

Matteson Lake 2023 Water Quality Summary

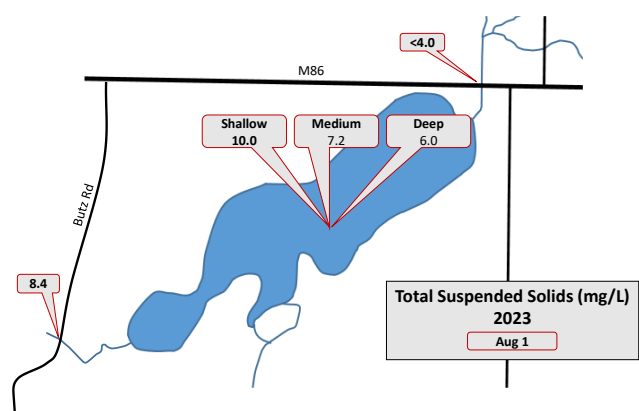
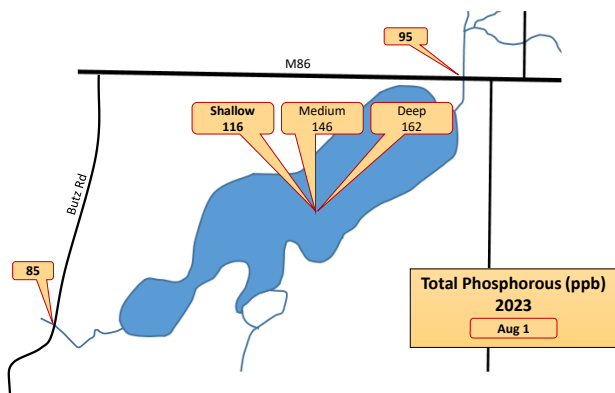
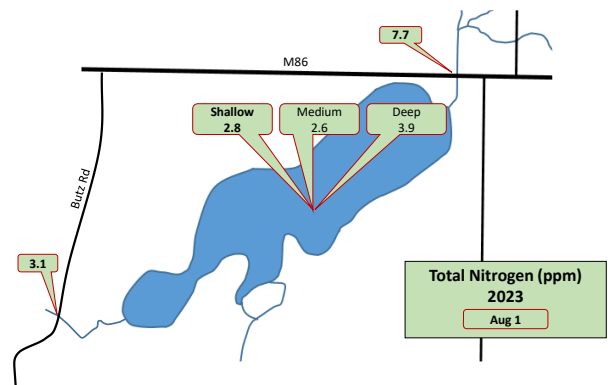
We sampled water from Matteson Lake and its inlet and outlet on August 1, 2023. On the same day, we sampled five locations along tributaries within the Matteson Lake watershed. The weather was dry that day (and in the preceding days) so the information we collected represents a mid- to late-summer snapshot of water quality in the lake during dry conditions.

2023 Matteson Lake Inlet-Outlet Sampling Results						
Date	Nitrogen (mg/L)		Phosphorus (ug/L)		TSS (mg/L)	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
08/01/23	7.7	3.1	95	85	<4.0	8.4

Our measurements indicate that on August 1st, water flowing into the lake at the M-86 bridge contained higher concentrations of **Phosphorous** and **Nitrogen** than water flowing out at the Butz Road dam. The opposite was observed for **Total Suspended Solids (TSS)**. The concentration of **TSS** leaving the lake was higher than that flowing in. The same relationships were observed in August 2022.

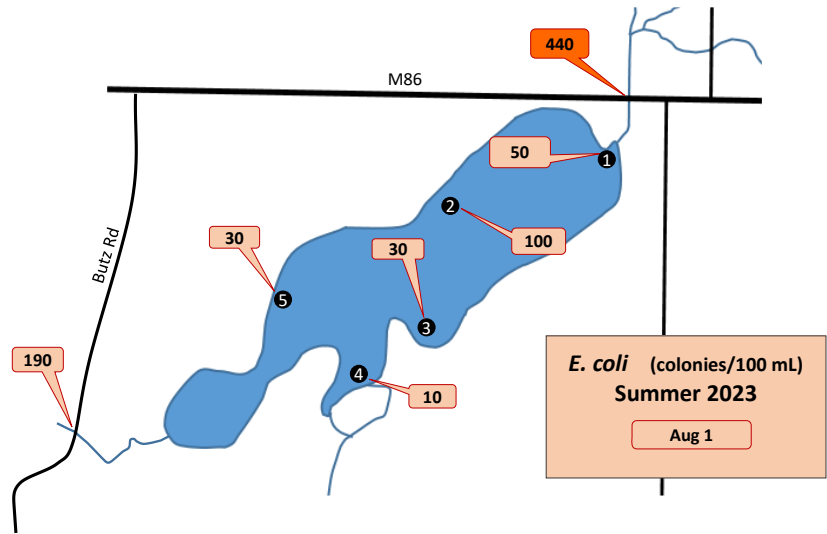
2023 Matteson Center-of-Lake Sampling Results									
Date	Nitrogen (mg/L)			Phosphorus (ug/L)			TSS (mg/L)		
	3 ft	16 ft	30 ft	3 ft	16 ft	30 ft	3 ft	16 ft	30 ft
08/01/23	2.8	2.6	3.9	116	146	162	10	7	6

In the lake center, we sampled near the surface, half-way down, and near the bottom of the lake. Nitrogen values were similar to those flowing into and out of the lake. Phosphorous values were higher than those flowing into the lake and the value of 116 ug/L (ppb) was the highest we've seen. Total Suspended Solids were greatest in the shallowest portion of the water column with concentrations slightly greater than that measured in water flowing out of the lake.



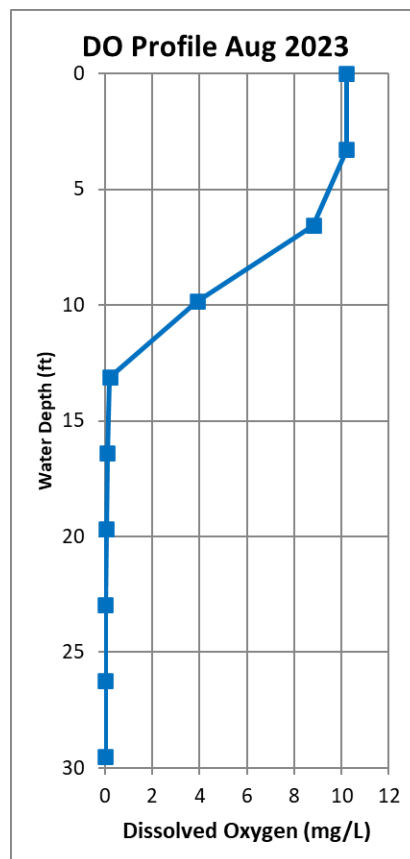
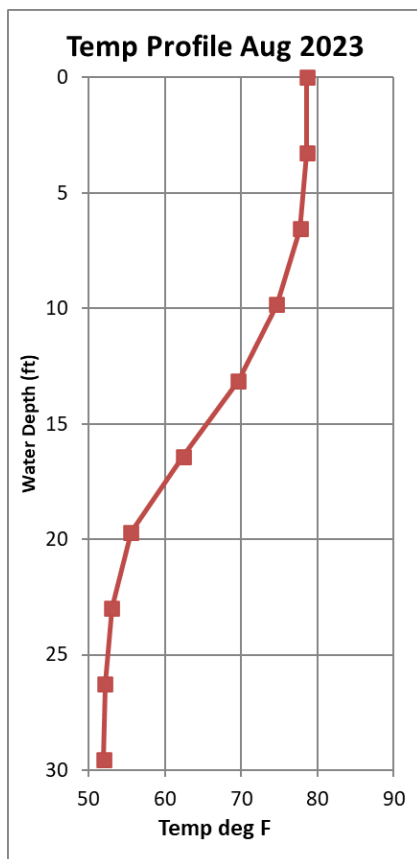
Bacteria

***E. coli* sampling** at the inlet, outlet, and five locations within the lake found bacteria values that were similar to those seen in prior years. The highest values were found at the lake inlet and the outlet. All values in the lake were safe for swimming. However, swimming in the river is not recommended at any time because of bacteria counts higher than healthy levels for body contact observed at the M-86 bridge this year and in past years.



Depth Profiles

Each summer, Matteson Lake stratifies – it separates into a warmer, less dense layer of water that floats on top of a deeper, colder, denser layer of water. The uppermost layer, called the epilimnion, contains abundant dissolved oxygen that fish can use to breathe through their gills. The lower layer, called the hypolimnion, is relatively stagnant and low in dissolved oxygen. The depth profiles measured in 2023 were consistent with summer stratification seen in past years.



Watershed Sampling

We sampled for phosphorous, nitrogen, and total suspended solids in five streams that flow into Matteson Lake.

Phosphorous is the limiting nutrient in the lake, which means that adding more of it stimulates the growth of unwanted algae and contributes to water cloudiness. Phosphorous concentrations greater than those seen in the lake were present at one location in the watershed. Water flowing into the lake at the M-86 bridge contained more phosphorous than water flowing out of the lake at the Butz Road dam.

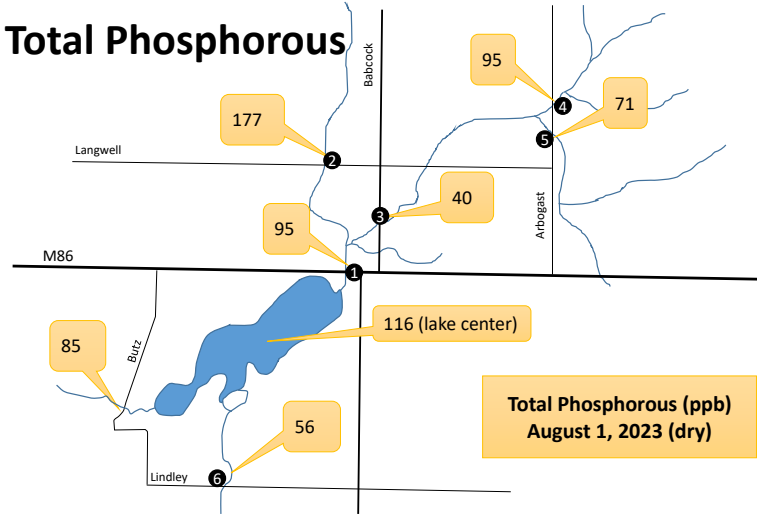
Nitrogen values in the watershed were greater than in the lake.

In contrast, total suspended solids were lower in the watershed than in the lake. The same relationship was observed in August 2022.

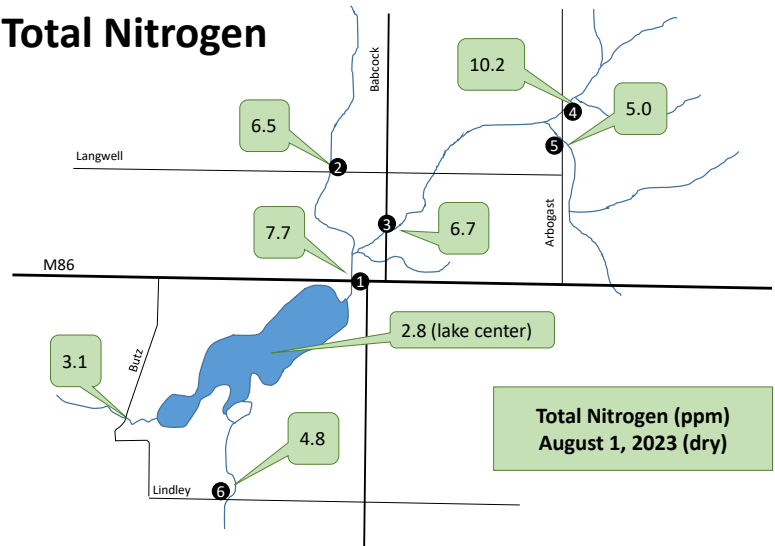
These results suggest that:

1. Nutrient cycling and sediment loading are complex and likely are introduced into the lake through multiple pathways.
2. The watershed contributes phosphorous loading to the lake.
3. Residential properties along the lake shore may contribute additional phosphorous loading to the lake.
4. Phosphorous storage in deep lake water may be released to the shallow water layer.
5. Wave and boating activity keep solids suspended in the upper layer of lake water.
6. The wetlands in the watershed just above and below the lake are beneficial because they remove sediment and nutrients from the water.

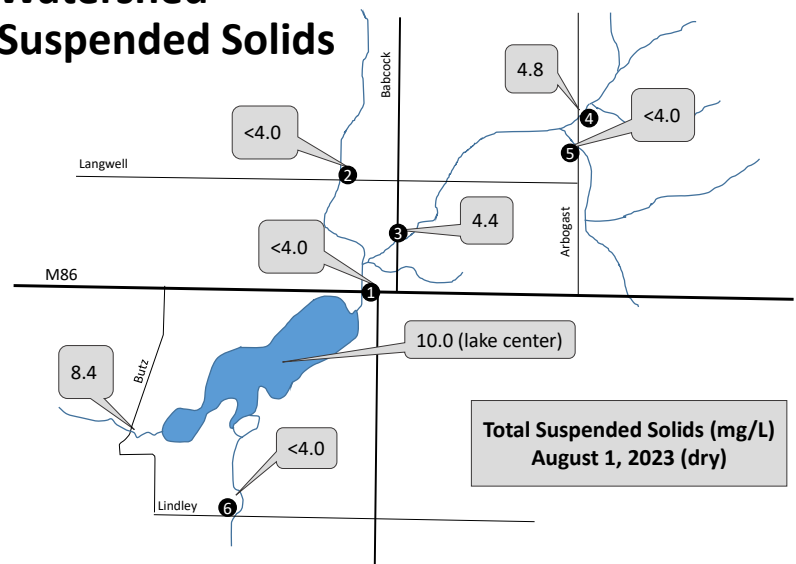
Watershed Total Phosphorous



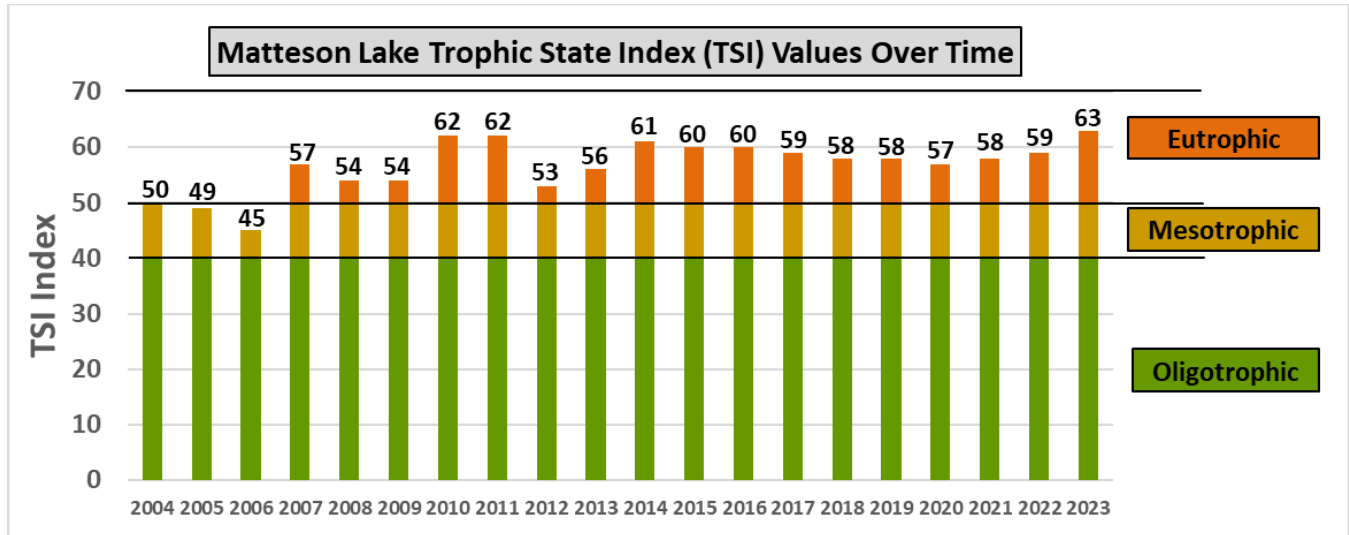
Watershed Total Nitrogen



Watershed Suspended Solids



Trophic State



The **Trophic State Index (TSI)** combines three water quality variables (water clarity, green algae abundance, and phosphorous concentration) into a single score that we track over time to help us identify trends in water quality changes. The TSI score for 2023 was 63, the highest since we began sampling 20 years ago. The increase was largely driven by the high phosphorous levels observed in the shallow lake water.

TSI Parameter	2022	2023
Secchi Disk Clarity (ft)	2.0	2.1
Chlorophyll-a (ppb)	9.6	7.8
Phosphorous (ppb)	41	116
TSI value	59	63

Over the past 17 years, Matteson Lake has been *eutrophic* (TSI > 50) because of excess nutrients that contribute to algae blooms and cloudy water. Too much phosphorous is bad for our lake because it is the limiting nutrient. More phosphorous in the water enhances algal growth. When the algae die, their decomposition robs the water of oxygen that fish need to live. Moreover, the brown water in Matteson Lake is not only unappealing, it also prevents sunlight from penetrating the lake to help beneficial aquatic plants grow.

Finally, when the lake water is warm, an influx of phosphorous (with runoff after a rain, for example) can trigger a harmful algal bloom (HAB). HABs are caused by blue-green algae (also known as cyanobacteria). They are potentially harmful because they release toxins such as microcystins that can be dangerous to dogs and people who swim in the water.

Long-term Outlook

Our long-term goal is to return Matteson Lake to mesotrophic conditions and to keep it there. To that end, the Matteson Lake Water Quality Committee and the Matteson Lake Association Executive Board are working with the Branch County Conservation District, St. Joseph County Conservation District, Branch County Drain Commission, St. Joseph County Drain Commission, Matteson Township, Colon Township Lake Board, and Friends of the St. Joseph River Association to develop a *Watershed Management Plan for Little Swan Creek*. Together we are writing and submitting grant proposals to the Michigan Department of Environment, Great Lakes, and Energy (EGLE), seeking funding to support our efforts.

*Special thanks to **Bob Kirchhofer, Don Batey, and John Hoffman** for helping to gather water quality samples and taking measurements on August 1st!*