NORTH Dakota | Environmental Quality
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December 2021

Baukol-Noonan Dam

(48.873543 N, -102.950255 W)

Divide County

- Baukol-Noonan Dam is a small reservoir in northwest North Dakota (Figure 1). See map at (https://gf.nd.gov/gnf/maps/fishing/lakecontours/baukolnoonan2004.pdf).
- Baukol-Noonan Dam is accessible by one public boat ramp near the middle of the pools.
- The Baukol-Noonan Dam watershed is about 3,000 acres of mostly agriculture. The most common crops grown are spring wheat, soybeans and flaxseed (Table 1).
- Baukol-Noonan Dam is a Class II fishery, which are "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 stocked annually. Walleye, yellow perch and northern pike were captured by the NDGF in 2020.
- Baukol-Noonan Dam was previously sampled in 1992-1993 and 2011 by the NDDEQ.

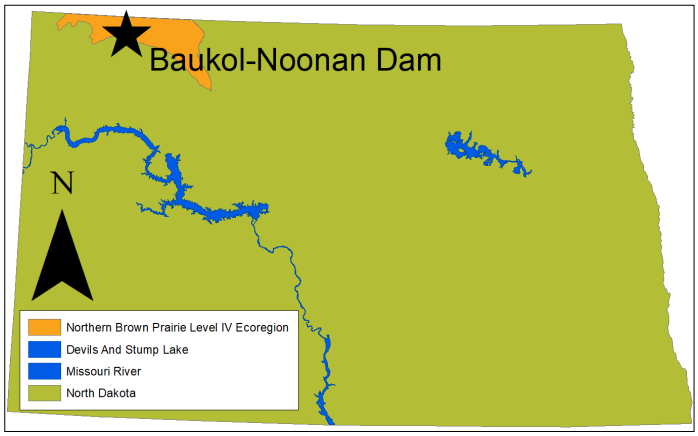

Figure 1. *Location of Baukol-Noonan Dam within the state*

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	71.2%	27.4%
Spring Wheat	*38.3%*	*42.2%*
Flaxseed	*21.0%*	*33.3%*
Soybeans	*17.7%*	*4.1%*
Grassland/Pasture	16.8%	43.7%
Developed	3.0%	2.5%
Wetlands	3.0%	5.0%
Open Water	2.9%	4.6%
Barren	2.4%	16.5%

Temperature and Dissolved Oxygen

- Baukol-Noonan Dam does stratify in the summer, with the majority of the water column typically well-oxygenated
- There was thermal stratification recorded in June and July 2021. Temperature change in the water column was 1.7 degrees Celsius (ºC), 3.0ºC, 7.3ºC and 0.0ºC in May, June, July and October, respectively (Figure 2).
- All samples in 2021 showed the lake as well-oxygenated, except during strong stratification in July.

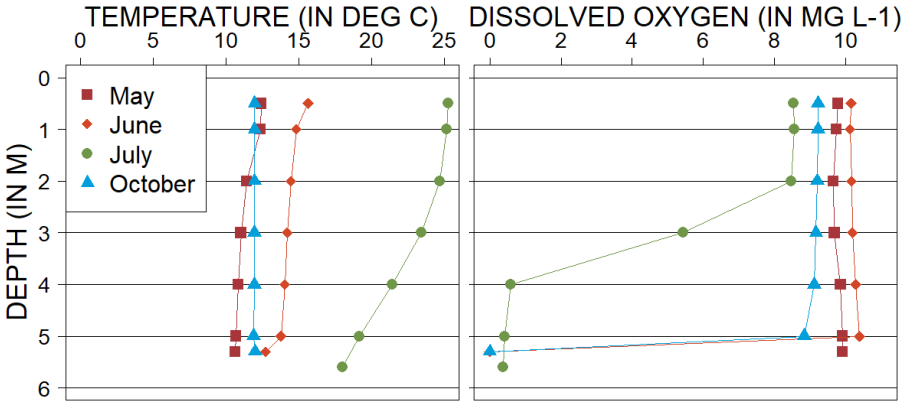

Figure 2. *2021 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L^{-1})*

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.
- Baukol-Noonan Dam is a mesotrophic lake (Figure 3) that has relatively low nutrient concentrations and low algal growth.
- TSI score in 2021 was improved compared to historical indices, driven by lower concentrations of chlorophyll-a and higher transparency.
- There have been no confirmed ***harmful*** algal (cyanobacteria) blooms at Baukol-Noonan Dam.

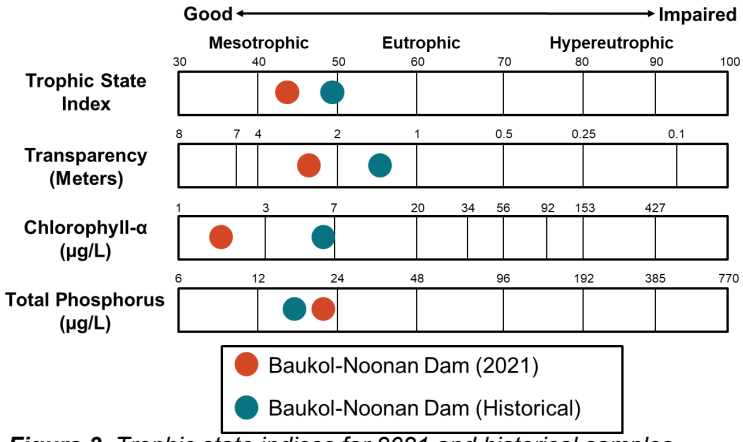

Figure 3. *Trophic state indices for 2021 and historical samples*

Nutrients

- Median concentration of total nitrogen (TN) at Baukol -Noonan Dam in 2021 was comparable to the historical median for the lake but much less than the median for the Northern Dark Brown Prairie Level IV Ecoregion (hereafter, Ecoregion) (Figure 4).
- Median TP concentration in 2021 was comparable to the median for the lake but much less than the median for the Ecoregion (Figure 4).
- Median concentrations of dissolved nutrients were comparable to median concentrations of total nutrients.
- Neither ammonia nor nitrate-plus-nitrite were detected at Baukol-Noonan Dam in 2021.

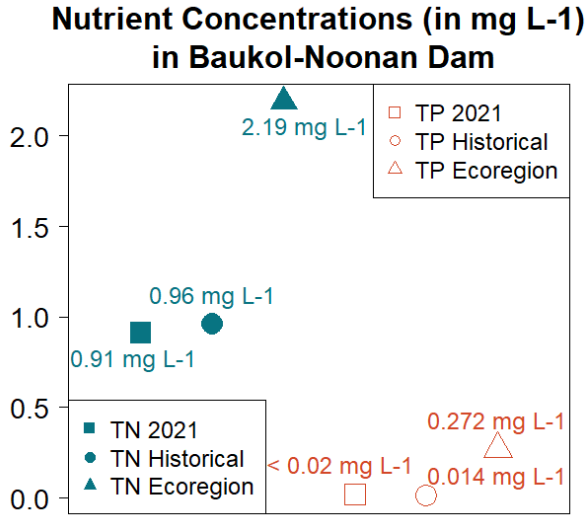

Figure 4. *Median concentrations of TN and TP in mg L^{-1} compared to regional medians*

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	294.5 mg L^{-1}	297 mg L^{-1}	299.5 mg L^{-1}
Bicarbonate (HCO^-_3)	344 mg L^{-1}	325 mg L^{-1}	346 mg L^{-1}
Calcium (Ca^{2+})	66.8 mg L^{-1}	55.1 mg L^{-1}	56.8 mg L^{-1}
Carbonate (CO^{2-}_3)	8.5 mg L^{-1}	20.5 mg L^{-1}	5 mg L^{-1}
Conductivity	2,605 µS cm^{-1}	2,354 µS cm^{-1}	1,460 µS cm^{-1}
Dissolved Solids	1,875 mg L^{-1}	1,635 mg L^{-1}	998.5 mg L^{-1}
Magnesium (Mg^{2+})	74.1 mg L^{-1}	46.3 mg L^{-1}	49.7 mg L^{-1}
Sodium (Na^+)	426.5 mg L^{-1}	458.5 mg L^{-1}	197 mg L^{-1}
Sulfate (SO^{2-}_4)	1,085 mg L^{-1}	848 mg L^{-1}	440 mg L^{-1}

- Sulfate is the dominant anion in Baukol-Noonan 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 the median concentration for the Ecoregion.

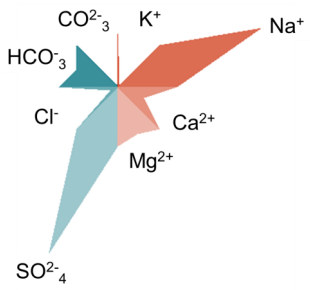

Figure 5. *Maucha diagram showing ionic balance based on 2021 data*