

February 2019

Pelican Lake

(48.94259 N, -100.26692 W)

Bottineau County

- Pelican Lake is a small, natural lake in northern North Dakota (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/pelicanbottineau2010.pdf>).
- Pelican Lake is accessible by one public boat ramp on the north side of the lake.
- The Pelican Lake watershed is about 800 acres of mostly deciduous forest, open water and agricultural land (Table 1). The most common crops are other hay/non-alfalfa, spring wheat and peas (Table 1).
- Pelican Lake is a Class III fishery, which are “capable of supporting natural reproduction and growth of warm water fishes (e.g., largemouth bass and bluegill) and associated aquatic biota.”
- Pelican Lake is managed for northern pike, but there has been no stocking reported in recent years. The most recent sampling survey by the ND Game and Fish found northern pike, yellow perch and black bullhead.
- Pelican Lake was previously sampled in 1995-1996 and 2005-2006.

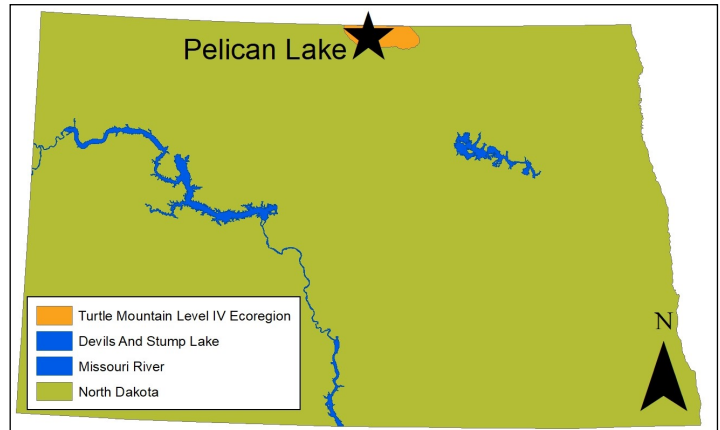


Figure 1. Location of Pelican Lake within the state

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	% in Watershed	% within 500 meters
Deciduous Forest	48.3%	65.9%
Open Water	22.6%	17.7%
Agriculture	12.1%	2.9%
Other Hay/Non-Alfalfa	26.1%	52.3%
Spring Wheat	22.7%	2.3%
Peas	19.9%	NA
Grassland/Pasture	9.0%	5.7%
Developed	5.8%	6.1%
Wetlands	2.3%	1.6%

Temperature and Dissolved Oxygen

- Pelican Lake commonly stratifies in the summer, with warm, well-oxygenated water at the top of the water column, and cold, low-oxygen water near the bottom.
- Stratification was observed in all samples in 2015, with a temperature change of 6.36 degrees Celsius (°C), 14.13°C and 5.98°C in May, July and September, respectively (Figure 2).
- All samples showed oxygen depletion during times of thermal stratification.

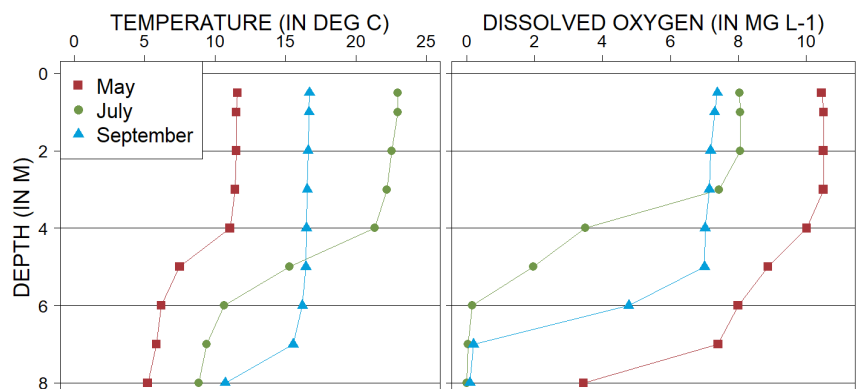


Figure 2. 2015 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter (mg L⁻¹)

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.
- Pelican Lake is a mesotrophic lake (Figure 3) that has low nutrient concentrations and low algal growth.
- Trophic state is similar to historical indices.
- There have been no confirmed **harmful** algal (cyanobacteria) blooms at Pelican Lake.

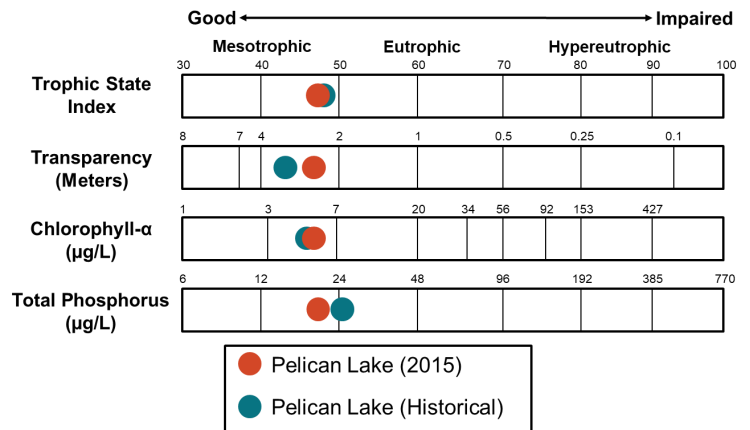


Figure 3. Trophic state indices for 2015 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) was lower in 2015 compared to the historical median and the median for the Turtle Mountains Level IV Ecoregion (Figure 1; hereafter, Turtle Mountains) where Pelican Lake is located (Figure 4).
- Median concentration of dissolved TN was similar to TN.
- Median TP concentration was in 2015 than historical concentrations and the median for the Turtle Mountains (Figure 4).
- Median concentration of dissolved phosphorus were similar to TP.
- Ammonia and nitrate plus nitrite were rarely above detection limits in Pelican Lake in 2015.

Nutrient Concentrations (in mg L⁻¹) in Pelican Lake

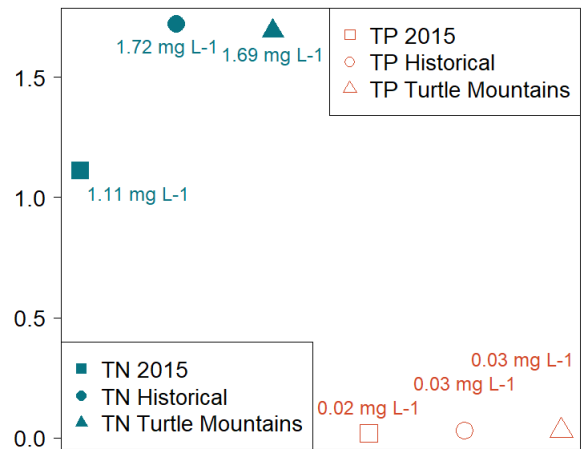


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2015 and historical samples and from all Turtle Mountain natural lakes.

Measure	2015 Median	Historical Median	Ecoregion Median
Alkalinity	257 mg L ⁻¹	275 mg L ⁻¹	290 mg L ⁻¹
Bicarbonate (HCO ₃ ⁻)	301 mg L ⁻¹	309 mg L ⁻¹	325 mg L ⁻¹
Calcium (Ca ²⁺)	33.1 mg L ⁻¹	31.2 mg L ⁻¹	32.4 mg L ⁻¹
Carbonate (CO ₃ ²⁻)	6 mg L ⁻¹	15 mg L ⁻¹	12 mg L ⁻¹
Conductivity	524 µS cm ⁻¹	602 µS cm ⁻¹	685 µS cm ⁻¹
Dissolved Solids	297 mg L ⁻¹	335 mg L ⁻¹	382 mg L ⁻¹
Magnesium (Mg ²⁺)	47.2 mg L ⁻¹	54.2 mg L ⁻¹	61.9 mg L ⁻¹
Sodium (Na ⁺)	5.8 mg L ⁻¹	7.1 mg L ⁻¹	8.9 mg L ⁻¹
Sulfate (SO ₄ ²⁻)	31.2 mg L ⁻¹	51.3 mg L ⁻¹	60 mg L ⁻¹

- Bicarbonate is the dominant anion in Pelican Lake, while magnesium is the dominant cation (Figure 5).
- Median concentrations of most cations and anions are lower than the historical median and the Ecoregion median.

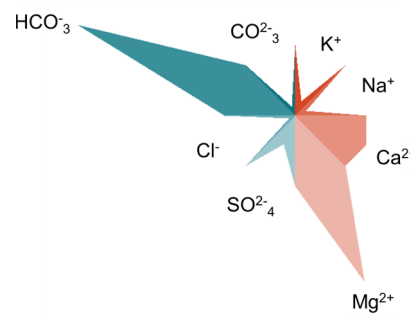


Figure 5. Maucha diagram showing ionic balance based on 2015 data