

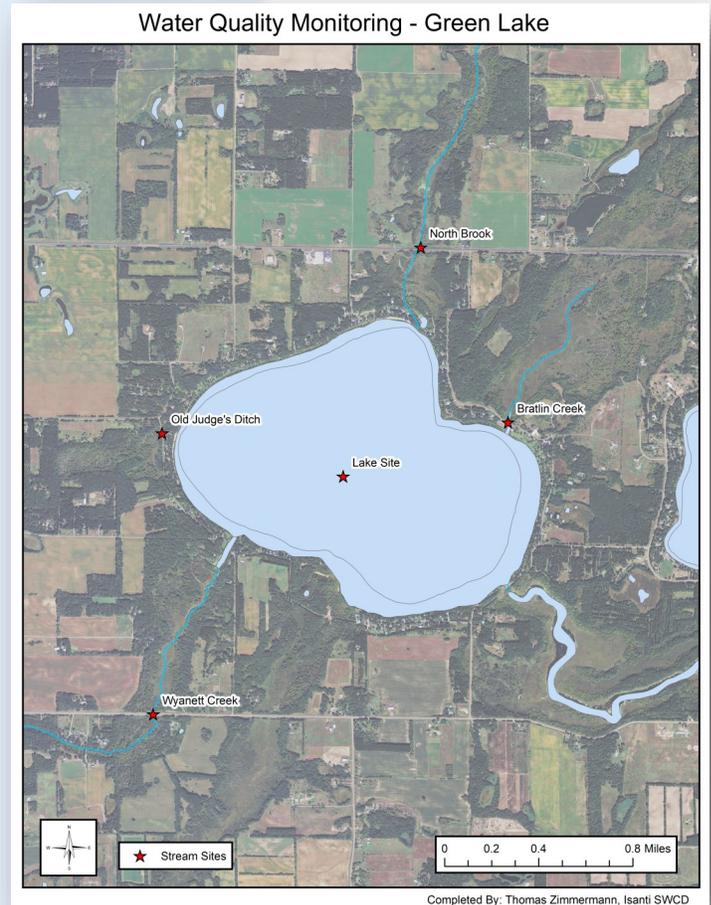
Green Lake Tributary Monitoring 2018



North Brook



Wyanett Creek



2018 was the third year the Green Lake Improvement District (GLID) partnered with the Isanti Soil and Water Conservation District (SWCD) to monitor the health of inlets that empty into Green Lake:

- North Brook at highway 95
- Wyanett Creek at 325th Ave.
- Bratlin Creek
- Old Judge's Creek

This report describes the results of monitoring that occurred in 2018 as well as comparisons to previous years.

General Definitions:

Total Phosphorus: An essential plant nutrient in which an excess can cause severe algal blooms.

Orthophosphate: The amount of phosphorus that is immediately available for algae and plant growth.

Total Suspended Solids: Tiny particles of soil and other matter that remain suspended in water making it cloudy. Particles include sediment and organic matter.

Transparency: An indirect measure of suspended and dissolved materials (soil particles and tea color caused by organic materials) in the water.

2018 Area Conditions



2018 Rainfall Summary

The area was largely missed by heavy rains throughout the year. The majority of rain events occurred during the growing season (vegetation was growing and available to take up water) and nearly all events were under two inches. As a result, less sediment and phosphorus made its way into surface waters and water levels and flow were lower than usual across the county. Consistent (though still small) rain events and cooler than average temperatures in the fall led to a slight rebound in stream levels late in the season.

Water Health Comparisons:

- TP measurements for this ecoregion typically range between 60 and 150 $\mu\text{g/L}$.
- TSS measurements for this area typically range between 4.8 and 16 mg/L .
- The State goal or standard for TP in streams is 100 $\mu\text{g/L}$ (i.e. we would like to see TP stay below this number).

Tributary Monitoring

What: In 2018 eight sampling events were targeted at four inlets. We targeted four samples during rain events and four during base flow. The samples were tested for total phosphorus (TP), total suspended solids (TSS) and transparency. Dissolved oxygen, temperature, conductivity, pH and water flow were also measured in the field.

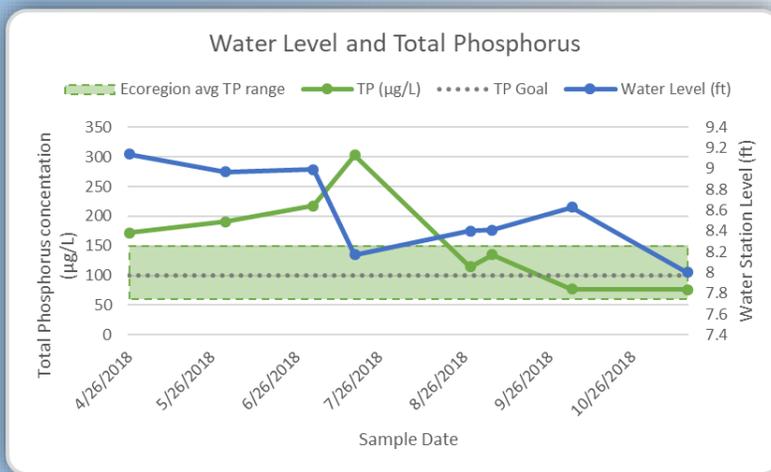
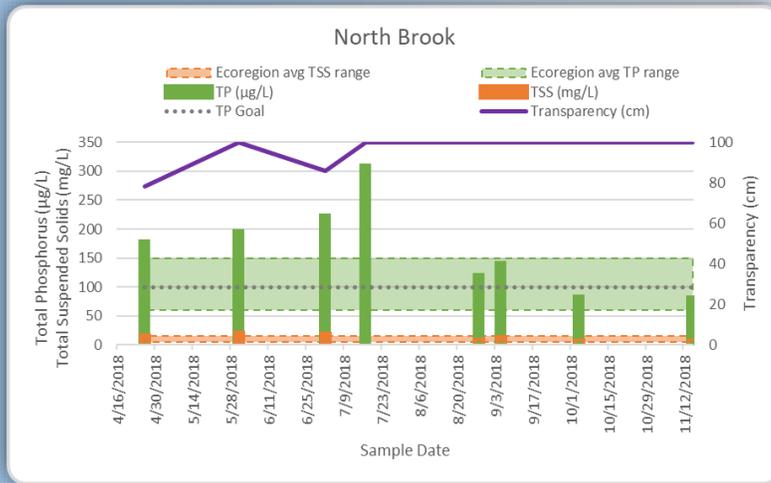
In addition to water quality, water levels were continually tracked using in-stream data loggers at North Brook and Wyanett Creek. The water levels were recorded every four hours from early May through early November.

Why: The information collected is used in conjunction with the Subwatershed Assessment for North Brook and Wyanett Creek completed in 2017. The data helps us determine which tributary should be a higher priority for water quality projects. In theory, the stream that delivers the most nutrients to the lake would be the highest priority. Additionally, the information collected can be used to track trends and to determine how well water quality improvement projects are working.

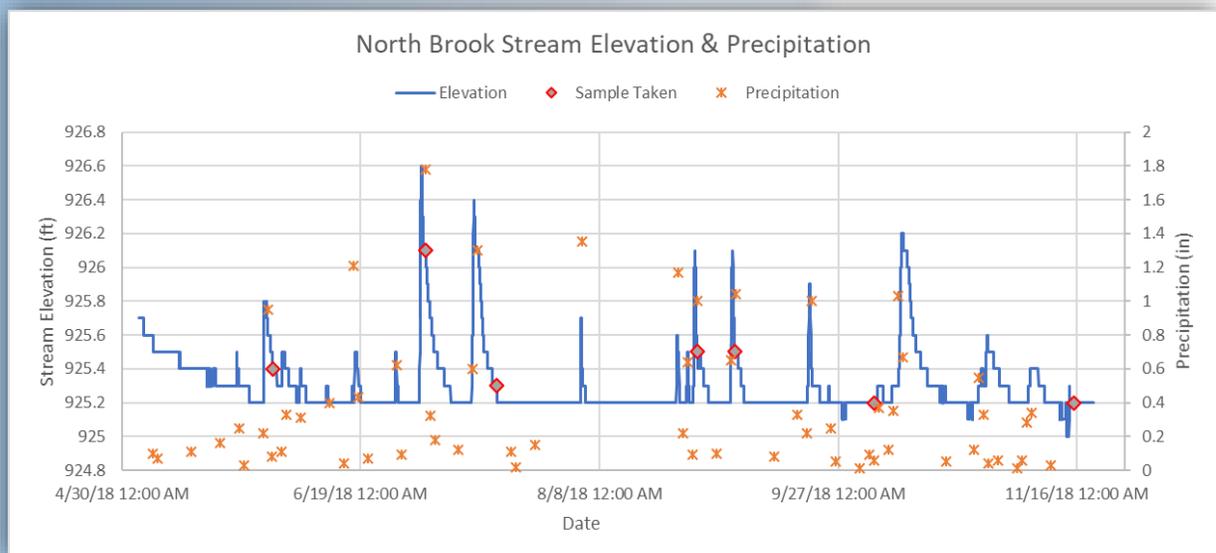
2018 Tributary Monitoring Results

Total Suspended Solids (TSS), Total Phosphorus (TP) and Transparency Tube

Site: North Brook



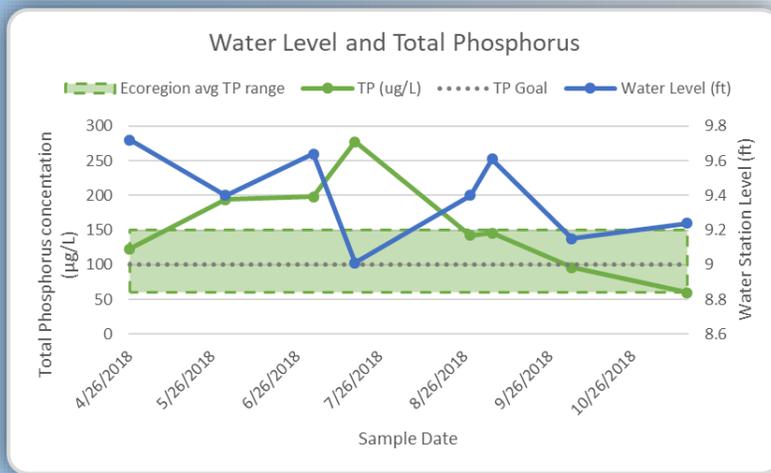
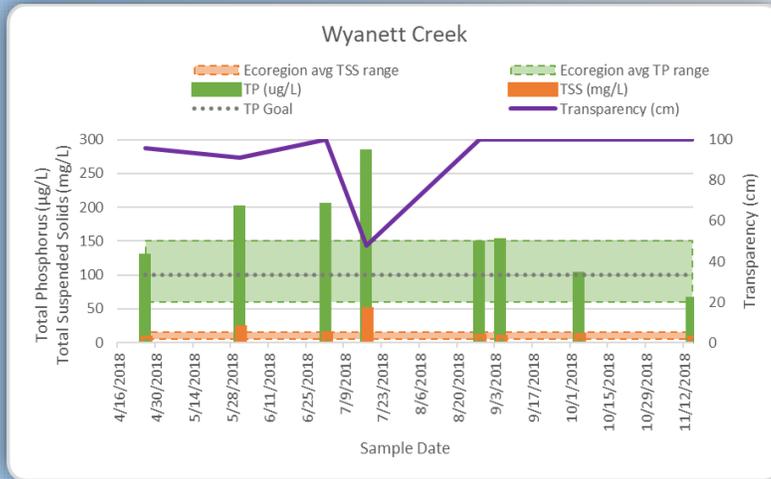
- 2018 average TP was 173 µg/L. The average TP range from 2016-2017 was 169-181µg/L.
- This tributary had the highest TP of all four tributaries monitored in 2018. Elevated TP in July corresponds with rain events.
- TP concentrations were relatively lower than previous years. The timing of rainfall as described at the beginning of the report likely has something to do with this (less nutrients being flushed from the land in 2018).
- 2018 average TSS was 9 mg/L. The average TSS range from 2016-2017 was 10-21 mg/L.
- 2018 average transparency was 96 cm. The average transparency range from 2016-2017 was 86-93 cm.
- TP levels appear to have an inverse relationship with water level.
- In 2018, based on paired flow and sample information, North Brook contributed more nutrients to the lake than Wyanett Creek. The reverse was true in 2016 and 2017.



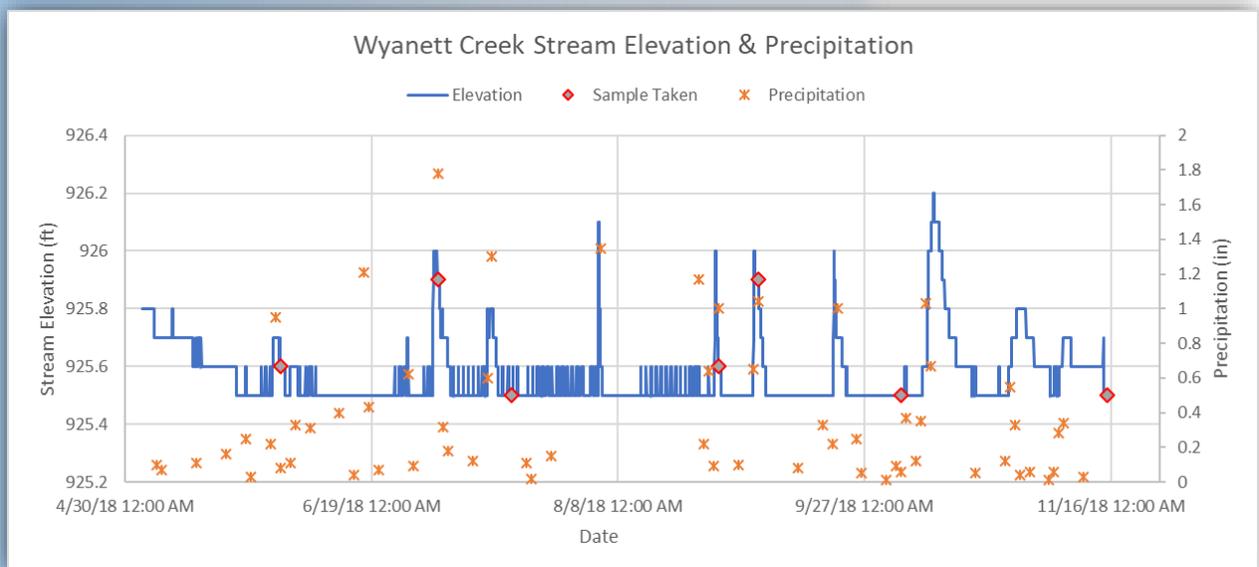
2018 Tributary Monitoring Results

Total Suspended Solids (TSS), Total Phosphorus (TP) and Transparency Tube

Site: Wyanett Creek



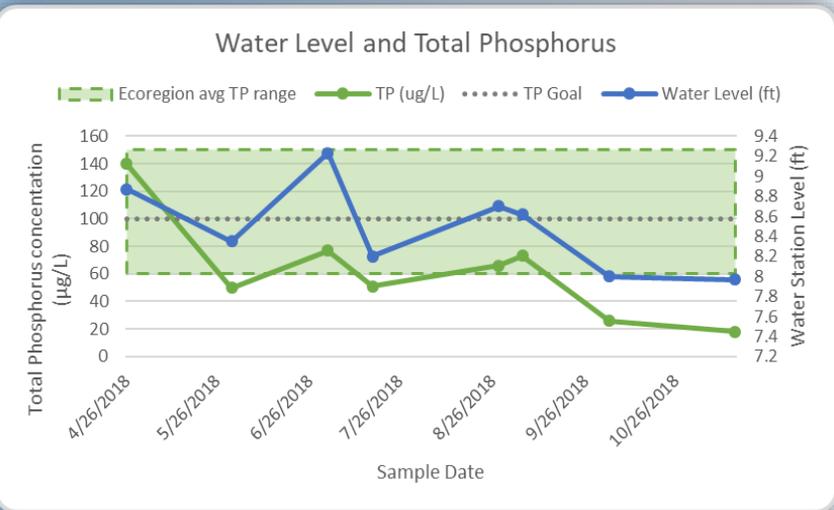
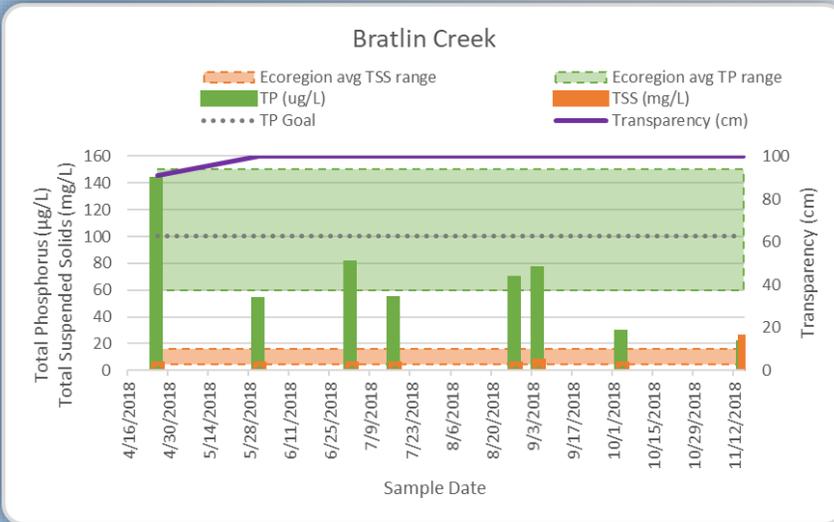
- 2018 average TP was 154 $\mu\text{g/L}$. The average TP range from 2016-2017 was 220-247 $\mu\text{g/L}$.
- This site had the second highest TP of the four sites monitored.
- TP concentrations were relatively lower than previous years. The timing of rainfall as described at the beginning of the report likely has something to do with this (less nutrients being flushed from the land in 2018).
- 2018 average TSS was 11 mg/L. The average TSS range from 2016-2017 was 18-24 mg/L.
- 2018 average transparency was 92 cm. The average transparency range from 2016-2017 was 79-84 cm.
- TP levels appear to have an inverse relationship with water level.
- In 2018, based on paired flow and sample information, North Brook contributed more nutrients to the lake than Wyanett Creek. The reverse was true in 2016 and 2017.



2018 Tributary Monitoring Results

Total Suspended Solids (TSS), Total Phosphorus (TP) and Transparency Tube

Site: Bratlin Creek



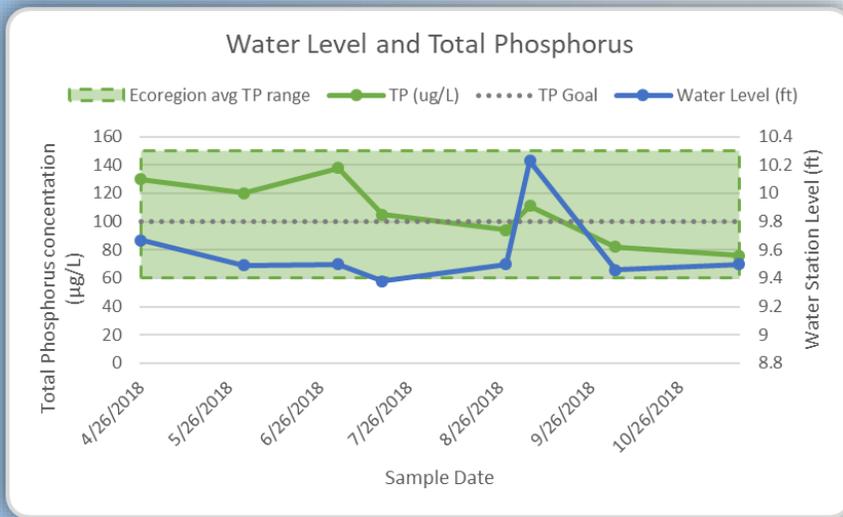
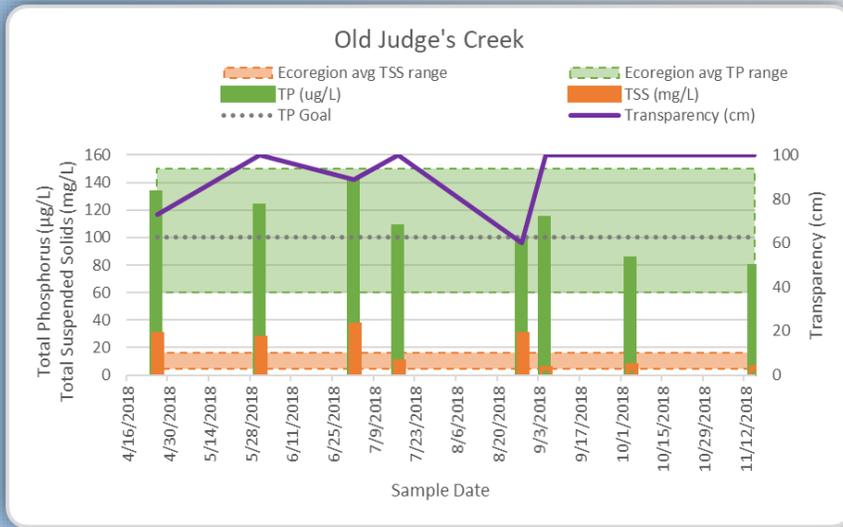
- 2018 average TP was 63 µg/L. The average TP in 2017 was 102µg/L.
- This site had the lowest TP of all four tributaries monitored.
- This site has relatively low TP throughout the season; however, early season high TP occurred in both 2017 and 2018.
- TP concentrations were relatively lower than previous years. The timing of rainfall as described at the beginning of the report likely has something to do with this (less nutrients being flushed from the land in 2018).
- 2018 average TSS was 2 mg/L. The average TSS in 2017 was 6 mg/L.
- 2018 average transparency was 99 cm. The average transparency in 2017 was 100 cm.
- TP levels correspond with water level fluctuations.
- Based on paired flow and TP measurements, Bratlin Creek contributed the second lowest amount of TP to the lake in 2018.



2018 Tributary Monitoring Results

Total Suspended Solids (TSS), Total Phosphorus (TP) and Transparency Tube

Site: Old Judge's Creek



- 2018 average TP was 107 µg/L. The average TP in 2017 was 102µg/L.
- TP concentrations were relatively lower than previous years. The timing of rainfall as described at the beginning of the report likely has something to do with this (less nutrients being flushed from the land in 2018).
- 2018 average TSS was 16 mg/L. The average TSS in 2017 was 6 mg/L.
- 2018 average transparency was 90cm. The average transparency in 2017 was 100cm.
- Stream flow is typically blocked by a man-made dam (log) in the culvert.
- TP levels correspond with water level fluctuations.
- Based on paired flow and TP measurements, Old Judge's Creek contributed the lowest amount of TP to the lake in 2018.



2018 Results and Recommendations



2018 summary:

North Brook: While TP levels were lower than previous years, there is plenty of opportunity for improvement. This watershed should be a priority location for restoration projects such as cover crops, filter strips, buffers, and/or a wetland restoration. More investigation would be necessary before moving forward with a wetland restoration. Isanti County is currently in the process of initiating a county ditch maintenance program— North Brook is planned to be the first ditch to go through the process. The County will work closely with the SWCD to identify restoration opportunities during the process.

Wyanett Creek: While TP levels were lower than previous years, there is plenty of opportunity for improvement. This watershed should be a priority location for restoration projects such as cover crops, filter strips, buffers, and/or a wetland restoration. More investigation would be necessary before moving forward with a wetland restoration.

Bratlin Creek: This location typically has good water health (with the exception of the early season). While there may be restoration opportunities here— time and effort may be best focused at North Brook and Wyanett Creek to start. However, if the opportunity arises, the protection of existing natural areas (wetland, forest, grassland) in this watershed would be beneficial (i.e. land easements or purchases and/or increased building set-backs from the creek and wetland boundaries).

Old Judge's Creek: Water flow at this location is the lowest of all sites; thus, this site contributes the least TP to the lake. Nonetheless, if opportunities for restoration projects arise in this watershed they should be investigated— time and effort may be best focused at North Brook and Wyanett Creek to start.

Future Monitoring

- No monitoring is scheduled for 2019. The SWCD recommends sampling every other year OR three years on and three years off. Cost estimates will be provided to the LID for both scenarios prior to the July Annual meeting.



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Thanks to the GLID members who have assisted with lake and stream monitoring, notably Ken and Barb Murray.