

February 2019

# Heckers Lake

(47.34045 N, -100.67067 W)

## Sheridan County

- Heckers Lake is a small canal lake in central North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/heckers2003.pdf>).
- Heckers Lake does not have its own boat ramp, but is accessible by the public boat ramp on New Johns Lake. All canal lakes are also accessible from anywhere along the canal.
- Land cover near the lake is mostly grassland/pasture and agricultural land. The most common crops grown are soybeans, spring wheat and non-alfalfa hay (Table 1).
- Heckers 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 biennially. Yellow perch, smallmouth bass and common carp were also found in the lake in 2018.
- Heckers Lake was previously assessed in 1993-1994 and 2005-2006.

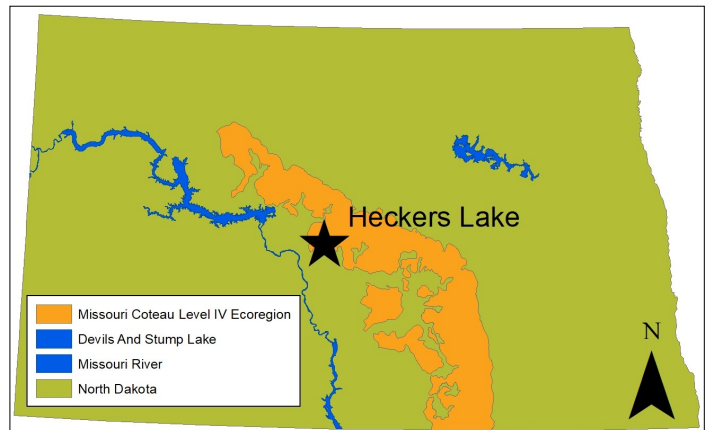


Figure 1. Location of Heckers Lake within the state

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	60.1%
Agriculture	15.8%
Spring Wheat	37.9%
Soybeans	32.2%
Other Hay/Non-Alfalfa	26.7%
Developed	9.8%
Open Water	9.6%
Wetlands	4.7%

## Temperature and Dissolved Oxygen

- Heckers Lake rarely stratifies in the summer, with the majority of the water column being well-oxygenated
- There was thermal stratification in May of 2018, likely related to a rapid increase in surface temperature following ice-off. Temperature change in the water column was 4.54 degrees Celsius (°C) in May, but only 0.51°C and 0.35°C in July and September, respectively (Figure 2).
- All samples in 2018 showed the lake as well-oxygenated, except right at the bottom in May and July.

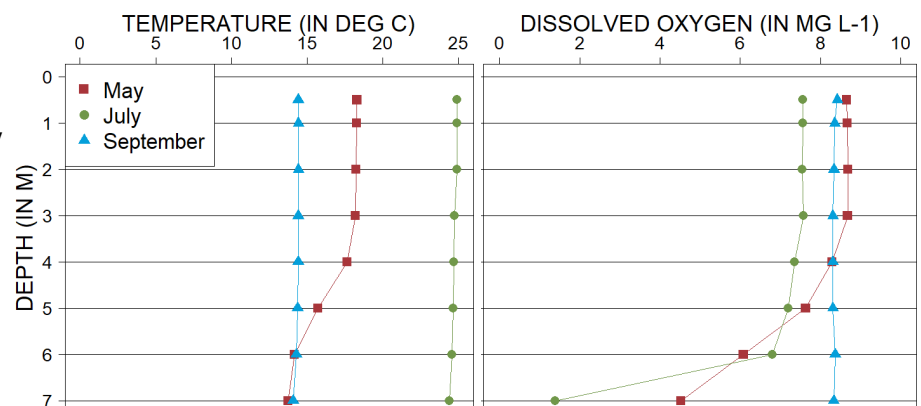


Figure 2. 2018 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L<sup>-1</sup>)

## 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.
- Heckers Lake is a mesotrophic lake (Figure 3) that has low nutrient concentrations and low algal growth.
- Present trophic state is similar to historical indices.
- There have been no confirmed **harmful** algal (cyanobacteria) blooms at Heckers Lake.

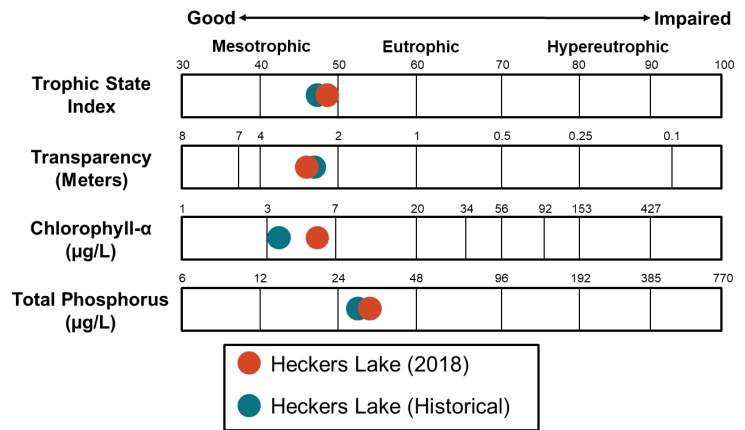


Figure 3. Trophic state indices for 2018 and historical samples

## Nutrients

- Median concentration of total nitrogen (TN) was greater in 2018 compared to the historical median but lower than the median for the Missouri Coteau Level IV Ecoregion (hereafter, Missouri Coteau) where Heckers Lake is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration was greater in 2018 than historical concentrations but less than the median for the Missouri Coteau (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia and nitrate plus nitrite were rarely detected in Heckers Lake in 2018.

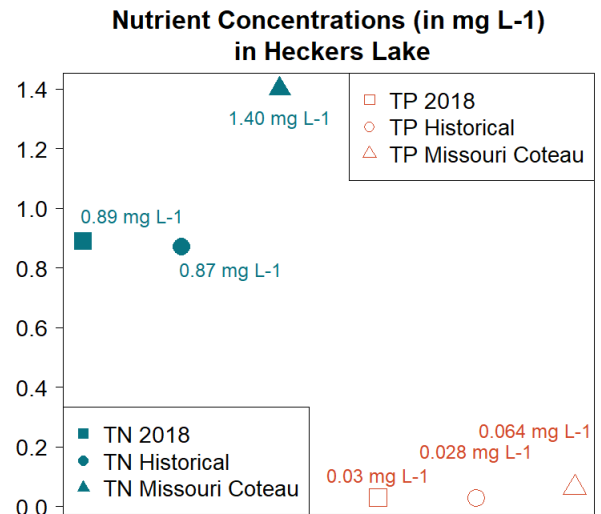


Figure 4. Median concentrations of TN and TP in mg L<sup>-1</sup> compared to regional medians

## 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	235 mg L <sup>-1</sup>	253 mg L <sup>-1</sup>	274 mg L <sup>-1</sup>
Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	261 mg L <sup>-1</sup>	285 mg L <sup>-1</sup>	289 mg L <sup>-1</sup>
Calcium (Ca <sup>2+</sup> )	71.0 mg L <sup>-1</sup>	64.2 mg L <sup>-1</sup>	39.8 mg L <sup>-1</sup>
Carbonate (CO <sub>3</sub> <sup>2-</sup> )	14 mg L <sup>-1</sup>	10 mg L <sup>-1</sup>	21 mg L <sup>-1</sup>
Conductivity	1,590 µS cm <sup>-1</sup>	1,520 µS cm <sup>-1</sup>	1,010 µS cm <sup>-1</sup>
Dissolved Solids	1,130 mg L <sup>-1</sup>	1,060 mg L <sup>-1</sup>	642 mg L <sup>-1</sup>
Magnesium (Mg <sup>2+</sup> )	95.4 mg L <sup>-1</sup>	79.6 mg L <sup>-1</sup>	72.4 mg L <sup>-1</sup>
Sodium (Na <sup>+</sup> )	168 mg L <sup>-1</sup>	161 mg L <sup>-1</sup>	62 mg L <sup>-1</sup>
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	629 mg L <sup>-1</sup>	563 mg L <sup>-1</sup>	239 mg L <sup>-1</sup>

- Sulfate is the dominant anion in Heckers Lake (although bicarbonate is relatively high), while magnesium and sodium are co-dominant cations (Figure 5).
- Median concentrations of most cations and anions are greater than the historical median for the lake and for the Missouri Coteau.

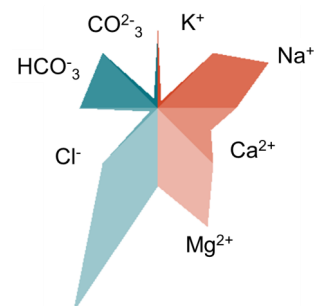


Figure 5. Maucha diagram showing ionic balance based on 2018 data