

December 2019

# Dry Lake

(46.085369 N, -99.427294 W)

## McIntosh County

- Dry Lake is a large natural lake in southeastern North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/drymcintosh2003.pdf>).
- There is one public, paved boat ramp on Dry Lake on the west side of the lake.
- The Dry Lake watershed is greater than 100,000 acres of mostly agriculture and grassland/pasture. The most common crops grown are soybeans, spring wheat and corn (Table 1).
- Dry Lake is a Class II fishery, which are “capable of supporting natural reproduction and growth of cool water fishes (e.g., northern pike and walleye) and associated aquatic biota.”
- Dry Lake is managed for walleye, with fingerlings of each stocked biennially. Walleye, yellow perch and northern pike were captured during the last sample by the ND Game and Fish.
- Dry Lake was previously assessed in 2005-2006.

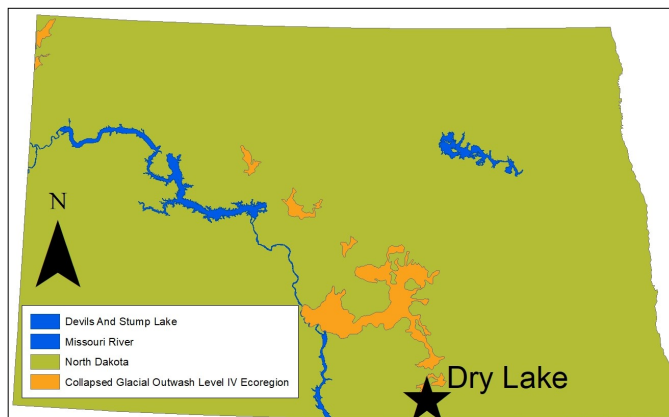


Figure 1. Location of Dry Lake within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2018). Value listed of crop type represents percentage of total production

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	46.8%	31.5%
Soybeans	42.8%	15.1%
Spring Wheat	17.8%	29.1%
Corn	16.5%	16.0%
Grassland/Pasture	35.2%	38.8%
Open Water	12.2%	22.0%
Developed	3.9%	4.7%
Shrubland	0.9%	0.7%
Wetlands	0.8%	1.8%
Forest	0.2%	0.3%

## Temperature and Dissolved Oxygen

- Dry Lake can stratify 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 no thermal stratification recorded in 2019. Temperature change in the water column was 0.5 degrees Celsius (°C), 0.6°C and 1.1°C in May, July and September, respectively.
- Dissolved oxygen concentrations were relatively high throughout the water column during all samples.

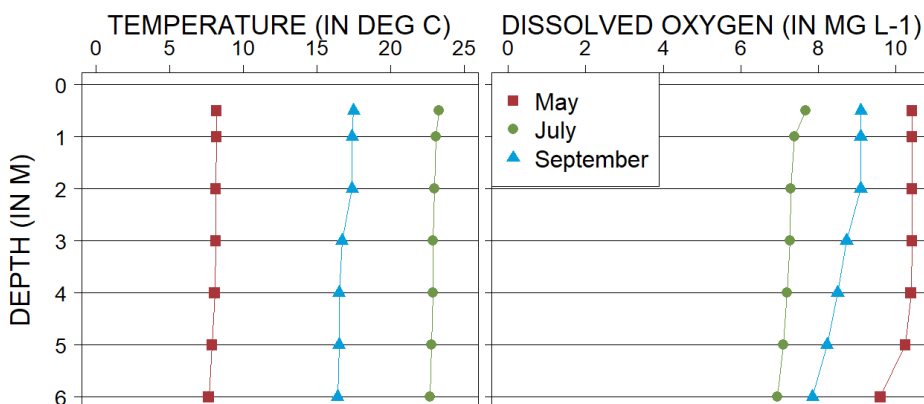


Figure 2. 2019 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ( $mg L^{-1}$ )

## 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.
- Dry Lake is a highly eutrophic lake (Figure 3) that has high nutrient concentrations and high algal growth.
- Current trophic state has improved slightly compared to historical data, but total phosphorus remains very high.
- Dry Lake seems to have annual *harmful* algal (cyanobacteria) blooms.

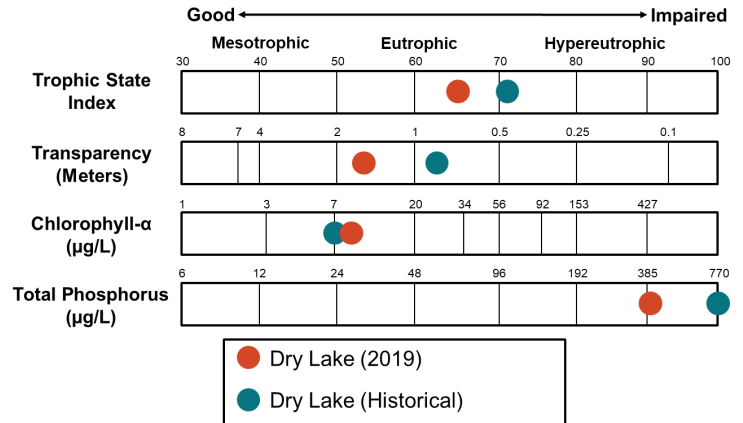


Figure 3. Trophic state indices for 2019 and historical samples

## Nutrients

- Median concentration of total nitrogen (TN) in 2019 was less than the historical median for the lake but greater than the median for the Collapsed Glacial Outwash Level IV Ecoregion (hereafter, Ecoregion) where Dry Lake is located (Figure 4).
- Median concentration of dissolved TN was similar to TN.
- Median TP concentration in 2019 was much less than the median for the lake but much greater than the median for the Ecoregion (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia was not detected at Dry Lake in 2019, while nitrate-plus-nitrite was only detected in the fall.

### Nutrient Concentrations (in mg L<sup>-1</sup>) in Dry Lake

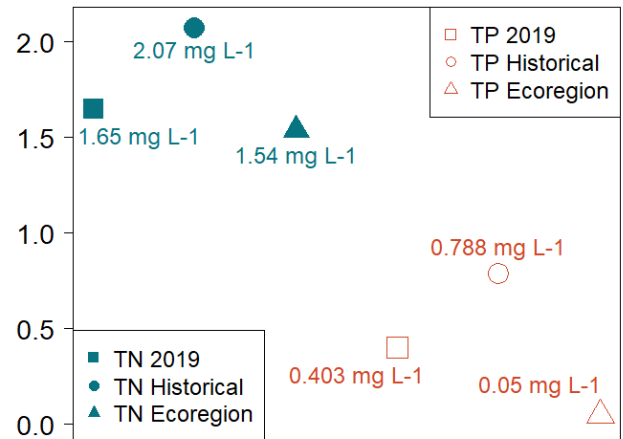


Figure 4. Median concentrations of TN and TP in mg L<sup>-1</sup> compared to regional medians

## Water Chemistry

**Table 2.** Median concentrations of selected constituents for 2019 and historical samples and from all Ecoregion natural lakes.

Measure	2019 Median	Historical Median	Ecoregion Median
Alkalinity	506 mg L <sup>-1</sup>	549 mg L <sup>-1</sup>	464 mg L <sup>-1</sup>
Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	524 mg L <sup>-1</sup>	524 mg L <sup>-1</sup>	463 mg L <sup>-1</sup>
Calcium (Ca <sup>2+</sup> )	40.3 mg L <sup>-1</sup>	44.4 mg L <sup>-1</sup>	26.1 mg L <sup>-1</sup>
Carbonate (CO <sub>3</sub> <sup>2-</sup> )	51 mg L <sup>-1</sup>	68.5 mg L <sup>-1</sup>	56 mg L <sup>-1</sup>
Conductivity	2,380 µS cm <sup>-1</sup>	2,035 µS cm <sup>-1</sup>	1,760 µS cm <sup>-1</sup>
Dissolved Solids	1,620 mg L <sup>-1</sup>	1,360 mg L <sup>-1</sup>	1,240 mg L <sup>-1</sup>
Magnesium (Mg <sup>2+</sup> )	89.8 mg L <sup>-1</sup>	68.2 mg L <sup>-1</sup>	86.7 mg L <sup>-1</sup>
Sodium (Na <sup>+</sup> )	370 mg L <sup>-1</sup>	327.5 mg L <sup>-1</sup>	164 mg L <sup>-1</sup>
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	676 mg L <sup>-1</sup>	466 mg L <sup>-1</sup>	547 mg L <sup>-1</sup>

- Sulfate is the dominant anion in Dry Lake, while sodium is the dominant cation (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.

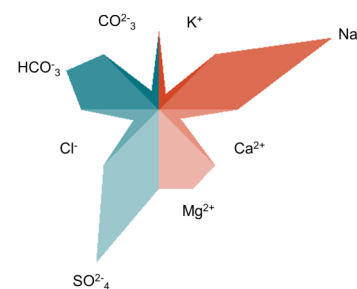


Figure 5. Maucha diagram showing ionic balance based on 2019 data