

April 2019

McGregor Dam

(48.5835 N, -102.9354 W)

Williams County

- McGregor Dam is a reservoir in northwest North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/mcgregor2003.pdf>).
- There is one public boat ramp on McGregor Dam, one each on the east and west sides of the lake.
- The McGregor Dam watershed is about 4,800 acres of mostly agricultural land and grassland/pasture. The most common crops grown are durum wheat, canola and flaxseed (Table 1).
- McGregor Dam is a Class I fishery, which are “capable of supporting growth of cold water fishes (e.g., salmonids) and associated aquatic biota.”
- McGregor Dam is managed for rainbow trout and walleye, with catchables of the former stocked annually and fingerlings of the latter stocked annually. Yellow perch, walleye and rainbow trout were found during the last sample by the ND Game and Fish.
- McGregor Dam was previously assessed in 1991-1992 and 2003-2004.

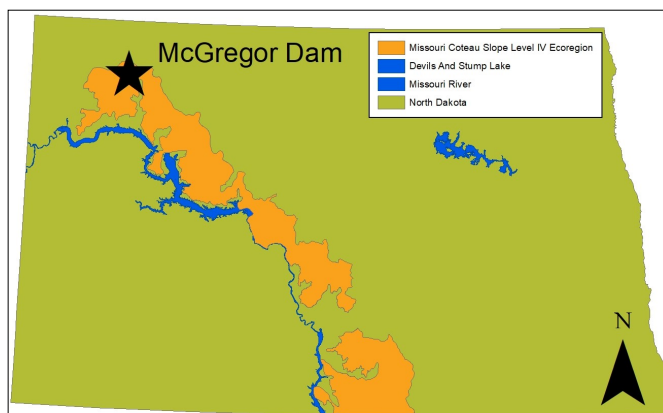


Figure 1. Location of McGregor Dam within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2014). Value listed of crop type represents percentage of total production

| Land Cover Type | % in Watershed | % within 500 meters |
|--------------------|----------------|---------------------|
| Agriculture | 69.8% | 51.8% |
| <i>Durum Wheat</i> | 39.7% | 45.5% |
| <i>Canola</i> | 22.1% | 8.3% |
| <i>Flaxseed</i> | 9.0% | 7.1% |
| Grassland/Pasture | 24.6% | 33.6% |
| Developed | 3.8% | 10.3% |
| Open Water | 0.8% | 0.7% |
| Wetlands | 0.8% | 2.0% |
| Forest | 0.2% | 1.4% |
| Shrubland | < 0.1% | < 0.1% |

Temperature and Dissolved Oxygen

- McGregor Dam regularly 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 May and July 2014. Temperature change in the water column was 3.28 degrees Celsius (°C), 11.78°C and 0.85°C in May, July and October, respectively.
- Profiles showed a substantial amount of oxygen deprivation during thermal stratification, strengthened by large cyanobacteria blooms.

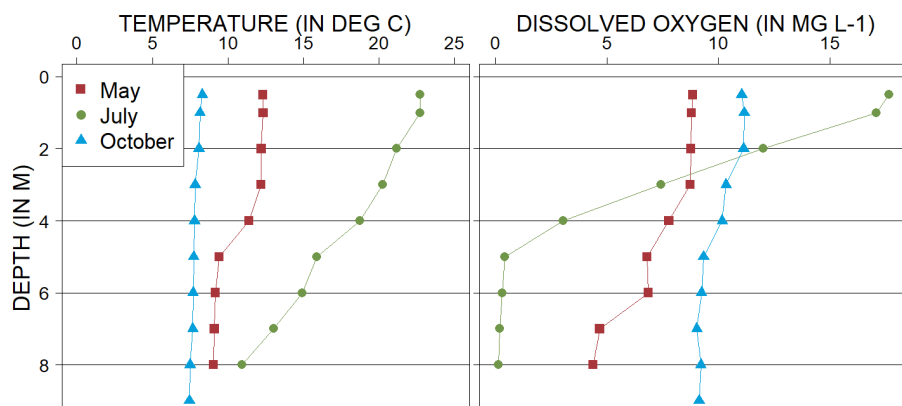


Figure 2. 2014 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L⁻¹)

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.
- McGregor Dam is a eutrophic reservoir (Figure 3) that has high nutrient concentrations and dense algal growth.
- Current trophic state is similar to historical indices.
- McGregor Dam experiences large cyanobacteria blooms, but have not been reported to the state.

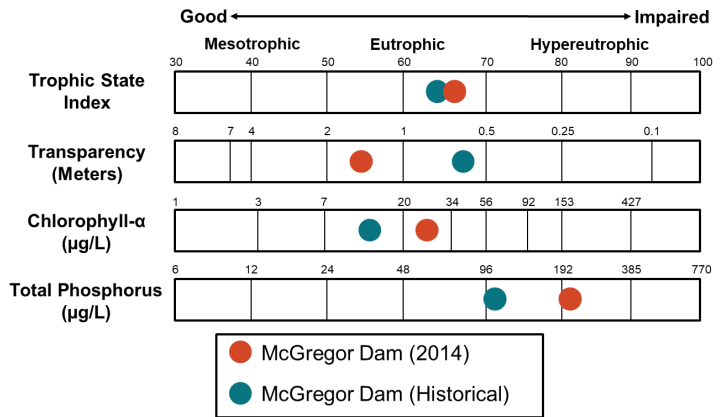


Figure 3. Trophic state indices for 2014 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2014 was less than the historical median for the lake but greater than the median for the Missouri Coteau Slope Level IV Ecoregion (hereafter, Coteau Slope) where McGregor Dam is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2014 was greater than the median for the lake and greater than the median for the Coteau Slope (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia was detected in all samples at McGregor Dam in 2014, while there were two detections of nitrate plus nitrite.

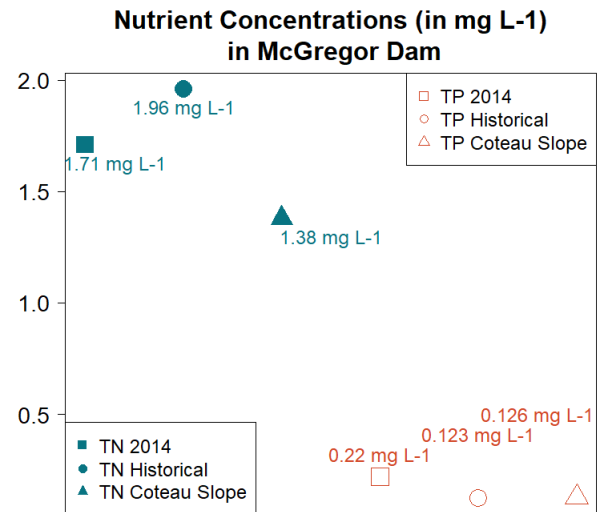


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2014 and historical samples and from all Coteau Slope reservoirs.

| Measure | 2014 Median | Historical Median | Ecoregion Median |
|--|---------------------------|--------------------------|---------------------------|
| Alkalinity | 214 mg L ⁻¹ | 182 mg L ⁻¹ | 207 mg L ⁻¹ |
| Bicarbonate (HCO ₃ ⁻) | 227 mg L ⁻¹ | 212.5 mg L ⁻¹ | 225.5 mg L ⁻¹ |
| Calcium (Ca ²⁺) | 101 mg L ⁻¹ | 54.4 mg L ⁻¹ | 74.6 mg L ⁻¹ |
| Carbonate (CO ₃ ²⁻) | 5 mg L ⁻¹ | 2 mg L ⁻¹ | 8.5 mg L ⁻¹ |
| Conductivity | 1,360 µS cm ⁻¹ | 882 µS cm ⁻¹ | 1,445 µS cm ⁻¹ |
| Dissolved Solids | 1,010 mg L ⁻¹ | 578 mg L ⁻¹ | 923 mg L ⁻¹ |
| Magnesium (Mg ²⁺) | 106 mg L ⁻¹ | 61.6 mg L ⁻¹ | 63 mg L ⁻¹ |
| Sodium (Na ⁺) | 55.4 mg L ⁻¹ | 32.9 mg L ⁻¹ | 148 mg L ⁻¹ |
| Sulfate (SO ₄ ²⁻) | 580 mg L ⁻¹ | 270.5 mg L ⁻¹ | 494 mg L ⁻¹ |

- Sulfate is the dominant anion in McGregor Dam, while magnesium is the 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 Coteau Slope.

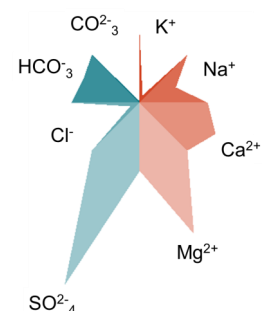


Figure 5. Maucha diagram showing ionic balance based on 2014 data