

East Arroda Dam

(48.40512 N, -97.79582 W)

Oliver County

- East Arroda Dam is a Dam in central North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/arrodalakes2022.pdf>)
- There is one public boat ramp on East Arroda Dam on the northwest side of the lake near the Highway.
- The East Arroda Dam watershed drains about 65,000 acres. Land cover in the watershed is mostly rangeland. Agriculture in the area is dominated by wheat, soybeans, and corn (Table 1).
- East Arroda Dam is a Class II, cool-water fishery, which are “capable of supporting natural reproduction and growth of cool water fishes (e.g., walleye and northern pike) and associated aquatic biota.”
- East Arroda Dam is managed for northern pike, perch, black crappie, and white crappie. The lake hasn’t been stocked since 2020. Northern Pike were the only species found during the last survey by the ND Game and Fish (2023).
- East Arroda Dam was last sampled in 2006.

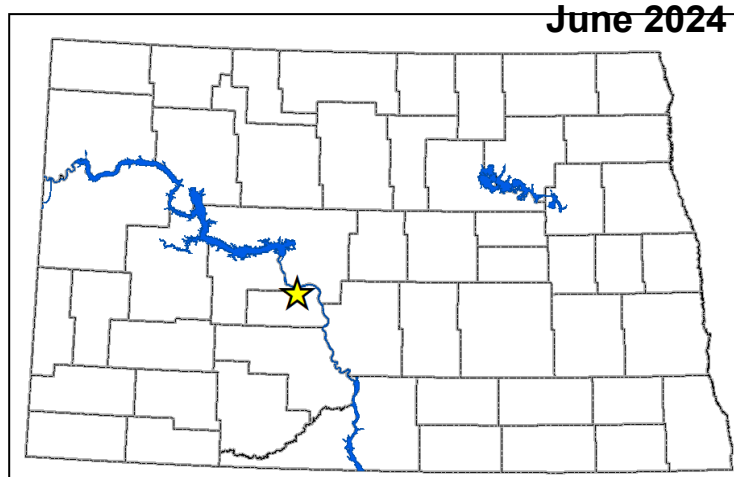


Figure 1. Location of East Arroda Dam within the state

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	24.5 %	2.9%
Wheat	7.9 %	<1%
Soybeans	7.0 %	<1%
Corn	3.8%	1.7%
Trees	5.7 %	21.3%
Rangeland	52.1 %	42.8%
Water	12.9 %	30.4%
Bare	2.8 %	2.7%

Temperature and Dissolved Oxygen

- East Arroda Dam stayed stratified throughout the sampling season, with warm, well-oxygenated water at the top of the water column, and cold, low-oxygen water near the bottom.
- Thermal stratification took place in May, June, August and October. The greatest temperature change in the water column during these months was 10.95 degrees Celsius (°C), 8.96 °C, 7.8 °C, and 2.5 °C (Figure 2).
- Dissolved oxygen concentrations were relatively high at the surface, but low to anoxic near the bottom (Figure 2).

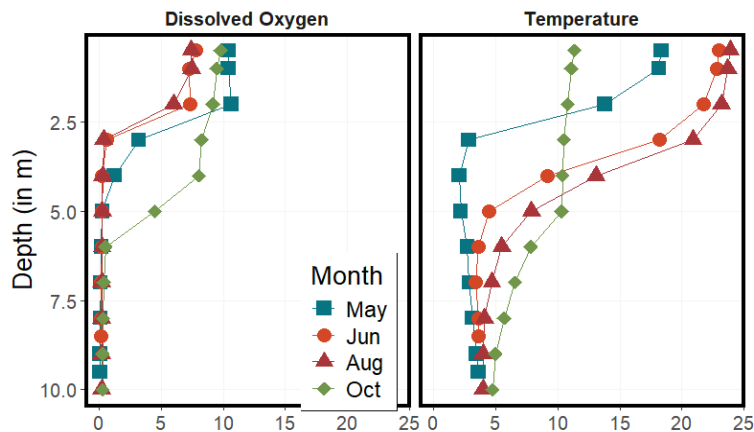


Figure 2. 2023 profiles of dissolved oxygen (left) in milligrams per liter (mg L^{-1}) and temperature (right) in degrees Celsius.

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.
- East Arroda Dam is a eutrophic lake that has moderate nutrient concentrations and low algal and plant growth (Figure 3).
- Trophic state in 2023 was similar to the historical conditions.

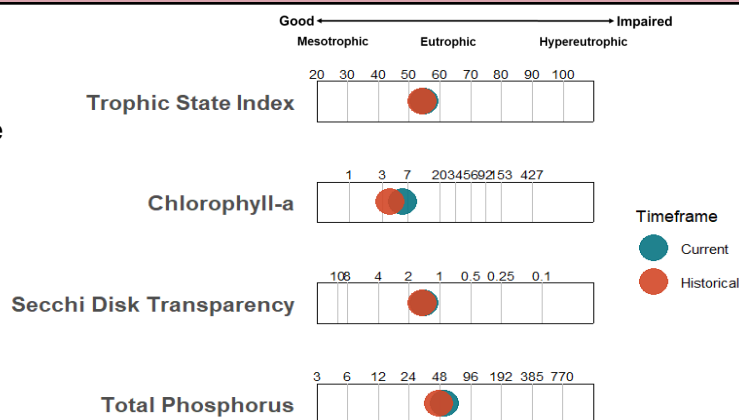


Figure 3. Trophic state indices for 2023 and historical samples

Nutrients

- 2023 median concentration of total nitrogen (TN) was greater than the historical median, and the River Breaks Level IV Ecoregion median (hereafter, Missouri plateau) where East Arroda Dam is located (Figure 4).
- Median concentration of dissolved TN was less than TN (2023).
- Median TP concentration in 2023 was greater than the median for the lake and for the Ecoregion (Figure 4).
- Median concentration of dissolved phosphorus was less than TP (2023).
- Nitrate + nitrate was found above the detection limit of 0.03 mg/L in East Arroda Dam during the 2023 sampling season.

Nutrient Concentrations (in mg L⁻¹) in East Arroda Dam

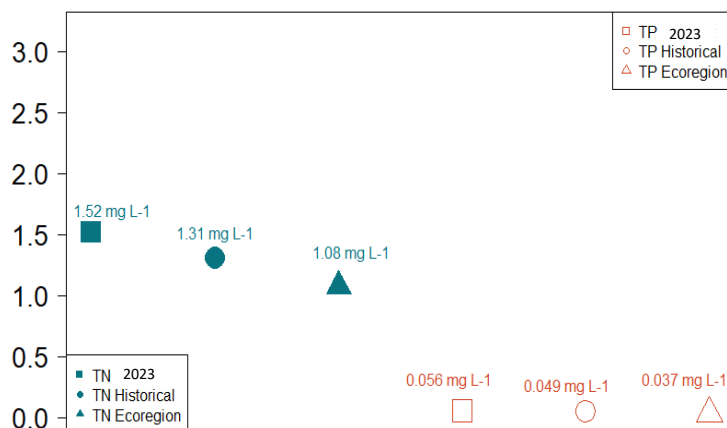


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

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

Measure	2023 Median	Historical Median	Ecoregion Median
Alkalinity	443 mg L ⁻¹	501 mg L ⁻¹	201 mg L ⁻¹
Bicarbonate (HCO ⁻)	488.5 mg L ⁻¹	494 mg L ⁻¹	217 mg L ⁻¹
Calcium (Ca ²⁺)	48.6 mg L ⁻¹	35.75 mg L ⁻¹	47.5 mg L ⁻¹
Carbonate (CO ²⁻ ₃)	18.5 mg L ⁻¹	41 mg L ⁻¹	11 mg L ⁻¹
Conductivity	2990 μS cm ⁻¹	2755 μS cm ⁻¹	823.5 μS cm ⁻¹
Dissolved Solids	2070 mg L ⁻¹	1890 mg L ⁻¹	521.5 mg L ⁻¹
Magnesium (Mg ²⁺)	51.6 mg L ⁻¹	39.9 mg L ⁻¹	24.7 mg L ⁻¹
Sodium (Na ⁺)	590 mg L ⁻¹	552 mg L ⁻¹	94.4 mg L ⁻¹
Sulfate (SO ²⁻ ₄)	1075 mg L ⁻¹	911 mg L ⁻¹	206 mg L ⁻¹

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