

April 2019

McVile Dam

(47.76172 N, -98.16461 W)

Nelson County

- McVile Dam is a small reservoir in northeast North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/mcvilledam2009.pdf>).
- There is one public boat ramp on McVile Dam on the west side of the lake.
- The McVile Dam watershed is about 11,500 acres of mostly agricultural land and grassland/pasture. The most common crops grown are spring wheat and soybeans (Table 1).
- McVile Dam 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.”
- McVile Dam is managed for walleye, with fingerlings stocked most years. Walleye, bluegill and northern pike were found during the last sample by the ND Game and Fish.
- McVile Dam was previously assessed in 1992-1993.

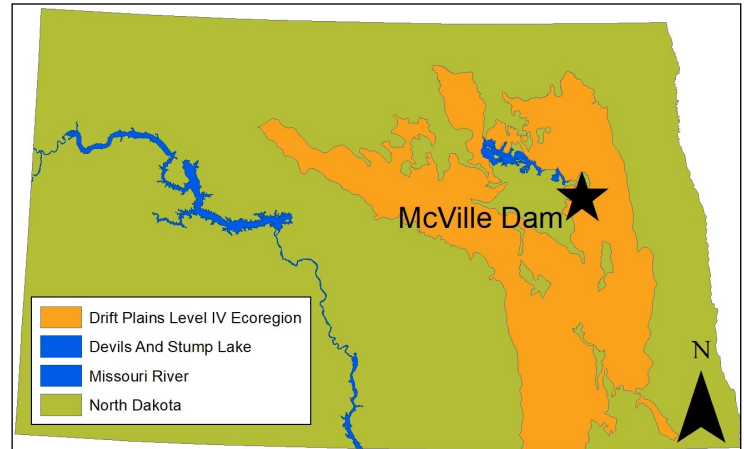


Figure 1. Location of McVile Dam within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2015). Value listed of crop type represents percentage of total production

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	50.8%	6.6%
Soybeans	49.9%	11.3%
Spring Wheat	32.3%	2.8%
Corn	5.8%	18.1%
Grassland/Pasture	23.4%	78.0%
Wetlands	13.7%	1.5%
Open Water	7.2%	1.7%
Developed	4.3%	12.2%
Forest	0.5%	NA

Temperature and Dissolved Oxygen

- McVile Dam 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 in July and September 2016. Temperature change in the water column in 2016 was 2.05 degrees Celsius (°C), 8.60°C and 2.78°C in May, July and September, respectively.
- Dissolved oxygen concentration was relatively high during most samples, though thermal stratification caused sharp declines in dissolved oxygen.

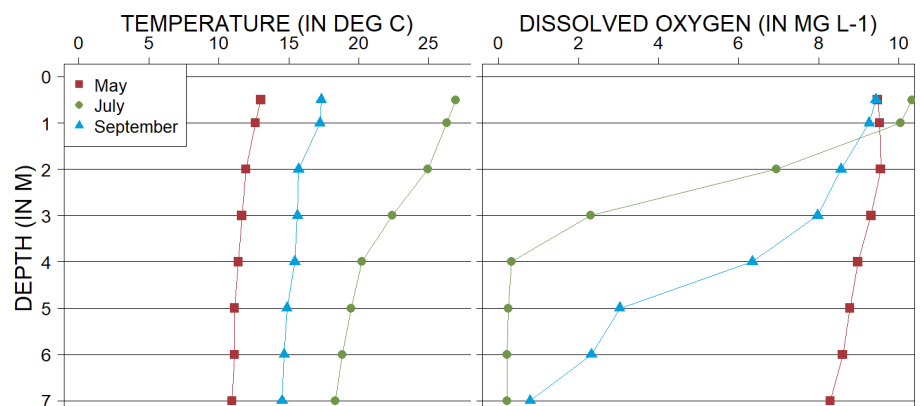


Figure 2. 2016 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ($mg L^{-1}$)

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.
- McVille Dam is a eutrophic reservoir (Figure 3) that has moderate nutrient concentrations but moderate algal growth.
- Current trophic state has improved compared to historical indices, driven by a decrease in TP.
- There have been no confirmed harmful algal (cyanobacteria) blooms at McVille Dam.

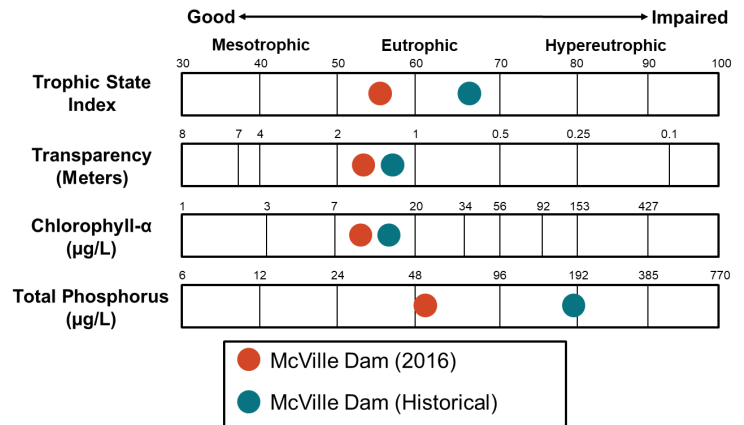


Figure 3. Trophic state indices for 2016 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2016 was less than the historical median for the lake and less than the median for the Drift Plains Level IV Ecoregion (hereafter, Drift Plains) where McVille Dam is located (Figure 4).
- Median concentration of dissolved TN was similar to TN.
- Median TP concentration in 2016 was much less than the historical median for the lake and much less than the median for the Drift Plains (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia was detected once at McVille Dam in 2016, while there were no detections of nitrate plus nitrite.

**Nutrient Concentrations (in mg L⁻¹)
in McVille Dam**

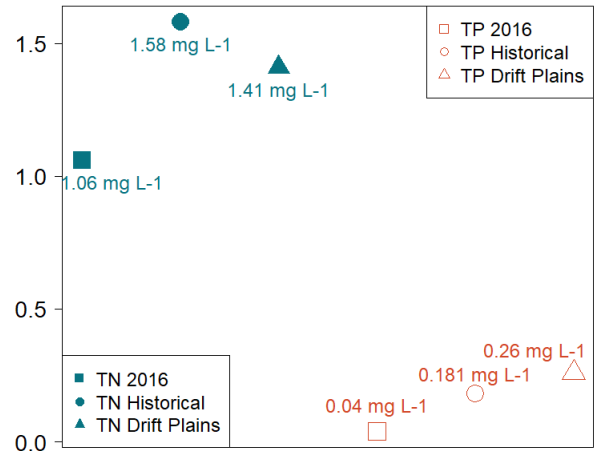


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2016 and historical samples and from all Drift Plains reservoirs.

Measure	2016 Median	Historical Median	Ecoregion Median
Alkalinity	292 mg L ⁻¹	244 mg L ⁻¹	311 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	347 mg L ⁻¹	283 mg L ⁻¹	341 mg L ⁻¹
Calcium (Ca ²⁺)	96 mg L ⁻¹	57.3 mg L ⁻¹	73.8 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	5 mg L ⁻¹	4 mg L ⁻¹	14 mg L ⁻¹
Conductivity	983 µS cm ⁻¹	919 µS cm ⁻¹	1,081 µS cm ⁻¹
Dissolved Solids	640 mg L ⁻¹	612 mg L ⁻¹	713 mg L ⁻¹
Magnesium (Mg ²⁺)	55.2 mg L ⁻¹	57.4 mg L ⁻¹	52.5 mg L ⁻¹
Sodium (Na ⁺)	59.9 mg L ⁻¹	77.8 mg L ⁻¹	106 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	245 mg L ⁻¹	257 mg L ⁻¹	271 mg L ⁻¹

- Sulfate and bicarbonate are co-dominant anions in McVille Dam, while calcium and magnesium are co-dominant cation (Figure 5).
- Median concentrations of most cations and anions are greater than the historical median for the lake but similar to the median for the Drift Plains.

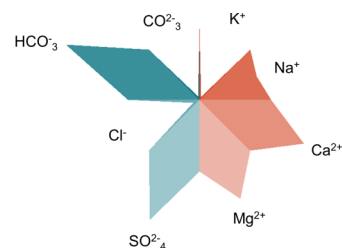


Figure 5. Maucha diagram showing ionic balance based on 2016 data