

October 2019

# Carbury Dam

(48.63413 N, -99.36362 W)

## Bottineau County

- Carbury Dam is a reservoir in northern North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/carbury2004.pdf>).
- There is one public boat ramp on Carbury Dam on the east side of the lake.
- The Carbury Dam watershed is about 12,000 acres of mostly agriculture, forest and grassland/pasture. The most common crops grown are spring wheat, soybeans and other hay/non-alfalfa (Table 1).
- Carbury 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.”
- Carbury Dam is managed for northern pike, with fingerlings stocked annually. No fish were captured during the last sample by the ND Game and Fish.
- Carbury Dam was previously assessed in 1992-1993.

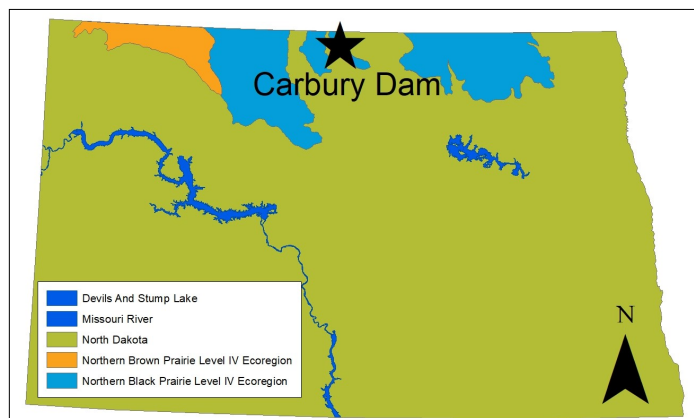


Figure 1. Location of Carbury Dam within the state

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	42.0%	43.1%
Spring Wheat	35.3%	41.6%
Soybeans	32.9%	NA
Other Hay/Non-Alfalfa	10.6%	18.5%
Forest	25.9%	0.4%
Grassland/Pasture	21.9%	47.5%
Developed	5.4%	5.5%
Open Water	3.1%	0.2%
Wetlands	1.8%	2.4%
Shrubland	< 0.1%	NA

## Temperature and Dissolved Oxygen

- Carbury Dam can stratify 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 no thermal stratification during 2015 sampling, however. Temperature change in the water column was 0.00 degrees Celsius (°C), 0.17°C and 0.13°C in May, July and September, respectively.
- Dissolved oxygen concentrations were relatively low in Carbury Dam in July, but high during the other samples.

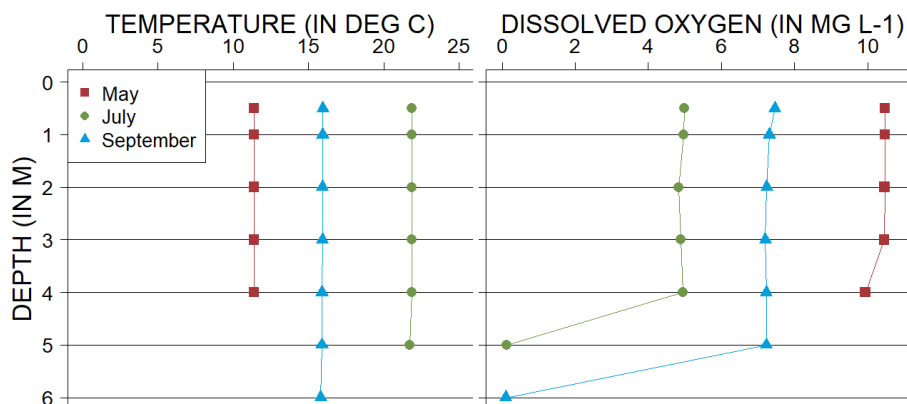


Figure 2. 2015 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L<sup>-1</sup>)

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

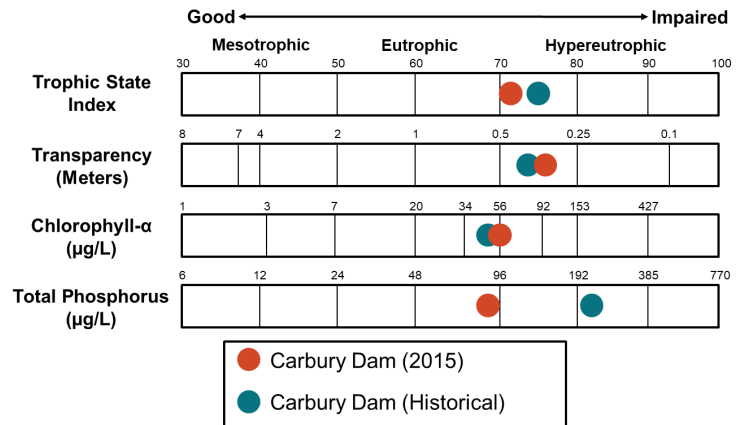


Figure 3. Trophic state indices for 2015 and historical samples

## Nutrients

- Median concentration of total nitrogen (TN) in 2015 was less than the historical median for the lake and less than the median for the combined Dark Prairie Level IV Ecoregions (hereafter, Ecoregion) where Carbury Dam is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2015 was less than the median for the lake and less than the median for the Ecoregion (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia was detected in one sample at Carbury Dam in 2015, while there were no detections of nitrate plus nitrite.

### Nutrient Concentrations (in mg L<sup>-1</sup>) in Carbury Dam

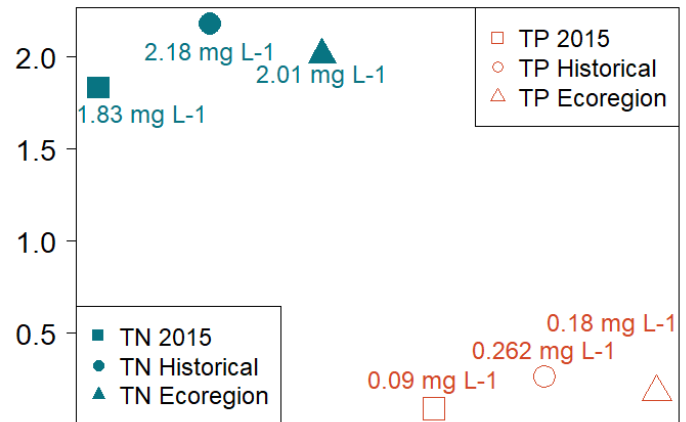


Figure 4. Median concentrations of TN and TP in mg L<sup>-1</sup> compared to regional medians

## Water Chemistry

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

Measure	2015 Median	Historical Median	Ecoregion Median
Alkalinity	313 mg L <sup>-1</sup>	322 mg L <sup>-1</sup>	284 mg L <sup>-1</sup>
Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	351 mg L <sup>-1</sup>	333 mg L <sup>-1</sup>	322.5 mg L <sup>-1</sup>
Calcium (Ca <sup>2+</sup> )	78.5 mg L <sup>-1</sup>	58 mg L <sup>-1</sup>	55.9 mg L <sup>-1</sup>
Carbonate (CO <sub>3</sub> <sup>2-</sup> )	15 mg L <sup>-1</sup>	20 mg L <sup>-1</sup>	7 mg L <sup>-1</sup>
Conductivity	1,890 µS cm <sup>-1</sup>	1,620 µS cm <sup>-1</sup>	1,084 µS cm <sup>-1</sup>
Dissolved Solids	1,380 mg L <sup>-1</sup>	1,110 mg L <sup>-1</sup>	698.5 mg L <sup>-1</sup>
Magnesium (Mg <sup>2+</sup> )	117 mg L <sup>-1</sup>	80.3 mg L <sup>-1</sup>	48.8 mg L <sup>-1</sup>
Sodium (Na <sup>+</sup> )	201 mg L <sup>-1</sup>	192 mg L <sup>-1</sup>	112 mg L <sup>-1</sup>
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	755 mg L <sup>-1</sup>	568 mg L <sup>-1</sup>	292.5 mg L <sup>-1</sup>

- Sulfate is the dominant anion in Carbury Dam, while magnesium and sodium 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.

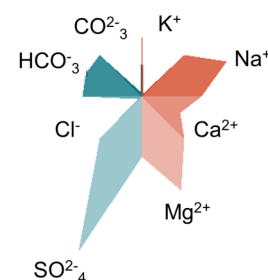


Figure 5. Maucha diagram showing ionic balance based on 2015 data