

# Whitman Dam

(48.18311 N, -98.055 W)

## Nelson County

- Whitman Dam is a long, narrow reservoir in northeast North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/whitman2004.pdf>).
- There is one public boat ramp on the southwest side of Whitman Dam, adjacent to the dam.
- The Whitman Dam watershed is about 37,000 acres of mostly agricultural land, wetlands and grassland/pasture. The most common crops grown are spring wheat, canola and soybeans (Table 1).
- Whitman 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.”
- Whitman Dam is managed for walleye, with fingerlings stocked most years. In 2017 and 2018, however, the ND Game and Fish began stocking the lake with muskellunge. White sucker, black crappie, walleye, yellow perch and northern pike were found during the last sample by the Game and Fish.
- Whitman Dam was previously assessed in 1991 -1992.

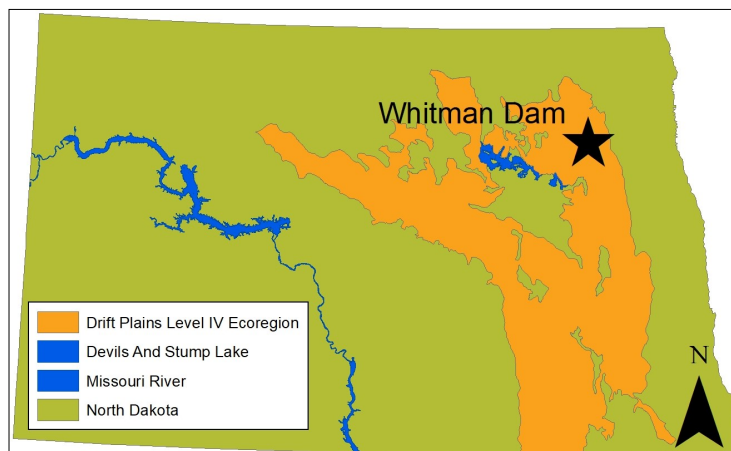


Figure 1. Location of Whitman Dam within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2015). Value listed of crop type represents percentage of total production

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	52.4%	53.7%
Spring Wheat	38.7%	46.7%
Canola	25.7%	2.7%
Soybeans	16.2%	12.9%
Grassland/Pasture	20.8%	33.2%
Wetlands	20.8%	8.7%
Developed	4.3%	6.2%
Open Water	1.4%	1.3%
Forest	0.3%	0.4%

## Temperature and Dissolved Oxygen

- Whitman Dam 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 in May and July 2016. Temperature change in the water column in 2016 was 2.96 degrees Celsius (°C), 4.44°C and 1.55°C in May, July and September, respectively.
- Dissolved oxygen concentration was relatively high during most samples, though thermal stratification caused oxygen depletion in the summer.

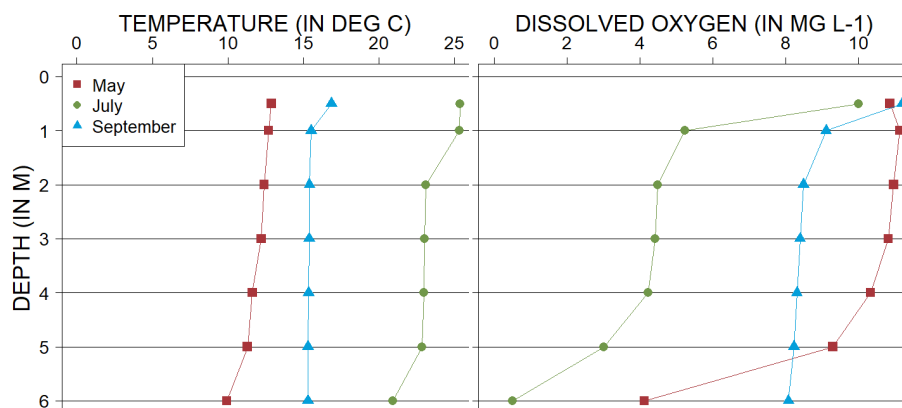


Figure 2. 2016 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L<sup>-1</sup>)

## 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.
- Whitman Dam is a highly eutrophic reservoir (Figure 3) that has high nutrient concentrations but moderate algal growth.
- Current trophic state is similar to historical indices.
- There have been no confirmed **harmful** algal (cyanobacteria) blooms at Whitman Dam.

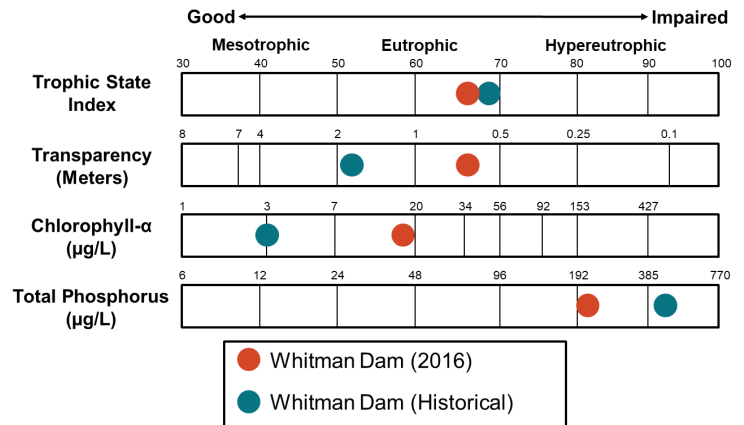


Figure 3. Trophic state indices for 2016 and historical samples

## Nutrients

- Median concentration of total nitrogen (TN) in 2016 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 Whitman Dam is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2016 was less than the historical median for the lake but greater than the median for the Drift Plains (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia was detected in all samples at Whitman Dam in 2016, while there was one detection of nitrate plus nitrite.

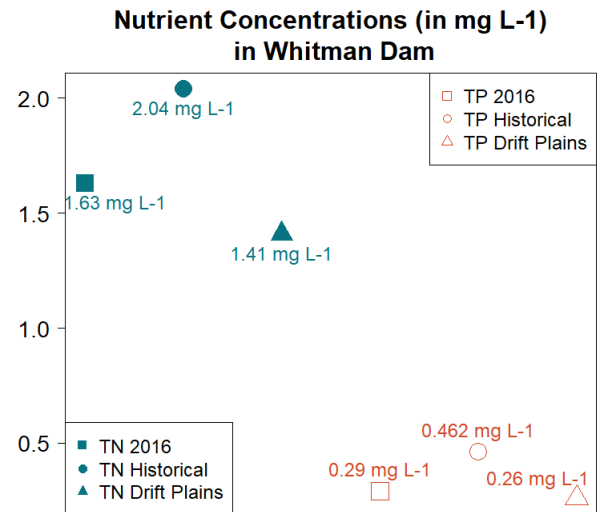


Figure 4. Median concentrations of TN and TP in mg L<sup>-1</sup> compared to regional medians

## Water Chemistry

**Table 2.** Median concentrations of selected constituents for 2016 and historical samples and from all Drift Plains reservoirs.

Measure	2016 Median	Historical Median	Ecoregion Median
Alkalinity	213 mg L <sup>-1</sup>	251 mg L <sup>-1</sup>	311 mg L <sup>-1</sup>
Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	251 mg L <sup>-1</sup>	304 mg L <sup>-1</sup>	341 mg L <sup>-1</sup>
Calcium (Ca <sup>2+</sup> )	94.5 mg L <sup>-1</sup>	69.4 mg L <sup>-1</sup>	73.8 mg L <sup>-1</sup>
Carbonate (CO <sub>3</sub> <sup>2-</sup> )	4 mg L <sup>-1</sup>	2.5 mg L <sup>-1</sup>	14 mg L <sup>-1</sup>
Conductivity	1,540 µS cm <sup>-1</sup>	943 µS cm <sup>-1</sup>	1,081 µS cm <sup>-1</sup>
Dissolved Solids	1,090 mg L <sup>-1</sup>	579 mg L <sup>-1</sup>	713 mg L <sup>-1</sup>
Magnesium (Mg <sup>2+</sup> )	70.4 mg L <sup>-1</sup>	36.5 mg L <sup>-1</sup>	52.5 mg L <sup>-1</sup>
Sodium (Na <sup>+</sup> )	173 mg L <sup>-1</sup>	81.8 mg L <sup>-1</sup>	106 mg L <sup>-1</sup>
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	574 mg L <sup>-1</sup>	211 mg L <sup>-1</sup>	271 mg L <sup>-1</sup>

- Sulfate is the dominant anion in Whitman Dam, while sodium, 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 Drift Plains.

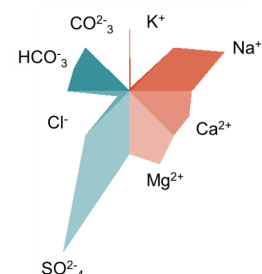


Figure 5. Maucha diagram showing ionic balance based on 2016 data