

June 2024

Mirror Lake

(45.9941 N, -102.63483 W)

Adams County

- Mirror Lake is a lake in southwestern North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/mirror2023.pdf>)
- There is one public boat ramp on the north side of Mirror Lake off of mirror lake road in Hettinger, ND.
- The Mirror Lake watershed drains about 19,500 acres. Land cover in the watershed is dominated by rangeland and agricultural land. Agriculture is largely comprised of wheat, alfalfa, and soybeans (Table 1).
- Mirror 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.”
- Mirror Lake is managed primarily for channel catfish and walleye. The lake was last stocked in 2021 with channel catfish and yellow perch. Channel catfish, yellow perch, walleye, and black bullhead were found during the last survey by the ND Game and Fish (2023).
- Mirror lake was last sampled in 2006.

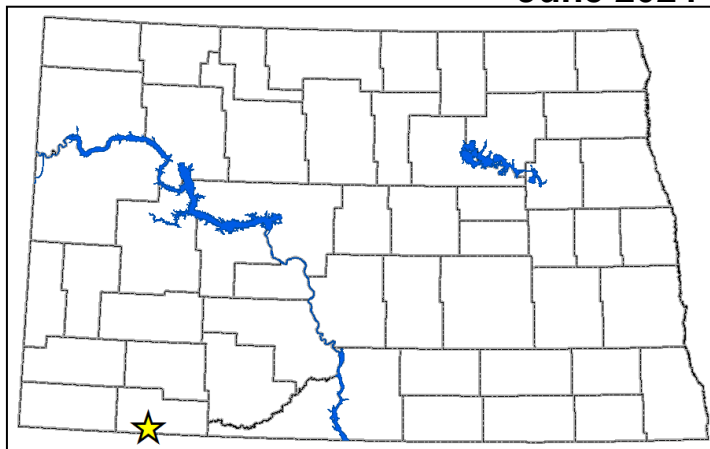


Figure 1. Location of Mirror Lake within the state

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	38.7%	54.2%
Wheat	14.4%	1.6%
Alfalfa	6.1%	4.1%
Soybeans	5.8%	<1.0%
Trees	3.0%	3.4%
Rangeland	49.8%	42.8%
Water	2.2%	5.0%
Bare	6.6%	40.4%

Temperature and Dissolved Oxygen

- Mirror Lake was stratified in May and July, with warm, well-oxygenated water at the top of the water column, and cold, low-oxygen water near the bottom.
- The greatest temperature change in the water column during these months was 1.4 degrees Celsius (°C) and 2.4°C (Figure 2).
- Dissolved oxygen (DO) concentrations were relatively high at the surface, but there was some anoxic conditions near the bottom (Figure 2).

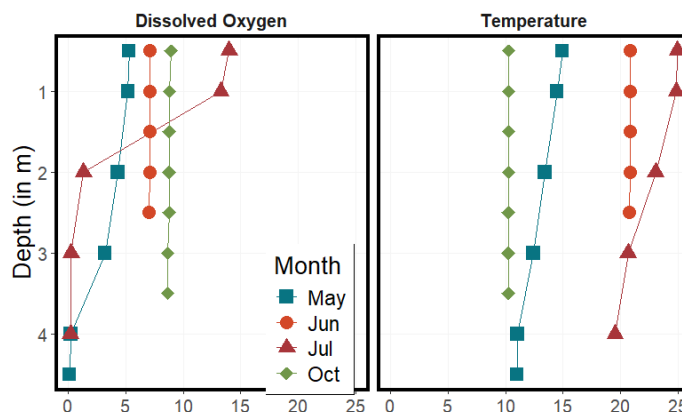


Figure 2. 2023 profiles of dissolved oxygen (left) in milligrams per liter (mg L^{-1}) and temperature (right) in degrees Celsius.

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.
- Mirror Lake is a eutrophic lake (Figure 3) that has high nutrient concentrations and high to moderate algal and plant growth.
- Trophic state in 2023 was a higher than the historical condition.

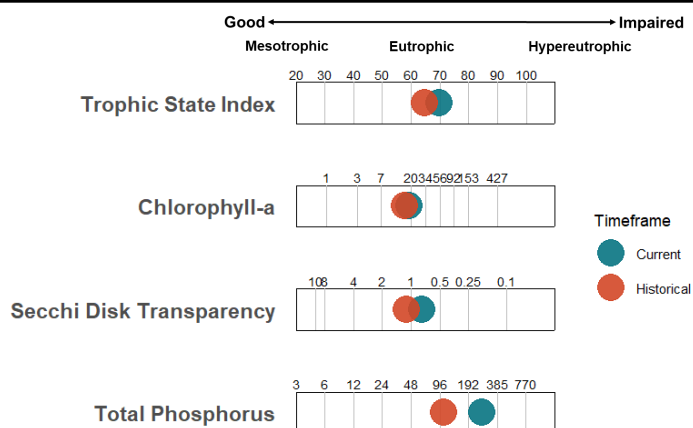


Figure 3. Trophic state indices for 2023 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2023 was greater than the historical median and the Missouri Plateau Level IV Ecoregion median where Mirror 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.
- Ammonia was detected in 2 of 4 samples (May and June) and Nitrate + Nitrite was detected in one corresponding sample (June). Both were found above the detection limit of 0.03 mg/L during the 2023 sampling season.

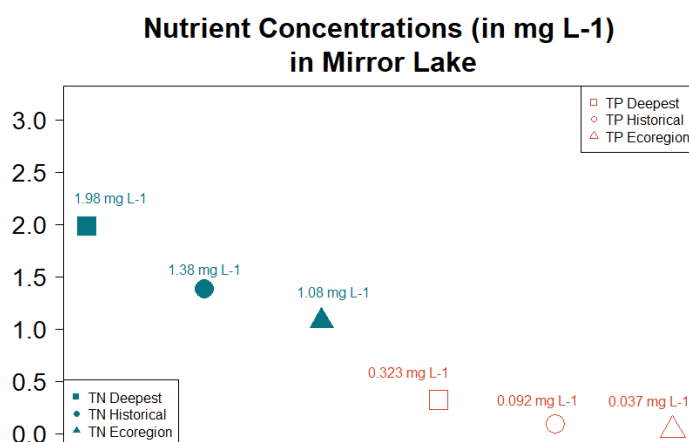


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

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	319 mg L ⁻¹	298 mg L ⁻¹	201 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	367.5 mg L ⁻¹	311 mg L ⁻¹	217 mg L ⁻¹
Calcium (Ca ²⁺)	82.5 mg L ⁻¹	66.8 mg L ⁻¹	47.5 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	5.75 mg L ⁻¹	20 mg L ⁻¹	11 mg L ⁻¹
Conductivity	2485 µS cm ⁻¹	2160 µS cm ⁻¹	823.5 µS cm ⁻¹
Dissolved Solids	1840 mg L ⁻¹	1470 mg L ⁻¹	521.5 mg L ⁻¹
Magnesium (Mg ²⁺)	128 mg L ⁻¹	94.6 mg L ⁻¹	24.7 mg L ⁻¹
Sodium (Na ⁺)	349 mg L ⁻¹	296 mg L ⁻¹	94.4 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	1032.5 mg L ⁻¹	858.5 mg L ⁻¹	206 mg L ⁻¹

- Sulfate is the dominant anion in Mirror 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).