

June 2024

Gascoyne Lake

(46.13172 N, -103.09339 W)

Bowman County

- Gascoyne Lake is a lake in southwestern North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/gascoyne2023.pdf>)
- There is one public boat ramp located on the south end of Gascoyne Lake near Highway 12.
- The Gascoyne Lake watershed drains about 18,000 acres. Land cover in the watershed is mostly agricultural land, with some larger sections of rangeland. Agriculture in the area is dominated by wheat, sunflower, and corn (Table 1).
- Gascoyne 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.”
- Gascoyne lake is managed for northern pike and yellow perch. The lake was last stocked in 2022 with yellow perch. Northern pike and common carp were found during the last survey by the ND Game and Fish (2023).
- Gascoyne Lake was last sampled in 2009.

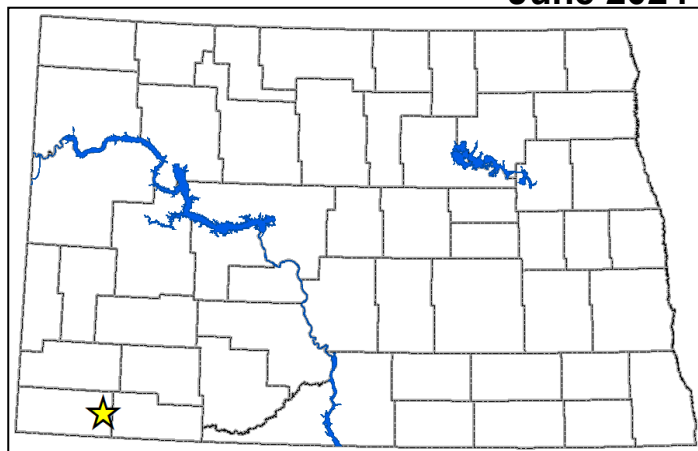


Figure 1. Location of Gascoyne Lake within the state

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	62.0%	47.9%
Wheat	35.6%	41.0%
Sunflower	11.5%	<1%
Corn	8.2%	0%
Trees	8.2%	2.8%
Rangeland	22.5%	36.5%
Water	2.6%	8.0%
Bare	4.7%	4.7%

Temperature and Dissolved Oxygen

- Gascoyne Lake stayed mixed throughout most of the sampling season with consistent temperatures throughout the water column.
- Thermal stratification took place in May and October. The greatest temperature change in the water column during these months was 1.4 degrees Celsius (°C) and 9°C (Figure 2).
- Dissolved oxygen concentrations were relatively high throughout the sampling season and very consistent throughout the water column (Figure 2).

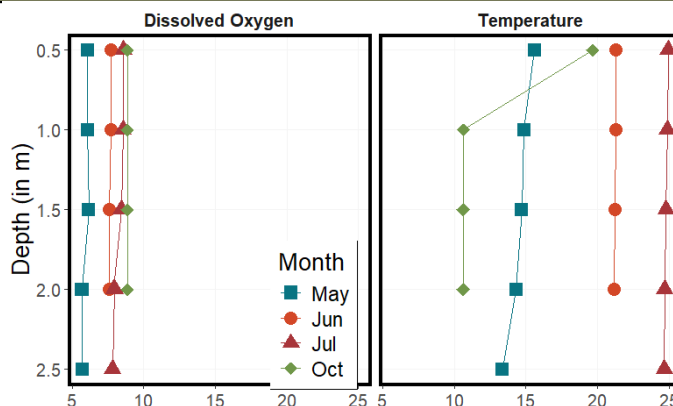


Figure 2. 2023 profiles of dissolved oxygen (left) and temperatures (right) in milligrams per liter (mg L⁻¹)

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

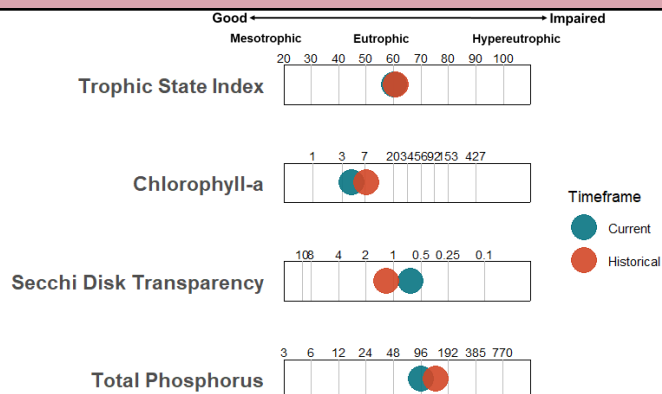


Figure 3. Trophic state indices for 2023 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2023 was greater than the historical median and the median for the Missouri Plateau Level IV Ecoregion where Gascoyne Lake is located (Figure 4).
- 2023 median concentration of dissolved TN was less than TN.
- Median TP concentration in 2023 was less than the historical median but greater than the ecoregion median (Figure 4).
- 2023 median concentration of dissolved phosphorus was less than TP.
- Ammonia was found above the detection limit of 0.03 mg/L in one sampling event (May) during the 2023 season.

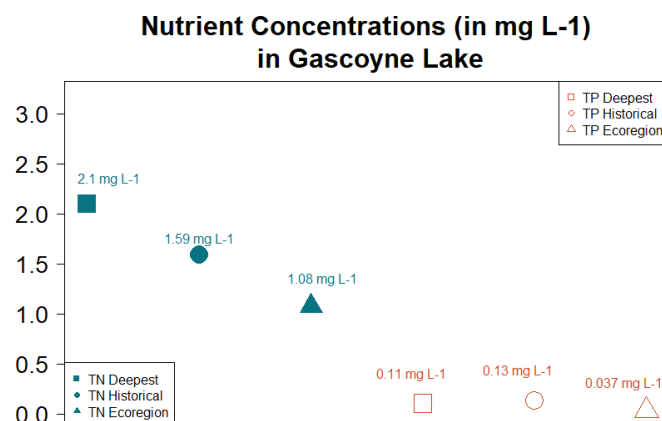


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

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	473 mg L ⁻¹	431 mg L ⁻¹	201 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	495.5 mg L ⁻¹	478 mg L ⁻¹	217 mg L ⁻¹
Calcium (Ca ²⁺)	87.6 mg L ⁻¹	79.3 mg L ⁻¹	47.5 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	40 mg L ⁻¹	38 mg L ⁻¹	11 mg L ⁻¹
Conductivity	4360 μS cm ⁻¹	4140 μS cm ⁻¹	823.5 μS cm ⁻¹
Dissolved Solids	3440 mg L ⁻¹	3250 mg L ⁻¹	521.5 mg L ⁻¹
Magnesium (Mg ²⁺)	220.5 mg L ⁻¹	200 mg L ⁻¹	24.7 mg L ⁻¹
Sodium (Na ⁺)	747 mg L ⁻¹	680 mg L ⁻¹	94.4 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	2045 mg L ⁻¹	1980 mg L ⁻¹	206 mg L ⁻¹

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