

December 2019

Harmon Lake

(46.939395 N, -100.963482 W)

Morton County

- Harmon Lake is a small reservoir in south-central North Dakota (Figure 1). See map at (<https://gf.nd.gov/gnf/maps/fishing/lakecontours/harmon2009.pdf>).
- There is one boat ramp on Harmon Lake on the north side of the lake.
- The Harmon Lake watershed is about 24,000 acres of mostly grassland/pasture and agriculture. The most common crops grown are spring wheat, other hay/non-alfalfa and soybeans (Table 1).
- Harmon 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.”
- The North Dakota Game and Fish stocks Harmon Lake annually with catchable trout. Bluegill, white sucker, black crappie, black bullhead, common shiner, largemouth bass, golden shiner, northern pike and walleye were captured in the last sample by the NDGF.
- Harmon Lake has been assessed since it was first created with the first sample collected in 2009.

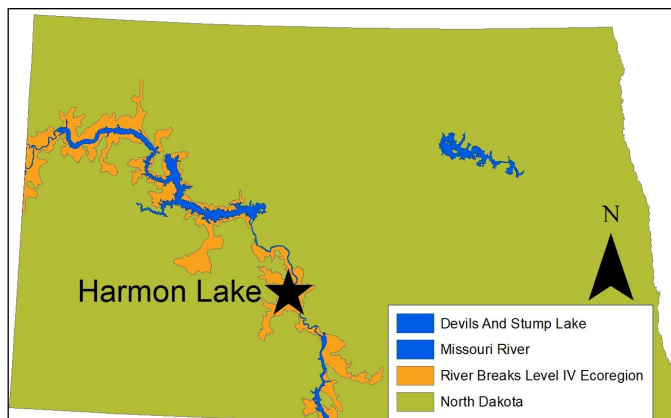


Figure 1. Location of Harmon Lake within the state

Table 1. Percentage of land cover in the watershed and near the lake (NASS, 2017). Value listed of crop type represents percentage of total production

| Land Cover Type | % in Watershed | % within 500 meters |
|-----------------------|----------------|---------------------|
| Grassland/Pasture | 56.4% | 69.6% |
| Agriculture | 34.4% | 2.7% |
| Spring Wheat | 39.7% | 32.6% |
| Other Hay/Non-Alfalfa | 19.5% | 7.1% |
| Soybeans | 14.0% | 3.1% |
| Wetlands | 3.4% | 21.5% |
| Developed | 3.1% | 1.0% |
| Forest | 1.8% | 3.5% |
| Open Water | 0.9% | 1.7% |
| Barren | < 0.1% | < 0.1% |

Temperature and Dissolved Oxygen

- Harmon 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.
- There was thermal stratification recorded at most visits in 2018. Temperature change in the water column was 16.9 degrees Celsius (°C), 14.9°C, 10.5°C and 0.6°C from May, July, August and October, respectively.
- Dissolved oxygen was relatively high near the surface, but decreased quickly under thermal stratification.

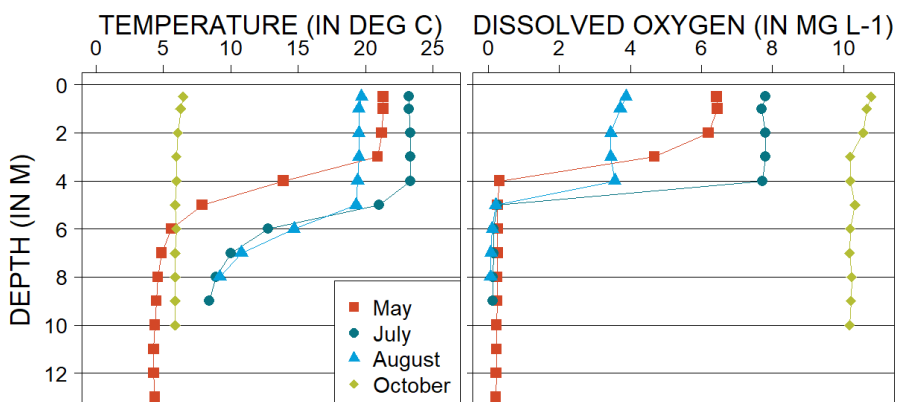


Figure 2. 2018 profiles of temperature (left) and dissolved oxygen (right) in milligrams per liter ($mg L^{-1}$)

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.
- Harmon Lake is a eutrophic reservoir (Figure 3) that has moderate nutrient concentrations and moderate algal growth.
- Trophic state in 2018 is similar to historical indices, which makes sense considering how recent historical data have been collected.
- The lake has had **harmful** algal (cyanobacteria) blooms, most notably in summer 2019.

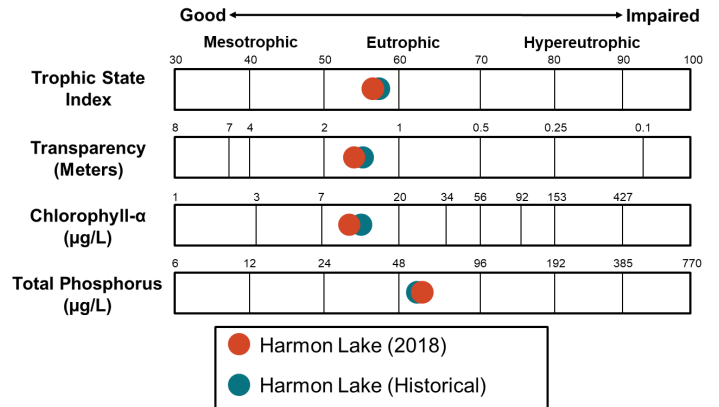


Figure 3. Trophic state indices for 2018 and historical samples

Nutrients

- Median concentration of total nitrogen (TN) in 2018 was greater than the historical median for the lake and greater than the median for reservoirs in the River Breaks Level IV Ecoregion (hereafter, Ecoregion) where Harmon Lake is located (Figure 4).
- Median total phosphorus (TP) concentration in 2018 was less than the median for the lake and less than the median for the Ecoregion (Figure 4).
- Dissolved nutrients samples were not collected in 2018.
- Ammonia was detected at relatively high concentrations in two samples at Harmon Lake in 2018, while nitrate-plus-nitrite was only detected once.

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

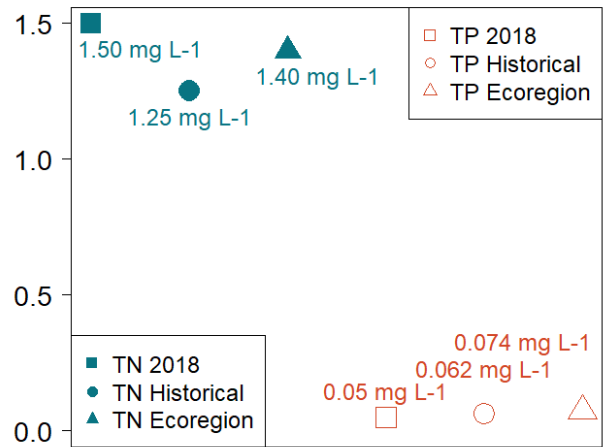


Figure 4. Median concentrations of TN and TP in mg L⁻¹ compared to regional medians

Water Chemistry

Table 2. Median concentrations of selected constituents for 2018 and historical samples and from all Ecoregion reservoirs.

| Measure | 2018 Median | Historical Median | Ecoregion Median |
|--|---------------------------|---------------------------|---------------------------|
| Alkalinity | 340.5 mg L ⁻¹ | 338 mg L ⁻¹ | 376 mg L ⁻¹ |
| Bicarbonate (HCO ₃ ⁻) | 372 mg L ⁻¹ | 374.5 mg L ⁻¹ | 412 mg L ⁻¹ |
| Calcium (Ca ²⁺) | 47.0 mg L ⁻¹ | 64.6 mg L ⁻¹ | 47.3 mg L ⁻¹ |
| Carbonate (CO ₃ ²⁻) | 21.1 mg L ⁻¹ | 11 mg L ⁻¹ | 19 mg L ⁻¹ |
| Conductivity | 2,405 µS cm ⁻¹ | 2,055 µS cm ⁻¹ | 1,680 µS cm ⁻¹ |
| Dissolved Solids | 1,710 mg L ⁻¹ | 1,515 mg L ⁻¹ | 1,150 mg L ⁻¹ |
| Magnesium (Mg ²⁺) | 93 mg L ⁻¹ | 77.4 mg L ⁻¹ | 64.7 mg L ⁻¹ |
| Sodium (Na ⁺) | 405.5 mg L ⁻¹ | 313 mg L ⁻¹ | 262.5 mg L ⁻¹ |
| Sulfate (SO ₄ ²⁻) | 928 mg L ⁻¹ | 800.5 mg L ⁻¹ | 483 mg L ⁻¹ |

- Sulfate is the dominant anion in Harmon Lake, while sodium is the dominant cation (Figure 5).
- Median concentrations of most cations and anions are greater than the historical median for the lake and greater than the median for the Ecoregion.

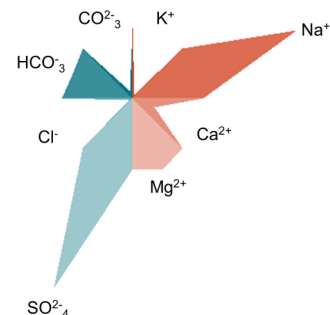


Figure 5. Maucha diagram showing ionic balance based on 2018 data