NORTH Dakota | Environmental Quality

Be Legendary.™

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December 2021

Kulm-Edgeley Dam

(46.329570 N, -98.817655 W)

Lamoure County

- Kulm-Edgeley Dam is a small reservoir in southeastern North Dakota (Figure 1). See map at (https://gf.nd.gov/gnf/maps/fishing/lakecontours/kulmedgeley2005.pdf).
- There is one boat ramp on Kulm-Edgeley Dam on the south side of the lake.
- The Kulm-Edgeley Dam watershed is about 3,600 acres of mostly agriculture. The most common crops grown are soybeans and corn, though there is a substantial amount of fallow/idle cropland (Table 1).
- Kulm-Edgeley 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."
- Kulm-Edgeley Dam is managed by the NDGF, with multiple species stocked across years. Bluegill and smallmouth bass were the only species captured in the last sample by the NDGF in 2020.
- Kulm-Edgeley Dam was previously assessed in 1991-1992 and 2005-2006 by the NDDEQ.

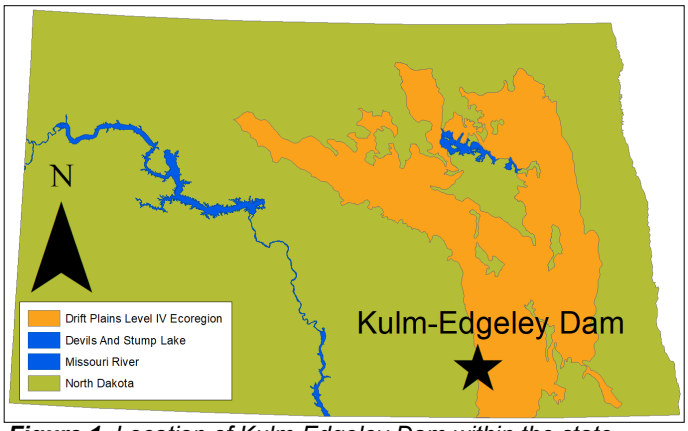

Figure 1. *Location of Kulm-Edgeley Dam within the state*

Table 1. *Percentage of land cover in the watershed and near the lake (NASS, 2020). Value listed of crop type represents percentage of total production*

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	64.5%	26.3%
Fallow/Idle Cropland	*49.8%*	*29.1%*
Soybeans	*38.4%*	*39.6%*
Corn	*10.2%*	*28.7%*
Grassland/Pasture	25.8%	62.2%
Wetlands	3.9%	2.5%
Shrubland	2.1%	4.5%
Developed	2.0%	2.6%
Open Water	1.5%	1.4%
Forest	0.2%	0.3%

Temperature and Dissolved Oxygen

- Kulm-Edgeley Dam commonly stratifies in the summer, with warmer, high-oxygen water in the epilimnion and cooler, low-oxygen water in the hypolimnion.
- Thermal stratification was recorded in June and July 2021. Temperature change in the water column was 0.1 degrees Celsius (ºC), 7.5ºC, 9.3ºC, and 1.5ºC in May, June, July and October, respectively.
- Dissolved oxygen concentrations decreased dramatically throughout the water column during most samples.

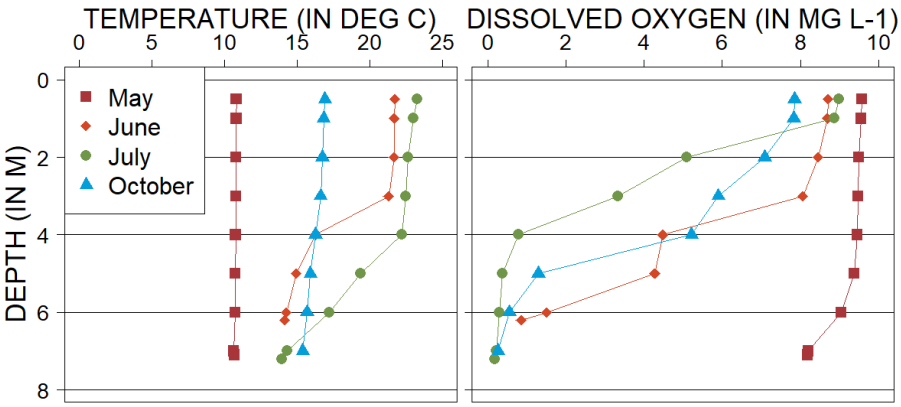

Figure 2. *2021 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L^{-1})*

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.
- Kulm-Edgeley Dam is a eutrophic natural lake (Figure 3) that has high nutrient concentrations, but moderate algal growth and transparency.
- Trophic state in 2021 was improved compared to historical indices.
- Kulm-Edgeley Dam has not had any confirmed ***harmful*** algal (cyanobacteria) blooms.

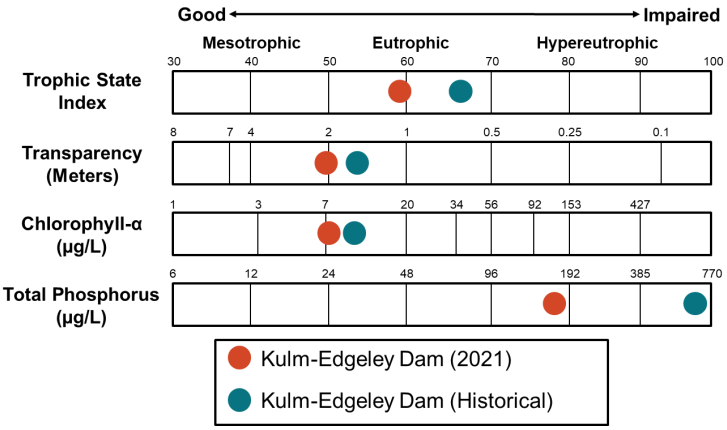

Figure 3. *Trophic state indices for 2021 and historical samples*

Nutrients

- Median concentration of total nitrogen (TN) at Kulm-Edgeley Dam in 2021 was less than the historical median for the lake and slightly less than the median for reservoirs in the Drift Plains Level IV Ecoregion (hereafter, Ecoregion) (Figure 4).
- Median TP concentration in 2021 was much less than the median for the lake and greater than the median for the Ecoregion (Figure 4).
- Median concentrations of dissolved nutrients were similar to concentrations of total nutrients.
- Ammonia and nitrate-plus-nitrite were rarely detected at Kulm-Edgeley Dam in 2021.

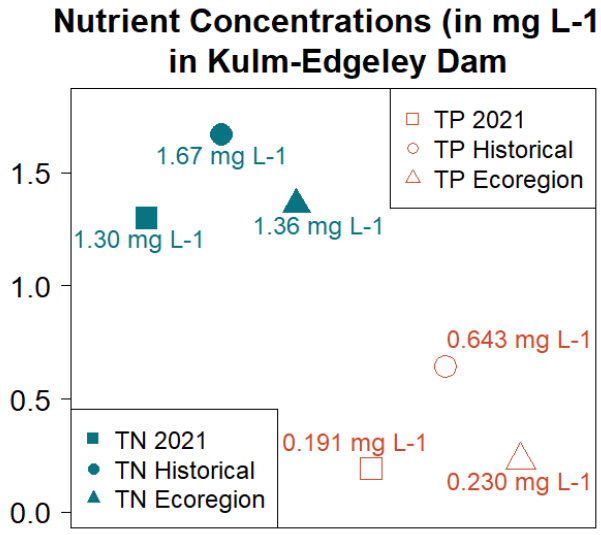

Figure 4. *Median concentrations of TN and TP in mg L^{-1} compared to regional medians*

Water Chemistry

Table 2. *Median concentrations of selected constituents for 2021 and historical samples and from all Ecoregion reservoirs.*

Measure	2021 Median	Historical Median	Ecoregion Median
Alkalinity	207.5 mg L^{-1}	210 mg L^{-1}	329.5 mg L^{-1}
Bicarbonate (HCO^{-}_{3})	240.5 mg L^{-1}	209 mg L^{-1}	365 mg L^{-1}
Calcium (Ca^{2+})	113 mg L^{-1}	63.1 mg L^{-1}	73.6 mg L^{-1}
Carbonate (CO^{2-}_{3})	3 mg L^{-1}	< 1 mg L^{-1}	16 mg L^{-1}
Conductivity	1,440 µS cm^{-1}	820 µS cm^{-1}	1,200 µS cm^{-1}
Dissolved Solids	1,039 mg L^{-1}	542 mg L^{-1}	809 mg L^{-1}
Magnesium (Mg^{2+})	85.1 mg L^{-1}	42.4 mg L^{-1}	55.2 mg L^{-1}
Sodium (Na^{+})	92.1 mg L^{-1}	57.4 mg L^{-1}	114 mg L^{-1}
Sulfate (SO^{2-}_{4})	601.5 mg L^{-1}	272 mg L^{-1}	303 mg L^{-1}

- Sulfate is the dominant anion in Kulm-Edgeley Dam, while calcium and magnesium are co-dominant cations (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 Ecoregion.

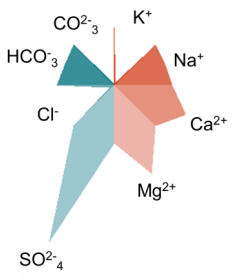

Figure 5. *Maucha diagram showing ionic balance based on 2021 data*