

November 2020

Larimore Dam

(47.93678 N, -97.59466 W)

Grand Forks County

- Larimore Dam is a small reservoir in northeast North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/larimore2003.pdf>).
- There is one public, paved boat ramp on Larimore Dam on the south side of the lake.
- The Larimore Dam watershed is about 40,000 acres of mostly agriculture. Agricultural production in the watershed is dominated by soybeans, spring wheat and corn (Table 1).
- Larimore Dam is a Class II, cool-water fishery, which are “capable of supporting natural reproduction and growth of cool water fishes (e.g., northern pike and walleye) and associated aquatic biota.”
- Larimore Dam is managed for a variety of fish species, with walleye, northern pike and muskellunge stocked in recent years. Black bullhead, yellow perch, walleye, white sucker, northern pike and black crappie were captured during the last sample by the ND Game and Fish in 2019.
- Larimore Dam was previously assessed in 1992 -1993 and 2005-2007.



Figure 1. Location of Larimore Dam within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2019). Value listed of crop type represents percentage of total production

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	68.3%	37.8%
Soybeans	30.7%	49.3%
Spring Wheat	25.3%	1.8%
Corn	22.0%	30.4%
Grassland/Pasture	16.5%	19.1%
Wetlands	5.2%	18.2%
Developed	4.9%	13.8%
Forest	4.1%	8.7%
Open Water	0.9%	2.3%
Barren	< 0.1%	< 0.1%

Temperature and Dissolved Oxygen

- Larimore Dam regularly stratifies in the summer being small and relatively deep.
- Thermal stratification was recorded multiple times in 2020. Top-to-bottom temperature changes of 4.7°C, 5.4°C, 5.0°C and 0.2°C were recorded in May, June, July and October, respectively.
- Dissolved oxygen concentrations were relatively high throughout the water column during all samples, but did decline sharply in the hypolimnion during thermal stratification.

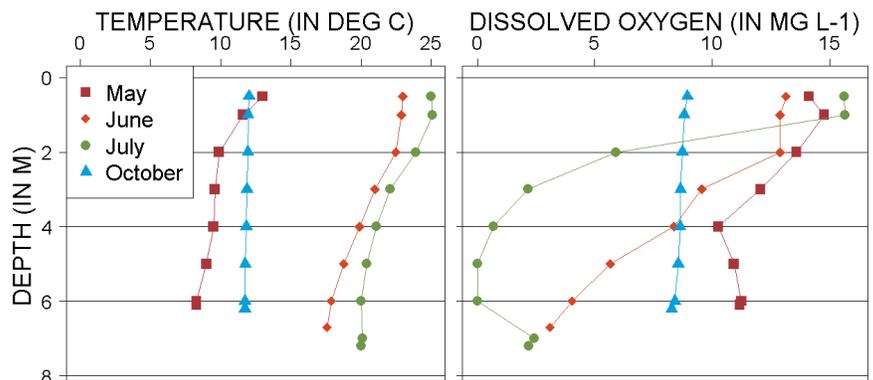


Figure 2. 2020 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ($mg L^{-1}$)

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.
- Larimore Dam is a eutrophic lake (Figure 3) that has moderate nutrient concentrations and moderate algal growth.
- Current trophic state is similar to historical data.
- There have been no confirmed **harmful** algal (cyanobacteria) blooms at Larimore Dam as of 2020.

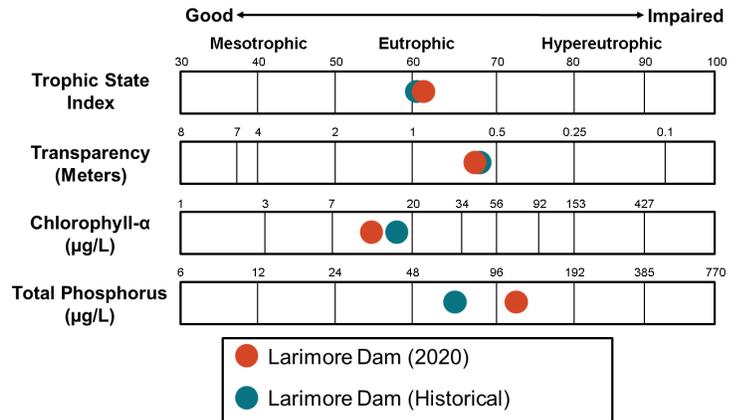


Figure 3. Trophic state indices for 2020 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2020 were greater than the historical median for the lake and greater than the median for the Glacial Lake Agassiz Basin Level IV Ecoregion (hereafter, Ecoregion) where Larimore Dam is located (Figure 4).
- Median concentration of dissolved TN was less than TN.
- Median total phosphorus (TP) concentration in 2020 was greater than the median for the lake and greater than the median for the Ecoregion (Figure 4).
- Median concentration of dissolved phosphorus was less than TP.
- Ammonia and nitrate-plus-nitrite were detected in half of all samples at Larimore Dam in 2020.

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

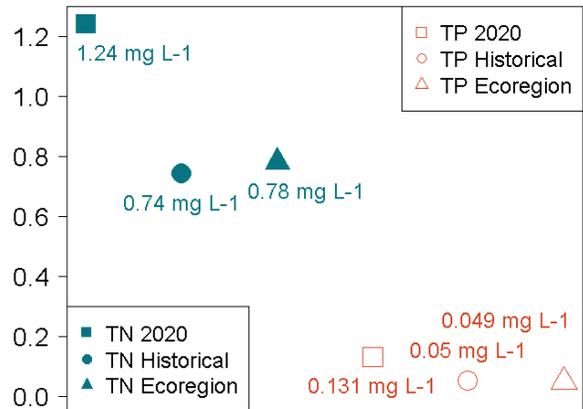


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2020 and historical samples and from all Ecoregion man-made lakes.

Measure	2020 Median	Historical Median	Ecoregion Median
Alkalinity	268.5 mg L ⁻¹	223 mg L ⁻¹	223.5 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	319.5 mg L ⁻¹	259 mg L ⁻¹	260.5 mg L ⁻¹
Calcium (Ca ²⁺)	112.5 mg L ⁻¹	96.8 mg L ⁻¹	72.3 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	9 mg L ⁻¹	5 mg L ⁻¹	8 mg L ⁻¹
Conductivity	1,480 µS cm ⁻¹	879 µS cm ⁻¹	855 µS cm ⁻¹
Dissolved Solids	1,011 mg L ⁻¹	540 mg L ⁻¹	513.5 mg L ⁻¹
Magnesium (Mg ²⁺)	64.2 mg L ⁻¹	35.1 mg L ⁻¹	35.5 mg L ⁻¹
Sodium (Na ⁺)	133.5 mg L ⁻¹	47.9 mg L ⁻¹	45.1 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	493.5 mg L ⁻¹	208 mg L ⁻¹	190.5 mg L ⁻¹

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

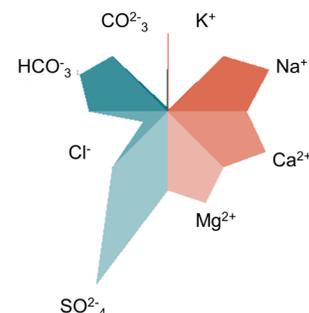


Figure 5. Maucha diagram showing ionic balance based on 2020 data