

Kolding Dam

(47.96376 N, -97.77627 W)

Grand Forks County

- Kolding Dam is a small reservoir in northeast North Dakota (Figure 1).
- There is one public boat ramp on the southeast side Kolding Dam.
- The Kolding Dam watershed is about 6,100 acres of mostly agricultural land and grassland/pasture. The most common crops grown are spring wheat, corn and soybeans (Table 1).
- Kolding Dam is a Class III fishery, which are “capable of supporting natural reproduction and growth of warm water fishes (e.g., largemouth bass and bluegill) and associated aquatic biota.”
- Kolding Dam is managed for northern pike, with fingerlings stocked intermittently. There is no recent fishery information from the ND Game and Fish.
- Kolding Dam was previously assessed in 1996-1997.

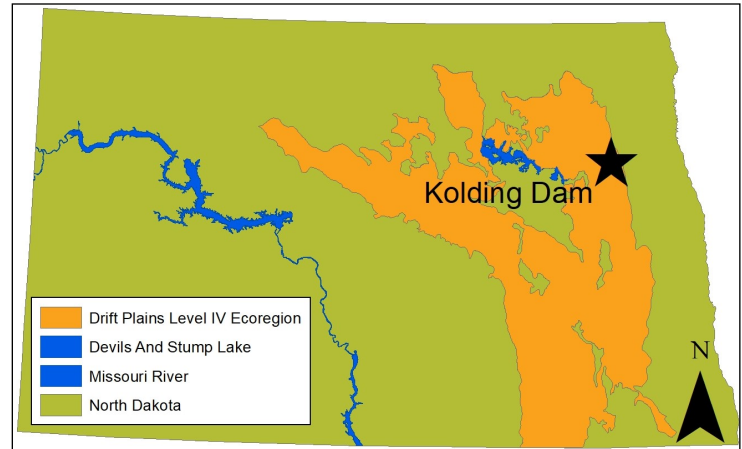


Figure 1. Location of Kolding Dam within the state

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	55.8%	50.9%
Soybeans	42.7%	33.1%
Spring Wheat	36.1%	42.6%
Corn	9.7%	NA
Grassland/Pasture	26.8%	24.4%
Wetlands	9.4%	4.5%
Open Water	3.3%	0.8%
Developed	3.1%	6.6%
Forest	1.7%	12.8%

Temperature and Dissolved Oxygen

- Kolding 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.
- Kolding Dam was stratified during every sample in 2015. Temperature change in the water column was 8.37 degrees Celsius (°C), 13.95°C and 6.95°C in May, July and September, respectively.
- Dissolved oxygen concentration was relatively low in Kolding Dam, especially during thermal stratification.

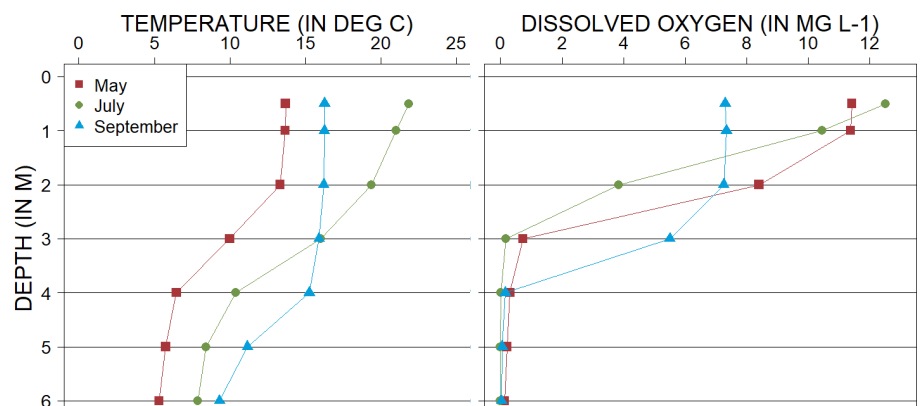


Figure 2. 2015 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ($mg\ L^{-1}$)

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.
- Kolding Dam is a hypereutrophic reservoir (Figure 3) that has high nutrient concentrations and high algal growth.
- Current trophic state has declined compared to historical indices.
- There have been no confirmed **harmful** algal (cyanobacteria) blooms at Kolding Dam.

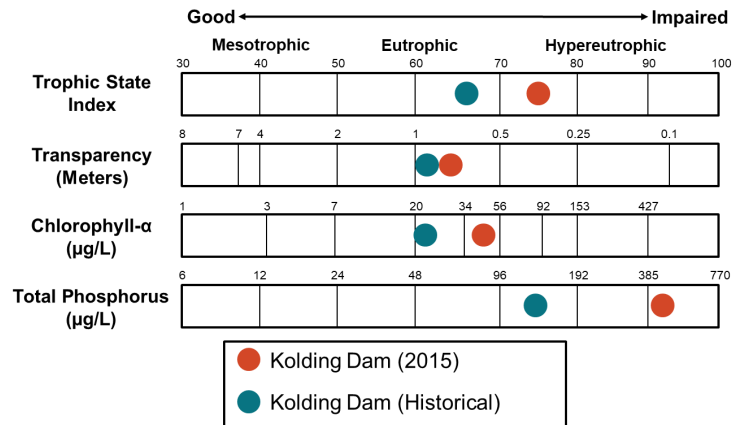


Figure 3. Trophic state indices for 2015 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2015 was less than the historical median for the lake but greater than the median for the Drift Plains Level IV Ecoregion (hereafter, Drift Plains) where Kolding Dam is located (Figure 4).
- Median concentration of dissolved TN was similar to TN.
- Median TP concentration in 2015 was much greater than the median for the lake and greater than the median for the Drift Plains (Figure 4).
- Median concentration of dissolved phosphorus was less than TP.
- Ammonia was detected at low concentrations in all samples at Kolding Dam in 2015, while there was one detection of nitrate plus nitrite.

Nutrient Concentrations (in mg L⁻¹)
in Kolding Dam

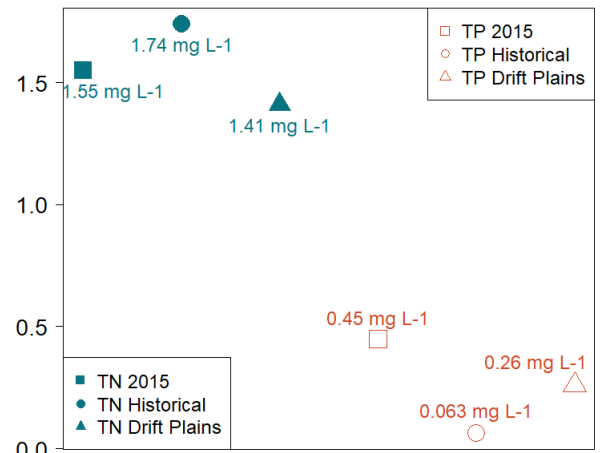


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2015 and historical samples and from all Drift Plains reservoirs.

Measure	2015 Median	Historical Median	Ecoregion Median
Alkalinity	339 mg L ⁻¹	213 mg L ⁻¹	311 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	389 mg L ⁻¹	211 mg L ⁻¹	341 mg L ⁻¹
Calcium (Ca ²⁺)	134 mg L ⁻¹	73.6 mg L ⁻¹	73.8 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	13 mg L ⁻¹	24 mg L ⁻¹	14 mg L ⁻¹
Conductivity	2,565 µS cm ⁻¹	2,040 µS cm ⁻¹	1,081 µS cm ⁻¹
Dissolved Solids	1,890 mg L ⁻¹	1,390 mg L ⁻¹	713 mg L ⁻¹
Magnesium (Mg ²⁺)	95.4 mg L ⁻¹	80.9 mg L ⁻¹	52.5 mg L ⁻¹
Sodium (Na ⁺)	313 mg L ⁻¹	249 mg L ⁻¹	106 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	1,043 mg L ⁻¹	818 mg L ⁻¹	271 mg L ⁻¹

- Sulfate is the dominant anion in Kolding Dam, while sodium is the dominant cation (Figure 5).
- Median concentrations of most cations and anions are greater than the historical median for the lake and greater than the median for the Drift Plains.

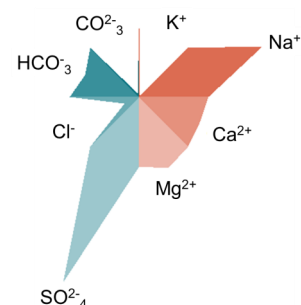


Figure 5. Maucha diagram showing ionic balance based on 2015 data