524 4th Street South

Sauk Centre, MN 56378

320.352.2231

2013 MONITORING SUMMARY

Grand Lake, Ploof's Creek, and Johannes Creek

Introduction

For the 2012 and 2013 monitoring seasons the Grand Lake Improvement District and the Sauk River Watershed District have worked together to implement a monitoring plan designed to evaluate the water quality of Ploof's Creek and Johannes Creek. Knowing the water quality of these creeks will assist the Grand LID with their goal of improving the water quality of Grand Lake.

"We would like to measure our creeks to determine if we should help fund projects along the creeks with the ultimate goal of improving Grand Lake's water quality."

- Scott Palmer - Grand LID President

Johannes Creek

Ploof's Creek South

"It is the vision of the Sauk River Watershed District to protect and enhance our natural resources by increasing public awareness and involvement….The District will be wise stewards of our natural resources and will work alongside our partners to leave the water quality better for future generations."

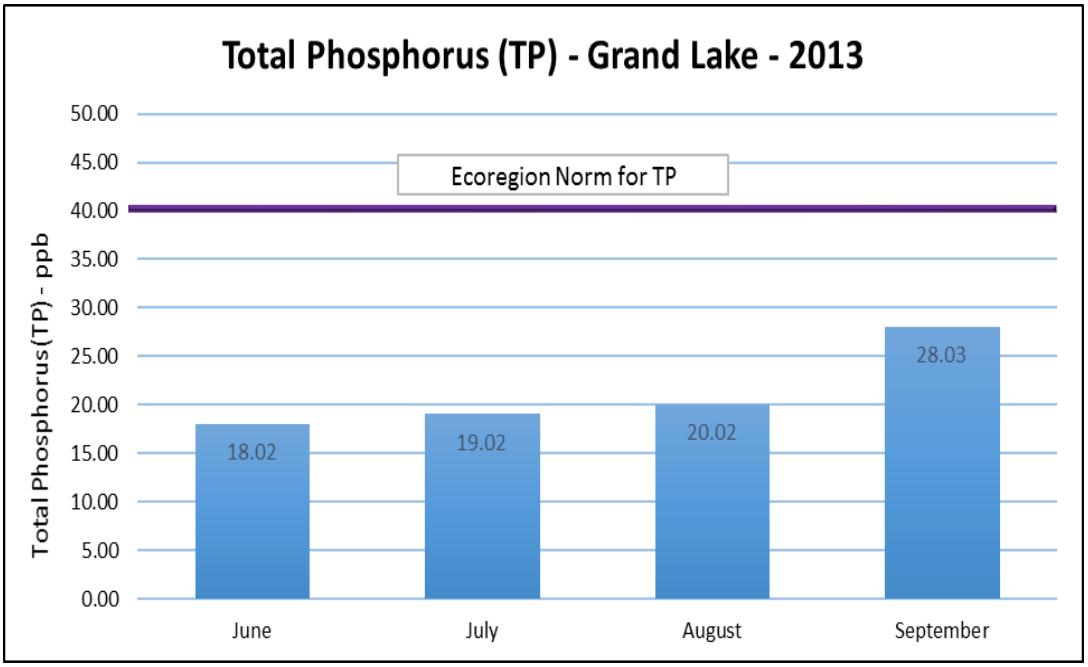
Created February 2014

Grand Lake

Total Phosphorus (TP)

Total phosphorus is made up of both organic and inorganic (ortho-phosphorus) materials. It can be found suspended in the water or in the bottom materials of the lake. The MPCA's ecoregion standard level for phosphorus in deep lakes (max depth greater than 20 feet) is 0.040 mg/L, which is equal to 40 ppb (parts per billion).

The figure to the left shows that all TP samples taken in Grand Lake during the 2013 season are within the ecoregion standard.



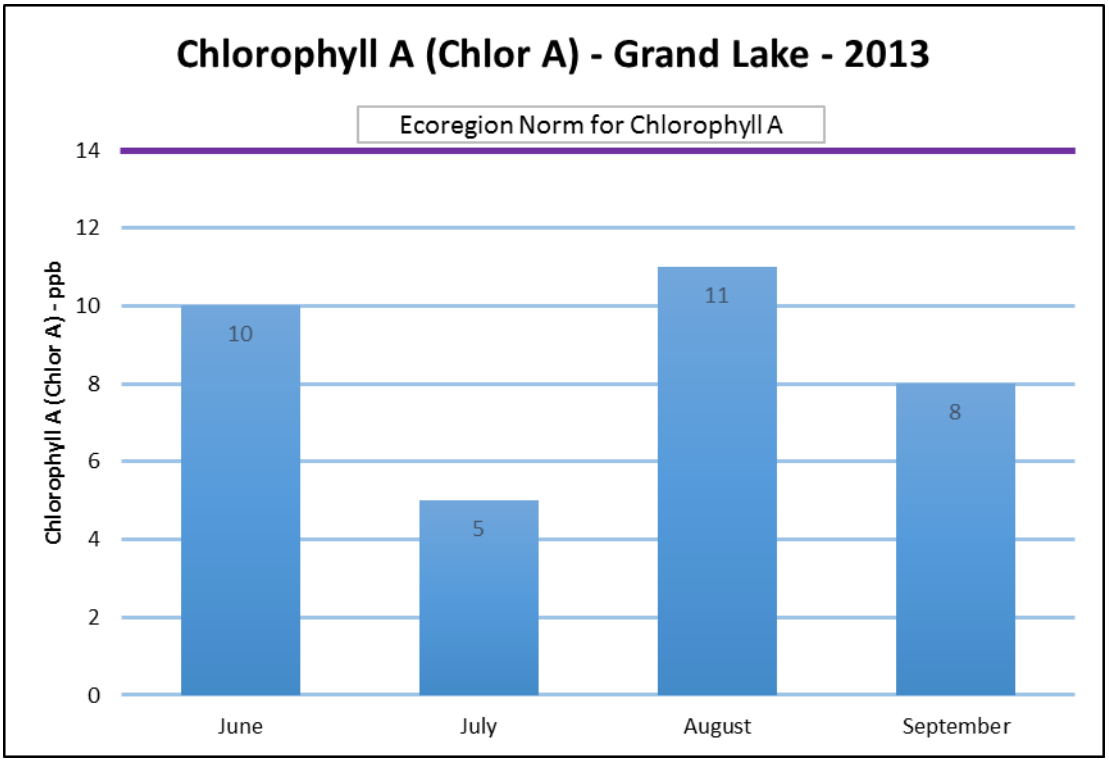
Total Suspended Solids samples were taken in Grand Lake during the 2013 monitoring season, however, research has shown that there are more effect ways of monitoring water clarity in lakes. The SRWD recommends discontinuing total suspended solid samples for Grand Lake in the future. The chart below shows the 2013 total suspended solid sample results.

Month	June	July	August	September
TSS (mg/L)	1	3	3	2

Chlorophyll A (Chlor-A)

Chlorophyll A samples are used to measure the amount of algae in the water. Algae grows as the water warms and the amount of growth is dependent on the amount of phosphorus available. Other environmental factors such as wind and water temperature can impact the amount of algae growth as well.

The ecoregion standard for Chlorophyll A is 14 ppb (parts per billion). As shown in the figure to the left, the Chlorophyll A samples taken in Grand Lake in 2013 were within the ecoregion standard.



Secchi Disk

Water clarity is measured using a transparency disk (secchi disk) that is lowered into the water on the shaded side of the boat until it can no longer be seen. Clarity is measured every time the lake is sampled. This data is used by the MPCA, along with phosphorus and chlorophyll a, to assess the water quality of a lake.

The ecoregion standard for secchi disk readings is greater than 1.4 meters (which is equal to about 4.6 feet). The figure to the lower right shows the secchi disk readings taken on Grand Lake during 2013, all of which are within the ecoregion standard.

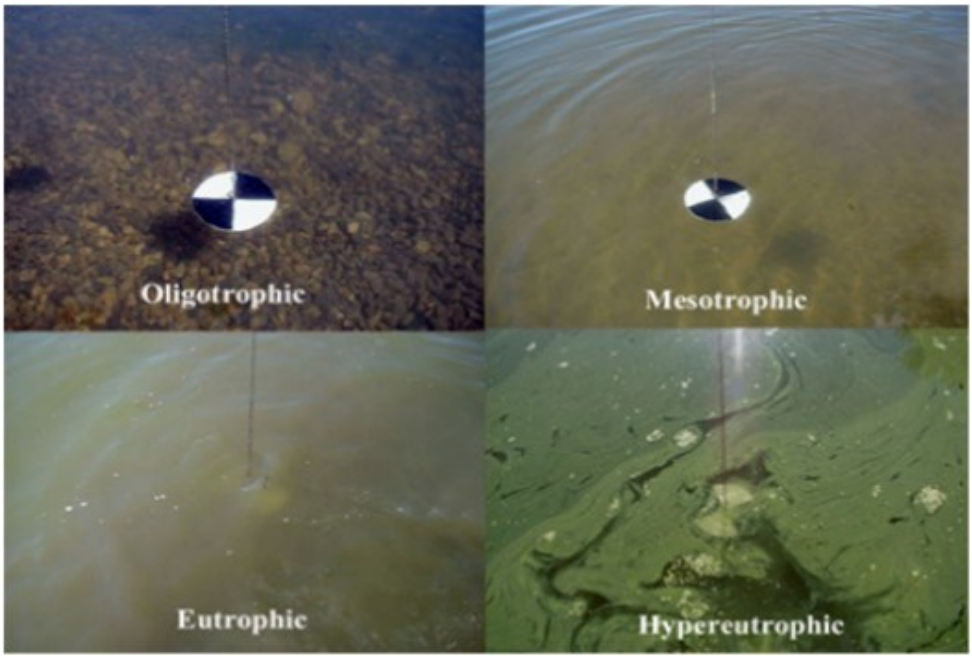
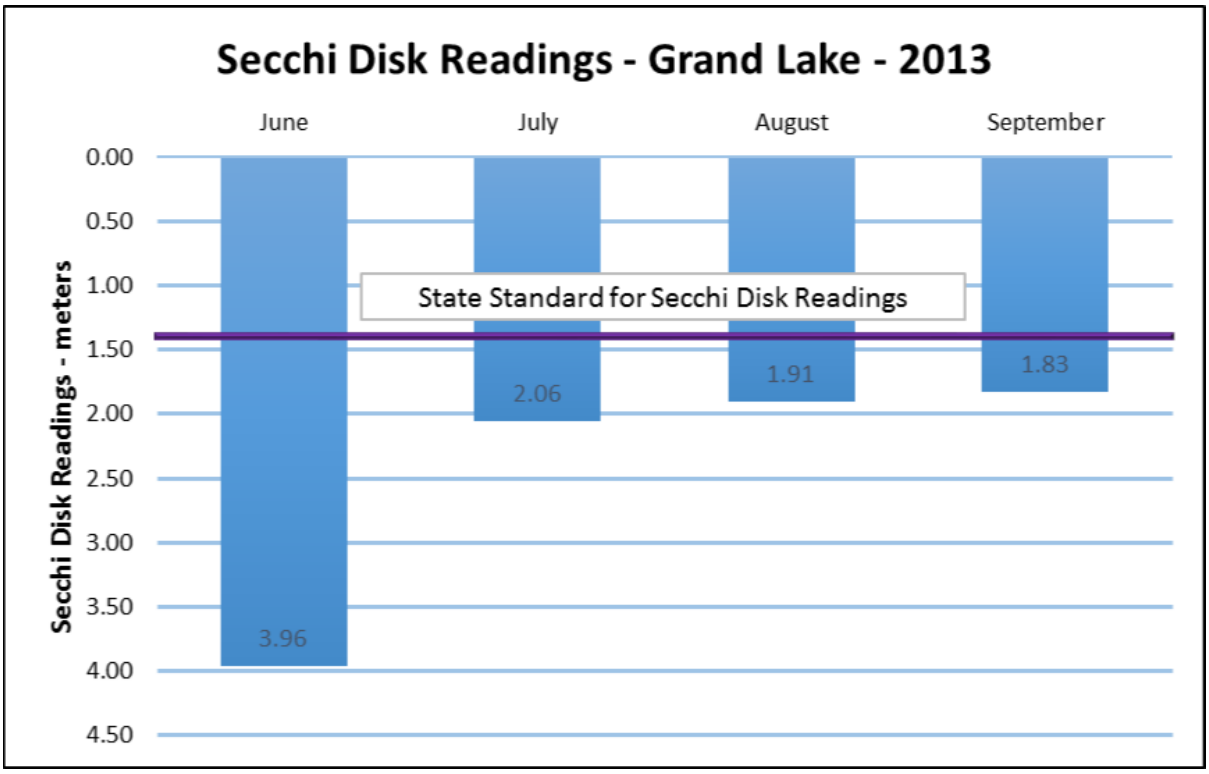


Photo Courtesy of the Minnesota Pollution Control Agency (MPCA)

The above photo provides examples of what the four main lake classifications (according to Carlson's Trophic Status Index/TSI) would look like during a secchi disk reading. Phosphorus samples, chlorophyll-a samples, and clarity/secchi disk readings are used to determine the TSI for a lake.

The four stages of lake classification are oligotrophic (clean, clear), mesotrophic (temporary algal and aquatic plant problems), eutrophic (persistent algal blooms and aquatic plant problems), and hypereutrophic (extreme nuisance algal blooms and aquatic plant problems).



Summary of Grand Lake

Based on the data that was collected by the Sauk River Watershed District during the 2013 monitoring season, Grand Lake is meeting state and ecoregion standards for the parameters tested. These results support the data posted on the MPCA website (Grand Lake ID: 73-0055-00). Additional data on Grand Lake can be found using the new lake and stream search tool under the surface water section of the waters portions of the MPCA website (www.pca.state.mn.us). This site includes data on the overall condition of the lake, water clarity, and recreational use.

The Grand Lake Improvement District intends to contract with the Sauk River Watershed District to continue water quality monitoring through the 2014 season. After that monitoring has been completed, SRWD staff will conduct analysis of the three years worth of data to provide the LID with the combination of several years worth of data.

Volunteer Boat Drivers

Volunteer boat drivers assisted the SRWD staff during the 2013 monitoring season while taking advantage of a hands-on learning experience. The SRWD would like to continue working with volunteer boat drivers to collect data on Grand Lake, as it saves some time and energy for the District, while saving the Grand LID money.

The SRWD would like to thank the 2013 volunteer boat drivers, and to invite anyone who may be interested in volunteering for the 2014 season to contact Sarah Jo at the office using the contact information found on the back of this report.

Volunteers must have a boat or pontoon on the lake that they would be willing to let SRWD staff sample from. Volunteers should be available for approximately 45 minutes before 10 or 11am Tuesday-Thursday.

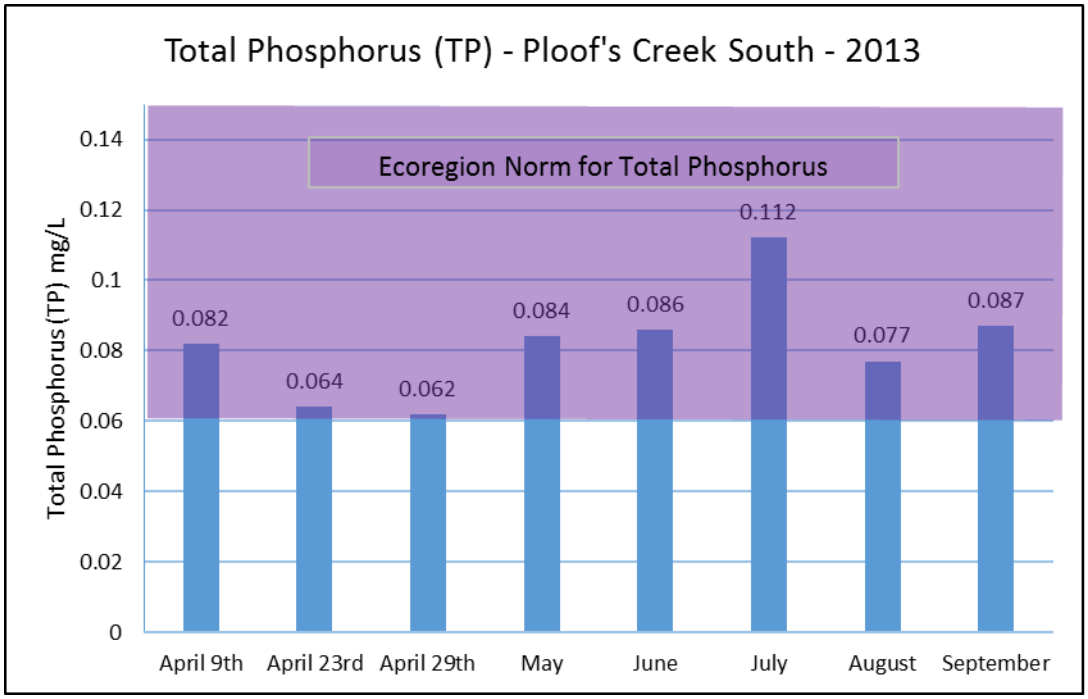
Shoreland Buffer Zone Option for Water Quality Protection

In 2012, the SRWD conducted a shoreline assessment of Grand Lake. Recommendations for protecting the water quality of Grand Lake were included in the final report, and could be expanded upon if requested.

One recommendation included in the report is to restore the manicured lakeshores into buffer zones with native vegetation. Creating a restored buffer zone provides several benefits such as offering a buffer between the affects of human activity and the lake, enhancing the amount and quality of habitat for both aquatic and terrestrial organisms, and stabilize the shorelines to decrease the amount of erosion occurring.

The final report on the shoreline assessment conducted in 2012, as well as additional documentation and recommendations from this project, are available upon request through the Sauk River Watershed District.

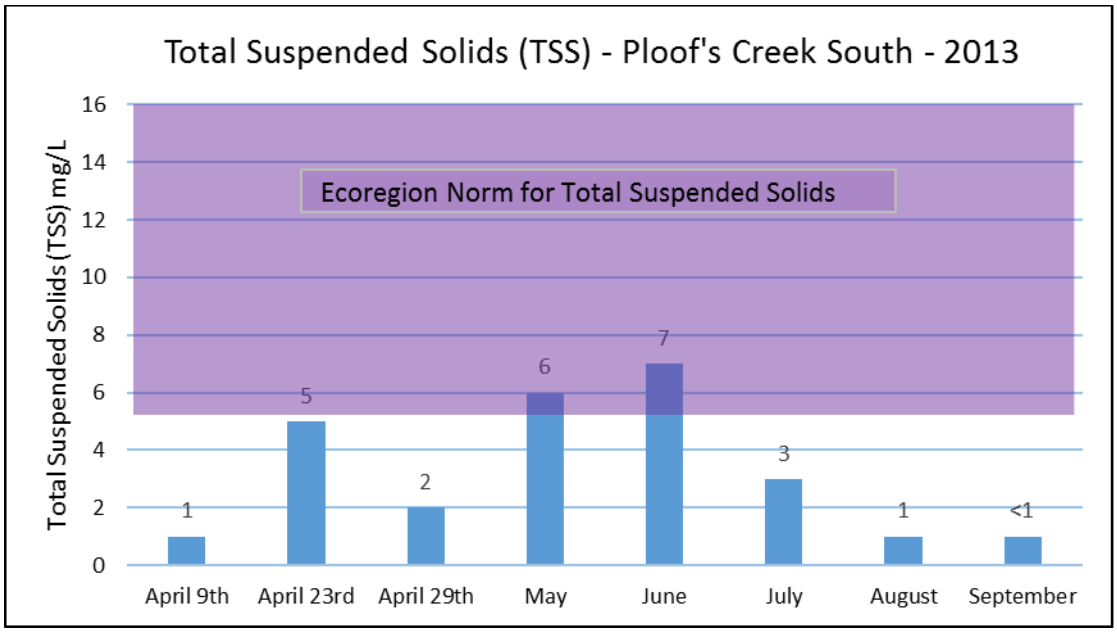
Ploof's Creek South



Total Phosphorus (TP)

The current ecoregion standard for total phosphorus in streams ranges from 0.06-0.15 mg/L. This is the standard that is shown in the figure to the left, however, it is important to note that the MPCA is currently going through the rule making process to adopt a new standard. That standard will be used by the SRWD once it is approved.

In regards to the 2013 total phosphorus samples collected on Ploof's Creek South, all samples are within the ecoregion standard.



Total Suspended Solids (TSS)

The current ecoregion standard for total suspended solids in streams ranges from 4.8-16mg/L. This is the standard shown in the figure to the left. The MPCA is currently going through the rule making process to adopt a new standard for total suspended solids, which will be used by the SRWD once it is approved.

As shown on the left, the 2013 total suspended solids samples collected on Ploof's Creek South are all within or below the ecoregion standard.

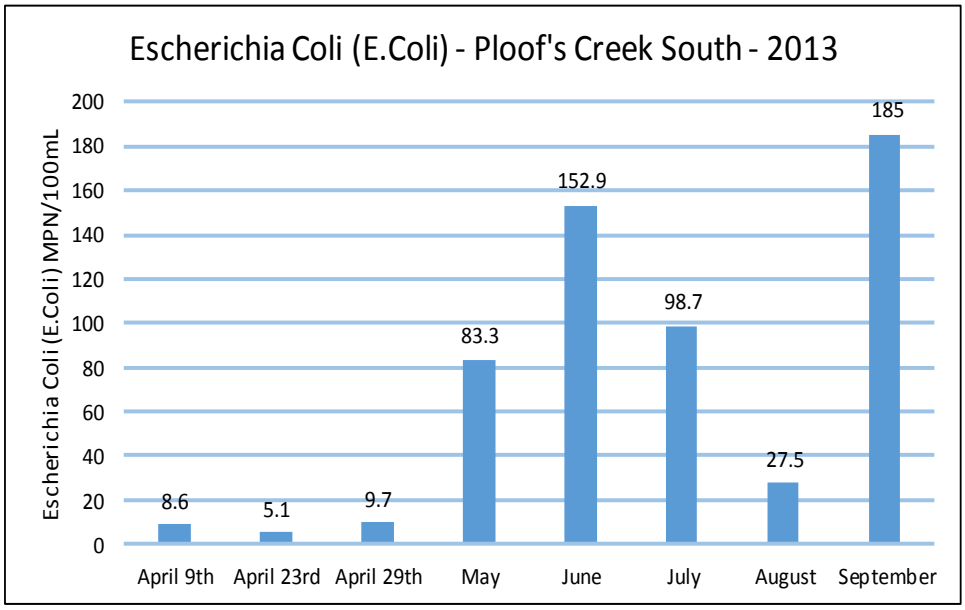
Ploof's Creek South

Escherichia Coli (E.Coli)

E.Coli is a bacteria found in surface waters that can be toxic to humans. It is found in human and animal waste and contaminates surface waters through direct surface runoff during rain events, snow melt, leaking septic systems, and manure spills. Due to the variety of ways it can contaminate surface waters, it is considered a "flashy" parameter and a large number of data points must be present to draw accurate conclusions regarding the data.

To establish a geometric mean for *E.Coli* data (which is the standard process for evaluating the data) 5 samples need to be collected over a 30 day (one month) time frame (these samples can be collected over multiple years). If the geometric mean of those samples is greater than 126 MPN/100mL, or if 10% of the samples are greater than 1260 MPN/100mL then the site would not meet state standards.

With the data collected in 2012 and 2013, there were only enough data points in April to complete a geometric mean for *E.Coli* in Ploof's Creek South. Since this would not be representative of the entire season, a geometric mean will not be calculated until after the 2014 monitoring season.

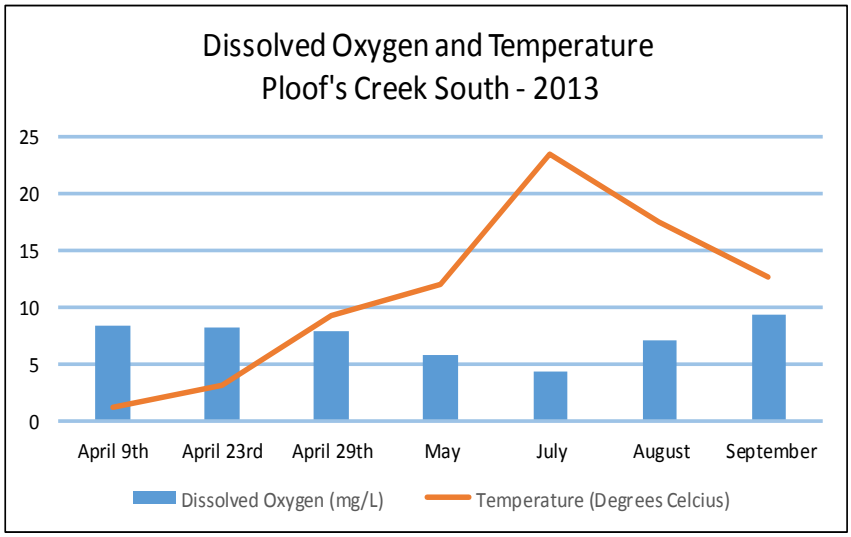


The above graph shows the *E.Coli* sample results for Ploof's Creek South in 2013. The large variation between sample results makes it difficult to draw conclusions based on this small data set.

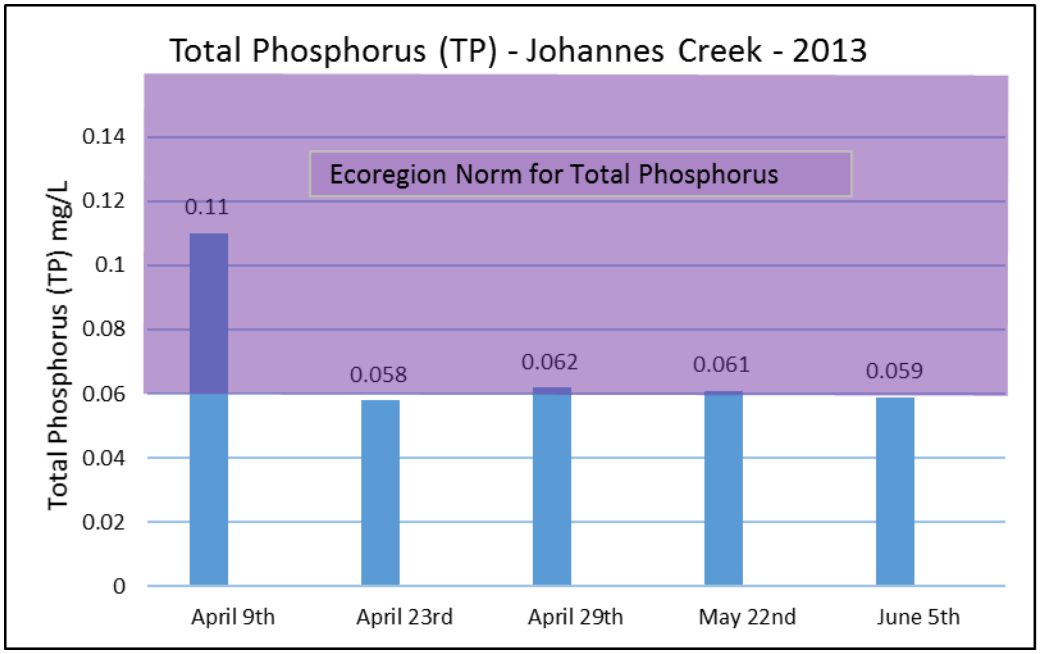
Summary of Creek Status

Based on the data collected in the 2013 monitoring season, Ploof's Creek South is meeting the ecoregion standards for water quality for the parameters analyzed. As explained previously, *E.Coli* is a sensitive parameter to analyze, so more data points will be needed to provide analysis on those samples.

Below is a graph showing the dissolved oxygen and temperature readings collected at Ploof's Creek South. Dissolved oxygen is the amount of oxygen dissolved in the water that is readily available for fish and other aquatic organisms. Temperature can directly influence the amount of dissolved oxygen present.



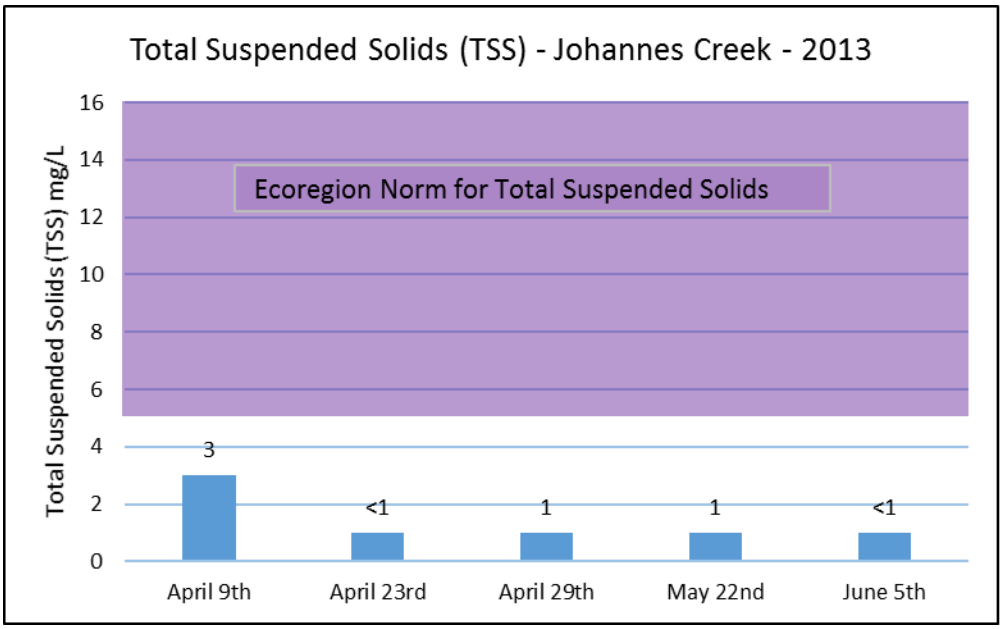
Johannes Creek



Total Phosphorus (TP)

The current ecoregion standard for total phosphorus in streams ranges from 0.06-0.15 mg/L. This is the standard that is shown in the figure to the left, however, it is important to note that the MPCA is currently going through the rule making process to adopt a new standard. That standard will be used by the SRWD once it is approved.

In regards to the 2013 total phosphorus samples collected on Ploof's Creek South, all samples are within the ecoregion standard.



Total Suspended Solids (TSS)

The current ecoregion standard for total suspended solids in streams ranges from 4.8-16mg/L. This is the standard shown in the figure to the left. The MPCA is currently going through the rule making process to adopt a new standard for total suspended solids, which will be used by the SRWD once it is approved.

As shown on the left, the 2013 total suspended solids samples collected on Johannes Creek are all below the ecoregion standard.

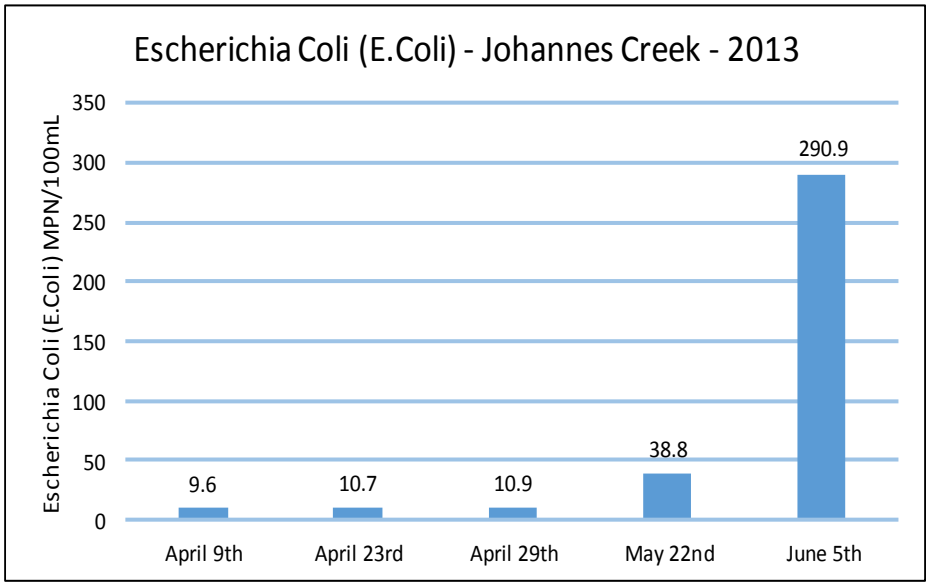
Johannes Creek

Escherichia Coli (E.Coli)

E.Coli is a bacteria found in surface waters that can be toxic to humans. It is found in human and animal waste and contaminates surface waters through direct surface runoff during rain events, snow melt, leaking septic systems, and manure spills. Due to the variety of ways it can contaminate surface waters, it is considered a "flashy" parameter and a large number of data points must be present to draw accurate conclusions regarding the data.

To establish a geometric mean for *E.Coli* data (which is the standard process for evaluating the data) 5 samples need to be collected over a 30 day (one month) time frame (these samples can be collected over multiple year). If the geometric mean of those samples is greater than 126 MPN/100mL, or if 10% of the samples are greater than 1260 MPN/100mL then the site would not meet state standards.

With the data collected in 2012 and 2013, there were only enough data points in April to complete a geometric mean for *E.Coli* in Johannes Creek. Since this would not be representative of the entire season, a geometric mean will not be calculated until after the 2014 monitoring season.

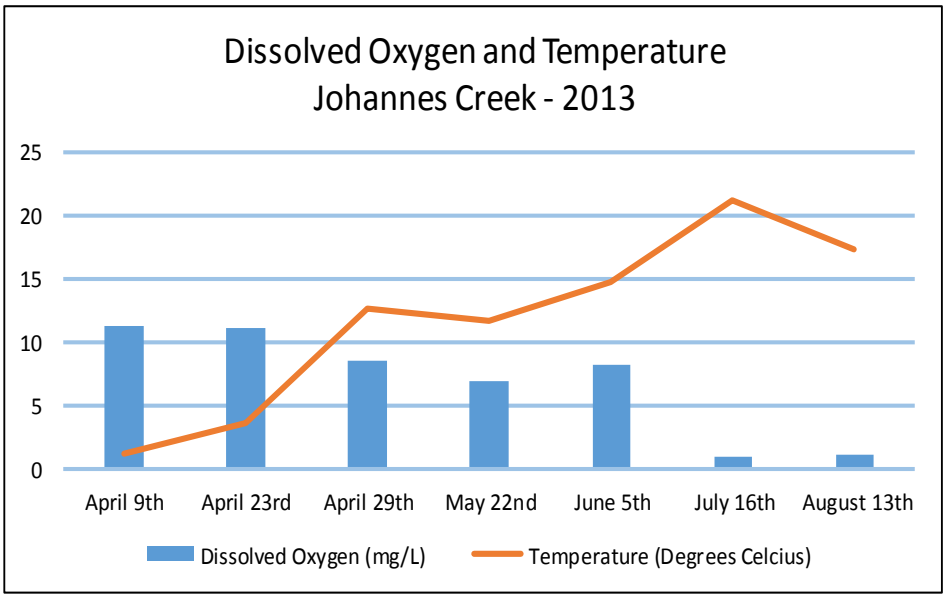


The above graph shows the *E.Coli* sample results for Johannes Creek in 2013. The large variation between sample results and the fact that staff was unable to collect samples for a large portion of the season due to stagnant water makes it difficult to draw conclusions based on this small data set.

Summary of Creek Status

Based on the data collected in the 2013 monitoring season, Johannes Creek is meeting the ecoregion standards for water quality for the parameters analyzed. As explained previously, *E.Coli* is a sensitive parameter to analyze, so more data points will be needed to provide analysis on those samples.

Below is a graph showing the dissolved oxygen and temperature readings collected on Johannes Creek. Dissolved oxygen is the amount of oxygen dissolved in the water that is readily available for fish and other aquatic organisms. Temperature can directly influence the amount of dissolved oxygen present.



Recommendations for Future Monitoring

- Continue sampling for chlorophyll a and total phosphorus on Grand Lake. Discontinue sampling for total suspended solids.
- Keep the rest of the monitoring plan for Grand Lake the same.
- Continue sampling for total phosphorus, total suspended solids, and *E.Coli* on Ploof's Creek South and Johannes Creek.
- Designate volunteers to be trained by SRWD staff to take samples during rain events. This will increase the likelihood of these samples being collected as it has been difficult for SRWD staff to get to these sites during the initial flush of a rain event.
- Continue discharge/flow measurements when conditions allow.
- Continue monitoring plan for 3 years. This will provide a 5 year data set which could include *E.Coli* analysis, which has not been completed with the existing two years worth of data due to a shortage of data points.

Contact Us

By Mail or In Person:
524 4th Street South
Sauk Centre, MN 56378

Phone:
320.352.2231

Fax:
320.352.6455

On the Web:
www.srwdmn.org

Email:
sarah@srwdmn.org

Sauk River Watershed District

Important Reminders

The data and recommendations included in this report are based on the 2013 monitoring season by the Sauk River Watershed District. It is important to remember that this dataset is not a complete picture of all conditions. 2013 was a dry year which can have a significant impact on data collection in comparison to a wet year.

Please contact Sarah Jo, Monitoring Coordinator at the Sauk River Watershed District with any questions or concerns regarding the information presented in this report.