

February 2019

New Johns Lake

(47.31848 N, -100.63834 W)

Burleigh County

- New Johns Lake is a large canal lake in central North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/newjohns2003.pdf>).
- New Johns Lake has two public boat ramps, one on the north side and one on the south side. All canal lakes are also accessible from anywhere along the canal.
- Land cover near the lake is mostly grassland/pasture and agricultural land. The most common crops grown are non-alfalfa hay, durum wheat and spring wheat (Table 1).
- New Johns Lake is a Class II fishery, which means it is “capable of supporting natural reproduction and growth of cool water fishes (e.g., northern pike and walleye) and associated aquatic biota.”
- The lake is primarily managed for walleye, with fingerlings stocked biennially. Muskellunge are also stocked in the lake. Northern pike, yellow perch, smallmouth bass, bluegill, white sucker and common carp were also found in the lake in 2018.
- New Johns Lake was previously assessed in 1993 -1994 and 2005-2006.

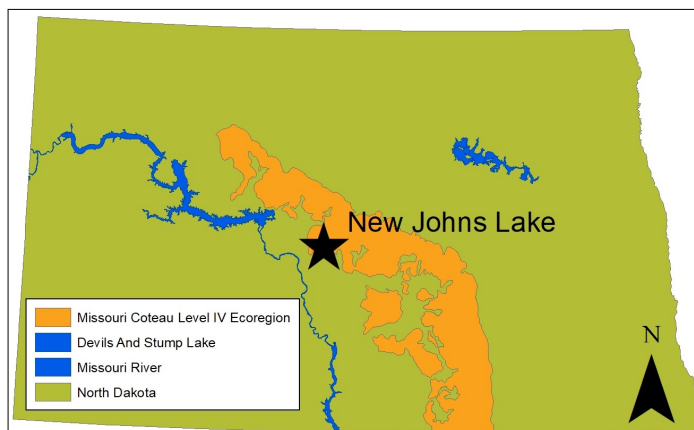


Figure 1. Location of New Johns Lake within the state

Table 1. Percentage of land cover near the lake (NASS, 2017). Value listed of crop type represents percentage of total production.

Land Cover Type	% within 500 meters
Grassland/Pasture	57.6%
Agriculture	24.7%
Other Hay/Non-Alfalfa	25.9%
Durum Wheat	21.5%
Spring Wheat	21.4%
Developed	7.7%
Open Water	6.0%
Wetlands	4.0%

Temperature and Dissolved Oxygen

- New Johns Lake rarely stratifies in the summer, with the majority of the water column being well-oxygenated
- There was thermal stratification in May of 2018. Temperature change in the water column was 2.54 degrees Celsius (°C), 0.34°C and 0.01°C in May, July and September, respectively (Figure 2).
- All samples in 2018 showed the lake as well-oxygenated.

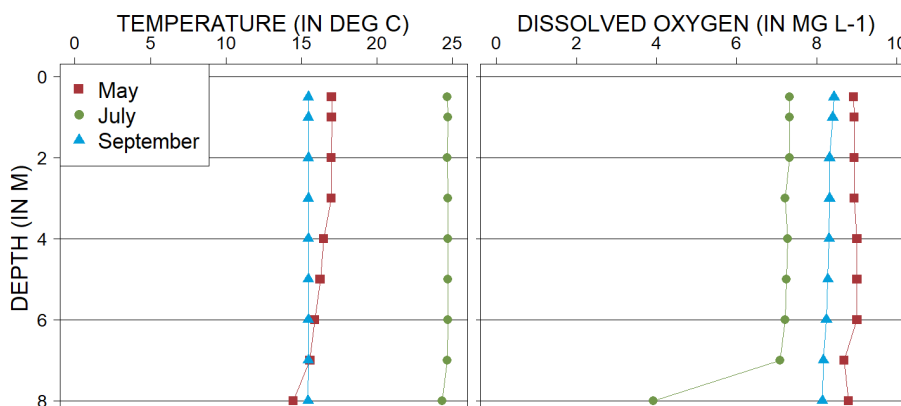


Figure 2. 2018 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L⁻¹)

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.
- New Johns Lake is a mesotrophic lake (Figure 3) that has low nutrient concentrations and low algal growth.
- Trophic state has declined slightly compared to historical indices.
- There have been no confirmed **harmful** algal (cyanobacteria) blooms at New Johns Lake.

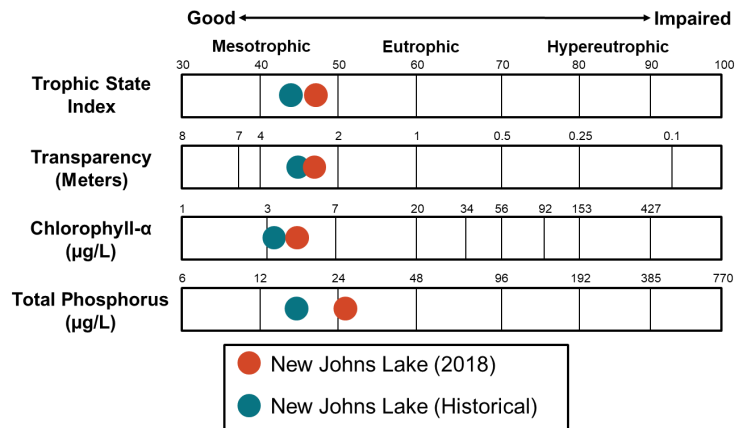


Figure 3. Trophic state indices for 2018 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) was greater than the historical median but less than the median for the Missouri Coteau Level IV Ecoregion (hereafter, Missouri Coteau) where New Johns Lake is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2018 was similar to historical concentrations but less than the median for the Missouri Coteau (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia and nitrate plus nitrite were rarely detected in New Johns Lake in 2018.

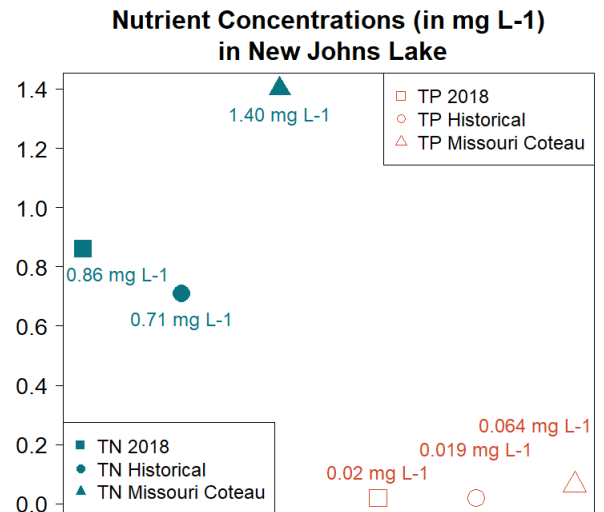


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2018 and historical samples and from all Missouri Coteau lakes.

Measure	2018 Median	Historical Median	Ecoregion Median
Alkalinity	230 mg L ⁻¹	248 mg L ⁻¹	274 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	266 mg L ⁻¹	277 mg L ⁻¹	289 mg L ⁻¹
Calcium (Ca ²⁺)	81.2 mg L ⁻¹	73.4 mg L ⁻¹	39.8 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	7 mg L ⁻¹	12 mg L ⁻¹	21 mg L ⁻¹
Conductivity	1,770 µS cm ⁻¹	1,660 µS cm ⁻¹	1,010 µS cm ⁻¹
Dissolved Solids	1,260 mg L ⁻¹	1,190 mg L ⁻¹	642 mg L ⁻¹
Magnesium (Mg ²⁺)	113 mg L ⁻¹	92.6 mg L ⁻¹	72.4 mg L ⁻¹
Sodium (Na ⁺)	170 mg L ⁻¹	166 mg L ⁻¹	62 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	722 mg L ⁻¹	680 mg L ⁻¹	239 mg L ⁻¹

- Sulfate is the dominant anion in New Johns Lake, while magnesium and sodium 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 Missouri Coteau.

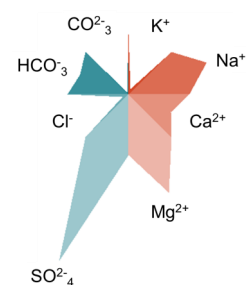


Figure 5. Maucha diagram showing ionic balance based on 2018 data