2025 Monitoring Report

Little Birch Lake Improvement Association

Created November 2025

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Sauk River Watershed District

Prairie Creek, Fuller/Hennessy, & Little Birch Lake South

Little Birch Lake Overview

Little Birch Lake spans 838 acres and straddles Stearns and Todd County, MN. This lake is considered a deep lake, with a maximum depth of ~89 feet and 9 miles of shoreline. Even though the lake has deep points, the littoral zone makes up around 33 percent of the total area, making it a great fishing lake. There is a 23-acre Aquatic Management Area (AMA) on the northeastern end of Little Birch where an unnamed stream enters the lake. AMAs can be established around lakes, rivers, streams, and adjacent wetlands and are created as a way to protect biologically rich habitats, water quality, and protect fish, amphibians, birds, and mammal habitats. Birch Lakes State Forest is east of the lake along the county borders. The lake is listed as containing zebra mussels.

This monitoring summary reviews seasonal conditions and data collected during the 2025 monitoring season, along with long-term data trends from 2013-2025. The information focuses on three sites: **Prairie Creek** (inlet to Little Birch Lake), **Fuller/Hennessy** (Prairie Creek at CR 98), and **Little Birch Lake South** (LB South). The Fuller/Hennessy site was added back to the monitoring schedule in 2024 to collect more data on Prairie Creek, and it was last sampled before then in 2021. Little Birch Lake has historically had exceptional water quality, and the Sauk River Watershed District (SRWD) has prioritized data collection on the lake. The SRWD has a 5-year intensive lake monitoring rotation, and we last sampled Little Birch in 2021. This means our staff will return in 2026 to monitor the lake.

Sampling Summary

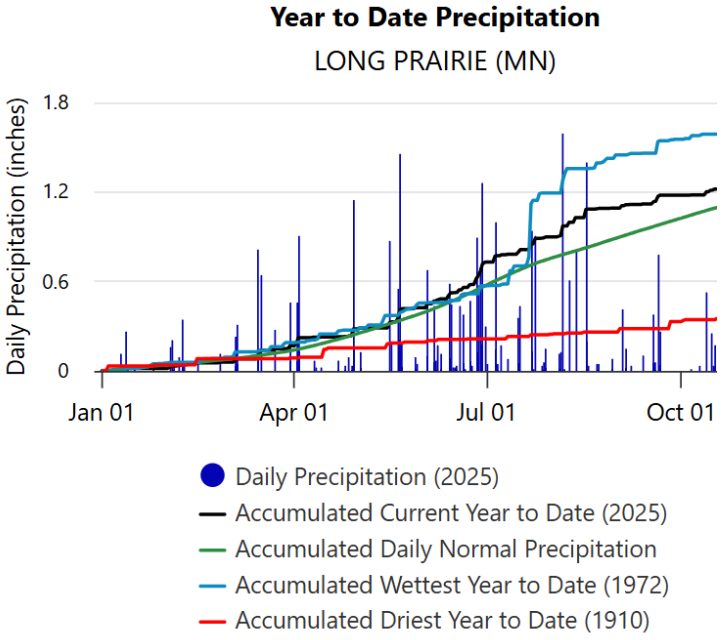
The Little Birch Lake Improvement Association (LBLA) collects surface water samples from Little Birch Lake and Prairie Creek each year and delivers them to the SRWD office, which they have been doing since 2012. Those samples are then sent to a Minnesota Department of Health certified laboratory for chemical analysis. The lake samples are collected monthly (May to September) and are analyzed for **chlorophyll-A (chl-A) and total phosphorus (TP)**. **Secchi depth** readings are also taken to assess water clarity (visibility in the water column). LBLA has been concerned about *Escherichia coli (E. coli)* levels in Prairie Creek creeping up over the years and opted to do a more intensive *E. coli* monitoring regimen in 2023 to reassess this parameter of concern. In 2025, Prairie Creek samples at both locations were analyzed for **total phosphorus (TP)** and ***E. coli***. Earlier this year, the watershed district was notified by the Minnesota Pollution Control Agency (MPCA), to whom we submit our sample results to, that they will propose to add an *E. coli* impairment to Prairie Creek on the monitored section. The stream section has been added to the draft impaired waters list, which will soon be released for public comment. More information about this proposed impairment can be found on the last page of this report.

Select Content by Page(s):

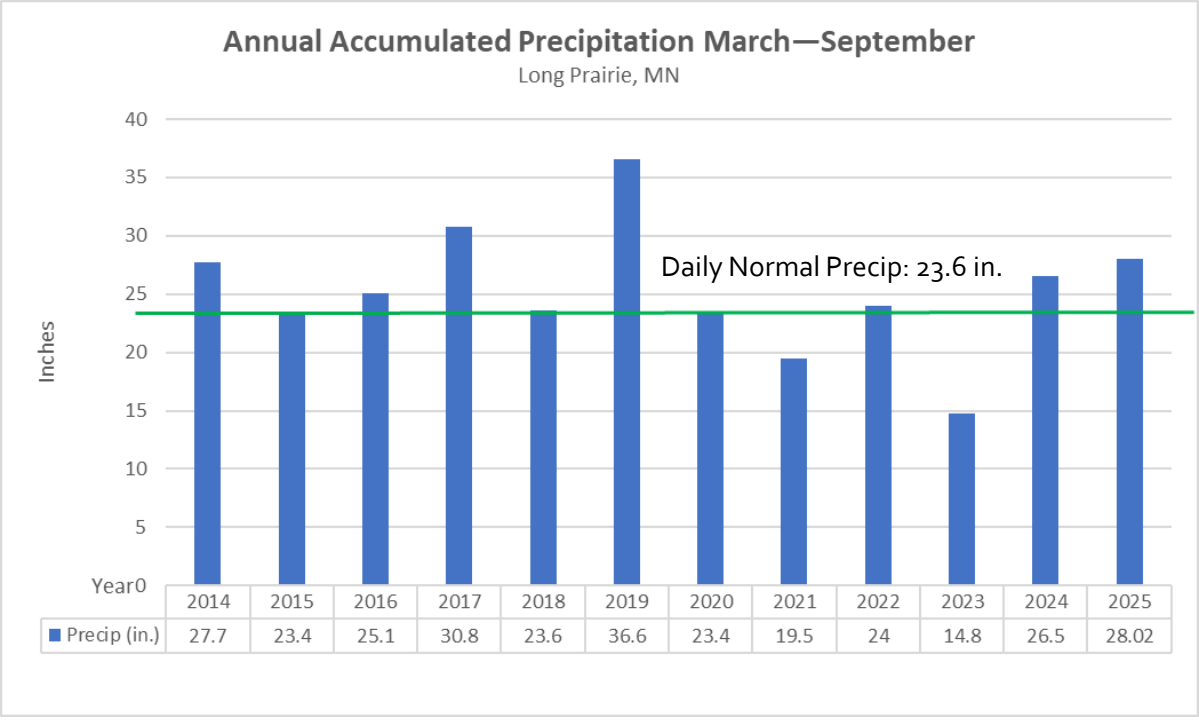
Sauk River Watershed District

2025 Precipitation Near Little Birch Lake

Although 2025 began with drought that persisted from the previous fall conditions, the monitoring season turned out to be particularly wet. The graph to the right shows the accumulated rainfall received in 2025 through the beginning of October (black line). Data was taken from the Long Prairie location, which is the closest long-term precipitation data collection site to Little Birch Lake. A "normal" amount of rainfall for the region (green line) from March-September is **~23.6 inches**. By mid-August, we had already received 24.2 inches since March. After another dry January and February, March came in like a lion with a blizzard on the 4th-5th. A rain system also came through the area on March 14-15, dumping just over an inch of rain in 48 hours. By early July, 63 percent of Minnesota was free of any drought designation with June being quite a wet month.



The graph below shows annual precipitation since 2013 from March through September. The 2019 season was abnormally wet, with 2023 being the driest year during this time period. As can be seen in the table below the graph, the total accumulated precipitation for the 2025 monitoring season was **28.02 inches** (4.4 inches above average), making it the third wettest season since 2013 at this collection site.



Little Birch 2025 Monitoring Activities

In 2025, the Little Birch Lake Improvement Association's water quality sampling activities focused on Prairie Creek and had two stream sampling locations—one between Fuller and Hennessy Lakes, and one before it flows into Little Birch Lake. The lake was sampled on the south end at a deep hole. Deep sampling locations are chosen on lakes to be representative of ambient conditions at the surface and to reduce the influence from near-shore microenvironments. Oxygen and temperature depth profiles are measured at these deep locations during intensive monitoring years to assess lake stratification and potential bottom-loading of nutrients. In 2022 and 2023, the Lake Association sampled another location in the northern part of the lake, but results at the North and South sites did not differ greatly from each other. Therefore, it was decided to only sample at the South location moving forward.

At Prairie Creek, total phosphorus (TP) and *E. coli* samples were taken twice per month from early April through September. No total suspended solids (TSS) samples were taken in 2025. Little Birch Lake samples were gathered monthly from May to September at the South monitoring location.

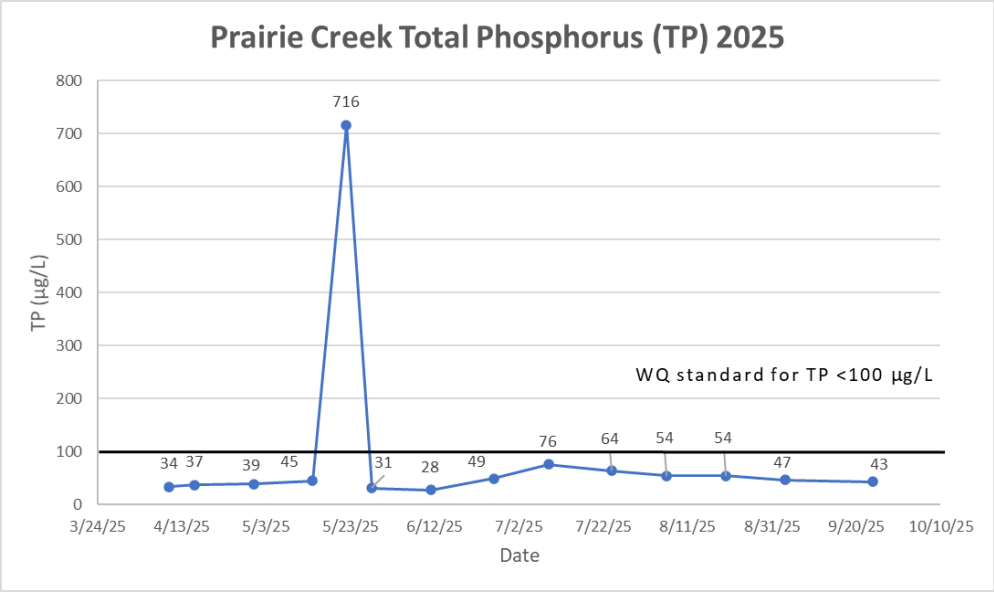
Prairie Creek near inlet

It should be noted that water quality (WQ) standards differ between lakes and streams, as well as by the designated use of a waterbody. Below is a table outlining the WQ standards for the rivers and lakes in our watershed based on their beneficial use classification and ecoregion. All of the Sauk River watershed falls within the North Central Hardwood Forest (NCHF) ecoregion. Lakes, streams, and rivers throughout Minnesota are classified based on their designated use. Little Birch Lake and Prairie Creek have been designated by the MPCA as *Class 2*: Beneficial use for Aquatic Life and Recreation. Most streams in the watershed, like Prairie Creek, are further classified as *Class 2B*, which has a designated use for cool and warm water fisheries, but no protection for drinking water. WQ standards are written to protect this designated resource for future generations.

E. coli Water Quality Standards for Class 2 Waters		
Monthly Geometric Mean	10% of Samples Max.	Applicable Season
126	1260	April 1 - October 31
Eutrophication standards for class 2B rivers and streams.		
Substance	**Units**	**Chronic Standard**
Total Suspended Solids	mg/L	less than or equal to 30
Phosphorus, total	µg/L	less than or equal to 100
Deep Lakes and Reservoirs in N Central Hardwood Forest Ecoregion		
Substance	**Units**	**Chronic Standard**
Phosphorus, total	µg/L	40
Chlorophyll-a	µg/L	14
Secchi disk transparency	feet	Not less than 4.6
Shallow Lakes in North Central Hardwood Forest Ecoregion (<15 ft)		
Substance	**Units**	**CS**
Phosphorus, total	µg/L	60
Chlorophyll-a	µg/L	20
Secchi disk transparency	feet	Not less than 3.3

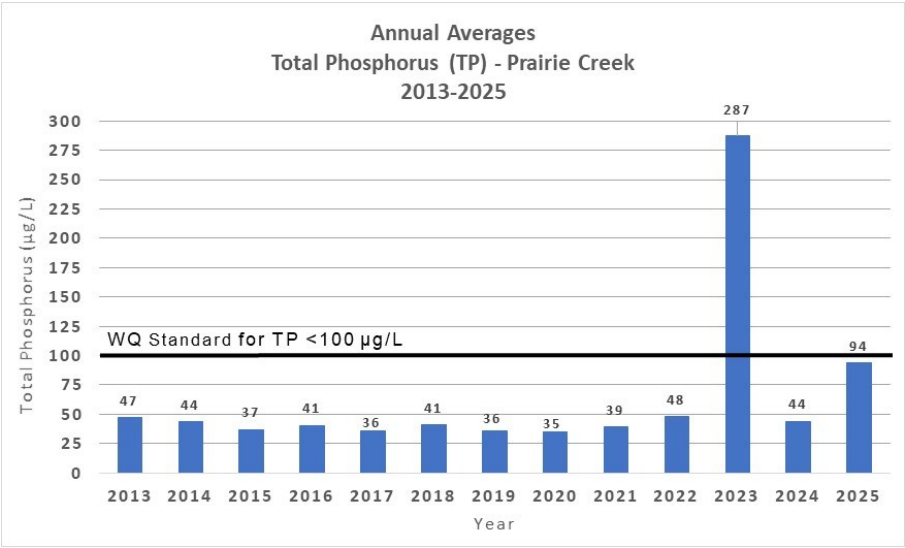
Prairie Creek 2025 Water Quality Data

Total Phosphorus (TP)



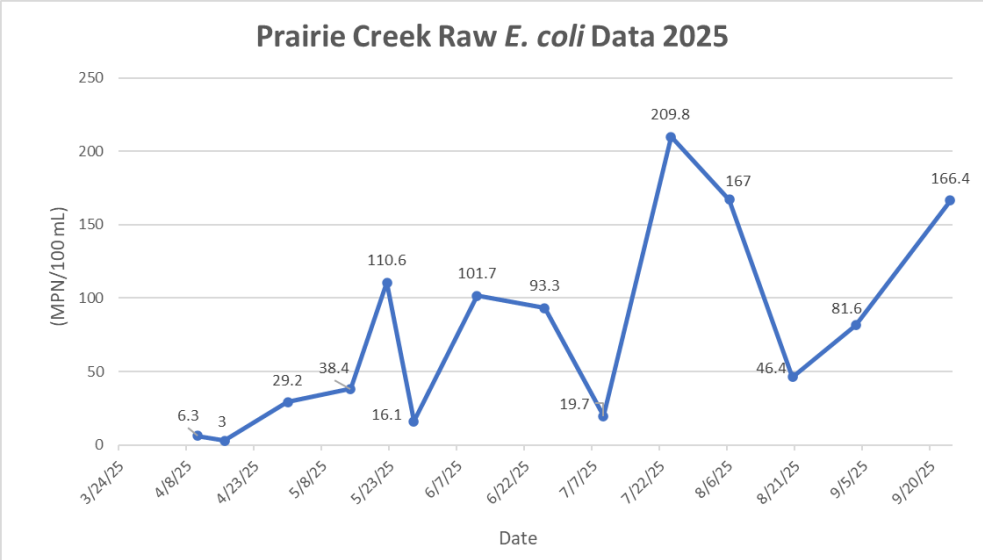
The water quality standard for TP in central Minnesota streams is **≤100 µg/L**. TP at this sampling site remained below the standard throughout the year, with the exception of an abnormally high concentration of 716 µg/L on 5/22. This result is considered an outlier, which is why samples are collected frequently throughout the year to account for discrepancies. The sample was collected the day after the largest rain event of the month (1.46" on 5/21). There was also 0.55" of rain recorded on 5/20. This sampling site is directly adjacent to cultivated fields on both sides, so if fertilizer was recently applied, the run-off was captured in the 5/22 sample.

The bottom graph shows the annual average TP concentrations at Prairie Creek from 2013 to 2025. The annual average TP concentration in 2025 was **94 µg/L**, which falls below the WQ standard. If the outlier result of 716 µg/L is excluded, the average is **46.2 µg/L**. Note that the calculated annual arithmetic average for 2023 also includes an outlier sample of **4,000 µg/L** on 4/9/23. This extreme value skewed the annual average to be unusually high and well above the WQ standard. If that extreme value is excluded from the calculation, the annual average would be 39 µg/L, well below the WQ standard. Since 2013, averages have consistently stayed below 50 µg/L. In the "Common Terms" section at the end of this report, there are more details about sourcing of total phosphorus and why we monitor for it. There is currently no concern for TP impairment in Prairie Creek, but with the past two monitoring seasons experiencing high rainfall amounts, we will continue to watch for elevated levels.



Prairie Creek Cont.

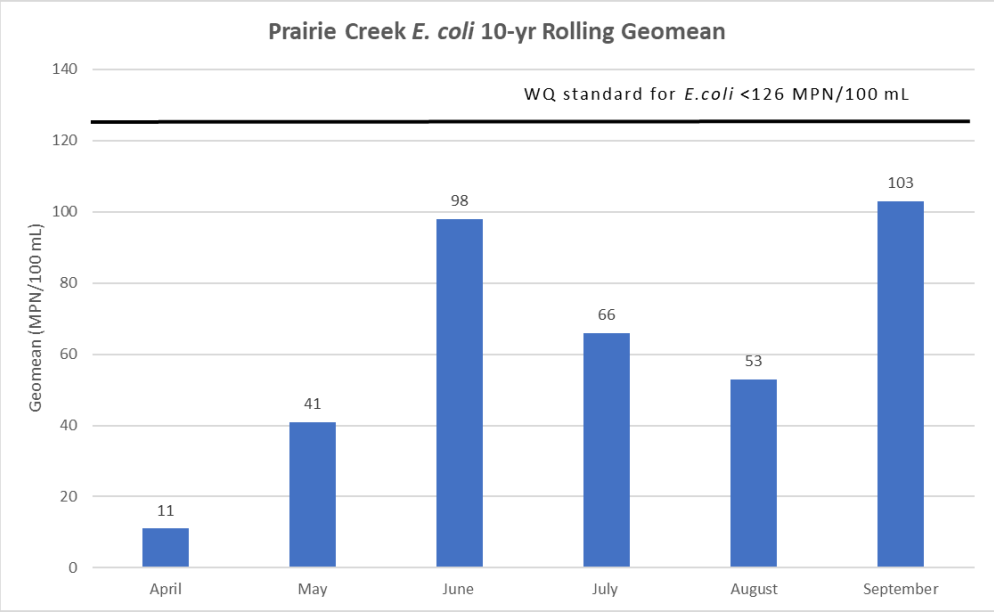
***Escherichia coli* (*E. coli*)**



The graph above shows the individual *E. coli* sample results from Prairie Creek in 2025. This site was sampled at least twice per month. *E. coli* levels generally increased throughout the summer, which is to be expected given the warmer temperatures and more daylight hours. These values are used to calculate a monthly geometric mean or *geomean*, which is how the water quality standard for *E. coli* is assessed (see page 16 for more information). To establish a geomean for *E. coli* data, at least 5 samples need to be collected either:

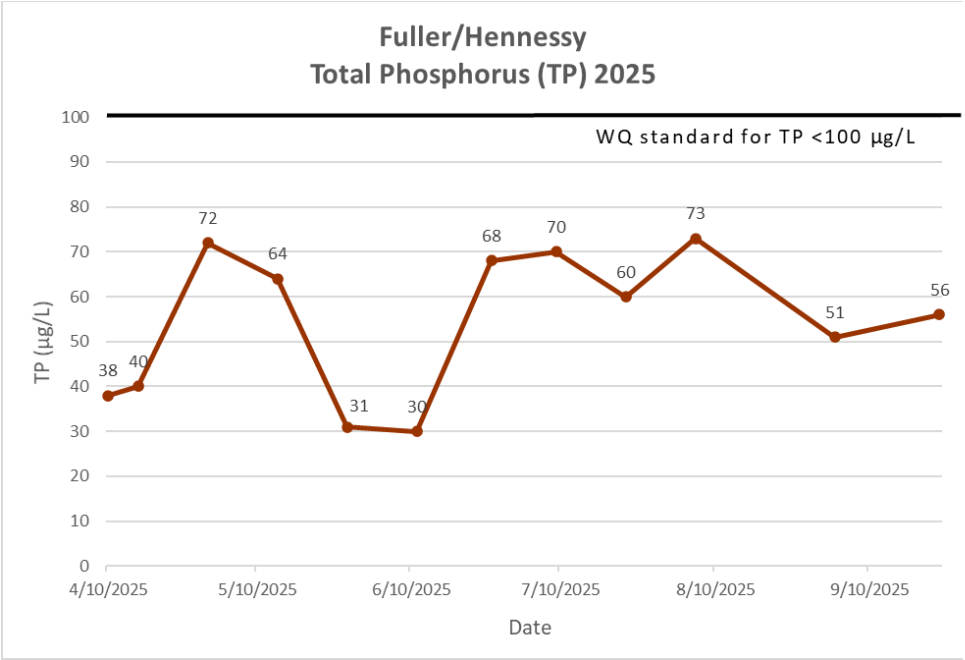
1) within a 30 day time frame, or
2) within the same 30 day window over multiple years.

If the geometric mean of those samples is greater than **126 MPN/100 mL**, or if 10% of the samples are greater than 1,260 MPN/100 mL, then the site does not meet the WQ standard. The geomean for Prairie Creek has been calculated over multiple years using Method 2. This is the method that was used for the 2025 season. In 2023, the LBLA chose to use Method 1 and collected five *E. coli* samples per month to calculate a new geomean. The graph below shows the 10-year rolling geomeans for each month. Each geomean is below the WQ standard, but there were elevated levels in June and September. June is usually the wettest month in Minnesota, and this year was no exception. The St. Cloud Regional Airport reported 7.81" in June, more than double the 3.75" average. A more in-depth explanation of the *E. coli* monitoring done on Prairie Creek is given on the last page of this report.



Fuller/Hennessy 2025 Water Quality Data

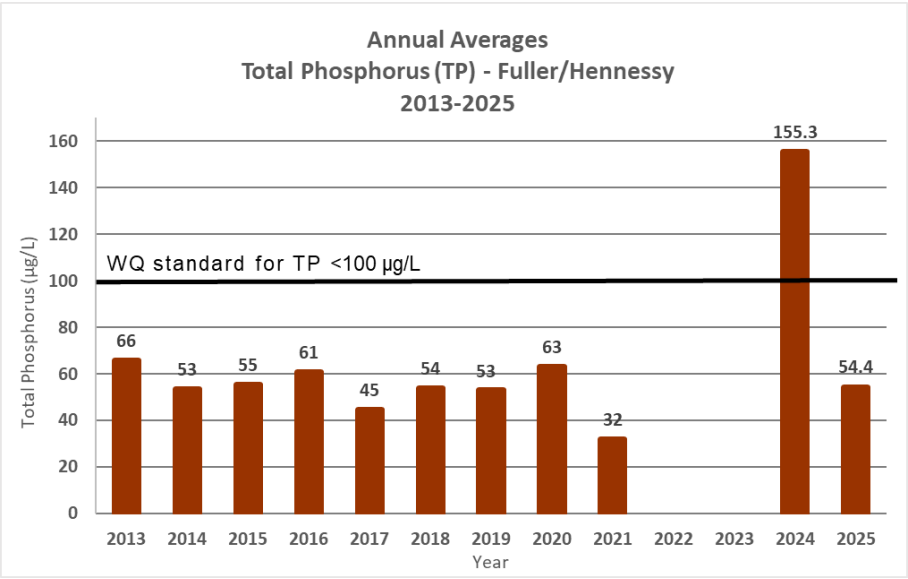
Total Phosphorus (TP)



For Prairie Creek at the Fuller/Hennessy site, TP concentrations remained below the standard of 100 µg/L throughout the entire season. The highest result was on 8/6 at 73 µg/L, which coincides with a 1.59" rain event. There were also elevated *E. coli* levels on that date, which can be seen on the following page.

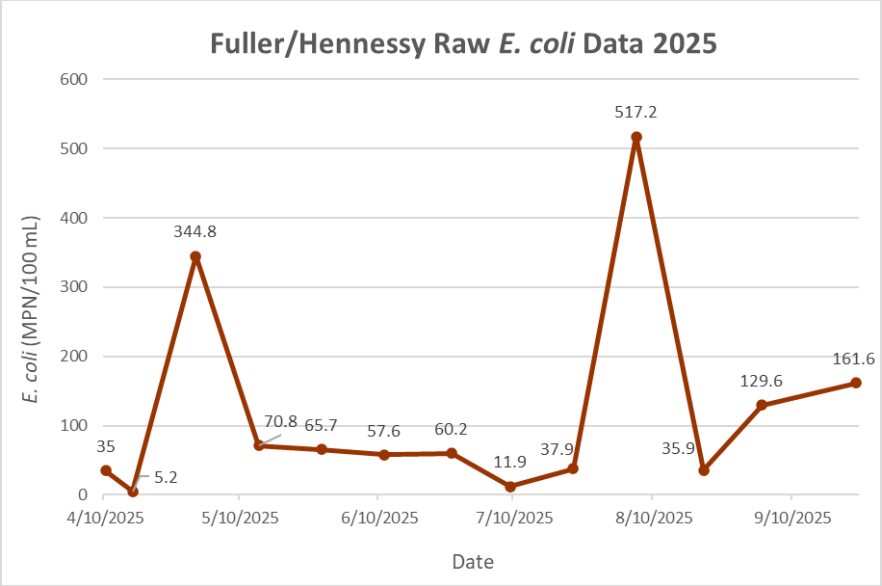
The graph below depicts the annual average TP concentrations from 2013 to 2025. Sampling was not conducted in 2022 or 2023, so no results are shown for those years. The 2025 annual average for TP is **54.4 µg/L**, which falls well below the WQ standard. Note that the 2024 average includes an outlier result of 1280 µg/L. If the outlier is excluded, the average would be 53 µg/L. Since 2013, sample results have consistently stayed below the WQ standard for the majority of the season, and there is no trend indicating an increase or decrease of TP levels at this sampling site.

It should be noted that TP concentrations in Prairie Creek at the Fuller/Hennessy site have usually been higher than the Prairie Creek site near the inlet of Little Birch Lake. This could be because the Fuller/Hennessy site, which is at the crossing of CR 98, is just downstream of where the outlet of Fuller Lake enters Prairie Creek, meaning it is receiving an input of nutrients from the lake in addition to what has already entered the creek upstream. Prairie Creek does not flow through Fuller Lake, but it does flow through Hennessy. Furthermore, at the Prairie Creek site near the inlet of the lake, the creek has since passed through Hennessy Lake, allowing more nutrients to settle out of the system.



Fuller/Hennessy Cont.

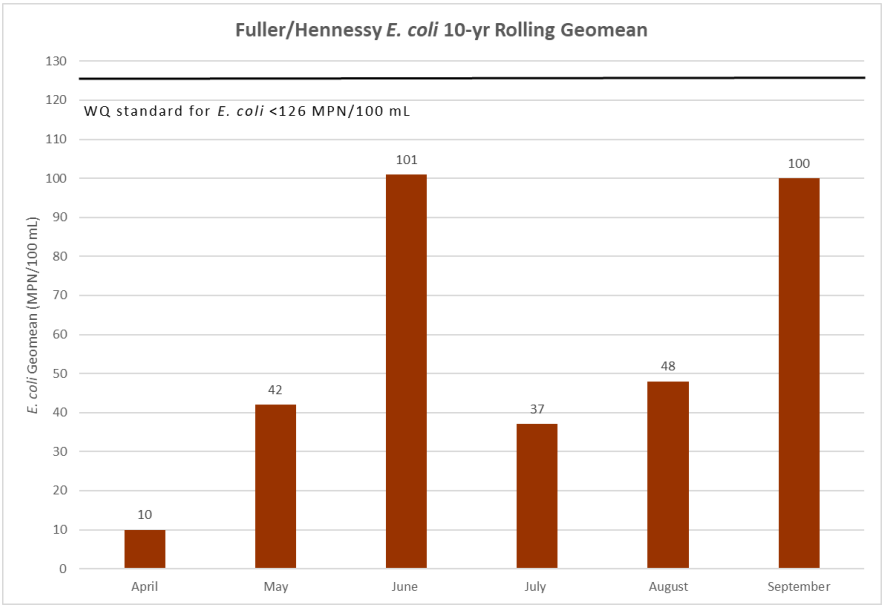
***Escherichia coli* (*E. coli*)**



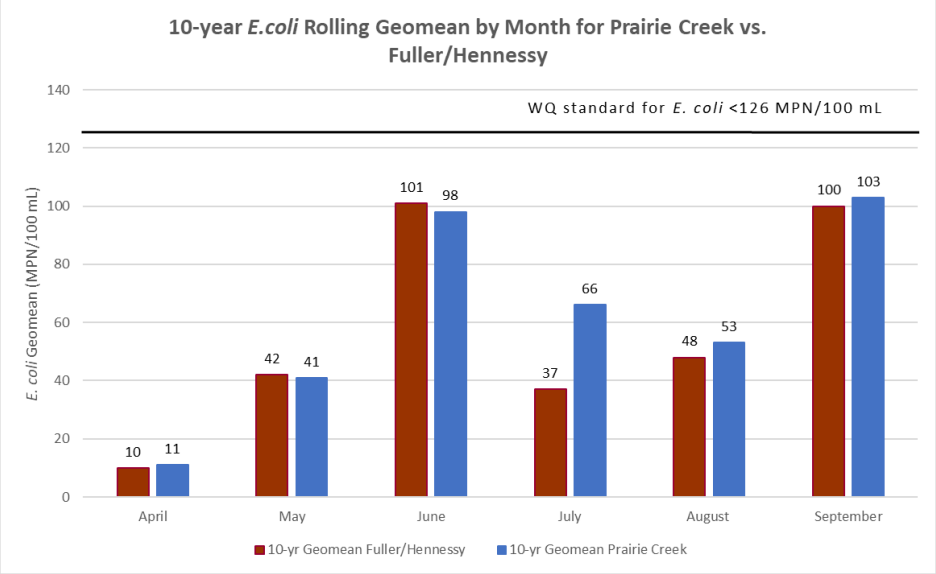
E. coli samples on Prairie Creek at the Fuller/Hennessy site were collected twice per month. The above graph shows the individual results for 2025. These values are used to calculate a monthly geomean, which is how the WQ standard for *E. coli* is assessed. To establish the geomean, at least 5 samples must be collected within the same 30 day window over multiple years. The elevated results on 4/30 and 8/6 both occurred in conjunction with rain events. There was 1.15" reported on 4/29 and 1.59" on 8/6. *E. coli* growth increases in response to overland runoff and warmer water temperatures. See more details about *E. coli* growth in the "Common Terms" section on page 15.

If the geomean of *E. coli* samples is greater than **126 MPN/100 mL**, or if 10% of the samples are greater than 1,260 MPN/100 mL, then the site does not meet the WQ standard. Keep in mind that the Fuller/Hennessy site was not sampled in 2022 or 2023. The graph below shows the 10-year rolling geomeans per month. Each geomean falls below the WQ standard but, similar to the Prairie Creek monitoring site, both June and September have higher geomeans that are approaching the 126 MPN/100 mL standard.

Bear in mind that *E. coli* is one specific type of naturally-occurring bacteria that can *sometimes* be disease-producing and is used as an "indicator organism." This means its presence does not guarantee there are harmful pathogens or fecal waste in a waterbody, but it is an indication of the potential presence of unsafe pathogens. *E. coli* is the chosen species for testing because itis easy and affordable to measure. Results should not be taken at face value because there are "naturalized" or "indigenous" strains that can reproduce naturally in streams. This is why bacteria levels in waterbodies are generally hard to measure and interpret.



Prairie Creek & Fuller/Hennessy Summary

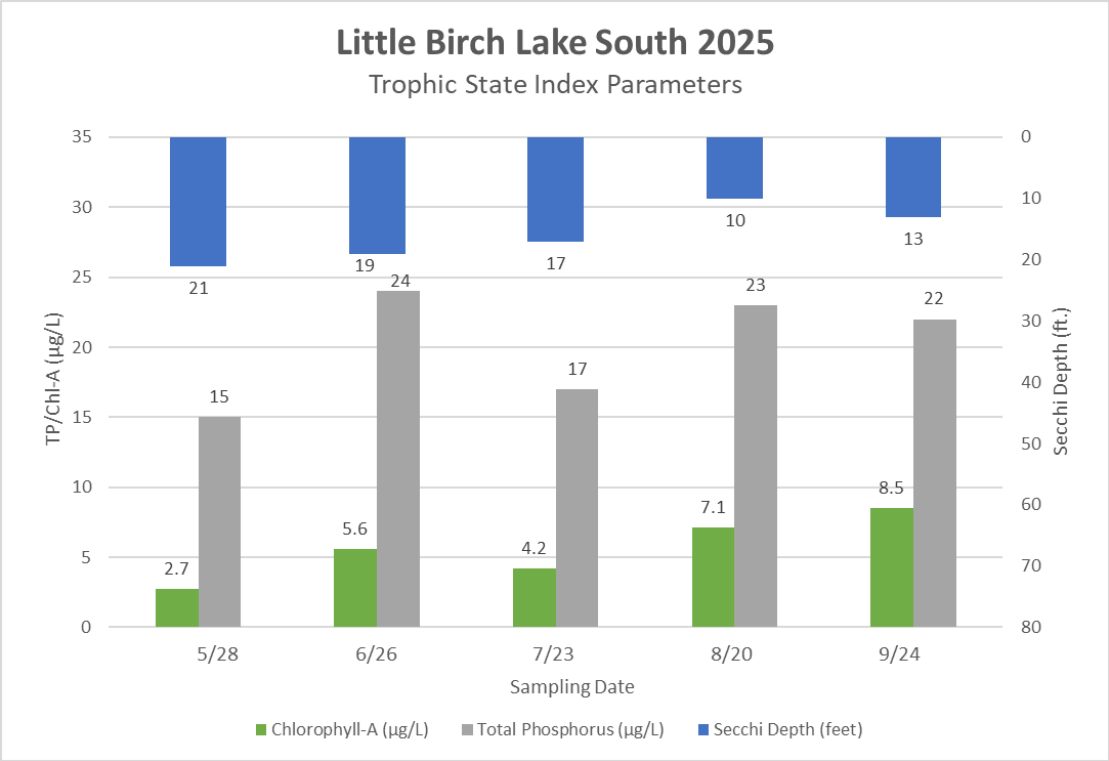


This monitoring season was another wet one with a warm fall. Comparing the water quality data collected in 2025 to historical data, the main concern is *E. coli*. However, the quality in Prairie Creek based on our monitoring is overall favorable. Compared to most streams in the Sauk River Watershed, Prairie Creek's TP levels are particularly low, meaning there are less nutrients available to feed algae blooms. The above graph plots the 10-year rolling geomeans for both sites by month. They both track relatively close, except for the Prairie Creek site's geomean being notably higher in July.

For the **Prairie Creek** site (near the inlet of the lake), all TP samples remained below the WQ standard of 100 µg/L except for one outlier result of 716 µg/L. The average of all 2025 TP results was 94 µg/L, and with the outlier excluded, it would be **46.2 µg/L**. As for *E. coli*, the arithmetic average for 2025 was **77.8 MPN/100 mL** (which, again, should not be taken at face value). Interestingly, this is lower than the 2025 arithmetic average at the Fuller/Hennessy site, even though there are cultivated crop fields directly adjacent to this site, which is closer to the inlet of the lake. Last year, the arithmetic average for *E. coli* at Prairie Creek was 90 MPN/100 mL.

For the **Fuller/Hennessy** site, TP results remained below the WQ standard for the entire monitoring season. The 2025 annual average was **54.4 µg/L**. This is significantly lower than the 2024 average, which did include an outlier result of 1280 µg/L. There is no increasing or decreasing trend of TP at the Fuller/Hennessy site at this time. The *E. coli* levels at this site did have a couple higher spikes in results, which is common when there are increased temperatures and runoff amounts. The arithmetic average this year was **118 MPN/100mL**, compared to 85 MPN/100mL in 2024. Each 10-year rolling geomean does fall below the WQ standard of 126 MPN/100 mL. As shown in the graph, *E. coli* geomeans are consistently higher at the Prairie Creek sampling site, but only by a margin. Both sites have elevated averages in June and September. The late summer levels can be attributed to failing septic systems, higher growth rate due to increased temperatures, and/or application of manure. After the MPCA reviewed the past *E. coli* data for the lowest section of Prairie Creek, they did determine that it should be added to the draft MN impaired waters list (IWL).

Little Birch Lake 2025 Water Quality Data

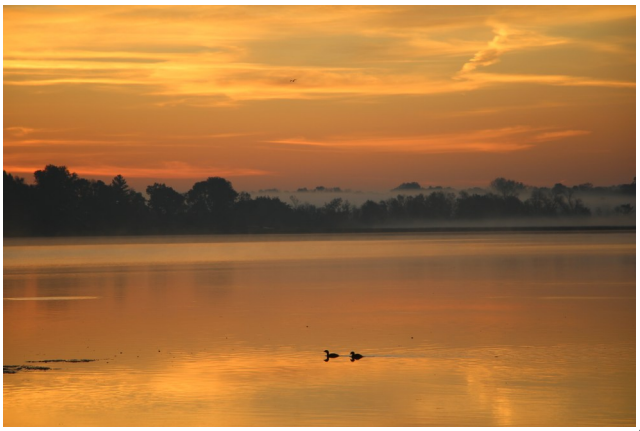


Carlson Trophic State Index

To evaluate the health of a waterbody, a common classification method is the Carlson Trophic State Index (TSI). For this method, a lake is rated based off of chlorophyll-A (chl-A) levels, total phosphorus (TP), and water clarity (measured by Secchi disk depth). The index is a scale from 0-100, with a low score indicating better water quality. For more information on Carlson TSI, see page 14. The above graph includes all three of these parameters for each sampling day in 2025. For chl-A (green bars), the NCHF water quality standard is 14 µg/L. Chl-A levels never exceeded this WQ standard and even remained below 10 µg/L throughout the year. The lake standard for TP is 40 µg/L, which was also not exceeded in 2025 (gray bars). TP and chl-A are displayed on the left vertical axis. The standard for Secchi disk depth (blue bars) is a depth greater than 1.4 meters (4.6 feet), so Little Birch Lake satisfied this standard throughout the monitoring season. Secchi is displayed from the top down and is read on the right vertical axis.

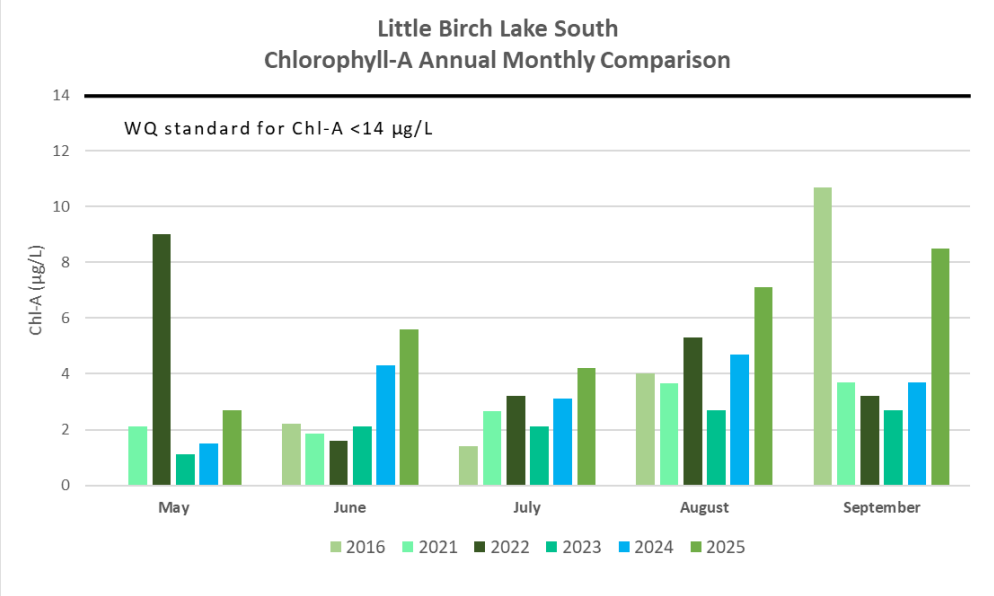
Little Birch Trophic State Index

Year	2016	2021	2022	2023	2024	2025
May	-	40	40	36	36	39
Jun	38	37	34	41	40	44
Jul	38	41	38	41	38	42
Aug	42	43	41	41	42	48
Sep	50	44	34	40	40	47
Yearly Average	**43**	**41**	**37**	**40**	**39**	**44**



Little Birch Lake South Cont.

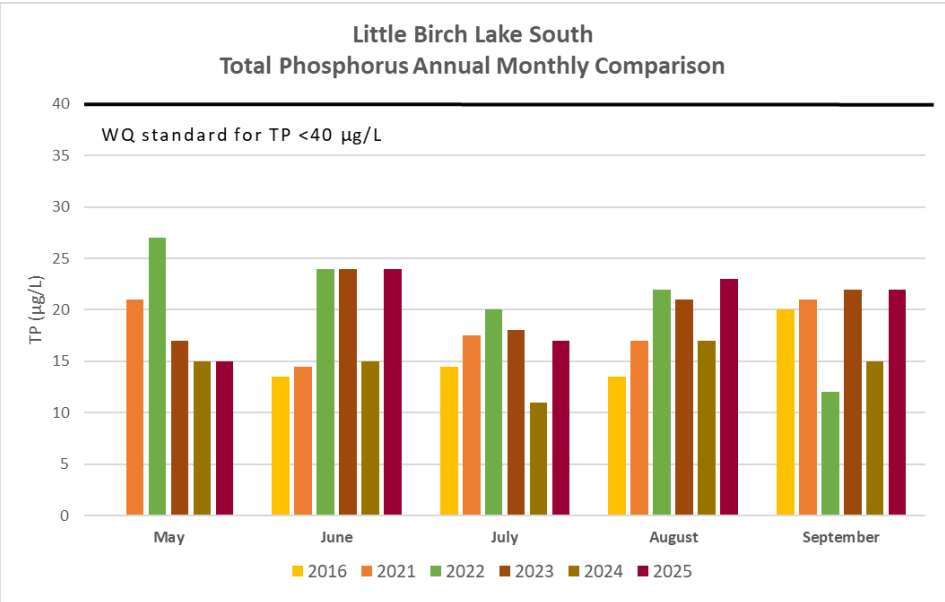
Chlorophyll-A



Sampling data for the Little Birch Lake South monitoring site has been collected annually since 2021, which is the last time the SRWD intensely monitored the lake in the 5-year rotation schedule. The lake was also intensely monitored in 2016 and will be again in 2026. Chl-A and TP samples are taken from the first 6 feet of surface water, which is the range for light penetration and algal growth. All chl-A samples in 2025 met the WQ standard of being below 14 µg/L. The highest result was in September with a result of 8.5 µg/L. Each monthly sample in 2025 was higher than both the 2023 and 2024 results. While the results are still well below the WQ standard, this is something to pay attention to. The monitoring season in 2025 did receive a hefty 28 inches of rain, meaning more nutrient inputs from runoff, which feeds algae growth. Each year's climate conditions vary, meaning chl-A concentrations can vary from month-to-month and year-to-year.

Total Phosphorus

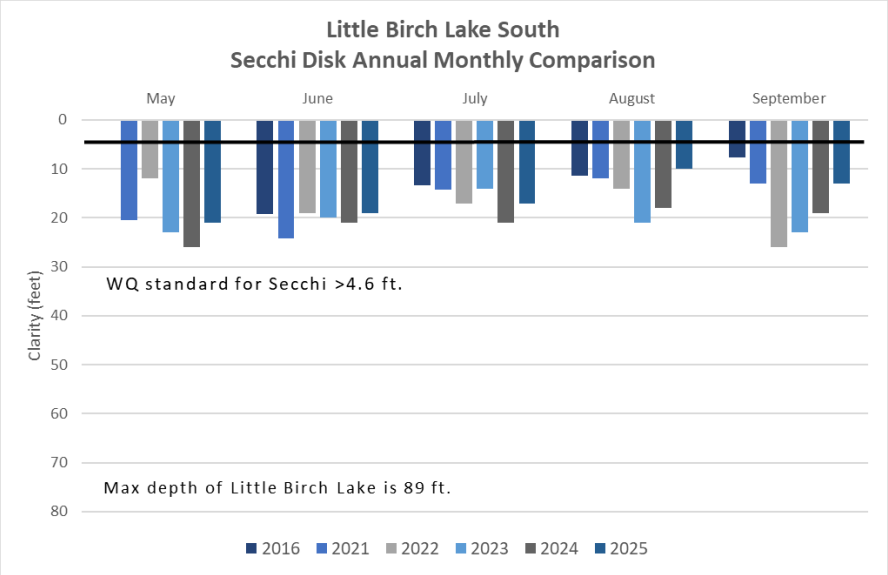
The graph below shows the monthly comparison of TP levels over multiple years. All TP samples collected from Little Birch Lake in 2025 were below the WQ standard of 40 µg/L. However, the 2025 average was **20.2 µg/L**, compared to only 14.6 µg/L in 2024. The highest result was 24 µg/L, occurring in June, which is understandable considering the lake had received a significant amount of runoff from rain events. Compared to past years, these are not the highest TP results recorded on this lake, and it seems to be tracking consistently over the years. The monthly results vary from year to year, which is why it is important to collect a large dataset in order to identify trends.



Little Birch Lake South Cont.

Secchi Disk

Secchi disks are used to measure lake depth visibility/clarity, which is an indicator of lake health. The Secchi disk is lowered into the lake on the shaded side of the boat until it can no longer be seen, and the visual depth is recorded. This data, along with TP and chlorophyll-A data, is used to assess overall water quality in a lake. The 2025 Secchi readings were all greater than the WQ standard minimum of 4.6 feet. The average Secchi depth for 2025 was **16 feet**, which is some of the best water clarity in the watershed.

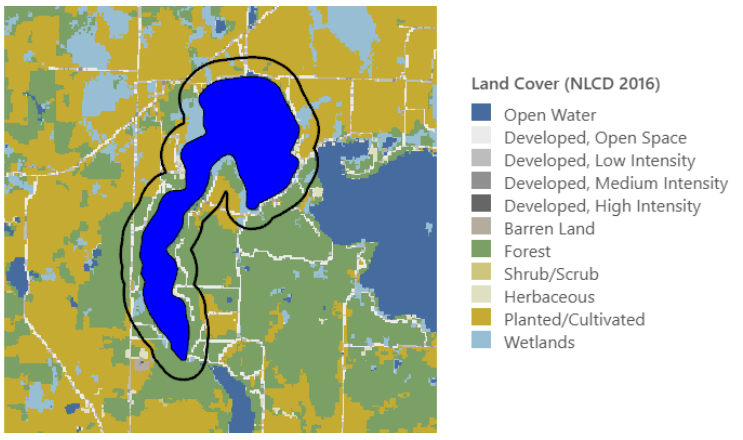


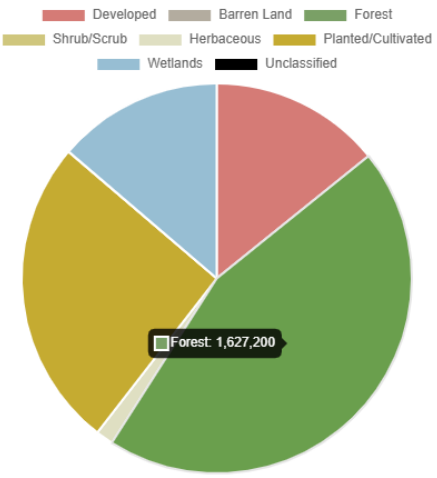
Note that the visible depth axis starts at zero in the upper left hand corner of the graph, and higher readings are desirable because that means there is visibility further into the water column. More information about Secchi depth can be found on page 17. Each monthly 2025 reading was lower than 2024, which had an average depth of 21 feet. This tracks with the higher chl-A levels since higher algae production usually means lower clarity. Overall, Secchi readings are consistently meeting the WQ standard.

Surrounding Land Cover

Shown below are diagrams that depict the land cover type surrounding Little Birch Lake. The bottom left map shows land use by type, with the thick black line representing the area within 1000 feet of the lake, which is considered shoreland. The pie chart shows the breakdown of land cover, demonstrating that Forest makes up the largest proportion of the shoreland area. Forest covers 45% of the surrounding area, followed by Planted/Cultivated land at 26%. All values are calculated using the 2016 National Land Cover Database (NLCD). The diagrams were created on the Minnesota LakeBrowser online dashboard.

In comparison to a standard lake in the watershed, Little Birch Lake has a high ratio of Forested cover. For example, the largest proportion of land cover surrounding Sauk Lake outside of Sauk Centre is Planted/Cultivated land at 41%. Conversely, Forest only covers 25% of the shoreland area around Sauk Lake.





2025 Monitoring Summary

This monitoring year was pervaded with frequent rain and persistent humidity. We were also coming out of a mild winter. Although 2025 began in drought conditions, precipitation came consistently from March through August. The rainfall total from March to September was 28.02 inches (4.4 inches above average).

Even so, **phosphorus levels** primarily remained below the WQ standard at both Prairie Creek and Little Birch Lake. The Prairie Creek site did have one outlier result, but otherwise consistently had low results. High peaks were observed during or after major rain events for both TP and *E. coli*. Each 10-year rolling geomean for ***E. coli*** remained below the WQ standard, but the geomeans for June and September do reach higher levels. *E. coli* results at the Prairie Creek site did see a slight improvement this year compared to last year. This brought the 10-year monthly geomeans closer to those at Fuller/Hennessy, which historically has had lower 10-year geomeans. The continued monitoring on this system has revealed conditions that support a thriving fish and aquatic organism community, but close attention should be given to *E. coli* levels.

Ice conditions on the lake itself were much more favorable this year compared to the 2023-24 winter. Ice-out in 2025 occurred on April 10th, but happened March 15th in 2024. Sampling results on Little Birch Lake saw no exceedances of the WQ standards for chlorophyll-A or TP. However, chl-A levels this year were higher than both 2024 and '23 results. TP results were also slightly higher than last year. In 2025, the lake had an overall TSI score of **44**, which is slightly higher than has been observed in the past. This puts the lake in the *mesotrophic* category, meaning a medium level of nutrients, good oxygen levels, and mostly clear water with submerged aquatic plants. The common range for TSI scores in the NCHF ecoregion is 46 to 58, so a score of 44 is encouraging for a lake in this watershed. It is recommended to continue monitoring the lake at the south monitoring site in 2026, which is a year the lake will be intensely monitored as part of the SRWD's 5-year rotation.

Continued water quality monitoring is vital for early identification of changes to water quality in Little Birch Lake. Maintaining long-term monitoring data allows for annual variations in weather, temperature, and rainfall to be accounted for. The longer and more frequent data collection occurs on a waterbody, the stronger the dataset for water quality assessments becomes.

Common Terms & Parameters

Arithmetic Mean/Average - This monitoring summary uses the arithmetic mean for all data displayed as averaged monthly and averaged annually, with the exception of *E. coli* (see geometric mean on p. 16). The arithmetic mean is commonly referred to as the average, or simply the mean, of a set of values. It is calculated by adding all the values together and then dividing them by the number of values (n) that were added. This is commonly used to consolidate many measurements into one representative measurement.

Carlson's Trophic State Index (TSI) - The Carlson Trophic State Index (TSI) is a classification system designed to rate water bodies using concentration measurements of both chlorophyll-A and total phosphorus, combined with Secchi disk readings. This rating indicates how much aquatic life, both plants and animals, a waterbody can sustain, and can be applied across all lake types and ecoregions uniformly. The higher the rating, the more likely it is that poor water quality will be observed. The word *trophic* is Greek meaning nourishment or food. Under the TSI scale, waterbodies may be defined as:

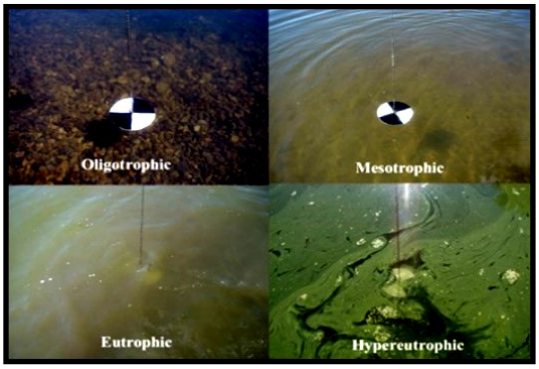
Oligotrophic: TSI 0 - 40, Clear water, good oxygen conditions, limited nutrients available, deep or shallow lake. From the Greek "oligos" meaning few, scanty.

Mesotrophic: TSI 40 - 50, Moderately clear water but increased chance of low oxygen conditions in shallow lakes. From the Greek "meso" meaning middle, moderate.

Eutrophic: TSI 50 - 70, Moderately clear to cloudy water, with a high chance of low oxygen conditions in the summer, extensive plant growth, and potential algal scum. From the Greek "eu" meaning well, plenty.

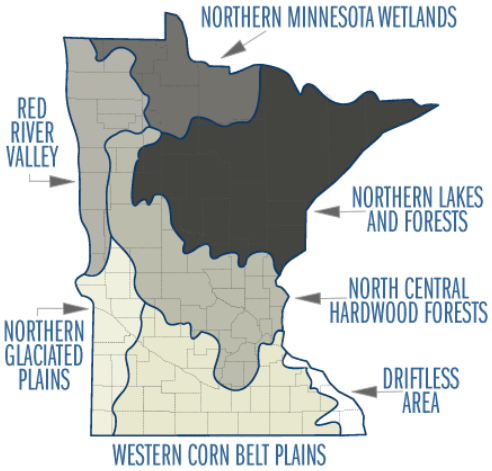
Hypereutrophic: TSI 70+, Dense plant growth, heavy algal blooms and scum possible, low oxygen conditions, fish kill possible. From the Greek "hyper" meaning over much.

Chlorophyll-A (chl-A) - Chlorophyll-A is a measure of the amount of algae growing in a waterbody, and can be used as an indicator of water quality. It is a comparable analysis to total suspended solids (TSS) in streams. As water warms, algae begins to grow, and the amount of growth is dependent on the amount of nutrients in the waterbody. Although algae is a natural part of freshwater ecosystems, too much algae can result in decreased levels of oxygen and cause aesthetic problems, such as green scum and bad odors. Some algae naturally produce toxins as well, which can be a public health concern in high concentrations. Waterbodies that receive septic systems discharges and agricultural and urban runoff may have high concentrations of chl-A in response to the excess nutrients. The general water quality standard for chl-A in deep lakes within the North Central Hardwood Forest (NCHF) ecoregion is less than 14 µg/L.



Common Terms & Parameters

Ecoregion - A region defined by distinctive geography, plant and animal communities, land uses, soil profiles, and sun and moisture patterns. Ecoregions are used by the Environmental Protection Agency (EPA) and Minnesota Pollution Control Agency (MPCA) to characterize regional differences in the state and their effects on water quality. The Minnesota ecoregion Little Birch Lake resides in is the North Central Hardwood Forest (NCHF). The NCHF ecoregion is a transitional zone between the predominantly forested northern lakes region and the corn belt plains in southern Minnesota. In addition to the ecoregion classification, lakes are further classified as shallow or deep, depending on the maximum and average lake depths. The size and depth of a lake influences characteristics such as water clarity, water temperature, and aquatic plant growth. Little Birch Lake is considered a deep water lake.



Escherichia coli - *E .coli* is a naturally-occurring bacteria found in animal and human waste, and it can be harmful in high concentrations. *E. coli* contaminates surface water through direct contact with waste and can move to rivers and lakes as nonpoint source runoff. It can also enter from point sources, such as wastewater releases and manure spills. Since there are a variety of ways *E. coli* can enter water, it is largely considered a non-point source pollutant and is an indicator of potential water quality concerns. Numerous samples must be taken to draw accurate conclusions regarding seasonal variables and long term water quality trends. The water quality standard for *E. coli* is a geometric mean (see page 16) of less than 126 MPN/100 mL.

Eutrophication - This occurs when an excess of nutrients that are usually environmentally limited enter a river or lake system and contribute to excessive plant and algae growth. The term comes from the Greek *eutrophos*, meaning "well-nourished." Eutrophication can have significant negative impacts on aquatic communities' health. The excessive plant growth can clog up boat motors, outcompete native plants, and change the animals that are able to survive in the waterbody. When the excessive plant growth dies back and decomposes, microbes in the water break down the plant material and use up the majority of the available oxygen in the waterbody. This creates low oxygen (anoxic) conditions and will stress and even kill aquatic animals. Additionally, water clarity and recreational suitability are greatly reduced in eutrophic conditions, and physical contact with or ingestion of the water could result in indigestion or even death.

The city of Ward Springs used to be called Birch Lake City. The name was changed in 1909 after the founders J.W. and Martha Ward.

Common Terms & Parameters

Geometric Mean (geomean) - This monitoring summary uses the MPCA method for deriving the arithmetic mean for *E. coli* sample analysis. The geometric mean is used when a set of static numbers is used to represent a dynamic value that is undergoing constant change. In this case, *E. coli* bacteria is capable of exponential growth and is represented using the geomean. This method is commonly used when working with bacterial populations. The geometric mean differs from the commonly used arithmetic mean (see page 14) in that it is calculated by multiplying the values together and then dividing them by the square root of the number of values (n^{th} root.) This mathematical approach is used so that the results are not heavily swayed by outliers (extremely high or low values), like in the arithmetic mean.

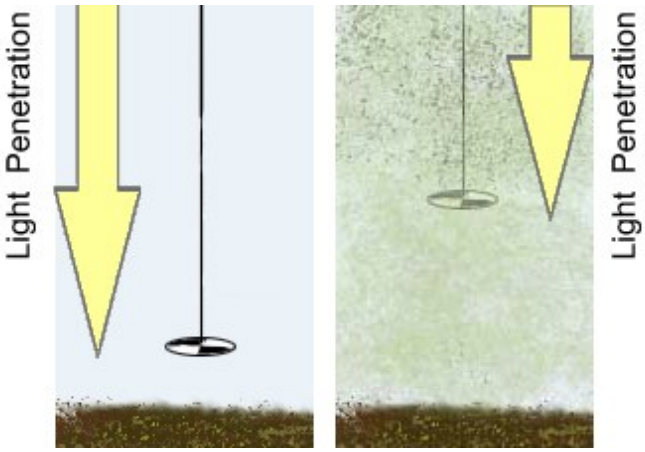
MPN/100mL - Most Probable Number (MPN) per 100 milliliters; *E. coli* samples are assessed and quantified as a concentration of living organisms in 100 mL (3.4 ounces) of sample water. This is done by diluting the water sample multiple times and than incubating the dilutions in a liquid broth to encourage *E. coli* growth. This is then used to estimate the *E. coli* concentration, and is reported as a most probable number, or MPN.

Point Source and Nonpoint Source - These terms are used when referring to how a pollutant enters a waterbody. Point sources are single and identifiable locations, such as the end of a pipe, and are regulated by state and federal agencies. Nonpoint sources are can be rain and snow runoff, which accumulate pollutants as water drains. Places like parking lots, farmland, construction sites, and eroding streambanks are considered nonpoint sources of pollution and are harder to track, control, and regulate.

River Nutrient Region - The EPA and MPCA did not develop nationwide or even statewide water quality criteria for surface waters, but instead developed guidelines for each unique ecoregion. Each ecoregion has been studied to identify reference conditions for that area. Reference conditions are used to reflect what a pristine or minimally impacted stream condition would be, and what the normal range of conditions are in that ecosystem. The MPCA has further researched and developed river nutrient criteria for each of Minnesota's ecoregions. This is the basis for creating water quality standards appropriate to each ecoregion's background conditions. Little Birch Lake, its tributaries, and the entirety of the Sauk River Watershed, are within the central river nutrient region (RNR). See page 4 for the specific standards for our parameters of interest.

Common Terms & Parameters

Secchi Disk - Water clarity is measured using a Secchi disk (also known as a transparency disk) that is lowered into the water until it can no longer be seen, and the depth of visibility is noted. Secchi disk readings are used to assess water visibility and quality. The general water quality standard for lake Secchi disk readings in the north central hardwood forest (NCHF) ecoregion is greater than 4.6 feet (1.4 meters).



Total Suspended Solids (TSS) - Total suspended solids is a measure of all particles suspended in a water sample that are larger than 2-microns in size (for reference, spider silk is 3-8 microns). This can include silt and clay particles, plankton, algae, fine organic debris, and other particulate matter. TSS is related to water turbidity (cloudiness) because high amounts of TSS can reduce how much, and deeply, sunlight penetrates a waterbody. A decrease in sunlight can hinder the ability of algae to photosynthesize to produce food and oxygen. Suspended solids can kill fish, clog their gills, and reduce their growth rates. As water slows when it enters lakes or reservoirs, the suspended sediments fall to the bottom of the waterbody in a process called siltation. This causes the water to clear, but can also change the composition of the bottom of the waterbody, potentially smothering bottom-dwelling organisms, or covering breeding areas. The Central River Nutrient Region standard for total suspended solids concentrations in Prairie Creek is less than 30 milligrams per liter (mg/L) to protect aquatic life and recreational use.

Total Phosphorus (TP) - Total phosphorus is a measure of both the organic and inorganic forms of phosphorus. Organic phosphorus is not commonly found in suspension in the water column, and is not as chemically available as food. Inorganic phosphorus, referred to as ortho-phosphorus, is commonly dissolved in water and is readily available to plants and animals. Phosphorus is an essential nutrient for growth, but is only necessary in small concentrations to sustain life. Phosphorus can also be found in the water column and embedded in water bottom materials. Most rivers and lakes have elevated phosphorus, with point source contributions from wastewater and industrial releases, and nonpoint source contributions from agricultural fertilizers and contaminated groundwater.

Minnesota is broken up into ecoregions to account for the variability in landscape, land use, and weather across the state, and each ecoregion has unique water quality standards. The Central River Nutrient Region standard for total phosphorus in Prairie Creek is less than 100 µg/L. The NCHF ecoregion water quality standard for Little Birch lake, a deep water lake, is <40 µg/L.

Prairie Creek *E. coli* Impairment Status

Given that Little Birch Lake is such a valuable resource in our watershed, the LBLA and SRWD want to keep its water quality at the forefront. Since Prairie Creek feeds directly into the lake, it acts as a potential source for nutrient inputs. In 2024-25, all historical Prairie Creek data was reviewed by MPCA's chemistry assessment staff as an opt-in request. Their general watershed monitoring occurs on a rotational basis every 10 years, with two years for data collection and the third year for assessing whether waterbodies are meeting the standards. The next round of MPCA monitoring in our watershed will be starting in 2027, but the LBLA wanted the *E. coli* data to be assessed before then. MPCA staff did conclude that Prairie Creek was consistently *not* meeting the WQ standard, so they proposed that it be listed as impaired. The impairment would just be for the 1.85 mile section south of Hennessy Lake, and only for *E. coli* (stream ID #07010202-593). The section will be listed on the draft impaired waters list (IWL), which will be released for public comment in early 2026. You can sign up to be added to the email list and receive a notification when public comment opens on the IWL website under "Stay Connected:" https://www.pca.state.mn.us/air-water-land-climate/minnesotas-impaired-waters-list. The list must then be approved by Environmental Protection Agency (EPA) and will not be finalized until around May 2026.

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Sauk River Watershed District

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As mentioned earlier, *E. coli* is a tricky parameter to measure and track since it is a living organism that self-produces and varies widely. That is why a geometric mean is used to evaluate the data. Bacterial behavior in the environment is complex. Levels of bacteria, specifically fecal coliform, in a waterbody depend not only on sources (such as septic systems and livestock) but also weather, water current, and temperature. As these influences fluctuate, the bacterial levels can greatly increase or decrease. Some types of bacteria, whether harmful or not, can survive and grow in the environment, but many pathogens will eventually die off.

In the Sauk River Watershed, common sources of fecal coliform are pastures near waterways and runoff from upland pastures. Manure application is also a prevalent source, so the MN feedlot rules require manure management plans for feedlots greater than 300 animal units that do not operate a certified manure applicator. Local Soil & Water Conservation Districts work closely with farmers to improve feedlots, manage manure handling/incorporation, and maintain buffer areas.

Please Note:
The data and recommendations included in this report are based on the 2025 monitoring season. Stream and lake samples were collected by a Little Birch Lake Association volunteer, and all data were reviewed by the Sauk River Watershed District. This report is not a complete picture of all conditions but built to assess specific measurements of water quality.

Contact Abi Borgerding, Environmental Monitoring Manager with the Sauk River Watershed District, with any questions or concerns regarding the information presented in this report.

All water quality standard information and state statistics were gathered from Minnesota Pollution Control Agency (MPCA) documents accessed November 2025. Photos of Little Birch Lake and Prairie Creek courtesy of Amy Rieland.