NORTH Dakota | Environmental Quality

Be Legendary.™

December 2021

Twin Lakes
(46.404782 N, -98.264384 W)

Lamoure County

- Twin Lakes is a large natural lake in northeastern North Dakota (Figure 1). See map at (https://gf.nd.gov/gnf/maps/fishing/lakecontours/roundmchenry2020.pdf).

- There is one unpaved, public boat access on the west side of the lake.

- The Twin Lakes watershed is about 30,000 acres of mostly agriculture. The most common crops grown are soybeans and corn, with a substantial amount of fallow/idle cropland (Table 1).

- Twin Lakes is not defined in the state's Water Quality Standards.

- Twin Lakes is managed by the NDGF as a walleye fishery, with fingerlings stocked annually. Yellow perch, walleye and northern pike were captured in the last sample by the NDGF in 2020.
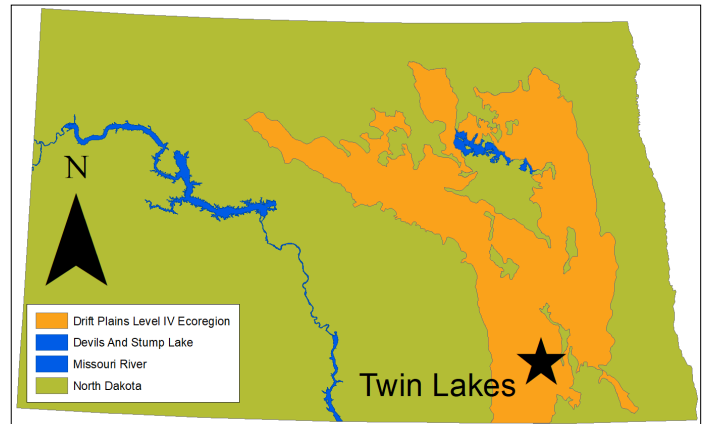
- Twin Lakes has no historical water quality data.

Figure 1. *Location of Twin Lakes 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	67.5%	72.9%
Fallow/Idle Cropland	*51.4%*	*41.9%*
Soybeans	*36.3%*	*42.5%*
Corn	*5.8%*	*7.0%*
Wetlands	14.2%	7.2%
Grassland/Pasture	8.5%	9.1%
Open Water	5.9%	7.2%
Developed	3.4%	3.0%
Forest	0.4%	0.5%
Barren	< 0.1%	< 0.1%

Temperature and Dissolved Oxygen

- Twin Lakes can stratify in the summer, though the lake is usually well-mixed.

- Thermal stratification was recorded in June 2021. Temperature change in the water column was 0.6 degrees Celsius (ºC), 3.3ºC, 1.4ºC and 0.0ºC in May, June, August and October, respectively.

- Dissolved oxygen concentrations remained high at Twin Lakes throughout all samples.
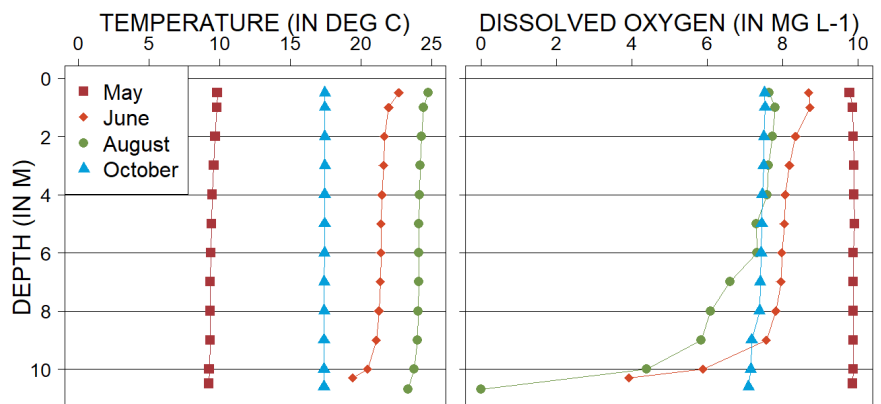

Figure 2. *2021 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L^{-1})*

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.

- Twin Lakes is a eutrophic reservoir (Figure 3) with relatively high nutrient concentrations, moderate algal growth and moderate transparency.

- Twin Lakes has been listed for confirmed **harmful** algal (cyanobacteria) blooms in the past, being on the advisory list multiple times.
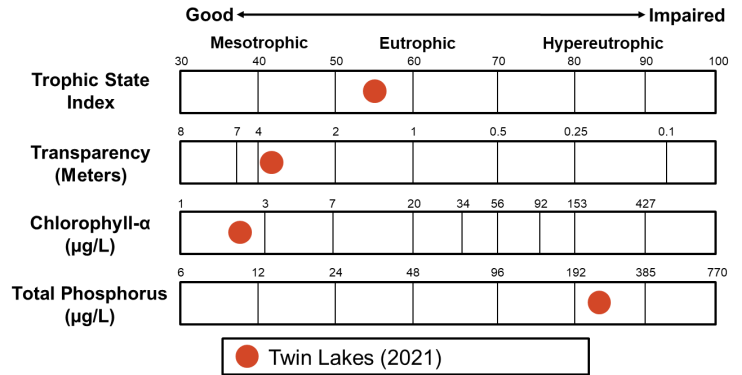

Figure 3. Trophic state indices for 2021 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) at Twin Lakes in 2021 was similar to the historical median for natural lakes in the Drift Plains Level IV Ecoregion (hereafter, Ecoregion) (Figure 4).

- Median TP concentration in 2021 was greater than the median for the Ecoregion (Figure 4).

- Median concentrations of dissolved nutrients were comparable to median concentrations of total nutrients.

- Ammonia and nitrate-plus-nitrite were detected during most samples at Twin Lakes in 2021, with most concentrations being low to moderate.
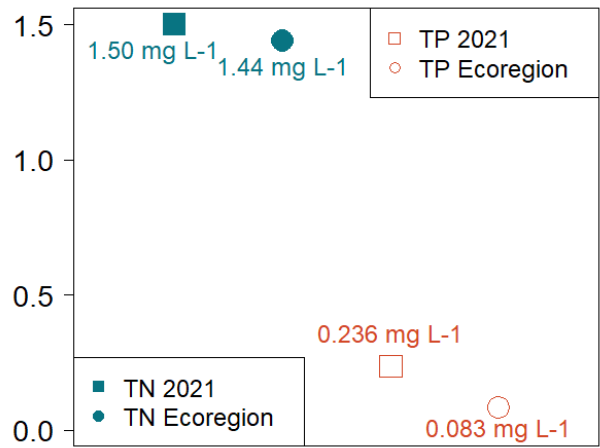

Figure 4. Median concentrations of TN and TP in mg L^{-1} compared to regional medians

Water Chemistry

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

Measure	2021 Median	Ecoregion Median
Alkalinity	364.5 mg L^{-1}	257 mg L^{-1}
Bicarbonate (HCO_3^-)	407.5 mg L^{-1}	301 mg L^{-1}
Calcium (Ca^{2+})	105 mg L^{-1}	54.3 mg L^{-1}
Carbonate (CO_3^{2-})	17 mg L^{-1}	17 mg L^{-1}
Conductivity	2,825 µS cm^{-1}	1,420 µS cm^{-1}
Dissolved Solids	2,120 mg L^{-1}	1,090 mg L^{-1}
Magnesium (Mg^{2+})	203.5 mg L^{-1}	90.3 mg L^{-1}
Sodium (Na^+)	268 mg L^{-1}	125 mg L^{-1}
Sulfate (SO_4^{2-})	1,190 mg L^{-1}	600 mg L^{-1}

- Sulfate is the dominant anion in Twin Lakes, while sodium and magnesium are co-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.
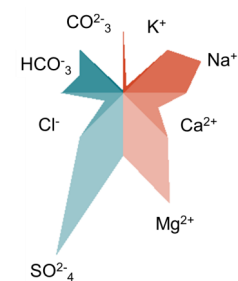

Figure 5. Maucha diagram showing ionic balance based on 2021 data