

November 2019

Wilson Dam

(46.176706 N, -98.751507 W)

Dickey County

- Wilson Dam is a small reservoir in southeast North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/wilson2003.pdf>).
- There is one boat ramp on Wilson Dam on the south side of the lake.
- The Wilson Dam watershed is about 5,300 acres of mostly agriculture. The most common crops grown are soybeans, corn and spring wheat (Table 1).
- Wilson Dam 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.”
- Recently, Wilson Dam has been managed for northern pike and largemouth bass. Northern pike, bluegill and yellow perch were captured during the last sample by the ND Game and Fish.
- Wilson Dam was previously assessed in 1993-1994 and 2005-2006.

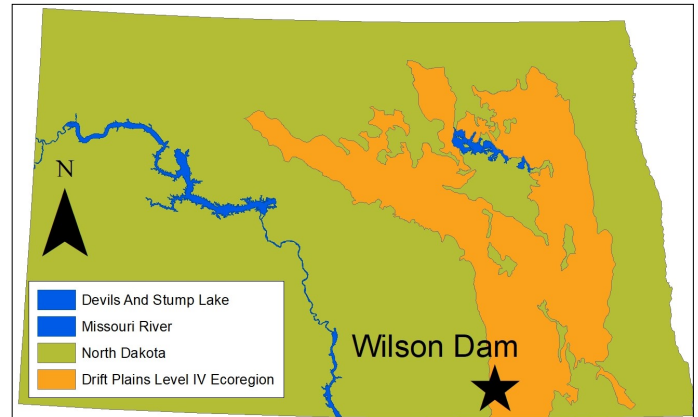


Figure 1. Location of Wilson Dam within the state

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
Grassland/Pasture	55.9%	14.5%
Agriculture	31.2%	78.2%
Soybeans	39.0%	20.4%
Corn	19.6%	49.7%
Spring Wheat	15.7%	28.7%
Open Water	8.5%	1.0%
Developed	1.9%	3.3%
Wetlands	1.2%	4.3%
Forest	0.2%	0.5%
Shrubland	1.0%	0.1%

Temperature and Dissolved Oxygen

- Wilson Dam commonly stratifies 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 thermal stratification recorded during the fall sample in 2019. Temperature change in the water column was 0.7 degrees Celsius (°C), 1.0°C and 4.4°C in May, July and September, respectively.
- Dissolved oxygen concentrations declined quickly during thermal stratification, but most concentrations were relatively high.

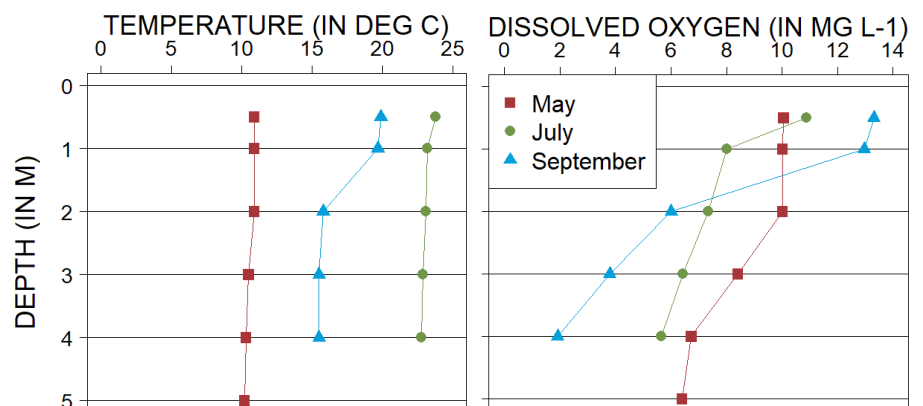


Figure 2. 2019 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L^{-1})

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.
- Wilson Dam is a hypereutrophic reservoir (Figure 3) that has high nutrient concentrations and dense algal growth.
- Current trophic state is similar to historical indices.
- Wilson Dam does experience frequent *harmful* algal (cyanobacteria) blooms in the summer.

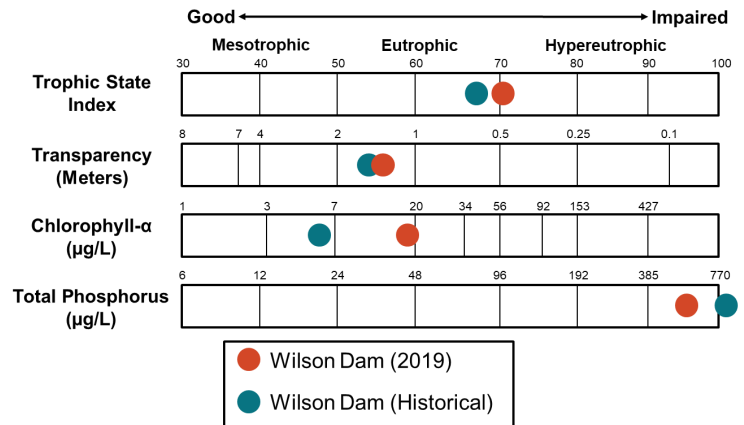


Figure 3. Trophic state indices for 2019 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2019 was less than the historical median for the lake and less than the median for reservoirs in the Drift Plains Level IV Ecoregion (hereafter, Ecoregion) where Wilson Dam is located (Figure 4).
- Median concentration of dissolved TN was similar to TN.
- Median TP concentration in 2019 was less than the median for the lake but greater than the median for the Ecoregion (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia and nitrate-plus-nitrite were detected twice during sampling in 2019 at Wilson Dam at low to moderate concentrations.

Nutrient Concentrations (in mg L⁻¹) in Wilson Dam

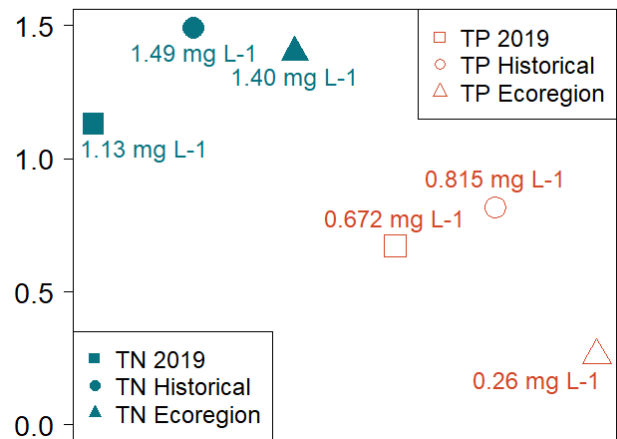


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

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

Measure	2019 Median	Historical Median	Ecoregion Median
Alkalinity	203 mg L ⁻¹	203 mg L ⁻¹	311 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	207 mg L ⁻¹	247 mg L ⁻¹	343 mg L ⁻¹
Calcium (Ca ²⁺)	75.5 mg L ⁻¹	66.6 mg L ⁻¹	74.6 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	8 mg L ⁻¹	< 1 mg L ⁻¹	14 mg L ⁻¹
Conductivity	1,290 µS cm ⁻¹	1,090 µS cm ⁻¹	1,100 µS cm ⁻¹
Dissolved Solids	856 mg L ⁻¹	678 mg L ⁻¹	734 mg L ⁻¹
Magnesium (Mg ²⁺)	66.2 mg L ⁻¹	53.1 mg L ⁻¹	52.9 mg L ⁻¹
Sodium (Na ⁺)	112 mg L ⁻¹	81.7 mg L ⁻¹	106.5 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	383 mg L ⁻¹	291 mg L ⁻¹	275 mg L ⁻¹

- Sulfate is the dominant anion in Wilson Dam, while sodium, calcium and magnesium are the 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.

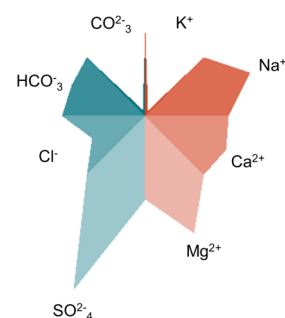


Figure 5. Maucha diagram showing ionic balance based on 2019 data