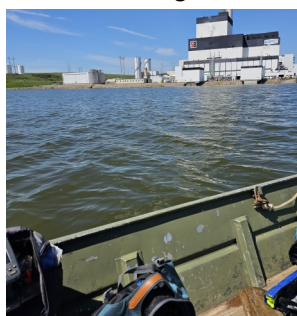


Figure 5. Photo of Nelson Lake (deepest point) during the July sampling event. Photo taken by Emily Brazil.