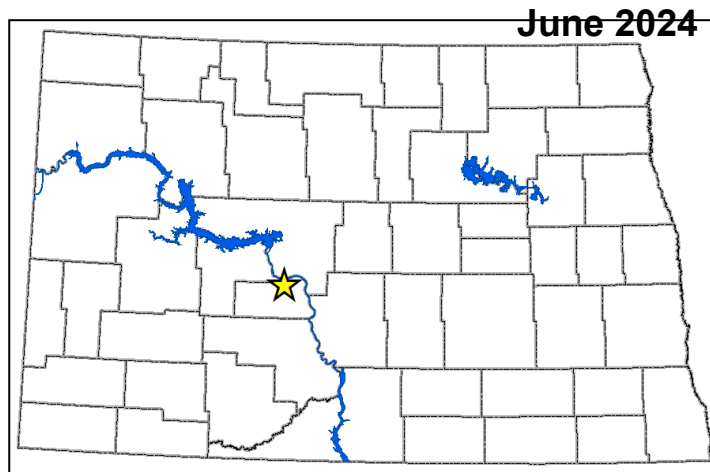


## West Arroda Dam

(47.23421 N, -101.22513 W)

### Oliver County

- West 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 West Arroda Dam on the west side of the lake.
- The West Arroda Dam watershed drains about 65,000 acres. Land cover in the sub-watershed is mostly rangeland. Agriculture is dominated by wheat, soybeans, and corn (Table 1).
- West 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.”
- West Arroda Dam is managed for rainbow trout, black crappie, white crappie, bluegill, and northern pike. The lake was last stocked in 2020. Bluegill, northern pike, and yellow perch were found during the last survey by the ND Game and Fish (2023).
- West Arroda Dam was last sampled in 2006.



June 2024

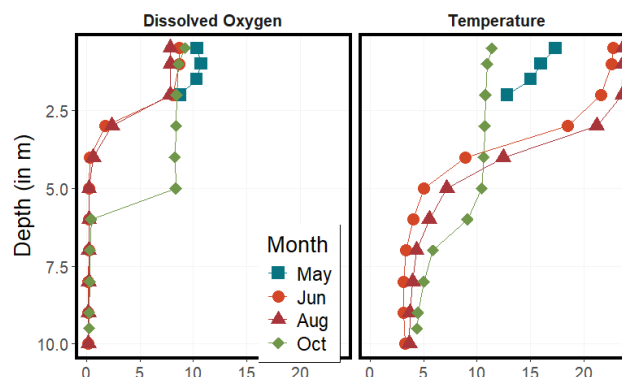
**Figure 1.** Location of West Arroda Dam within the state

**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 %	32.4%
Wheat	7.9 %	<1%
Soybeans	7.0 %	1.4%
Corn	3.8%	5.3%
Trees	5.7 %	17.8%
Rangeland	52.1 %	39.5%
Water	12.9 %	28.9%
Bare	2.8 %	2.6%

## Temperature and Dissolved Oxygen

- West Arroda Dam was 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 3.1 degrees Celsius (°C), 9.6°C, 8.8°C, and 1.3°C (Figure 2).
- Dissolved oxygen concentrations were relatively high at the surface, but low towards the bottom (Figure 2).



**Figure 2.** 2023 profiles of dissolved oxygen (left) in milligrams per liter ( $\text{mg L}^{-1}$ ) 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
- West Arroda Dam is a eutrophic lake that has moderate nutrient concentrations and low algal and plant growth (Figure 3).
- Trophic state in 2023 was relatively similar to historical conditions.

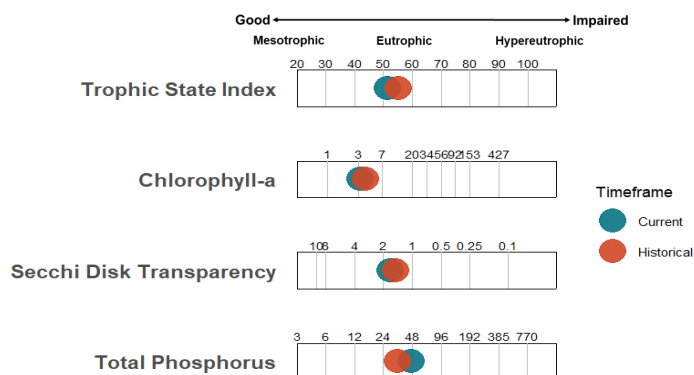


Figure 3. Trophic state indices for 2023 and historical samples

## Nutrients

- Median concentration of total nitrogen (TN) in 2023 was less than the historical median for the lake but greater than the median for the River Breaks Level IV Ecoregion (hereafter, Missouri Plateau) where West 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).

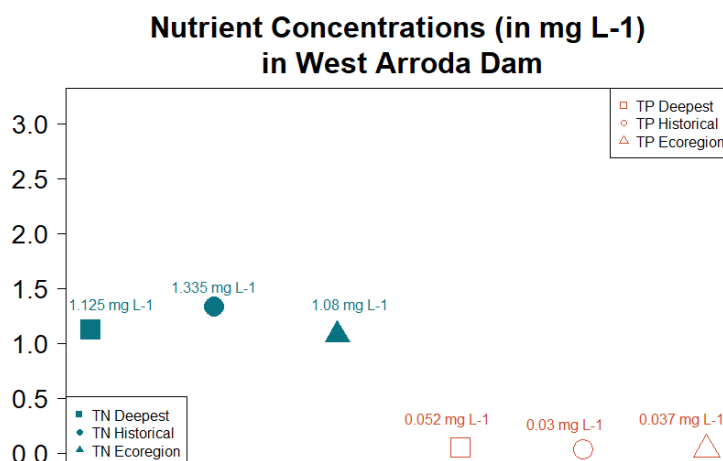


Figure 4. Median concentrations of TN and TP in mg L<sup>-1</sup> compared to regional medians.

## Water Chemistry

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

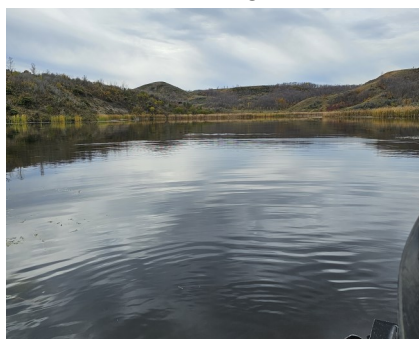


Figure 5. Photo of West Arroda Dam taken by Emily Brazil in October 2023.

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	347.5 mg L <sup>-1</sup>	459 mg L <sup>-1</sup>	201 mg L <sup>-1</sup>
Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	378.5 mg L <sup>-1</sup>	484.5 mg L <sup>-1</sup>	217 mg L <sup>-1</sup>
Calcium (Ca <sup>2+</sup> )	41.65 mg L <sup>-1</sup>	34.2 mg L <sup>-1</sup>	47.5 mg L <sup>-1</sup>
Carbonate (CO <sub>3</sub> <sup>2-</sup> )	17.5 mg L <sup>-1</sup>	36.5 mg L <sup>-1</sup>	11 mg L <sup>-1</sup>
Conductivity	2190 µS cm <sup>-1</sup>	2330 µS cm <sup>-1</sup>	823.5 µS cm <sup>-1</sup>
Dissolved Solids	1490 mg L <sup>-1</sup>	1600 mg L <sup>-1</sup>	521.5 mg L <sup>-1</sup>
Magnesium (Mg <sup>2+</sup> )	39.55 mg L <sup>-1</sup>	38.7 mg L <sup>-1</sup>	24.7 mg L <sup>-1</sup>
Sodium (Na <sup>+</sup> )	429.5 mg L <sup>-1</sup>	465.5 mg L <sup>-1</sup>	94.4 mg L <sup>-1</sup>
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	750.5 mg L <sup>-1</sup>	754.5 mg L <sup>-1</sup>	206 mg L <sup>-1</sup>