NORTH Dakota | Environmental Quality

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**February 2019**

# South McClusky Lake

(47.51347 N, -100.45948 W)

## Sheridan County

- South McClusky (Hoffer) Lake is a small canal lake in central North Dakota (Figure 1). See map at (https://gf.nd.gov/gnf/maps/fishing/lakecontours/south(hoffer)mcclusky2005.pdf).
- South McClusky Lake has one public boat ramp on the north side of the lake.
- Land cover near the lake is mostly grassland/ pasture and agricultural land. The most common crops grown are corn, soybeans and non-alfalfa hay (Table 1).
- South McClusky 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 annually. Yellow perch and white sucker were also found in the lake in 2018.
- South McClusky Lake was previously assessed in 2008.

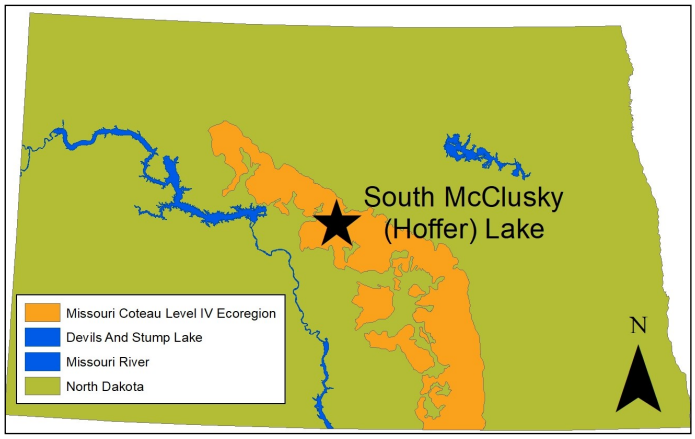


***Figure 1.*** *Location of South McClusky (Hoffer) Lake within the state*

***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 | 48.3% |
| Agriculture | 26.0% |
| *Corn* | *40.0%* |
| *Soybeans* | *23.2%* |
| *Other Hay/Non-Alfalfa* | *22.4%* |
| Open Water | 9.9% |
| Developed | 9.4% |
| Wetlands | 6.5% |

## Temperature and Dissolved Oxygen

- South McClusky (Hoffer) Lake rarely stratifies in the summer, with the majority of the water column being well-oxygenated
- There was no thermal stratification in 2018. Temperature change in the water column was 0.04 degrees Celsius (ºC), 0.00ºC and 0.00ºC in May, July and September, respectively (Figure 2).
- All samples in 2018 showed the lake as well-oxygenated.

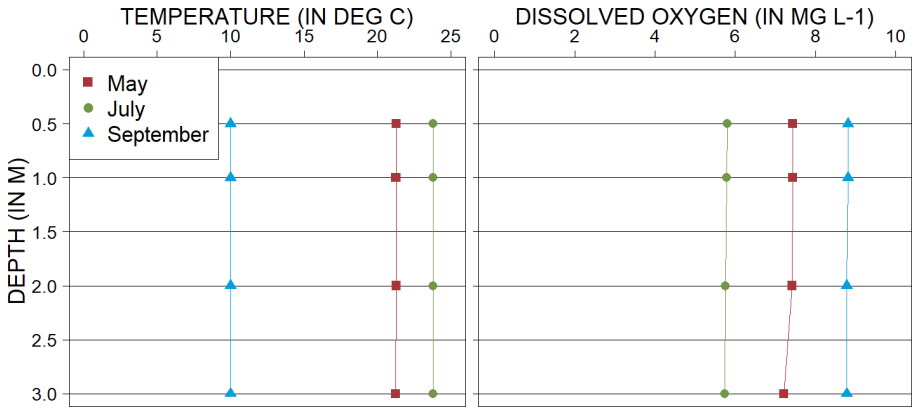


***Figure 2.*** *2018 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg $L^{-1}$)*

# 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.
- South McClusky Lake is a eutrophic lake (Figure 3) that has moderate nutrient concentrations and moderate algal growth.
- Trophic state is similar to historical indices.
- There have been no confirmed ***harmful*** algal (cyanobacteria) blooms at South McClusky (Hoffer) Lake.

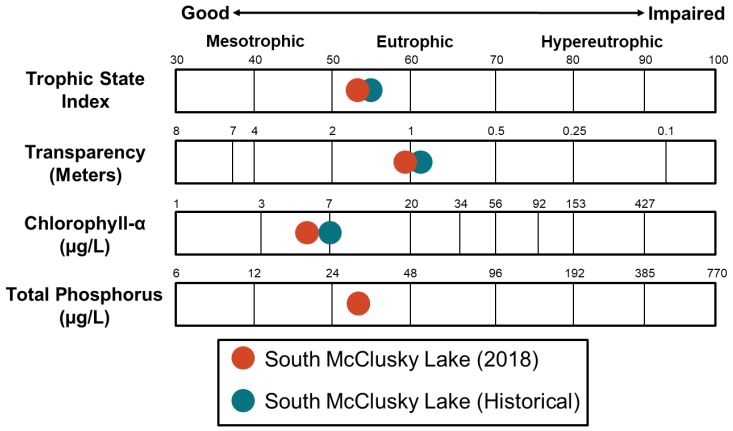


***Figure 3.*** *Trophic state indices for 2018 and historical samples*

# Nutrients

- Median concentration of total nitrogen (TN) was less than the historical median and the median for the Missouri Coteau Level IV Ecoregion (hereafter, Missouri Coteau) where South McClusky Lake is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2018 was less than historical concentrations and the median for the Missouri Coteau (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia was detected during all samples at South McClusky Lake in 2018, while nitrate plus nitrite was only detected in one sample.

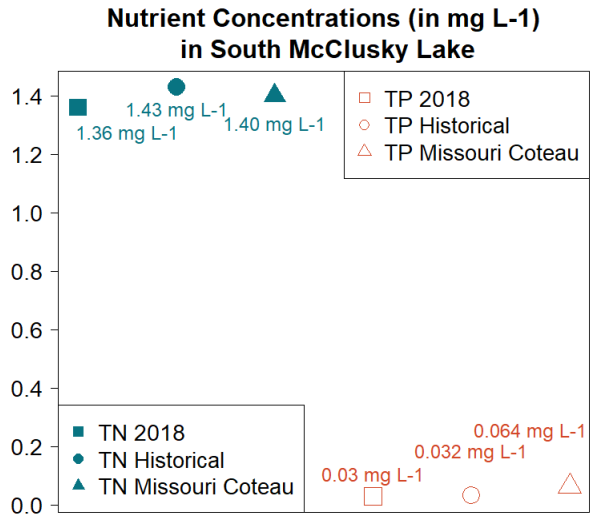


***Figure 4.*** *Median concentrations of TN and TP in mg L$^{-1}$ compared to regional medians*

# 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 | 328 mg L$^{-1}$ | 352 mg L$^{-1}$ | 274 mg L$^{-1}$ |
| Bicarbonate ($HCO^-_3$) | 379 mg L$^{-1}$ | 385 mg L$^{-1}$ | 289 mg L$^{-1}$ |
| Calcium ($Ca^{2+}$) | 84.4 mg L$^{-1}$ | 94.1 mg L$^{-1}$ | 39.8 mg L$^{-1}$ |
| Carbonate ($CO^{2-}_3$) | 19 mg L$^{-1}$ | 22 mg L$^{-1}$ | 21 mg L$^{-1}$ |
| Conductivity | 3,060 µS cm$^{-1}$ | 3,340 µS cm$^{-1}$ | 1,010 µS cm$^{-1}$ |
| Dissolved Solids | 2,360 mg L$^{-1}$ | 2,640 mg L$^{-1}$ | 642 mg L$^{-1}$ |
| Magnesium ($Mg^{2+}$) | 212 mg L$^{-1}$ | 206 mg L$^{-1}$ | 72.4 mg L$^{-1}$ |
| Sodium ($Na^+$) | 372 mg L$^{-1}$ | 439 mg L$^{-1}$ | 62 mg L$^{-1}$ |
| Sulfate ($SO^{2-}_4$) | 1,430 mg L$^{-1}$ | 1,615 mg L$^{-1}$ | 239 mg L$^{-1}$ |

- Sulfate is the dominant anion in South McClusky Lake, while magnesium and sodium are co-dominant cations (Figure 5).
- Median concentrations of most cations and anions are less than the historical median for the lake but greater than the median for the Missouri Coteau.

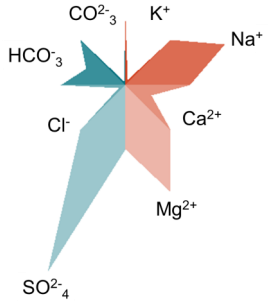


***Figure 5.*** *Maucha diagram showing ionic balance based on 2018 data*