NORTH Dakota | Environmental Quality
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December 2021

Lake Juanita
(47.557241 N, -98.730147 W)

Foster County

- Lake Juanita is a large, shallow in eastern North Dakota (Figure 1). See map at (https://gf.nd.gov/gnf/maps/fishing/lakecontours/juanita2005.pdf).

- There is one boat ramp on Lake Juanita on the southwest side of the lake.

- The Lake Juanita watershed is about 60,000 acres of mostly agriculture and grassland/pasture. The most common crops grown are soybeans and corn, though there is a substantial amount of fallow/idle cropland (Table 1).

- Lake Juanita 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 Juanita is managed by the NDGF as a northern pike fishery, with fingerlings stocked annually. Northern pike was the only species captured in the last sample by the NDGF in 2020.
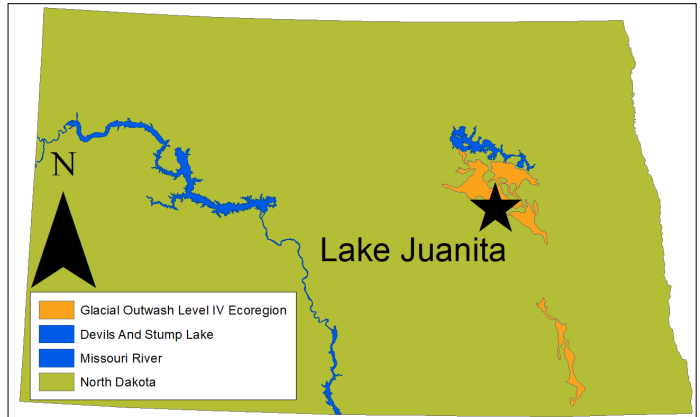
- Lake Juanita was previously assessed in 2008.

Figure 1. Location of Lake Juanita 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	52.6%	23.4%
Fallow/Idle Cropland	*32.9%*	*20.3%*
Soybeans	*28.8%*	*32.8%*
Spring Wheat	*10.0%*	*11.2%*
Grassland/Pasture	26.5%	55.1%
Wetlands	13.9%	9.5%
Developed	3.2%	6.1%
Open Water	2.8%	4.0%
Forest	1.0%	1.9%
Shrubland	< 0.1%	< 0.1%

Temperature and Dissolved Oxygen

- Lake Juanita rarely stratifies in the summer due to its shallow depth.

- Thermal stratification was not recorded in 2021. Temperature change in the water column was 0.0 degrees Celsius (ºC), 0.0ºC, 0.1ºC, and 0.7ºC in May, June, July and October, respectively.

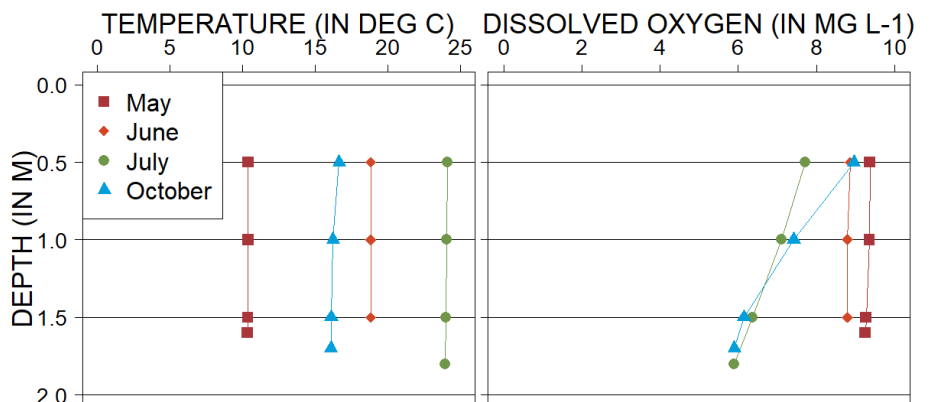- Dissolved oxygen concentrations were relatively high throughout the water column during all samples.

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.

- Lake Juanita is a hypereutrophic natural lake (Figure 3) that has high nutrient concentrations, dense algal growth and low transparency.

- Trophic state in 2021 was comparable to historical indices.

- Lake Juanita has not had any confirmed **harmful** algal (cyanobacteria) blooms.
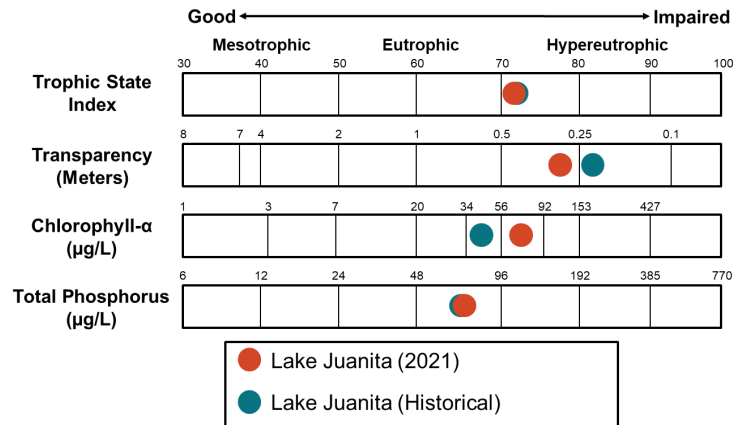

Figure 3. Trophic state indices for 2021 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) at Lake Juanita in 2021 was comparable to the historical median for the lake and the median for lakes and reservoirs in the Glacial Outwash Level IV Ecoregion (hereafter, Ecoregion) (Figure 4).

- Median TP concentration in 2021 was comparable to the median for the lake and less than the median for the Ecoregion (Figure 4).

- Median concentrations of dissolved nutrients at Lake Juanita in 2021 were much less than median concentrations of total nutrients.

- Neither ammonia nor nitrate-plus-nitrite were detected in Lake Juanita in 2021.
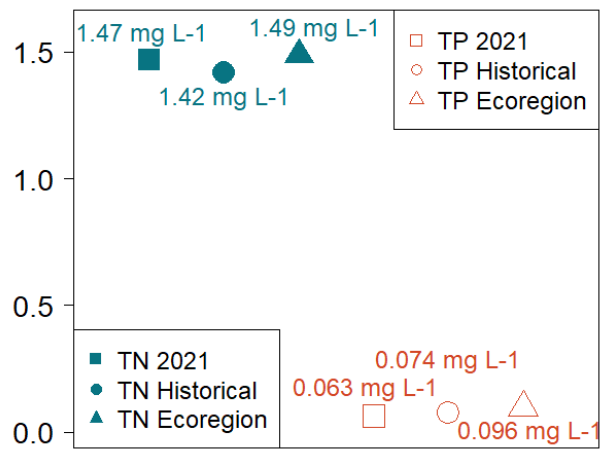

Figure 4. Median concentrations of TN and TP in mg L^{-1} compared to regional medians

Water Chemistry

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

Measure	2021 Median	Historical Median	Ecoregion Median
Alkalinity	311.5 mg L^{-1}	297.5 mg L^{-1}	297.5 mg L^{-1}
Bicarbonate (HCO_3^-)	314 mg L^{-1}	306.5 mg L^{-1}	290 mg L^{-1}
Calcium (Ca^{2+})	33.8 mg L^{-1}	42.6 mg L^{-1}	48.9 mg L^{-1}
Carbonate (CO_3^{2-})	30 mg L^{-1}	28 mg L^{-1}	28 mg L^{-1}
Conductivity	922 µS cm^{-1}	807.5 µS cm^{-1}	851.8 µS cm^{-1}
Dissolved Solids	583.5 mg L^{-1}	491.5 mg L^{-1}	516.5 mg L^{-1}
Magnesium (Mg^{2+})	58.9 mg L^{-1}	44.3 mg L^{-1}	50 mg L^{-1}
Sodium (Na^+)	85.5 mg L^{-1}	76.4 mg L^{-1}	82.4 mg L^{-1}
Sulfate (SO_4^{2-})	171 mg L^{-1}	112 mg L^{-1}	115 mg L^{-1}

- Bicarbonate is the dominant anion in Lake Juanita, 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.
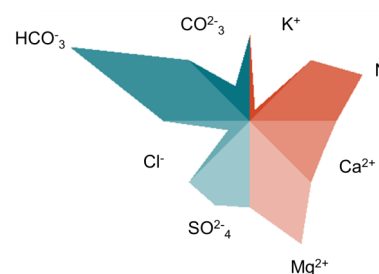

Figure 5. Maucha diagram showing ionic balance based on 2021 data