

December 2021

Velva Sportsmen's Dam

(47.935409 N, -100.971520 W)

Ward County

- Velva Sportsmen's Dam is a small reservoir in northern North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/velvasportsmans2003.pdf>).
- There is one paved, public boat ramp on the north side of the lake.
- The Velva Sportsmen's Dam watershed is about 900 acres of mostly grassland/pasture and agriculture. The most common crops grown are soybeans, alfalfa and other hay/non-alfalfa (Table 1).
- Velva Sportsmen's Dam is a Class I fishery, which are "waters capable of supporting growth of cold water fish species (e.g., salmonids) and associated aquatic biota."
- Velva Sportsmen's Dam is managed by the NDGF as a trout fishery, with fingerlings of rainbow trout and/or brown trout stocked annually. Only largemouth bass and rainbow trout were captured in the last sample by the NDGF in 2020.
- Velva Sportsmen's Dam was previously sampled in 1991-1992, 1994 and 2011 by the NDDEQ.

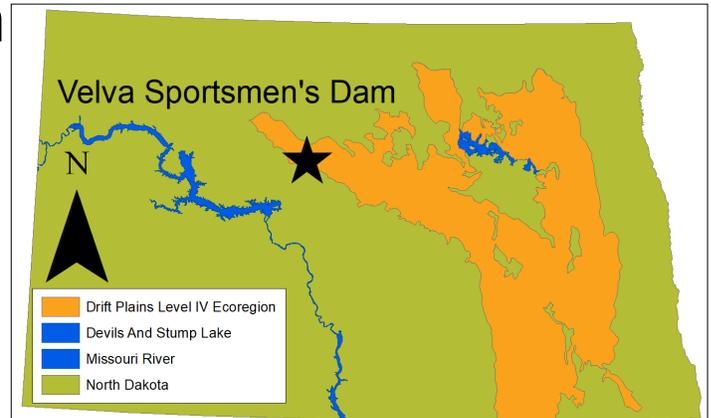


Figure 1. Location of Velva Sportsmen's Dam within the state

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
Grassland/Pasture	40.7%	36.3%
Agriculture	27.7%	47.8%
Spring Wheat	48.1%	38.2%
Other Hay/Non-Alfalfa	26.3%	22.6%
Alfalfa	22.1%	5.8%
Wetlands	15.2%	6.0%
Open Water	7.5%	0.6%
Developed	4.4%	4.0%
Forest	4.4%	5.3%
Shrubland	0.1%	n/a

Temperature and Dissolved Oxygen

- Velva Sportsmen's Dam commonly stratifies in the summer, with cooler, lower-oxygen water in the hypolimnion.
- Thermal stratification was recorded in June and July 2021. Temperature change in the water column was 2.1 degrees Celsius (°C), 2.3°C, 6.8°C and 0.0°C in May, June, July and October, respectively.
- Dissolved oxygen concentrations remained high at Velva Sportsmen's Dam, except during strong stratification in July.

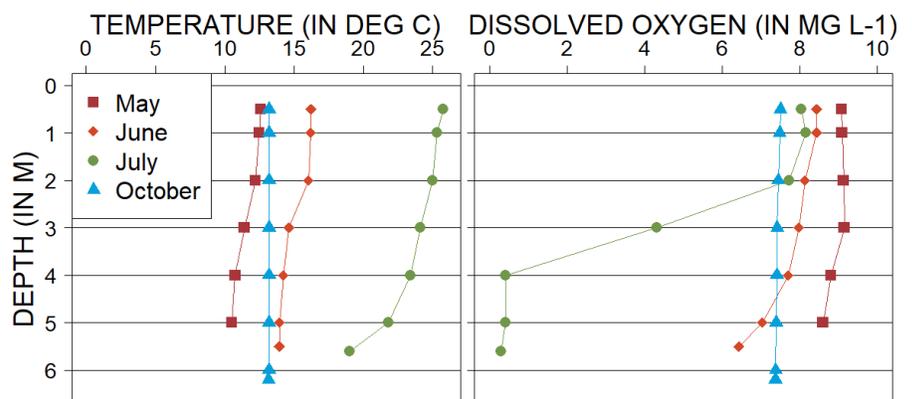


Figure 2. 2021 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ($mg L^{-1}$)

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.
- Velva Sportsmen’s Dam is a mesotrophic reservoir (Figure 3) with relatively low nutrient concentrations, low algal growth and high transparency.
- Trophic state in 2021 was improved compared to historical indices.
- Velva Sportsmen’s Dam has never been listed for confirmed **harmful** algal (cyanobacteria) blooms.

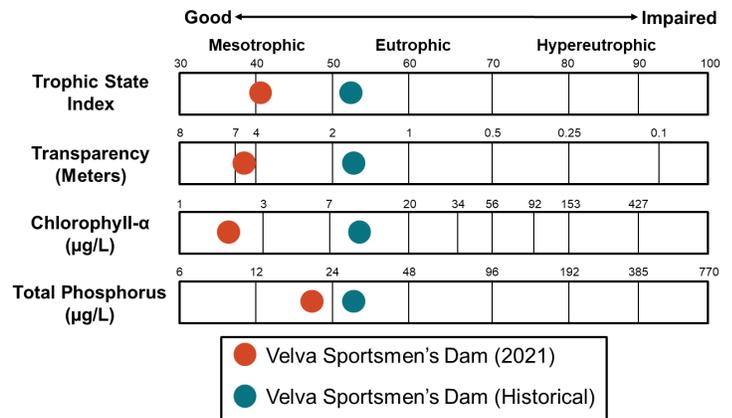


Figure 3. Trophic state indices for 2021 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) at Velva Sportsmen’s Dam in 2021 was similar to the historical median for the lake and much less than the median for reservoirs in the Drift Plains Level IV Ecoregion (hereafter, Ecoregion) (Figure 4).
- Median TP concentration in 2021 was less than the median for the lake and much less than the median for the Ecoregion (Figure 4).
- Median concentrations of dissolved nutrients at Velva Sportsmen’s Dam in 2021 were similar to historical concentrations.
- Ammonia and nitrate-plus-nitrite were only detected at Velva Sportsmen’s Dam in October 2021, but were detected at low concentrations.

Nutrient Concentrations (in mg L⁻¹) in Velva Sportsmen's Dam

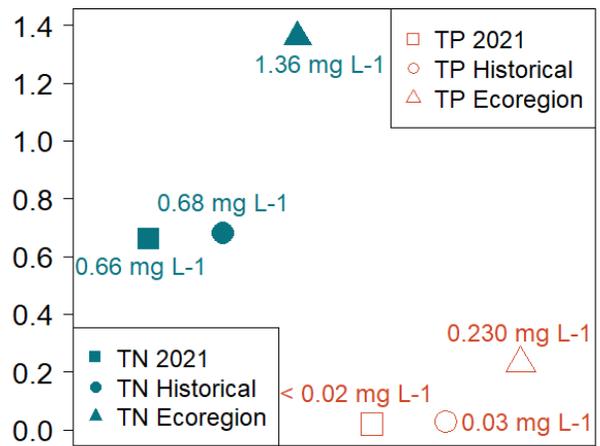


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

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

Measure	2021 Median	Historical Median	Ecoregion Median
Alkalinity	321 mg L ⁻¹	328 mg L ⁻¹	329.5 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	384 mg L ⁻¹	401 mg L ⁻¹	365 mg L ⁻¹
Calcium (Ca ²⁺)	80.9 mg L ⁻¹	114 mg L ⁻¹	73.6 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	3.5 mg L ⁻¹	2 mg L ⁻¹	16 mg L ⁻¹
Conductivity	1,310 µS cm ⁻¹	1,350 µS cm ⁻¹	1,200 µS cm ⁻¹
Dissolved Solids	901 mg L ⁻¹	934 mg L ⁻¹	809 mg L ⁻¹
Magnesium (Mg ²⁺)	72.7 mg L ⁻¹	76.7 mg L ⁻¹	55.2 mg L ⁻¹
Sodium (Na ⁺)	102.6 mg L ⁻¹	96.5 mg L ⁻¹	114 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	430 mg L ⁻¹	458 mg L ⁻¹	303 mg L ⁻¹

- Sulfate and bicarbonate are co-dominant anions in Velva Sportsmen’s Dam, while sodium, calcium and magnesium are co-dominant cations (Figure 5).
- Median concentrations of most cations and anions are similar to the historical median for the lake and greater than the median for the Ecoregion.

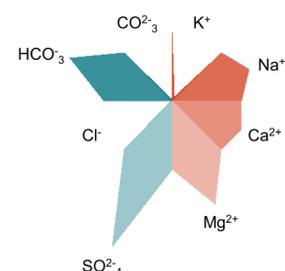


Figure 5. Maucha diagram showing ionic balance based on 2021 data