

April 2019

Camels Hump Dam

(46.9456 N, -103.8134 W)

Golden Valley County

- Camels Hump Dam is a small reservoir in western North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/camelshump2004.pdf>)
- There is one paved, public boat ramp on the north side of Camels Hump Dam.
- The Camels Hump Dam watershed is about 3,900 acres of mostly grassland/pasture and agricultural land. The most common crops grown are spring wheat, durum wheat and non-alfalfa hay (Table 1).
- Camels Hump Dam is a Class I fishery, which are “capable of supporting growth of cold water fish species (e.g., salmonids) and associated aquatic biota.”
- Camels Hump Dam is managed for bluegill, rainbow trout and brown trout, with catchables of the latter two stocked annually. Bluegill and largemouth bass were captured during the last ND Game and Fish sampling event.
- Camels Hump Dam was previously assessed in 2005-2006.

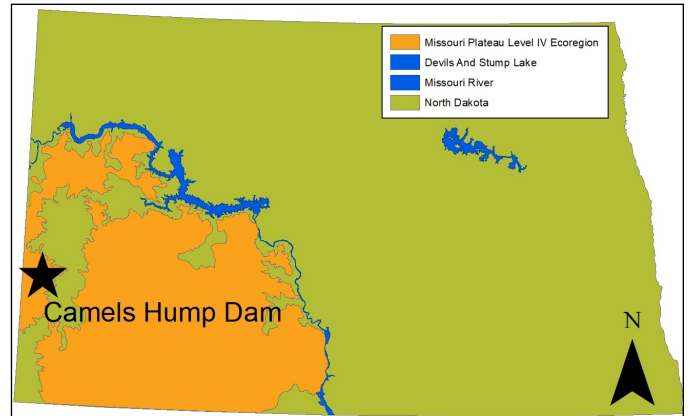


Figure 1. Location of Camels Hump Dam within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2013). Value listed of crop type represents percentage of total production.

Land Cover Type	% in Watershed	% within 500 meters
Grassland/Pasture	67.8%	65.8%
Agriculture	21.9%	9.9%
Other Hay/Non-Alfalfa	49.7%	65.3%
Spring Wheat	29.5%	NA
Durum Wheat	12.7%	NA
Developed	6.0%	19.4%
Shrubland	2.2%	1.7%
Forest	1.1%	1.0%
Open Water	0.9%	1.4%
Wetlands	0.3%	0.7%

Temperature and Dissolved Oxygen

- Camels Hump 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 in May and July 2014. Temperature change in the water column was 4.65 degrees Celsius (°C), 12.34°C and 0.01°C in May, July and October, respectively.
- All samples showed most of the lake as well-oxygenated, but did have sharp decreases with thermal stratification.

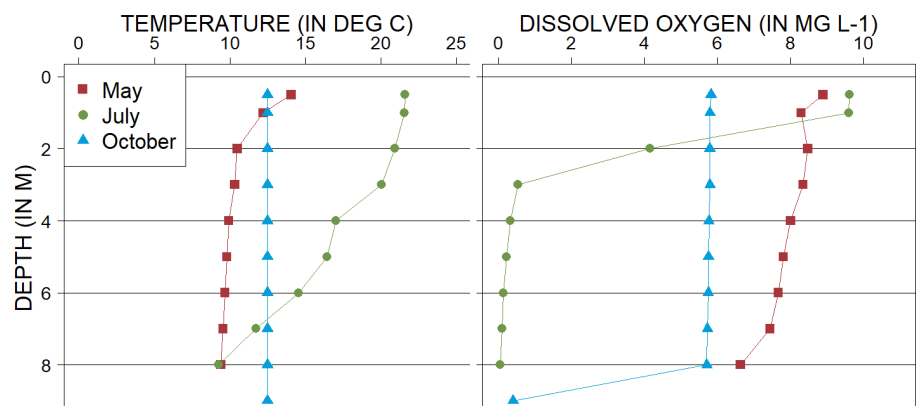


Figure 2. 2014 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ($mg L^{-1}$)

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.
- Camels Hump Dam is a eutrophic lake (Figure 3) that has moderate nutrient concentrations and moderate algal growth.
- Current trophic state has declined compared to historical indices.
- There have been confirmed **harmful** algal (cyanobacteria) blooms at Camels Hump Dam, with the last bloom in 2018.

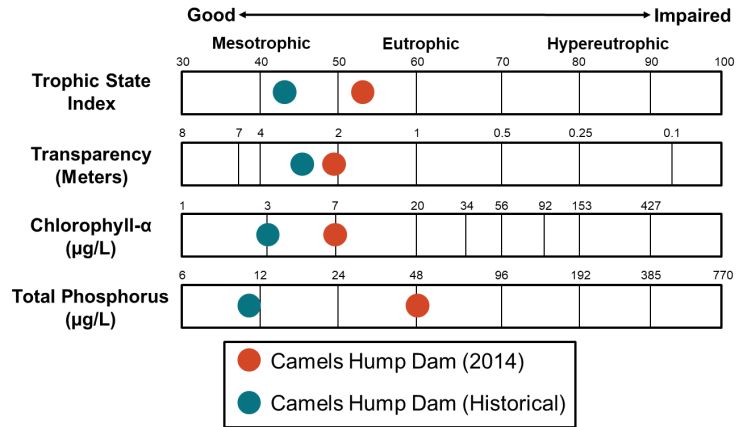


Figure 3. Trophic state indices for 2014 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2014 was greater than the historical median and less than the median for the Missouri Plateau Level IV Ecoregion (hereafter, Missouri Plateau) where Camels Hump Dam is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2014 was greater than the historical median but less than the median for the Missouri Plateau (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia was detected twice at moderate concentrations in Camels Hump Dam in 2014, while there were no detections of nitrate plus nitrite.

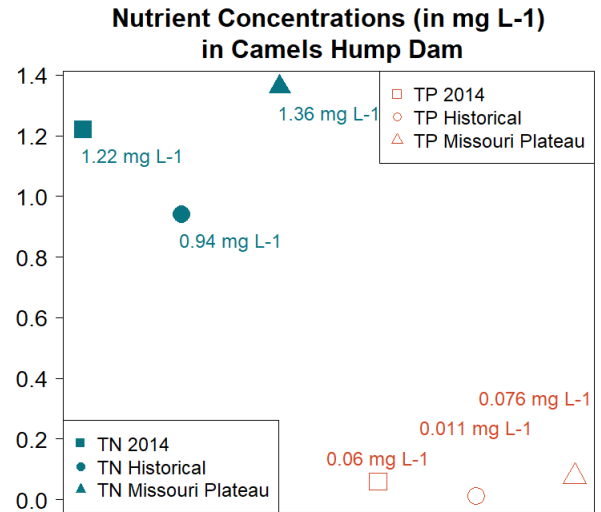


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

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

Measure	2014 Median	Historical Median	Ecoregion Median
Alkalinity	207 mg L ⁻¹	205 mg L ⁻¹	280 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	239 mg L ⁻¹	183 mg L ⁻¹	291 mg L ⁻¹
Calcium (Ca ²⁺)	62.1 mg L ⁻¹	44.8 mg L ⁻¹	49.3 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	2 mg L ⁻¹	33.5 mg L ⁻¹	19 mg L ⁻¹
Conductivity	1,930 µS cm ⁻¹	1,995 µS cm ⁻¹	1,790 µS cm ⁻¹
Dissolved Solids	1,410 mg L ⁻¹	1,405 mg L ⁻¹	1,270 mg L ⁻¹
Magnesium (Mg ²⁺)	75.6 mg L ⁻¹	65.7 mg L ⁻¹	62.3 mg L ⁻¹
Sodium (Na ⁺)	297 mg L ⁻¹	306 mg L ⁻¹	258 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	817 mg L ⁻¹	844 mg L ⁻¹	681 mg L ⁻¹

- Sulfate is the dominant anion in Camels Hump Dam, while sodium is the dominant cation (Figure 5).
- Median concentrations of most cations and anions are similar to the historical median for the lake and similar to the median for the Missouri Plateau.

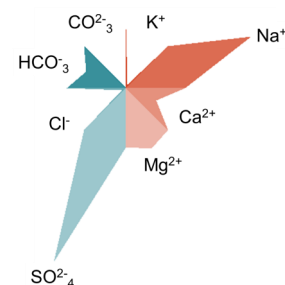


Figure 5. Maucha diagram showing ionic balance based on 2014 data