NORTH Dakota | Environmental Quality

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~~June 2024~~

Belfield Pond

(46.87901 N, -103.20729 W)

Stark County

- Belfield Pond is a lake in western North Dakota (Figure 1). See map at (https://gf.nd.gov/gnf/maps/fishing/lakecontours/belfield2004.pdf)
- There is one public boat ramp on Belfield Pond on the east side of the lake.
- Belfield Dam watershed drains about 29,500 acres. Land cover in the watershed is mostly rangeland, with a good amount of both agricultural and forest land. Agriculture is dominated by wheat, corn, and legumes (Table 1).
- Belfield Pond is a Class I, cold-water fishery, which is "capable of supporting growth of cold water fish species (e.g., Salmonoids) and associated aquatic biota."
- Belfield Pond is managed for bluegill, channel catfish, yellow perch, rainbow trout, and cutthroat trout. The lake was last stocked in 2023. No ND Game and Fish survey data is available.
- The dam was de-watered in the fall of 2023 for repairs (Figure 5).
- Belfield Pond was last sampled in 2006.

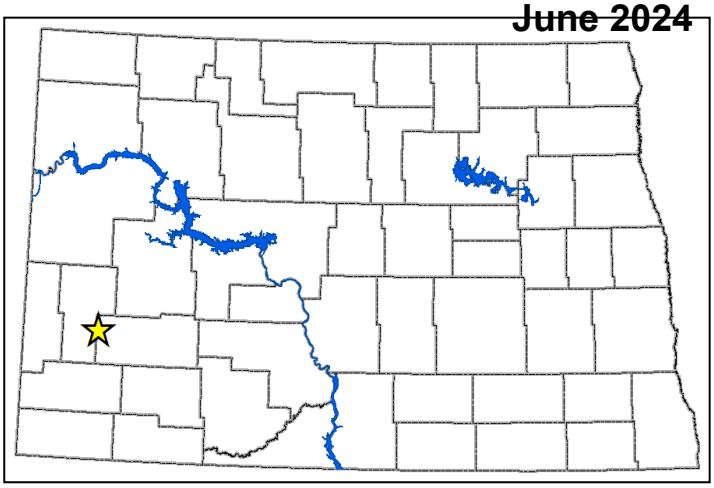

Figure 1. *Location of Belfield Pond within the state*

Table 1. *Percentage of land cover in the watershed and near the lake (NASSCDL, 2021). Value listed of crop type represents percentage of total production*

Land Cover Type	% in Watershed	% within 500 meters
Agriculture	26.6 %	22.0%
Wheat	*12.5 %*	*21.3%*
Corn	*3.8 %*	*0%*
Legumes	*3.4 %*	*0%*
Trees	26.1 %	9.1%
Rangeland	41.3 %	39.2%
Water	<1% %	1.7%
Bare	5.7 %	28.0%

Temperature and Dissolved Oxygen

- Belfield Dam stayed stratified throughout most of the sampling season, with warm, well-oxygenated water at the top of the water column, and cold, low-oxygen water near the bottom.
- Thermal stratification took place in May, June, and July. The greatest temperature change in the water column during these months was 8.6 degrees Celsius (ºC), 8.9ºC, and 5.8ºC (Figure 2).
- Dissolved oxygen concentrations were relatively high at the surface, but low to anoxic near the bottom (Figure 2).

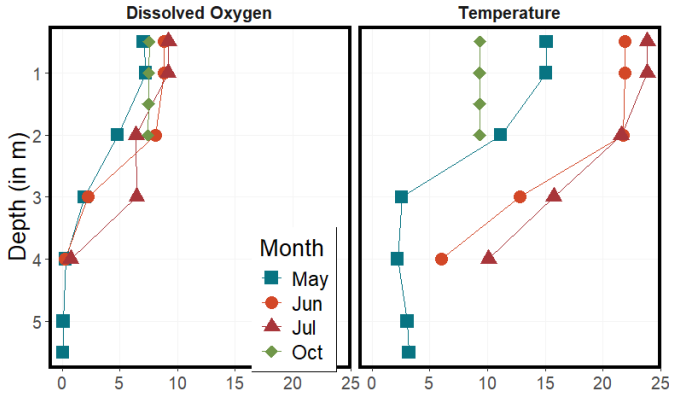

Figure 2. *2023 profiles of dissolved oxygen (left) in milligrams per liter (mg L^{-1}) and temperature (right) in degrees Celsius.*

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.
- Belfield Pond is a eutrophic lake (Figure 3) that has moderate nutrient concentrations and moderate algal and plant growth.
- Trophic state in 2023 was similar to historical conditions.

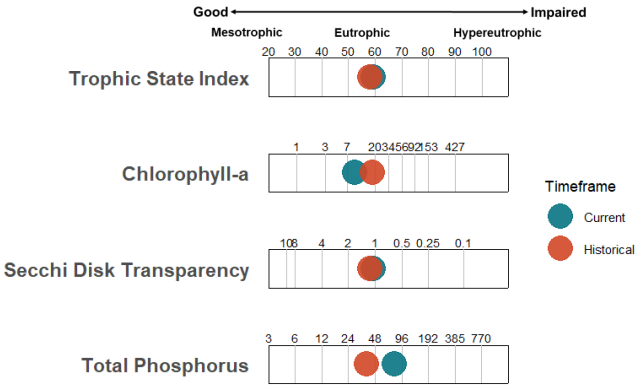

Figure 3. *Trophic state indices for 2023 and historical samples*

Nutrients

- Median concentration of total nitrogen (TN) in 2023 was less than the historical median for the lake but greater than the median for the Missouri plateau Level IV Ecoregion where Belfield Pond is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN (2023).
- Median TP concentration in 2023 was greater than the historical median for the lake and for the Ecoregion (Figure 4).
- Median concentration of dissolved phosphorus was less than TP.
- Ammonia was found above the detection limit of 0.03 mg/L in Belfield Dam during the fall sampling event when the lake level was significantly lower.

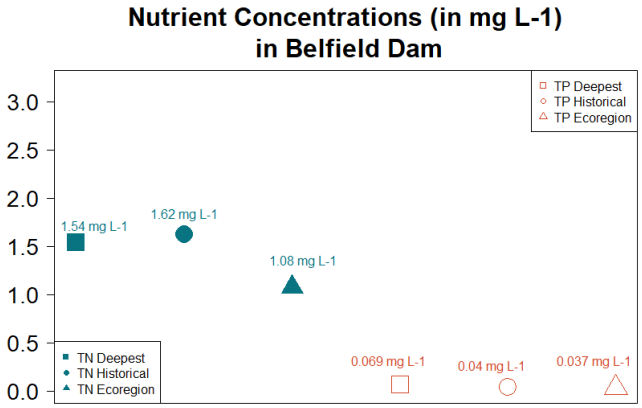

Figure 4. *Median concentrations of TN and TP in mg L^{-1} compared to regional medians*

Water Chemistry

Table 2. *Median concentrations of selected constituents for 2023, historical samples, and from all ecoregion natural lakes and reservoirs.*

Measure	2023 Median	Historical Median	Ecoregion Median
Alkalinity	238 mg L^{-1}	238.5 mg L^{-1}	201 mg L^{-1}
Bicarbonate (HCO^{-}_{3})	257.5 mg L^{-1}	260.5 mg L^{-1}	217 mg L^{-1}
Calcium (Ca^{2+})	89.75 mg L^{-1}	89.75 mg L^{-1}	47.5 mg L^{-1}
Carbonate (CO^{2-}_{3})	23 mg L^{-1}	16.5 mg L^{-1}	11 mg L^{-1}
Conductivity	4080 µS cm^{-1}	4070 µS cm^{-1}	823.5 µS cm^{-1}
Dissolved Solids	3105 mg L^{-1}	3105 mg L^{-1}	521.5 mg L^{-1}
Magnesium (Mg^{2+})	143 mg L^{-1}	127 mg L^{-1}	24.7 mg L^{-1}
Sodium (Na^{+})	773 mg L^{-1}	733 mg L^{-1}	94.4 mg L^{-1}
Sulfate (SO^{2-}_{4})	1935 mg L^{-1}	1935 mg L^{-1}	206 mg L^{-1}

- Sulfate is the dominant anion in Belfield Dam, while sodium is the dominant cation (Figure 2).
- 2023 median concentrations of most cations and anions are similar to historical medians for the lake and greater than the ecoregion medians (Table 2).

Figure 5. *Belfield Dam October 5, 2023 taken by Emily Brazil.*