

# Matteson Lake 2024 Water Quality Summary

We sampled water from Matteson Lake and its inlet and outlet on August 12, 2024. 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 late-summer snapshot of water quality in the lake during dry conditions. However, we have experienced a wetter than average summer with greater than average rainfall in June and July this year.

## 2024 Matteson Lake Inlet-Outlet Sampling Results

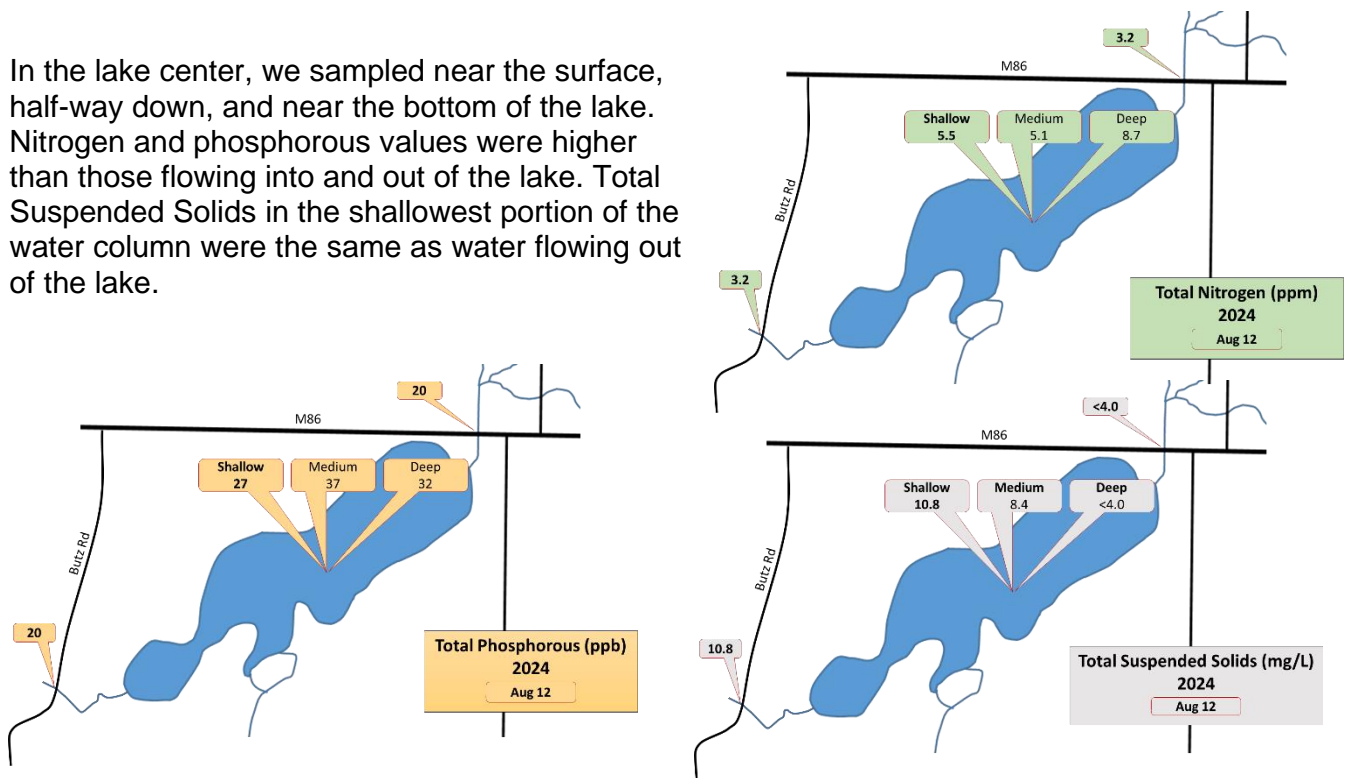
Date	Nitrogen (mg/L)		Phosphorus (ug/L)		TSS (mg/L)	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
08/12/24	3.2	3.2	20	20	<4.0	10.8

Our measurements indicate that on August 12<sup>th</sup>, water flowing into the lake at the M-86 bridge contained roughly the same concentrations of **Phosphorous** and **Nitrogen** as water flowing out at the Butz Road dam. The concentration of **Total Suspended Solids (TSS)**, leaving the lake was higher than that flowing in (which is consistent with observations in past years).

## 2024 Matteson Center-of-Lake Sampling Results

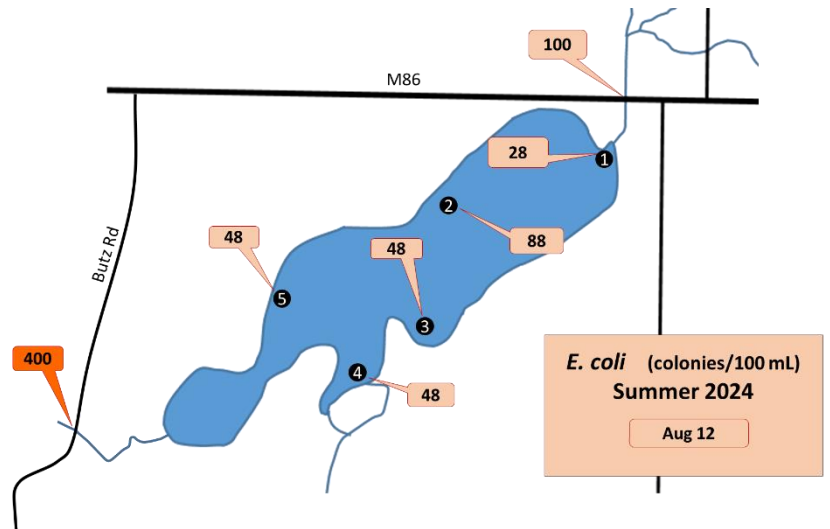
Date	Nitrogen (mg/L)			Phosphorus (ug/L)			TSS (mg/L)		
	3 ft	16 ft	32 ft	3 ft	16 ft	32 ft	3 ft	16 ft	32 ft
08/12/24	5.5	5.1	8.7	27	37	32	11	8	<4.0

In the lake center, we sampled near the surface, half-way down, and near the bottom of the lake. Nitrogen and phosphorous values were higher than those flowing into and out of the lake. Total Suspended Solids in the shallowest portion of the water column were the same as water flowing out of the lake.



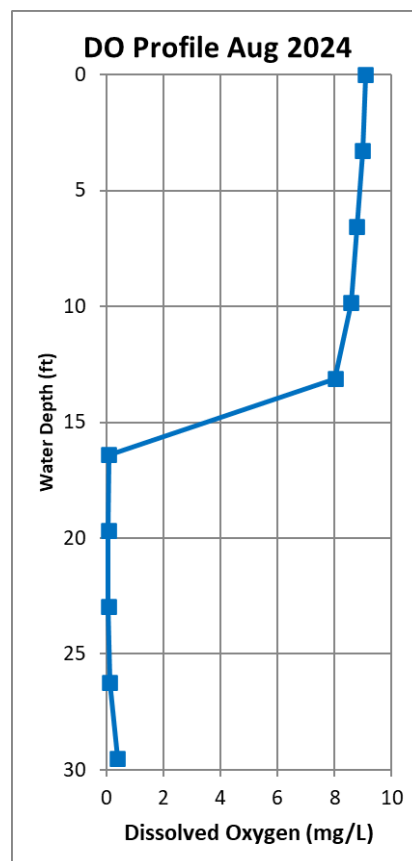
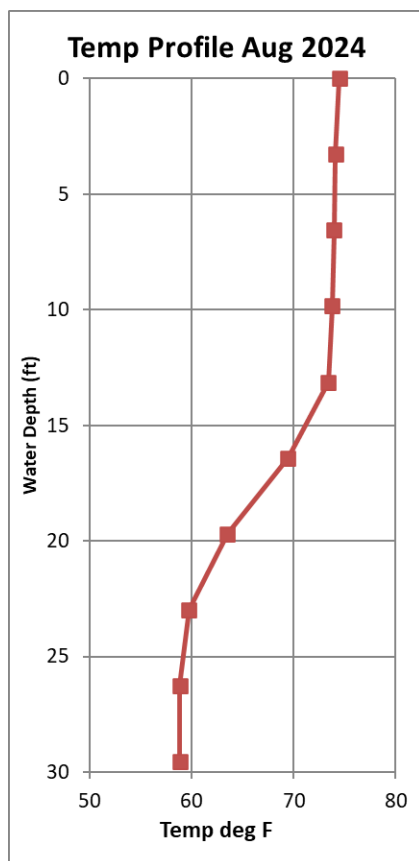
# Bacteria

***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 above or below the lake is not recommended at any time because of bacteria counts higher than healthy levels for body contact are found at the M-86 bridge in most 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 2024 were consistent with summer stratification seen in past years and the transition from warm, oxygenated water to colder, oxygen-poor water, called the *metalimnion*, was found between 13 and 16 feet below the lake surface this year.



## Watershed Sampling

We sampled for phosphorous, nitrogen, and total suspended solids in five places in 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 the same concentration of phosphorous as water flowing out of the lake at the Butz Road dam.

With one exception, Nitrogen values in the watershed were less than in the lake.

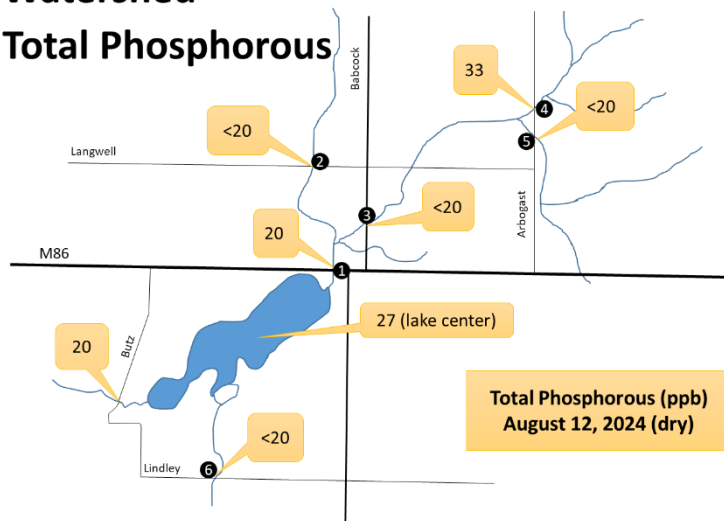
In contrast, total suspended solid concentrations were lower in the watershed than in the lake. The opposite relationship was observed in 2022 and 2023.

Collectively, 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 and nitrogen loading to the lake.
3. Residential properties along the lake shore contribute additional phosphorous and nitrogen loading to the lake.
4. Wave and boating activity keep solids suspended in the upper layer of lake water.
5. The wetlands in the watershed just above and below the lake are beneficial because they remove sediment and nutrients from the water.

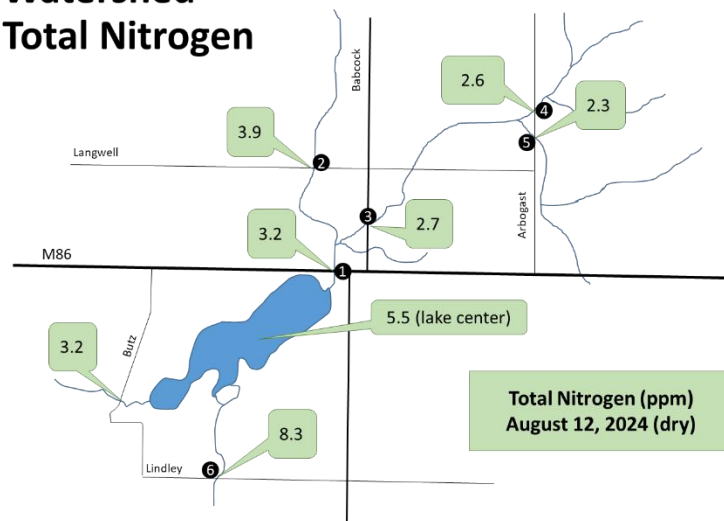
## Watershed

### Total Phosphorous



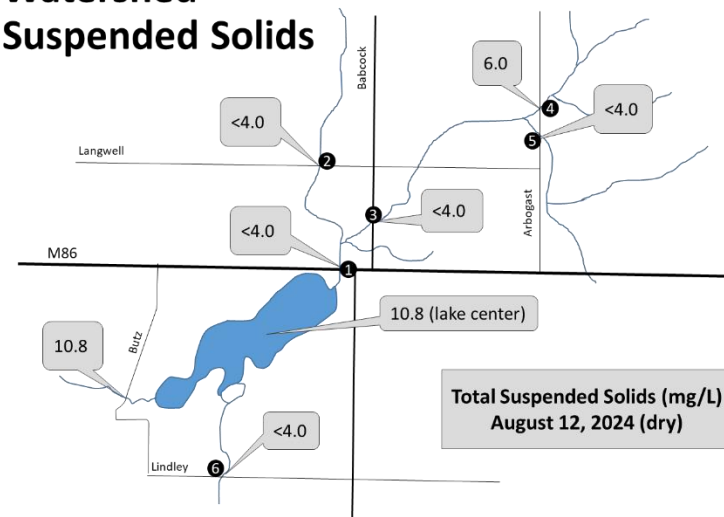
## Watershed

### Total Nitrogen

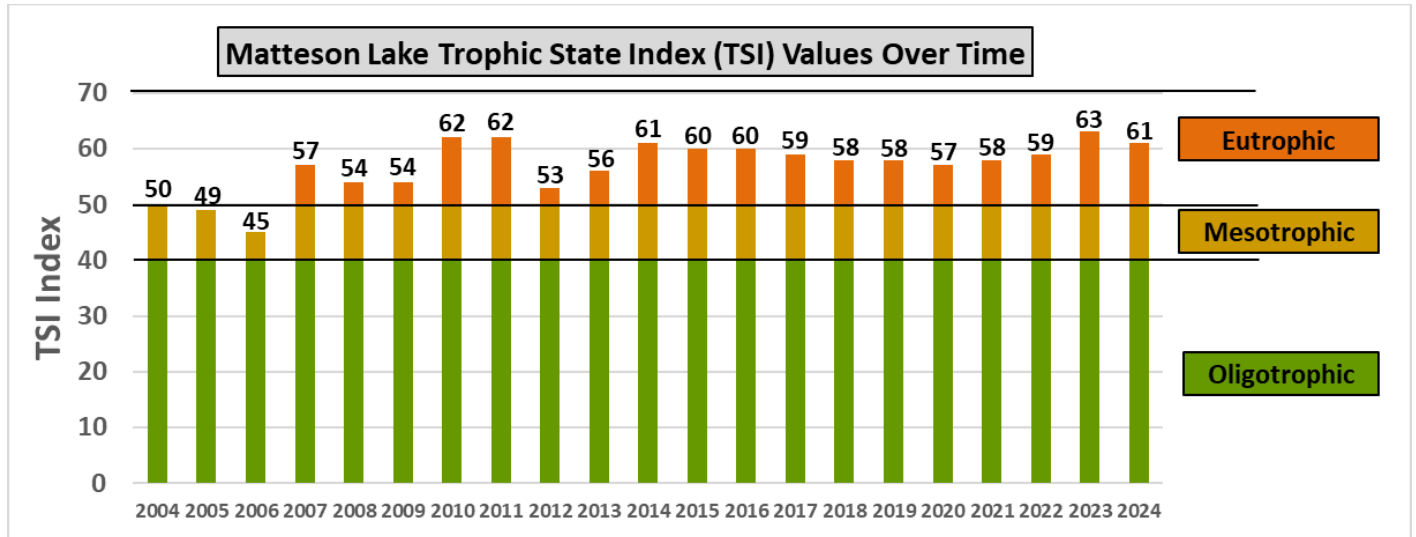


## Watershed

### 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 was 61 in 2024. A decrease in water clarity (Secchi Disk) and increase in algae (Chlorophyll-a) were offset by lower phosphorous to give us a slightly lower TSI score this year.

TSI Parameter	2022	2023	2024
Secchi Disk Clarity (ft)	2.0	2.1	1.7
Chlorophyll-a (ppb)	9.6	7.8	22
Phosphorous (ppb)	41	116	27
<b>TSI value</b>	<b>59</b>	<b>63</b>	<b>61</b>

For the past 18 years, Matteson Lake has been *eutrophic* (TSI > 50) because of excess nutrients that contribute to algae blooms and cloudy water. When the algae die, their decomposition robs the water of oxygen that fish need to live. The brown water in Matteson Lake is unappealing and it also prevents sunlight from penetrating the lake to help beneficial aquatic plants grow.

Also, 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. Weekly tests this summer have not detected microcystins at levels of concern.

## 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 **Don Batey, Bob Kirchhofer, and Marv Kirchhofer** for taking measurements and helping to gather water quality samples on August 12th!*

*Thanks also to **John and Marianne Hoffman and Art Mixis** for help with weekly microcystin testing!*