

April 2019

# Lake Ilo

(47.3435 N, -102.6693 W)

## Dunn County

- Lake Ilo is a large reservoir in western North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/ilo2005.pdf>)
- There is one paved, public boat ramp on the north side of Lake Ilo.
- The Lake Ilo watershed is about 81,000 acres of mostly grassland/pasture and agricultural land. The most common crops grown are spring wheat, corn and non-alfalfa hay (Table 1).
- Lake Ilo is a Class III fishery, which are “capable of supporting natural reproduction and growth of warm water fish species (e.g., largemouth bass and bluegill) and associated aquatic biota.”
- Lake Ilo is managed for walleye, with fingerlings stocked annually. Common carp, yellow perch, black bullhead, walleye, white sucker and northern pike were captured during the last ND Game and Fish sampling event.
- Lake Ilo was previously assessed in 2009.

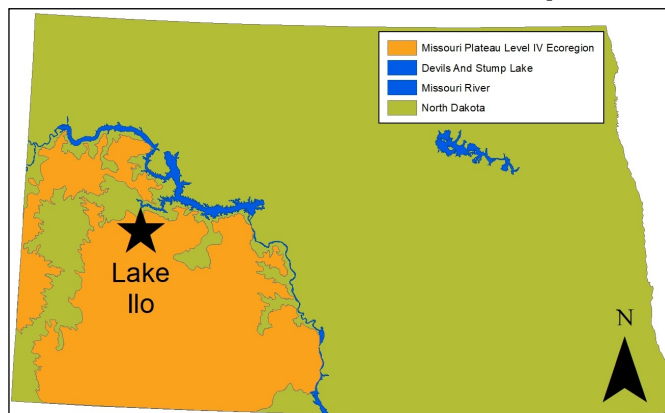


Figure 1. Location of Lake Ilo within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2013). Value listed of crop type represents percentage of total production.

Land Cover Type	% in Watershed	% within 500 meters
Grassland/Pasture	67.8%	78.4%
Agriculture	25.9%	9.0%
Other Hay/Non-Alfalfa	39.5%	38.7%
Spring Wheat	34.4%	6.5%
Corn	7.1%	24.2%
Developed	3.3%	5.2%
Open Water	1.1%	1.4%
Forest	1.3%	1.4%
Wetlands	0.4%	4.3%
Shrubland	0.1%	0.2%

## Temperature and Dissolved Oxygen

- Lake Ilo occasionally 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 recorded in July 2014. Temperature change in the water column was 0.41 degrees Celsius (°C), 1.33°C and 0.02°C in May, July and October, respectively.
- All samples showed most of the lake as well-oxygenated, though there was some near-bottom depletion.

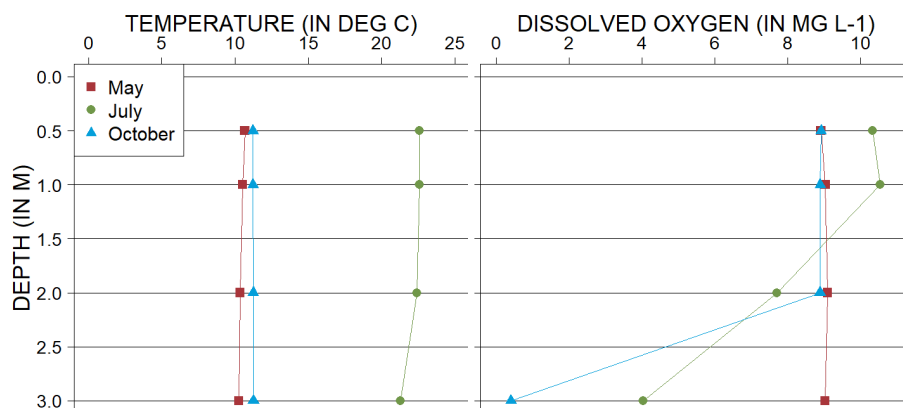


Figure 2. 2014 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ( $mg L^{-1}$ )

## 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.
- Lake Ilo is a eutrophic lake (Figure 3) that has high nutrient concentrations and moderate algal growth.
- Current trophic state has declined compared to historical indices.
- There have been no confirmed **harmful** algal (cyanobacteria) blooms at Lake Ilo.

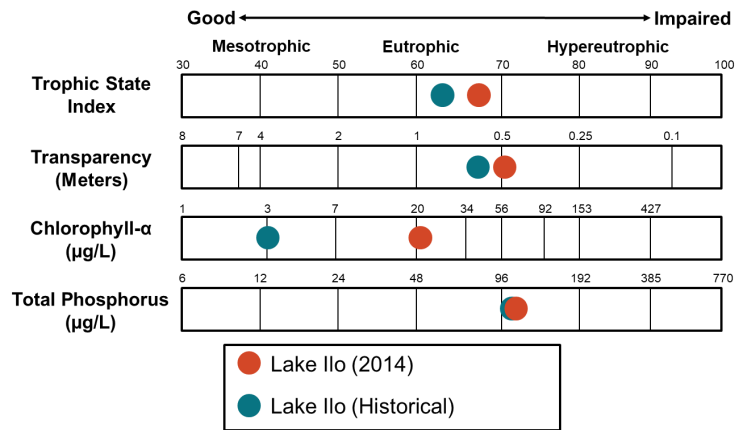


Figure 3. Trophic state indices for 2014 and historical samples

## Nutrients

- Median concentration of total nitrogen (TN) in 2014 was much greater than the historical median and greater than the median for the Missouri Plateau Level IV Ecoregion (hereafter, Missouri Plateau) where Lake Ilo is located (Figure 4).
- Median concentration of dissolved TN was slightly less than TN.
- Median TP concentration in 2014 was greater than the historical median and greater than the median for the Missouri Plateau (Figure 4).
- Median concentration of dissolved phosphorus was slightly less than TP.
- Ammonia and nitrate plus nitrite were detected in almost all samples at Lake Ilo in 2014, with some concentrations being relatively high.

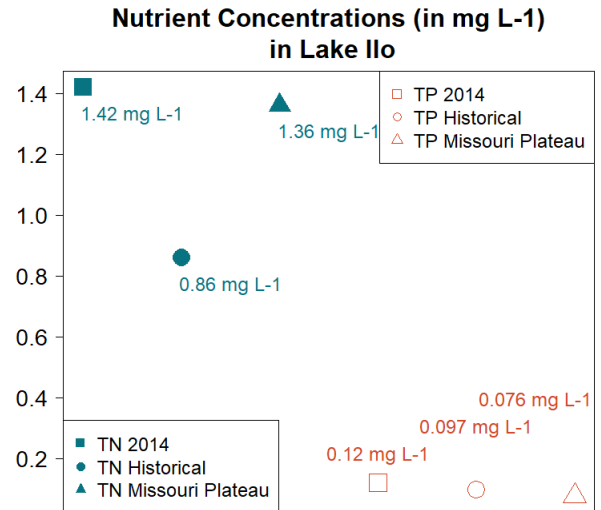


Figure 4. Median concentrations of TN and TP in mg L<sup>-1</sup> compared to regional medians

## Water Chemistry

Table 2. Median concentrations of selected constituents for 2014 and historical samples and from all Missouri Plateau reservoirs.

Measure	2014 Median	Historical Median	Ecoregion Median
Alkalinity	298 mg L <sup>-1</sup>	173 mg L <sup>-1</sup>	280 mg L <sup>-1</sup>
Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )	298 mg L <sup>-1</sup>	181 mg L <sup>-1</sup>	291 mg L <sup>-1</sup>
Calcium (Ca <sup>2+</sup> )	34.6 mg L <sup>-1</sup>	20.0 mg L <sup>-1</sup>	49.3 mg L <sup>-1</sup>
Carbonate (CO <sub>3</sub> <sup>2-</sup> )	14 mg L <sup>-1</sup>	15 mg L <sup>-1</sup>	19 mg L <sup>-1</sup>
Conductivity	1,320 µS cm <sup>-1</sup>	520 µS cm <sup>-1</sup>	1,790 µS cm <sup>-1</sup>
Dissolved Solids	882 mg L <sup>-1</sup>	317 mg L <sup>-1</sup>	1,270 mg L <sup>-1</sup>
Magnesium (Mg <sup>2+</sup> )	29.0 mg L <sup>-1</sup>	10.5 mg L <sup>-1</sup>	62.3 mg L <sup>-1</sup>
Sodium (Na <sup>+</sup> )	228 mg L <sup>-1</sup>	83.6 mg L <sup>-1</sup>	258 mg L <sup>-1</sup>
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	380 mg L <sup>-1</sup>	83.5 mg L <sup>-1</sup>	681 mg L <sup>-1</sup>

- Sulfate and bicarbonate are co-dominant anions in Lake Ilo, while sodium is the dominant cation (Figure 5).
- Median concentrations of most cations and anions are greater than the historical median for the lake but less than the median for the Missouri Plateau.

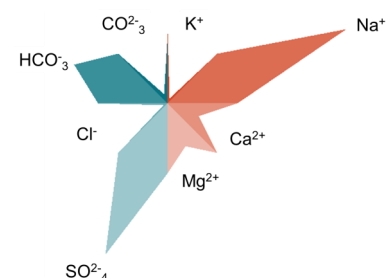


Figure 5. Maucha diagram showing ionic balance based on 2014 data