

December 2021

Jamestown Reservoir

(46.938355 N, -98.707964 W)

Stutsman County

- Jamestown Reservoir is a large reservoir in east-central North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/jamestownoverview2020.pdf>).
- Jamestown Reservoir is accessible by multiple public boat ramps around the lake.
- The Jamestown Reservoir watershed is greater than 1,000,000 acres of mostly agriculture. The most common crops grown are spring wheat and soybeans, but there is also a substantial amount of fallow/idle cropland (Table 1).
- Jamestown Reservoir 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.”
- The lake is primarily managed for walleye, though there are multiple species stocked most years. Yellow perch, crappie, bigmouth buffalo, walleye, common carp, white sucker, bullhead, northern pike and bluegill were captured by the NDGF in 2020.
- Jamestown Reservoir was previously sampled in 1998-1999 and 2008-2009 by the NDDEQ.

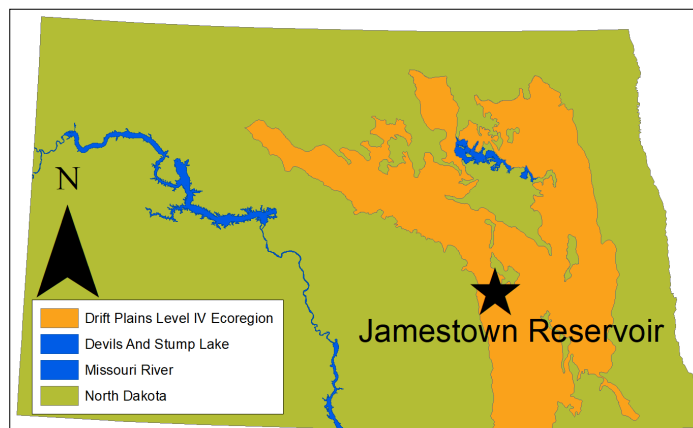


Figure 1. Location of Jamestown Reservoir within the state

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	70.8%	23.5%
Soybeans	32.2%	40.0%
Fallow/Idle Cropland	28.6%	33.3%
Spring Wheat	16.0%	4.7%
Grassland/Pasture	14.4%	53.4%
Wetlands	7.5%	7.2%
Developed	3.8%	9.3%
Open Water	2.9%	3.9%
Forest	0.5%	2.6%

Temperature and Dissolved Oxygen

- Jamestown Reservoir does stratify in the summer, with the majority of the water column typically well-oxygenated
- There was thermal stratification recorded in June 2021. Temperature change in the water column was 3.2 degrees Celsius (°C) in June, with changes of 0.5°C, 1.2°C and 0.0°C in May, July and October, respectively (Figure 2).
- All samples in 2021 showed the lake as well-oxygenated, even during stratification in June.

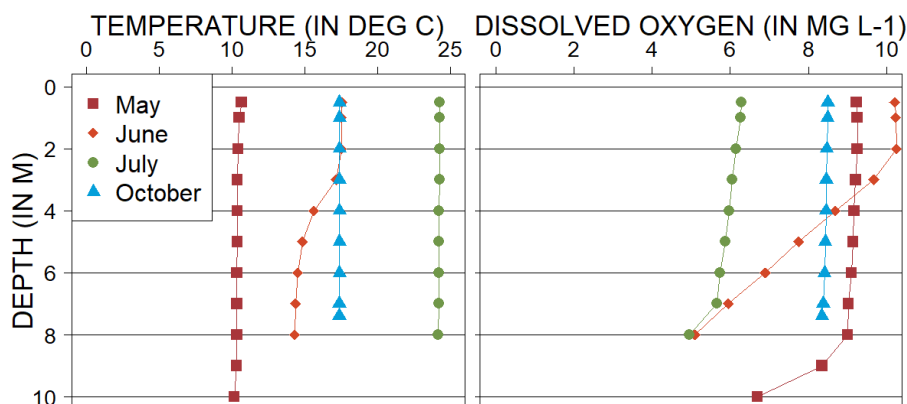


Figure 2. 2021 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ($mg L^{-1}$)

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.
- Jamestown Reservoir is a eutrophic lake (Figure 3) that has relatively high nutrient concentrations but moderate algal growth.
- TSI score in 2021 was improved compared to historical indices.
- There have been multiple confirmed **harmful** algal (cyanobacteria) blooms at Jamestown Reservoir, and has been listed as an advisory.

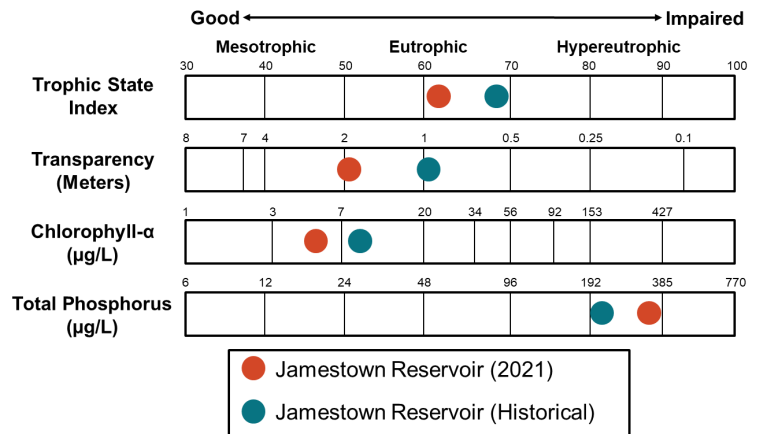


Figure 3. Trophic state indices for 2021 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) at Jamestown Reservoir in 2021 was greater than the historical median for the lake but similar to the median for the Drift Plains Level IV Ecoregion (hereafter, Ecoregion) (Figure 4).
- Median TP concentration at Jamestown Reservoir in 2021 was greater than the median for the lake and for the Ecoregion (Figure 4).
- Median concentrations of dissolved nutrients were similar to concentrations of total nutrients.
- Ammonia and nitrate-plus-nitrite were detected in most samples in 2021, with most concentrations being relatively low.

Nutrient Concentrations (in mg L⁻¹) in Jamestown Reservoir

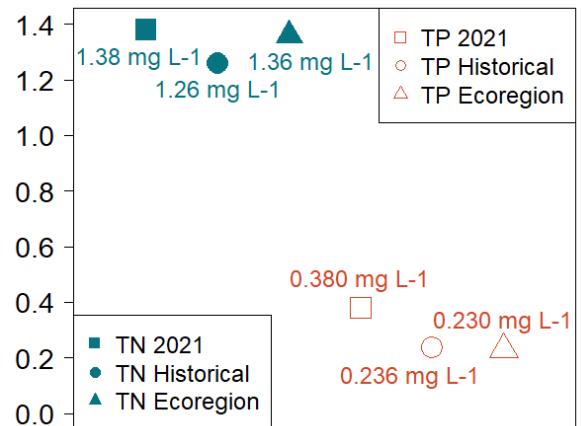


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to Ecoregion medians

Water Chemistry

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

Measure	2021 Median ¹	Historical	Ecoregion
Alkalinity	345.5 mg L ⁻¹	206 mg L ⁻¹	329.5 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	396 mg L ⁻¹	241.5 mg L ⁻¹	365 mg L ⁻¹
Calcium (Ca ²⁺)	86.0 mg L ⁻¹	51.2 mg L ⁻¹	73.6 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	13.5 mg L ⁻¹	1.5 mg L ⁻¹	16 mg L ⁻¹
Conductivity	1,325 µS cm ⁻¹	640 µS cm ⁻¹	1,200 µS cm ⁻¹
Dissolved Solids	879.5 mg L ⁻¹	390.5 mg L ⁻¹	809 mg L ⁻¹
Magnesium (Mg ²⁺)	69.5 mg L ⁻¹	28.4 mg L ⁻¹	55.2 mg L ⁻¹
Sodium (Na ⁺)	111.5 mg L ⁻¹	42.3 mg L ⁻¹	114 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	363 mg L ⁻¹	116 mg L ⁻¹	303 mg L ⁻¹

¹Data used were collected from the near-dam site (381165)

- Sulfate and bicarbonate are the co-dominant anion in Jamestown Reservoir, while sodium, calcium and magnesium were co-dominant cations (Figure 5).
- Median concentrations of most cations and anions are greater than the historical median for the lake and the median concentration for the Drift Plains.

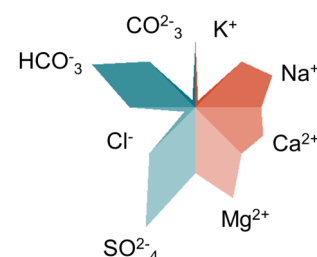


Figure 5. Maucha diagram showing ionic balance based on 2021 data