# Blacktail Dam Water Quality 2020-2021 Summary

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**Prepared for:**
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**Introduction**

Blacktail Dam is a 155 acre recreational reservoir in Williams County, North Dakota. The Dam has a singular boat landing on the south side and is heavily bordered by homes and camping areas. The Blacktail Dam watershed is a nearly 17,500 acre drainage basin consisting primarily of agricultural fields and native grassland/pasture. The monitoring of water quality in Blacktail Dam is essential to ensure the safety of individuals utilizing the waterbody for recreation and its ability to support various fish and wildlife species.


Figure 1: Location of Blacktail Dam in Williams County, North Dakota. Data analyzed for this report was collected at site 380540, the deepest location on Blacktail Dam.

Blacktail Dam was sampled ten times in 2020 and twelve times in 2021 by the Willams County Soil Conservation District. These samples were collected from April through October and a winter sample was collected in February of 2021. The sample types collected for this project included nutrients complete (i.e., total nitrogen, total Kjeldahl nitrogen, nitrate-nitrite, ammonia, total phosphorus), major cations/anions, ICP metals and chlorophyll A & B, dissolved oxygen, temperature and Secchi disk transparency.

**Data Overview**

A graphical analysis of total nitrogen, total phosphorous and chlorophyll-A is shown in Figures 2-8. Spikes in the 10-meter total nitrogen and total phosphorous samples likely correspond to periods of thermal stratification during which nutrients build up along the bottom of the water column. Once the lake turns over and the column becomes mixed, the pocket of nutrients is redistributed and can be utilized by surface organisms. This assumption can be confirmed by comparing the total nitrogen and total phosphorous datasets to temperature and dissolved oxygen profiles.

The lake has remained relatively stable based on Trophic State Indices (TSI) over time (Figure 9). 2020 was a relatively poor year regarding trophic state, which appears to be driven by poor transparency. Throughout its history, however, Blacktail Dam has high transparency during spring sampling and lower transparency later in the summer and into the fall. A lack of spring and early summer data in 2020 is a likely driver of poor transparency condition and not because of any in-lake effect.

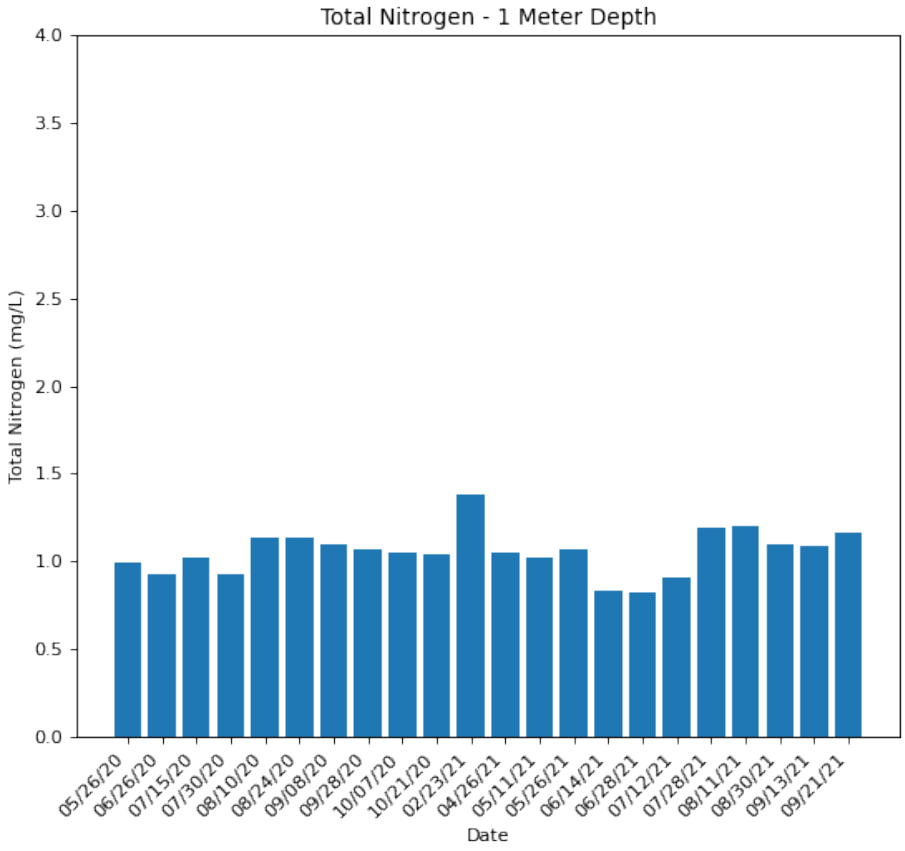


Figure 2: Total nitrogen concentrations at one meter below the surface of the water. Conditions are relatively uniform throughout the year with the largest spike in total nitrogen present in the winter sample (February).

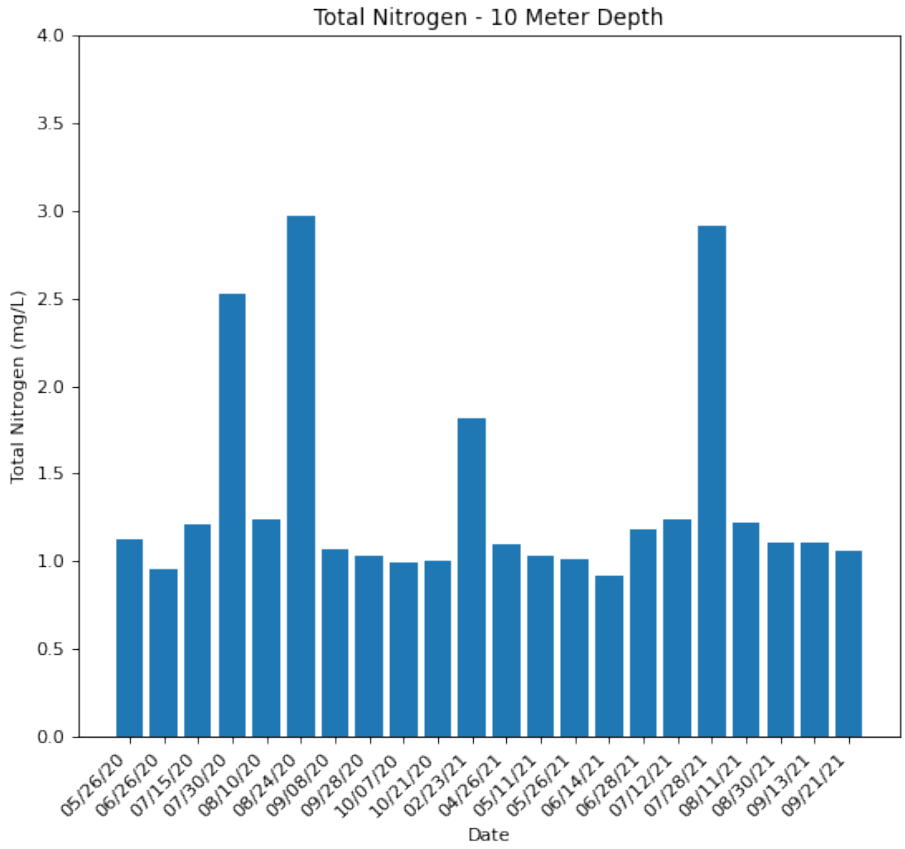


Figure 3: Total nitrogen concentrations at ten meters below the surface of the water. Spikes likely correspond to periods of thermal stratification.

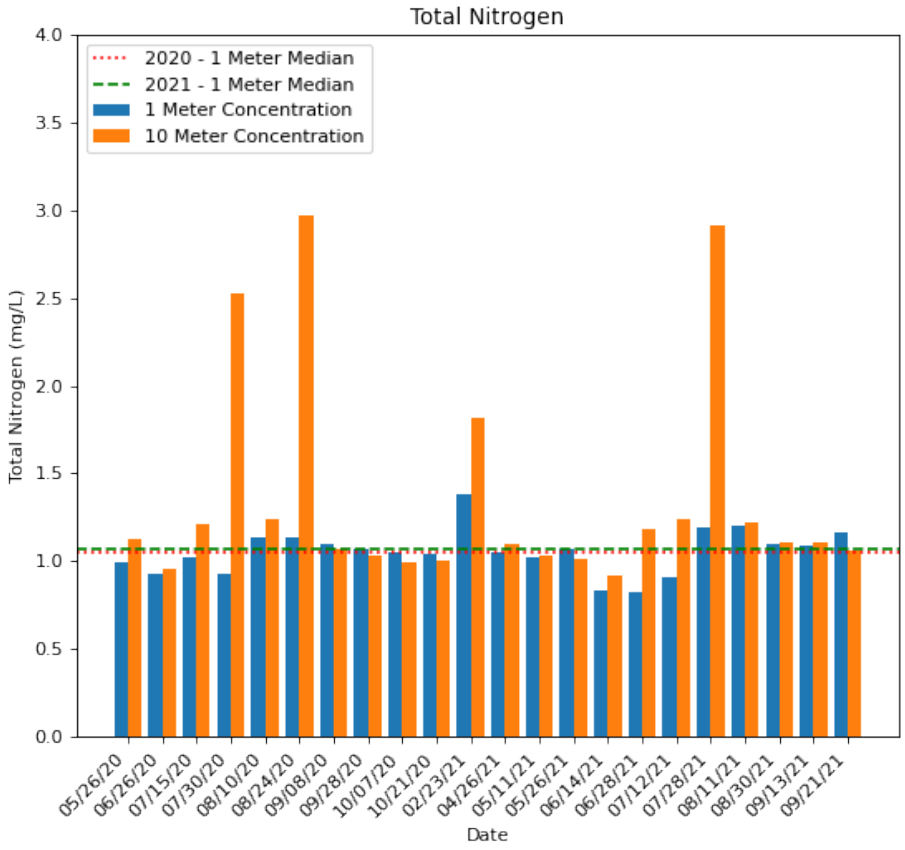


Figure 4: Total nitrogen at one (blue - left) and ten (orange - right) meter depths. The plotted 1 meter medians show the annual total nitrogen concentrations for 2020 and 2021 were very similar.

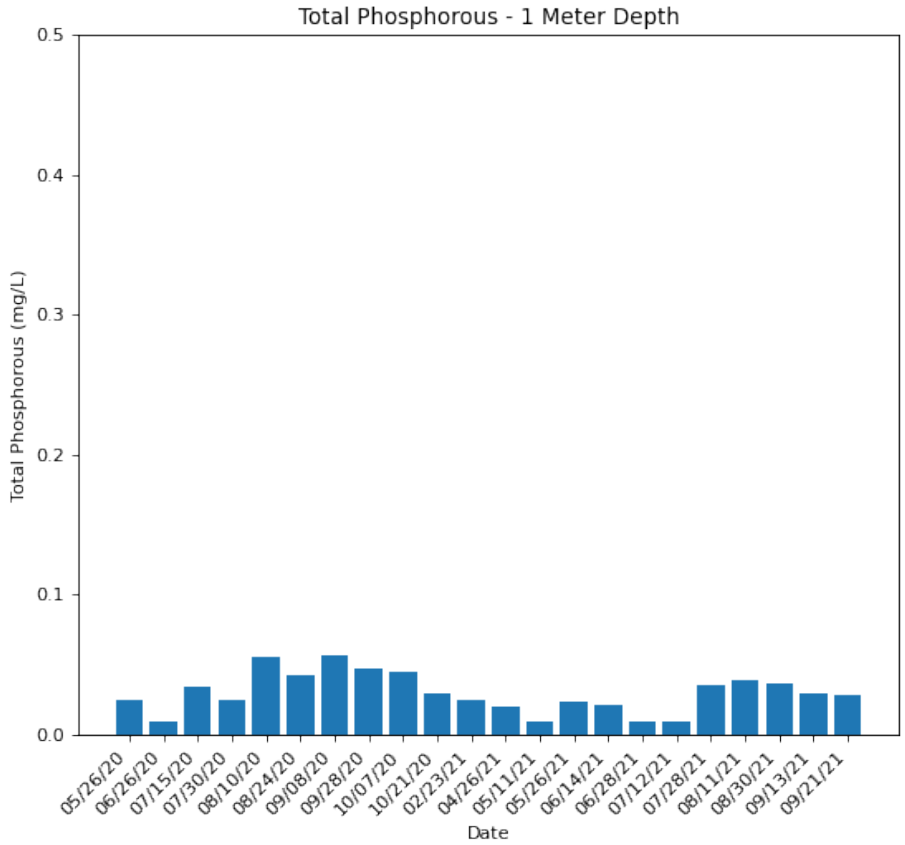


Figure 5: Total phosphorous concentrations at one meter below the surface of the water. Conditions are relatively uniform throughout the year with slightly more accumulating during the warmest months of the year (July, August, September).

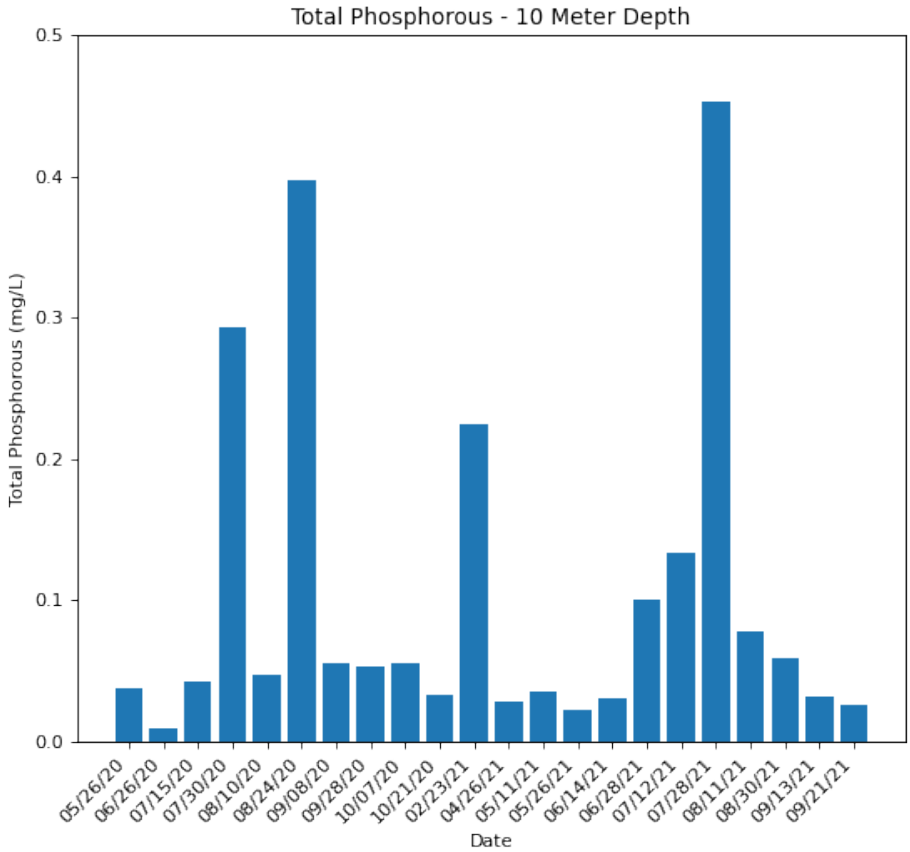


Figure 6: Total phosphorous concentrations at ten meters below the surface of the water. Spikes likely correspond to periods of thermal stratification.

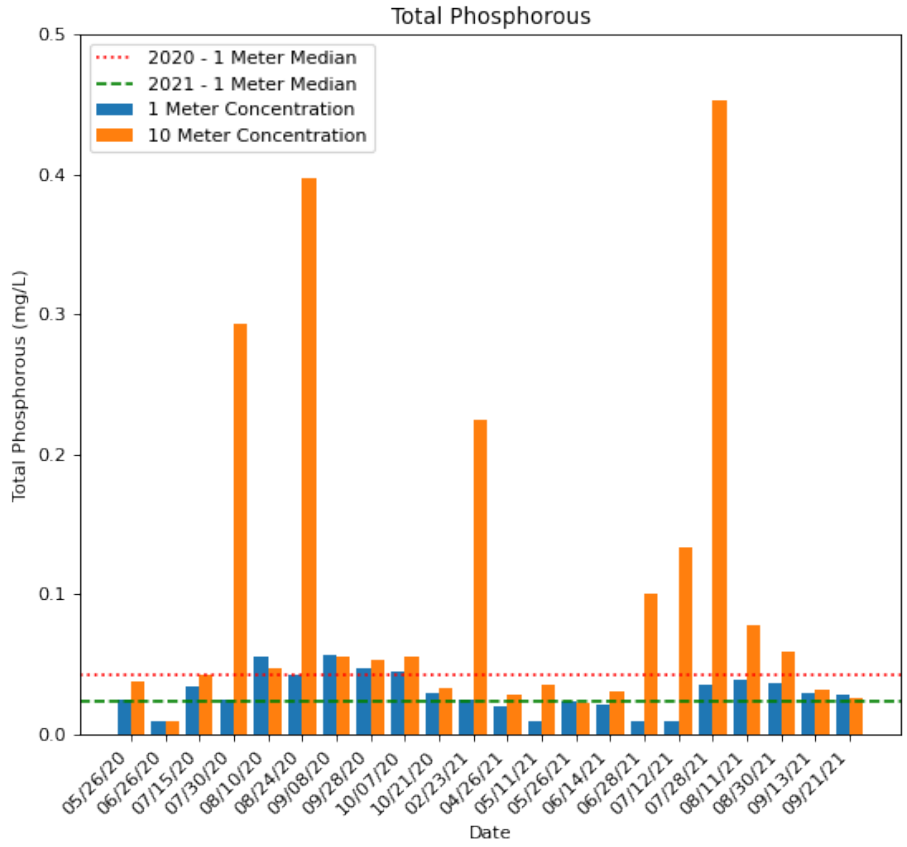


Figure 7: Total phosphorous at one (blue - left) and ten (orange - right) meter depths. The plotted 1-meter medians show a reduction in total phosphorous in 2021 as compared to 2020.

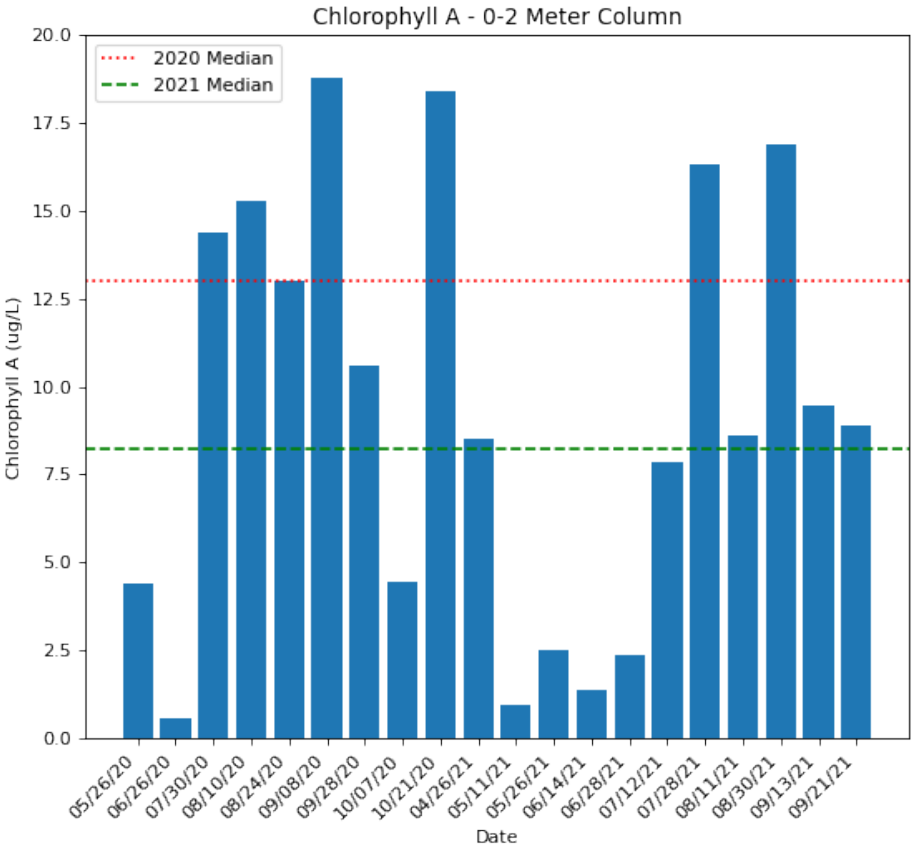


Figure 8: Chlorophyll-A concentrations taken at a 0–2-meter depth. 2020 and 2021 median values show a reduction of chlorophyll-A in 2021 which corresponds to the improved trophic state in 2021 as compared to 2020.

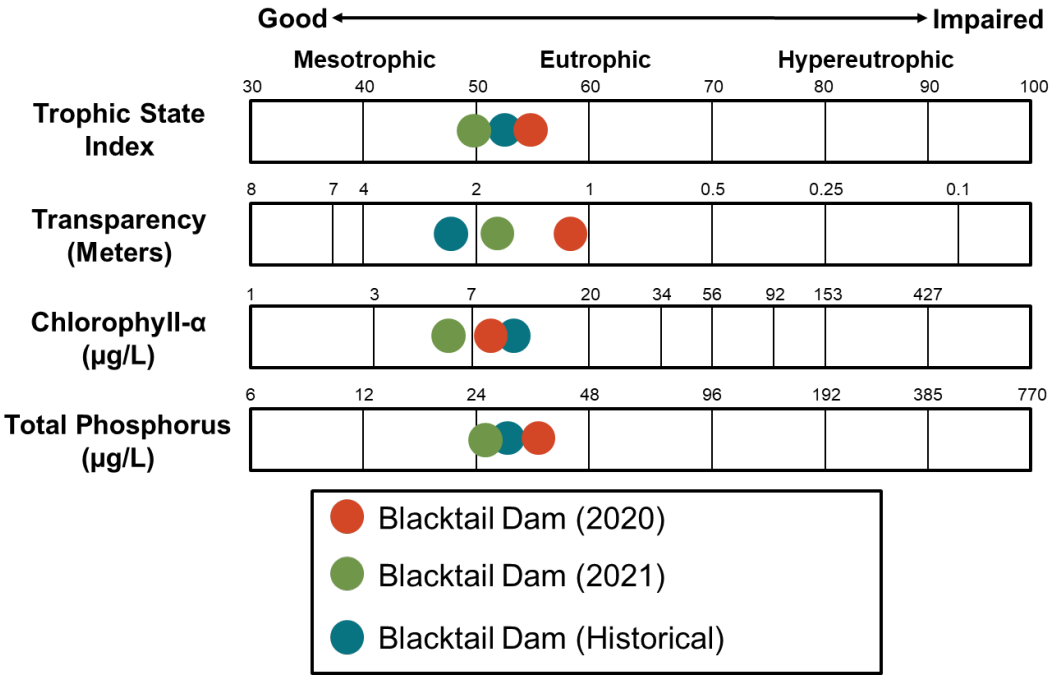


Figure 9: Trophic State indices for Historical, 2020 and 2021 samples.

**Summary**

As noted previously, Blacktail Dam has remained relatively stable. Based on Trophic State Index (TSI) scores from historic data, along with 2020 and 2021 sampling efforts, the reservoir is mesotrophic to eutrophic. Based on variables such as precipitation, temperature, etc., the reservoir periodically experiences algal blooms. However, Blacktail Dam has not had a water quality advisory or warning issued by the North Dakota Department of Environmental Quality's Harmful Algal Bloom Surveillance Program. Continued monitoring is recommended in the future to evaluate further variability.