

November 2019

Warsing Dam

(47.836766 N, -99.117486 W)

Eddy County

- Warsing Dam is a small reservoir in northwest North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/warsing2005.pdf>).
- There is one public, paved boat ramp on Warsing Dam on the northwest side of the lake.
- The Warsing Dam watershed is about 13,000 acres of mostly agriculture and grassland/pasture. The most common crops grown are soybeans, spring wheat and corn (Table 1).
- Warsing Dam 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.”
- Warsing Dam is managed walleye and northern pike, with fingerlings stocked most years. Northern pike, yellow perch and black bullheads were captured during the last sample by the ND Game and Fish following a partial winterkill in 2018-2019.
- Warsing Dam was previously assessed in 1992.

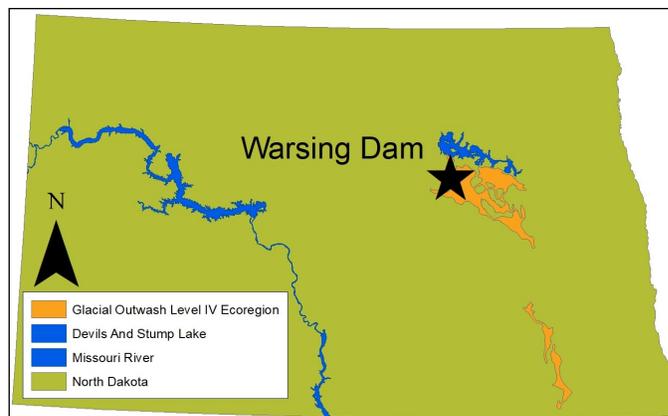


Figure 1. Location of Warsing Dam within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2015). Value listed of crop type represents percentage of total production

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	44.6%	21.4%
Soybeans	39.9%	1.1%
Spring Wheat	30.4%	24.7%
Corn	10.5%	0.3%
Grassland/Pasture	40.5%	62.8%
Wetlands	7.5%	4.5%
Developed	5.3%	10.0%
Open Water	1.4%	1.0%
Forest	0.5%	0.3%

Temperature and Dissolved Oxygen

- Warsing Dam commonly stratifies in the summer, with warm, well-oxygenated water at the top of the water column, and cold, low-oxygen water near the bottom.
- There was thermal stratification recorded at Warsing Dam in spring and summer 2016. Temperature change in the water column was 3.6 degrees Celsius (°C), 8.1°C and 1.0°C in May, July and September, respectively.
- Dissolved oxygen concentrations declined quickly during thermal stratification.

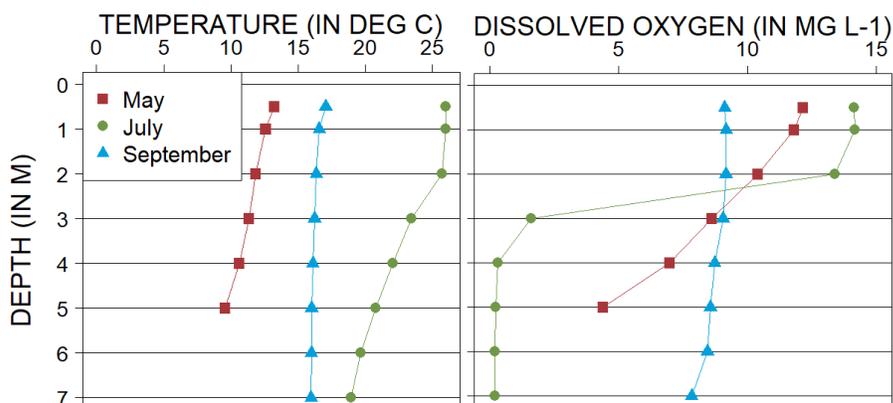


Figure 2. 2016 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L⁻¹)

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.
- Warsing Dam is a eutrophic reservoir (Figure 3) that has moderate nutrient concentrations and moderate algal growth.
- Current trophic state is similar to historical indices.
- There has not been a confirmed **harmful** algal (cyanobacteria) bloom at Warsing Dam.

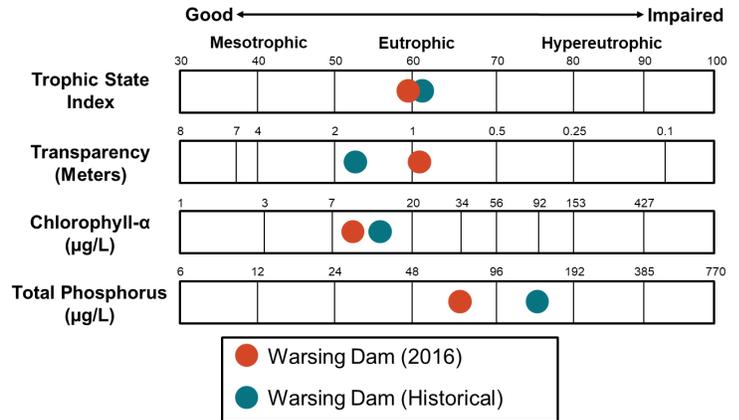


Figure 3. Trophic state indices for 2016 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2016 was less than the historical median for the lake. There is very little historical data for the Glacial Outwash Level IV Ecoregion, as Warsing Dam is one of the few monitored reservoirs in the Ecoregion.
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2016 was less than the median for the lake (Figure 4).
- Median concentration of dissolved phosphorus was less than TP.
- Ammonia was detected in low to moderate concentrations twice in 2016 at Warsing Dam, while nitrate-plus-nitrite was not detected.

Nutrient Concentrations (in mg L⁻¹) in Warsing Dam

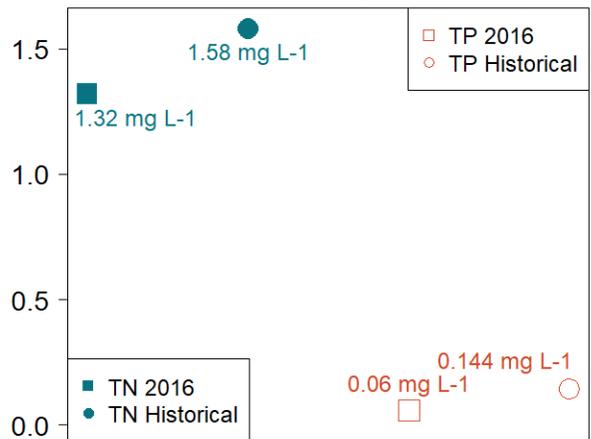


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2016 and historical samples from the lake

Measure	2016 Median	Historical Median
Alkalinity	256.5 mg L ⁻¹	276.5 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	276 mg L ⁻¹	278 mg L ⁻¹
Calcium (Ca ²⁺)	59.2 mg L ⁻¹	37.1 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	17.5 mg L ⁻¹	29 mg L ⁻¹
Conductivity	1,230 µS cm ⁻¹	852 µS cm ⁻¹
Dissolved Solids	817 mg L ⁻¹	516.5 mg L ⁻¹
Magnesium (Mg ²⁺)	71.5 mg L ⁻¹	41.1 mg L ⁻¹
Sodium (Na ⁺)	119 mg L ⁻¹	91.5 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	373 mg L ⁻¹	113 mg L ⁻¹

- Sulfate and bicarbonate are the dominant anions in Warsing Dam, while sodium and magnesium are the dominant cations (Figure 5).
- Median concentrations of most cations and anions are greater than the historical median for the lake.

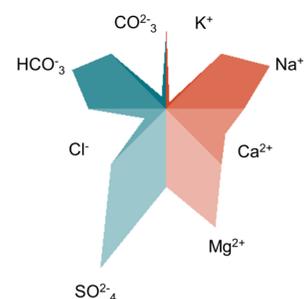


Figure 5. Maucha diagram showing ionic balance based on 2016 data