NORTH Dakota | Environmental Quality

Be Legendary.™

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May 2019

Island Lake

(48.58313 N, -99.69094 W)

Rolette County

- Island Lake is a natural lake in north-central North Dakota (Figure 1). See map at (https://gf.nd.gov/gnf/maps/fishing/lakecontours/islandlake2010.pdf).
- There is one public boat ramp on Island Lake on the west side of the lake.
- The Island Lake watershed is located in a closed basin and difficult to define. Land cover surrounding the lake is mostly agriculture, grassland/pasture and wetland. Agriculture is dominated by spring wheat, soybeans and canola (Table 1).
- Island Lake is not defined in the state's water quality standards.
- Island Lake is managed for northern pike, with fingerlings stocked most years. Yellow perch and northern pike were found during the last sample by the ND Game and Fish.
- Island Lake has no historical data.

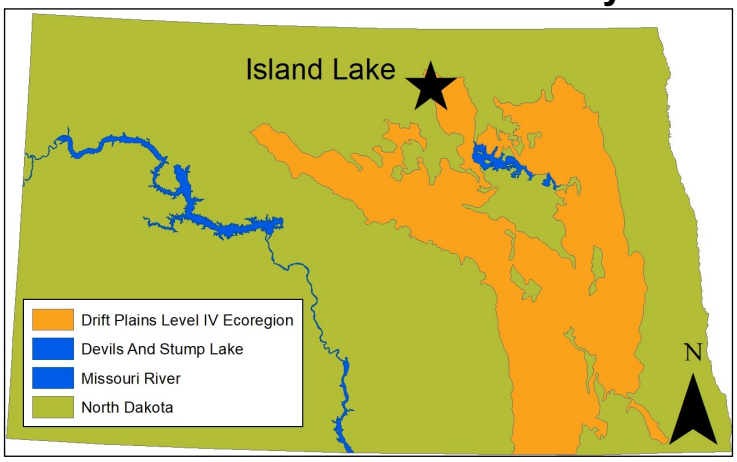

Figure 1. *Location of Island Lake within the state*

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	% within 500 meters
Agriculture	58.9%
Canola	*38.6%*
Spring Wheat	*26.6%*
Soybeans	*13.6%*
Wetlands	17.6%
Grassland/Pasture	13.8%
Open Water	5.7%
Developed	3.8%
Forest	0.3%

Temperature and Dissolved Oxygen

- Island Lake 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 no thermal stratification in 2015. Temperature change in the water column was 1.30 degrees Celsius (ºC), 0.04ºC and 0.01ºC in May, July and September, respectively.
- Dissolved oxygen concentrations were relatively high, though the ND Game and Fish reported a fish kill during the winter of 2017-2018.

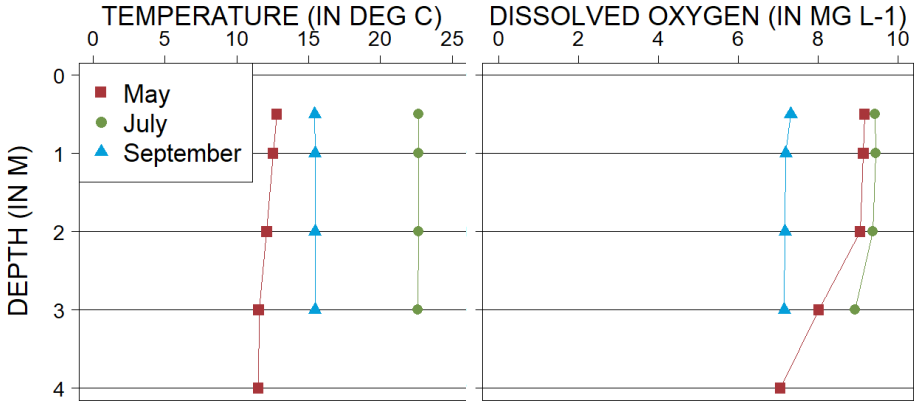

Figure 2. *2015 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L^{-1})*

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.
- Island Lake is a hypereutrophic lake (Figure 3) that has high nutrient concentrations and dense algal and plant growth.
- There are no historical indices to compare to.
- There have been no confirmed ***harmful*** algal (cyanobacteria) blooms at Island Lake, though cyanobacteria blooms are very common at the lake.

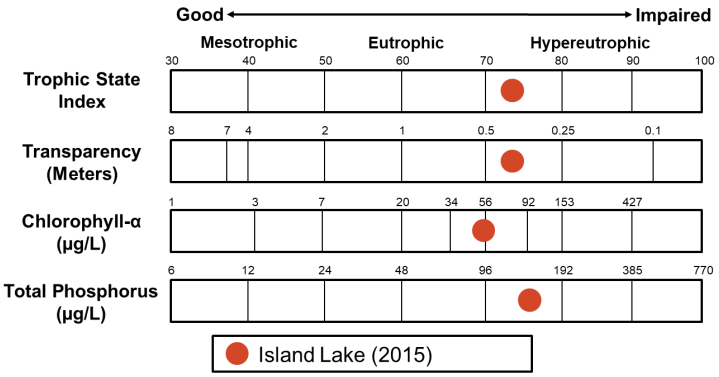

Figure 3. *Trophic state indices for 2015 and historical samples*

Nutrients

- Median concentration of total nitrogen (TN) in 2015 was greater than the median for the Drift Plains Level IV Ecoregion (hereafter, Drift Plains) where Island Lake is located (Figure 4).
- Median concentration of dissolved TN was less than TN.
- Median TP concentration in 2015 was greater than the median for the Drift Plains (Figure 4).
- Median concentration of dissolved phosphorus was less than TP.
- Ammonia was detected in all samples at Island Lake in 2015 at low concentrations, but nitrate plus nitrite was only detected once.

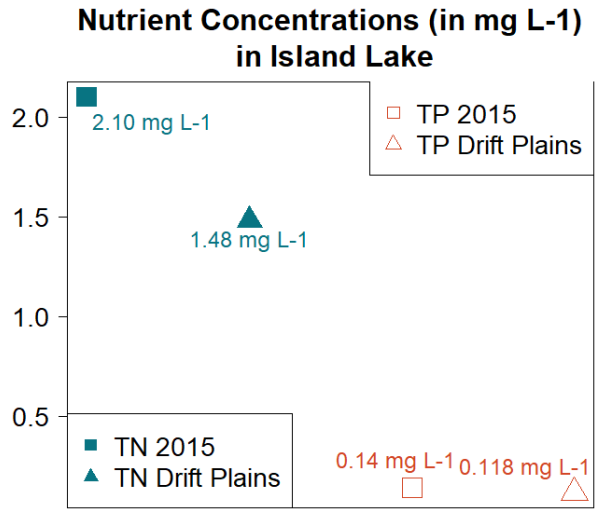

Figure 4. *Median concentrations of TN and TP in mg L^{-1} compared to regional medians*

Water Chemistry

Table 2. *Median concentrations of selected constituents for 2015 and historical samples and from all Drift Plains natural lakes.*

Measure	2015 Median	Ecoregion Median
Alkalinity	378 mg L^{-1}	237 mg L^{-1}
Bicarbonate (HCO^-_3)	339 mg L^{-1}	269 mg L^{-1}
Calcium (Ca^{2+})	32.9 mg L^{-1}	62.7 mg L^{-1}
Carbonate (CO^{2-}_3)	54 mg L^{-1}	17 mg L^{-1}
Conductivity	1,390 µS cm^{-1}	1,284 µS cm^{-1}
Dissolved Solids	916 mg L^{-1}	1,080 mg L^{-1}
Magnesium (Mg^{2+})	81.9 mg L^{-1}	91.1 mg L^{-1}
Sodium (Na^+)	141 mg L^{-1}	112 mg L^{-1}
Sulfate (SO^{2-}_4)	345 mg L^{-1}	600 mg L^{-1}

- Sulfate and bicarbonate are co-dominant anions in Island Lake, while magnesium and sodium are co-dominant cations (Figure 5).
- Median concentrations of most cations and anions are less than the median for the Drift Plains.

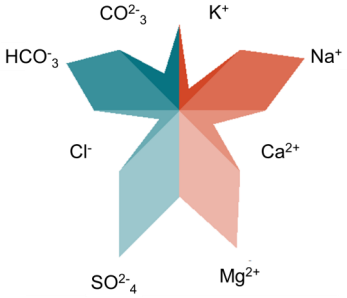

Figure 5. *Maucha diagram showing ionic balance based on 2015 data*