

Lake Lamoure

(46.299116 N, -98.276371 W)

Lamoure County

- Lake Lamoure is a large reservoir in southeast North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/lamoure2020.pdf>).
- There is one boat ramp on Lake Lamoure on the north side of the lake.
- The Lake Lamoure watershed is about 160,000 acres of mostly agriculture. The most common crops grown are soybeans and corn, though there is a substantial amount of fallow/idle cropland (Table 1).
- Lake Lamoure is a Class III fishery, which are “capable of supporting natural reproduction and growth of warm water fishes (e.g., largemouth bass and bluegill) and associated aquatic biota.”
- Lake Lamoure is managed by the NDGF as a walleye fishery, with fingerlings stocked annually. Bullhead, crappie, yellow perch, white sucker, walleye, northern pike, common carp and bluegill were captured in the last sample by the NDGF in 2020.
- Lake Lamoure has been sampled intensively since 1991 by the NDDEQ.

December 2021

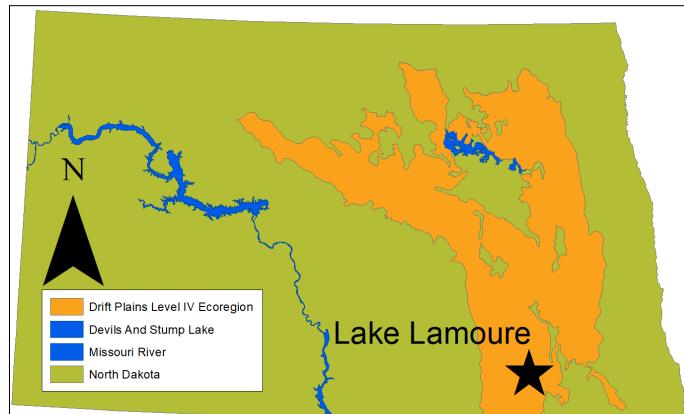


Figure 1. Location of Lake Lamoure within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2020). Value listed of crop type represents percentage of total production

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	71.6%	28.0%
Fallow/Idle Cropland	47.6%	5.6%
Soybeans	34.4%	57.6%
Corn	10.8%	29.1%
Grassland/Pasture	14.5%	46.9%
Wetlands	6.1%	7.1%
Developed	3.5%	4.6%
Open Water	3.4%	1.8%
Forest	0.7%	11.5%
Shrubland	0.2%	< 0.1%

Temperature and Dissolved Oxygen

- Lake Lamoure commonly stratifies in the summer, with cooler, low-oxygen water accumulating in the hypolimnion.
- Thermal stratification was recorded in June and August 2021. Temperature change in the water column was 1.1 degrees Celsius (°C), 8.9°C, 10.2°C, and 1.3°C in May, June, August and October, respectively.
- Dissolved oxygen concentrations were depleted quickly through the water column in most samples.

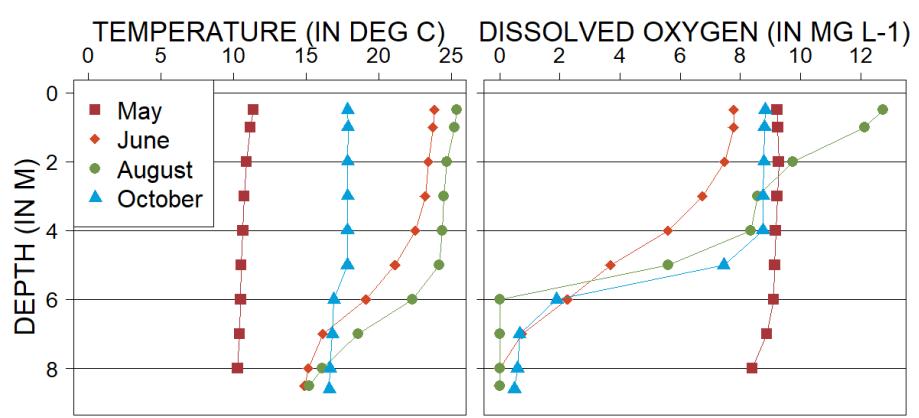


Figure 2. 2021 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L⁻¹)

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.
- Lake Lamoure is a eutrophic reservoir (Figure 3) that has high nutrient concentrations and dense algal growth, but relatively high transparency.
- Trophic state in 2021 was improved compared to historical indices.
- Lake Lamoure experiences **harmful** algal (cyanobacteria) blooms almost annually and has been on the advisory or warning list many times.

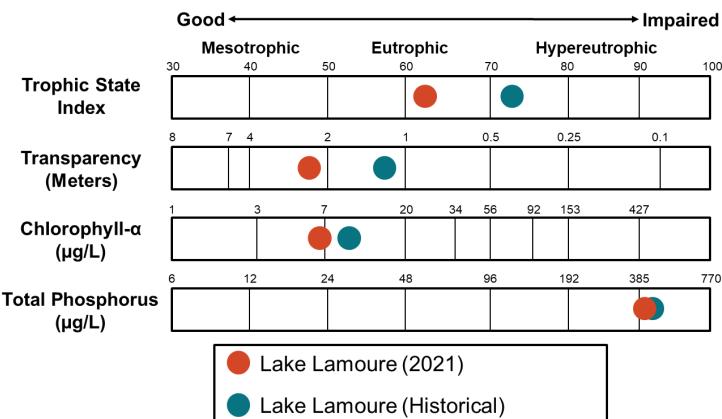


Figure 3. Trophic state indices for 2021 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) at Lake Lamoure in 2021 was less than the historical median for the lake and slightly greater than the median for reservoirs in the Drift Plains Level IV Ecoregion (hereafter, Ecoregion) (Figure 4).
- Median TP concentration at Lake Lamoure in 2021 was similar to the median for the lake but much greater than the median for the Ecoregion (Figure 4).
- Median concentrations of dissolved nutrients at Lake Lamoure in 2021 were similar to concentrations of total nutrients.
- Ammonia and nitrate-plus-nitrite were detected at Lake Lamoure in 2021 during most samples, though most concentrations were relatively low.

Nutrient Concentrations (in mg L^{-1}) in Lake Lamoure

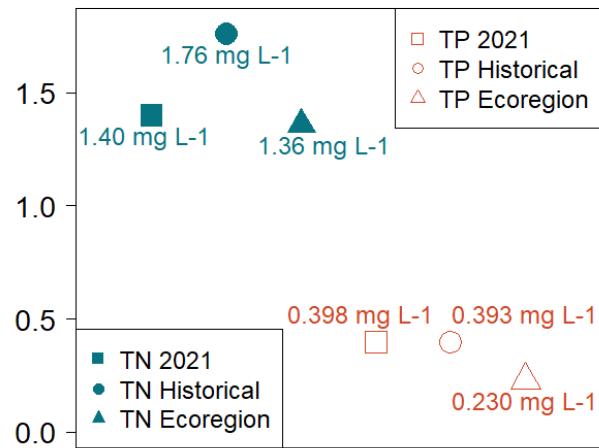


Figure 4. Median concentrations of TN and TP in mg L^{-1} compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2021 and historical samples and from all Ecoregion reservoirs.

Measure	2021 Median	Historical Median	Ecoregion Median
Alkalinity	340 mg L^{-1}	182 mg L^{-1}	329.5 mg L^{-1}
Bicarbonate (HCO_3^-)	396.5 mg L^{-1}	179 mg L^{-1}	365 mg L^{-1}
Calcium (Ca^{2+})	139.5 mg L^{-1}	39.1 mg L^{-1}	73.6 mg L^{-1}
Carbonate (CO_3^{2-})	13.5 mg L^{-1}	20.5 mg L^{-1}	16 mg L^{-1}
Conductivity	1,695 $\mu\text{S cm}^{-1}$	500 $\mu\text{S cm}^{-1}$	1,200 $\mu\text{S cm}^{-1}$
Dissolved Solids	1,205 mg L^{-1}	295 mg L^{-1}	809 mg L^{-1}
Magnesium (Mg^{2+})	107.5 mg L^{-1}	26.7 mg L^{-1}	55.2 mg L^{-1}
Sodium (Na^+)	97.4 mg L^{-1}	23.7 mg L^{-1}	114 mg L^{-1}
Sulfate (SO_4^{2-})	591 mg L^{-1}	63 mg L^{-1}	303 mg L^{-1}

- Sulfate is the dominant anion in Lake Lamoure, while calcium and magnesium are the co-dominant cations (Figure 5).
- Median concentrations of most cations and anions are much greater than the historical median for the lake and greater than the median for the Ecoregion.

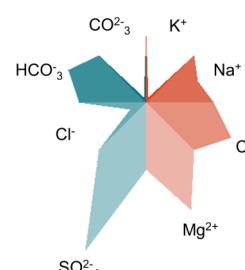


Figure 5. Maucha diagram showing ionic balance based on 2021 data