



Little Beaver Creek Subwatershed Health Check

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On behalf of the Beaver River Watershed Initiative



Acknowledgement

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Introduction

The Beaver River Watershed Initiative (BRWI) is an Environmental Non-Profit Organization and sub-committee of Grey Sauble Conservation Authority (GSCA). The BRWI focuses on enhancing watercourses within the Town of the Blue Mountains and the Municipality of Grey Highlands. Little Beaver Creek subwatershed is one of the smallest subwatersheds in the greater GSCA watershed. The headwaters of Little Beaver Creek begin just west of The Blue Mountains Meaford Townline and there are 4 major branches, or tributaries that feed into the main channel, classifying it as a 4th order stream. The Little Beaver Creek subwatershed was graded as a “C-Fair” in the most recent GSCA Watershed Report Card. This project entitled “Little Beaver Subwatershed Health Check” is a short-term study to gain a better understanding of the water quality in the Little Beaver Creek subwatershed in order to target stewardship and restoration efforts. It is important to note that this limited number of samples is not enough to quantify any significant conclusions about the water quality of Little Beaver Creek and that more studies are needed.

Procedure

Water samples were collected 8 times between April and October 2019. The locations are shown in Figure 1. Site 1 is located at the Town of the Blue Mountains water treatment plant off Bay Street West and Site 2 is located off Highway 26 south of the Georgian Trail bridge. Site 3 is the east branch of the Little Beaver on Alfred Street West. Site 4 is where the Little Beaver Creek crosses under 10th Line. There are two branches that flow into the main Little Beaver, Site 5 which is the west branch on Alfred St. W and Site 6 at the corner of Peel Street North and Highway 26. These sites were chosen to gain a more comprehensive understanding of the water quality from the headwaters, contributing tributaries and the creek mouth.

At each site, two PET bottles were rinsed three times each and then filled by facing upstream and submerging them approximately 30 cm under water (where possible). These samples were sent to SGS Canada Inc. and tested for: Total Phosphorus, Nitrate, Nitrite, Chlorides and Suspended Solids. Additionally, one bacti bottle was filled at each site to be tested for E.coli.

While in the field, a YSI multimeter was used to measure physical parameters, including: temperature, dissolved oxygen, conductivity, turbidity and pH.

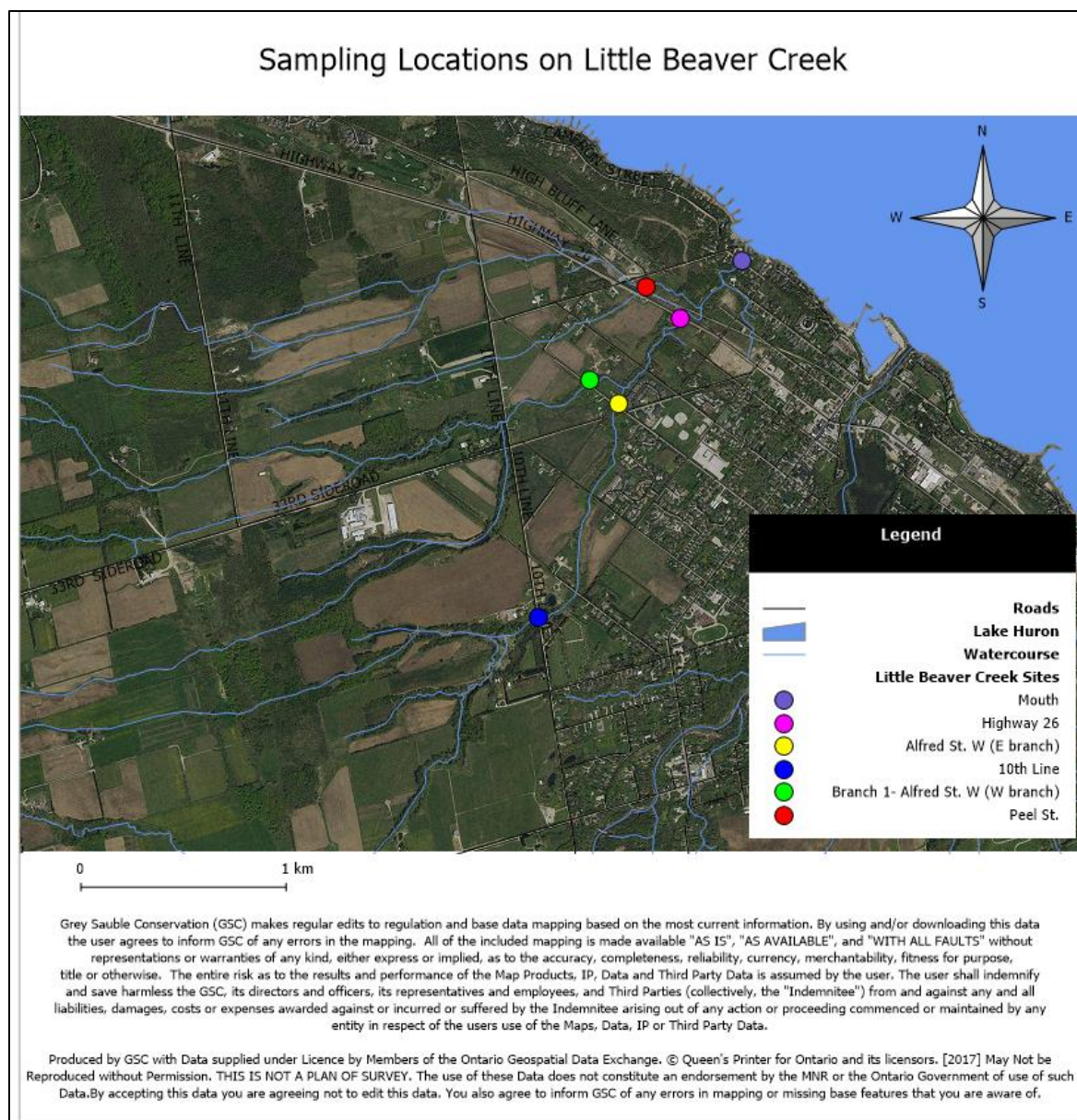


Figure 1. Sampling locations on Little Beaver Creek

Box and Whisker Plots are used in the results section to best show all results at each sampling location. They can be interpreted as follows:

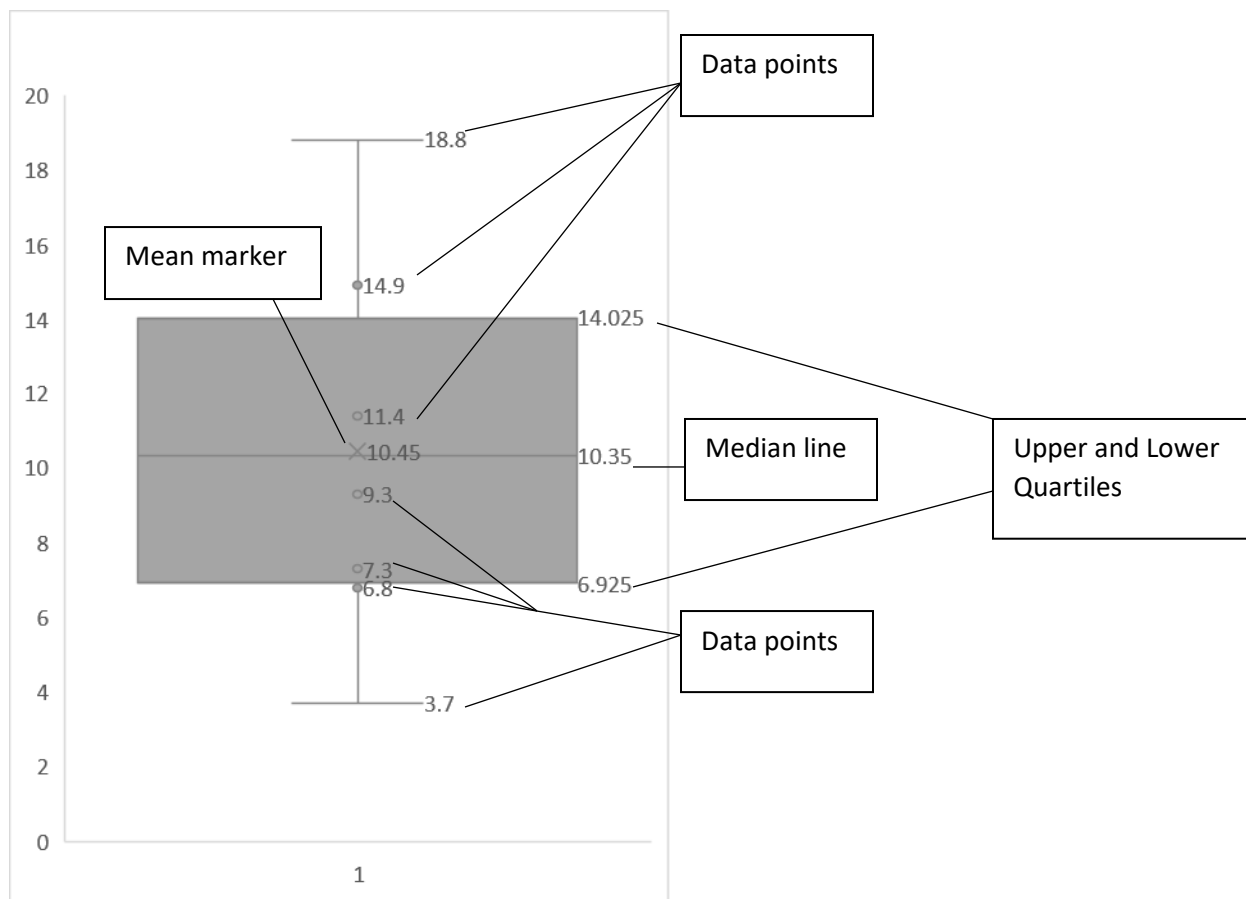


Figure 2. How to interpret Box and Whisker Plot

Results

Raw data is not included in this report but is available upon request.

Dissolved oxygen levels for Highway 26, Alfred St. W (E branch), 10th Line and Branch 1- Alfred St. W had averages of 7.19 mg/l, 6.47 mg/l, 6.77 mg/l and 6.65 mg/l respectively. The averages for the mouth and Peel St. were slightly higher, averaging 10.23 mg/l and 9.45 mg/l. Figure 3 summarizes all results using a Box and Whisker Plot. The Canadian Water Quality Guidelines for the Protection of Aquatic Life list Dissolved Oxygen requirements in warm water as 6 mg/l for early life stages and 5.5 mg/l for other life stages and cold water as 9.5 for early life stages and 6.5 for other life stages.

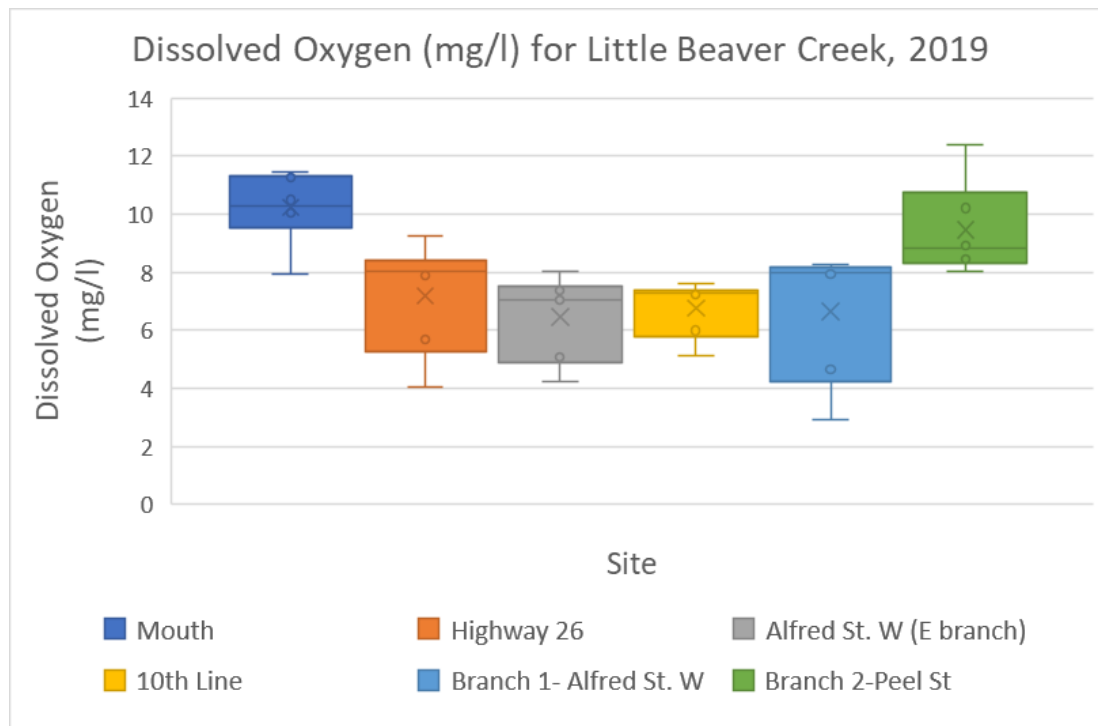


Figure 3. Dissolved oxygen (mg/l) results, 2019

E.coli results as shown in Figure 4 indicate that all data points were between 0 and 230 CFU/100 ml with the exception of Highway 26 on June 24, where the count was 1240 CFU/100 ml. The allowable limit set by the federal government for recreation is 100 CFU/100 ml and when reviewing the geomean of all sites as shown in Figure 5, all sites except for the site at Highway 26 are below this limit. This site is also being skewed by the one reading of 1240 CFU/100 ml.

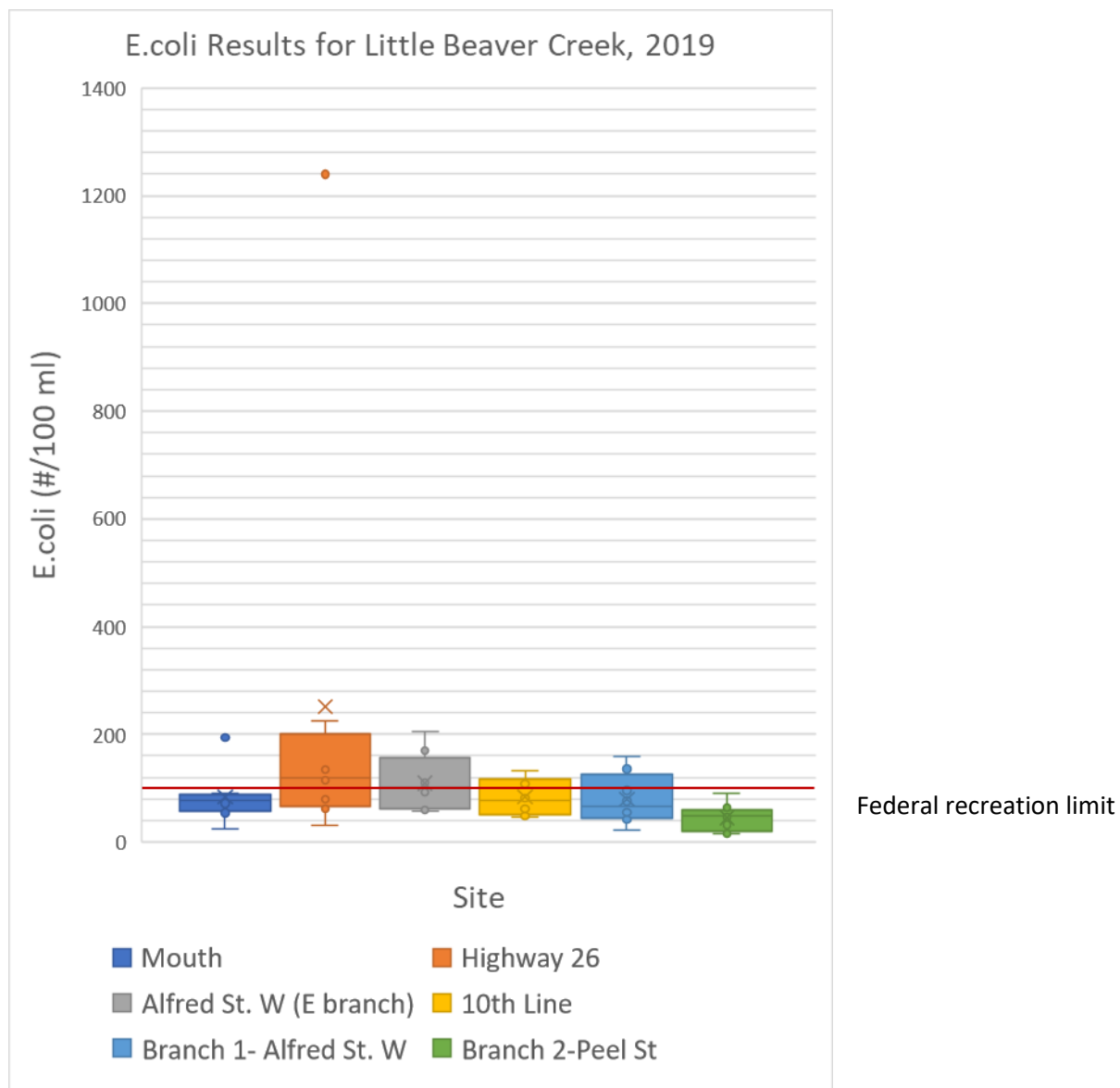


Figure 4. E.coli (#/100 ml) results, 2019

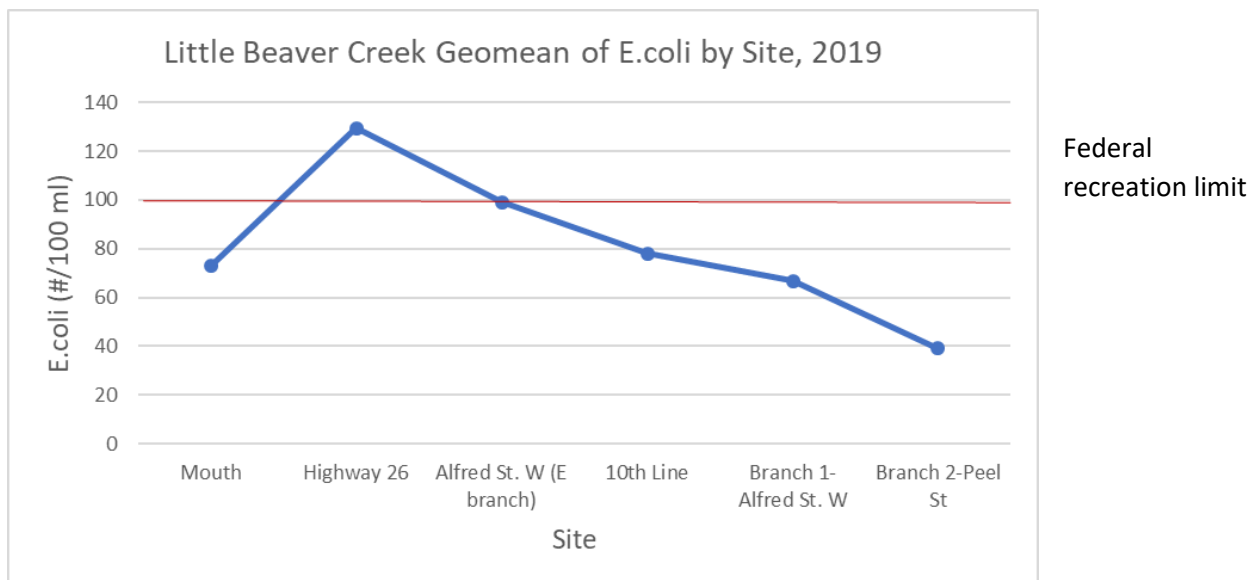


Figure 5. E.Coli Geomeans for all Sites on Little Beaver Creek, 2019

Total Phosphorus results are shown in the Box and Whisker Plot in Figure 6. The Provincial Water Quality Objective (PWQO) for Total Phosphorus is 0.03 mg/l, in which case most data points fall below that limit. When looking at the average Total Phosphorus results for each site in Figure 7, all sites on average are below the PWQO.

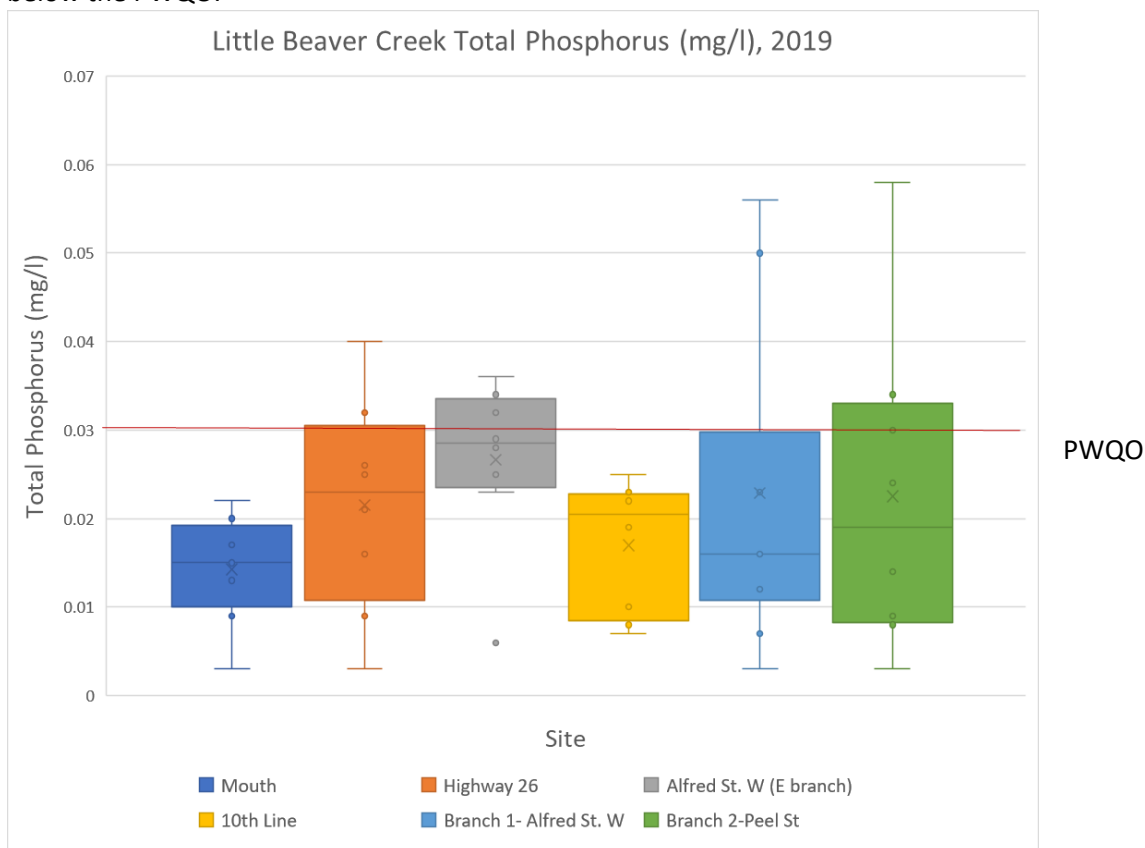


Figure 6. Total Phosphorus (mg/l) results for Little Beaver Creek, 2019

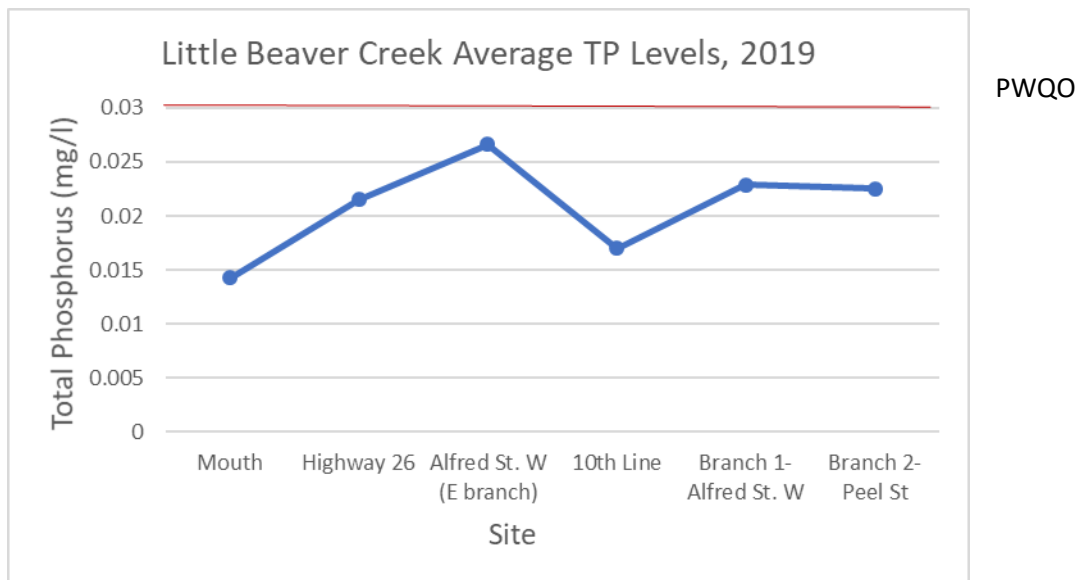


Figure 7. Average Total Phosphorus (mg/l) results for Little Beaver Creek, 2019

Nitrate results are shown in the Box and Whisker Plot in Figure 8. These results are well below the Canadian Council of Ministers of the Environment (CCME) guidelines of 550 mg/l short term or 13 mg/l long term.

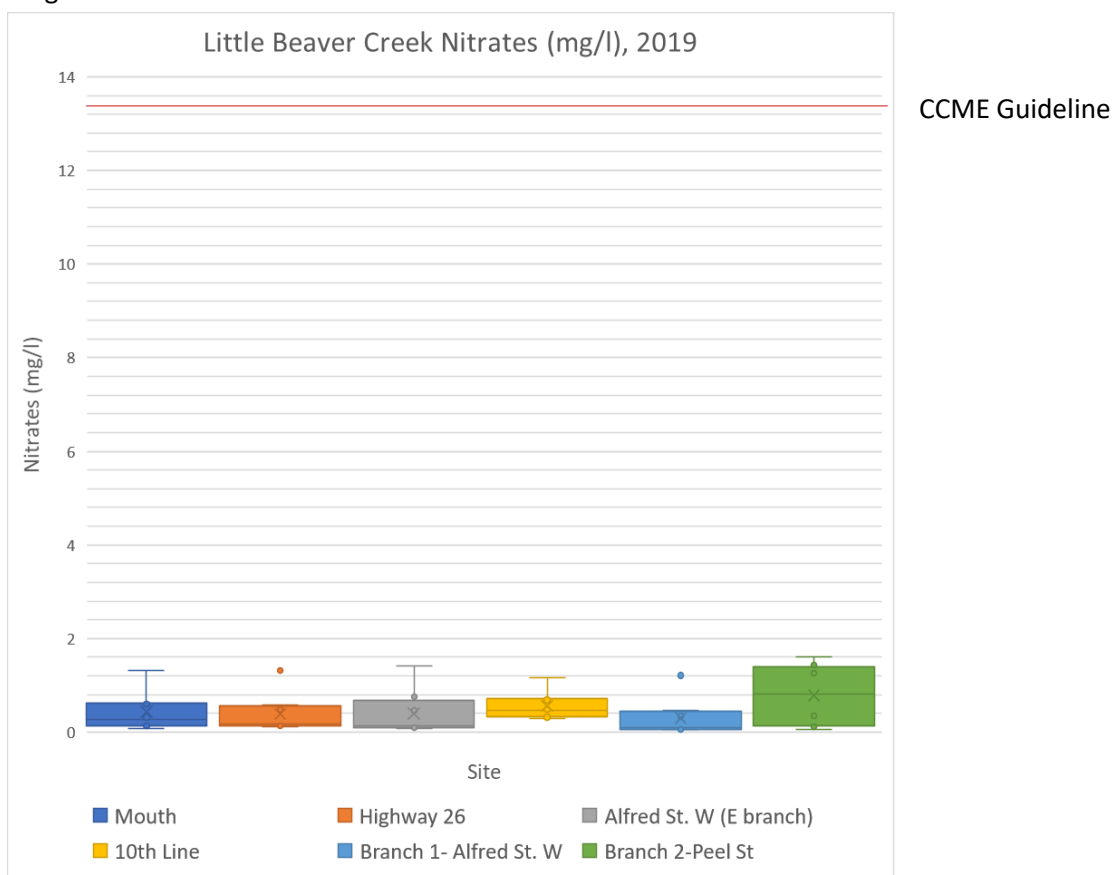


Figure 8. Nitrate (mg/l) results for Little Beaver Creek, 2019

The CCME guidelines for Chloride is 640 mg/l short term or 120 mg/l long term. All sites on average are well below these limits, as shown in Figure 9.

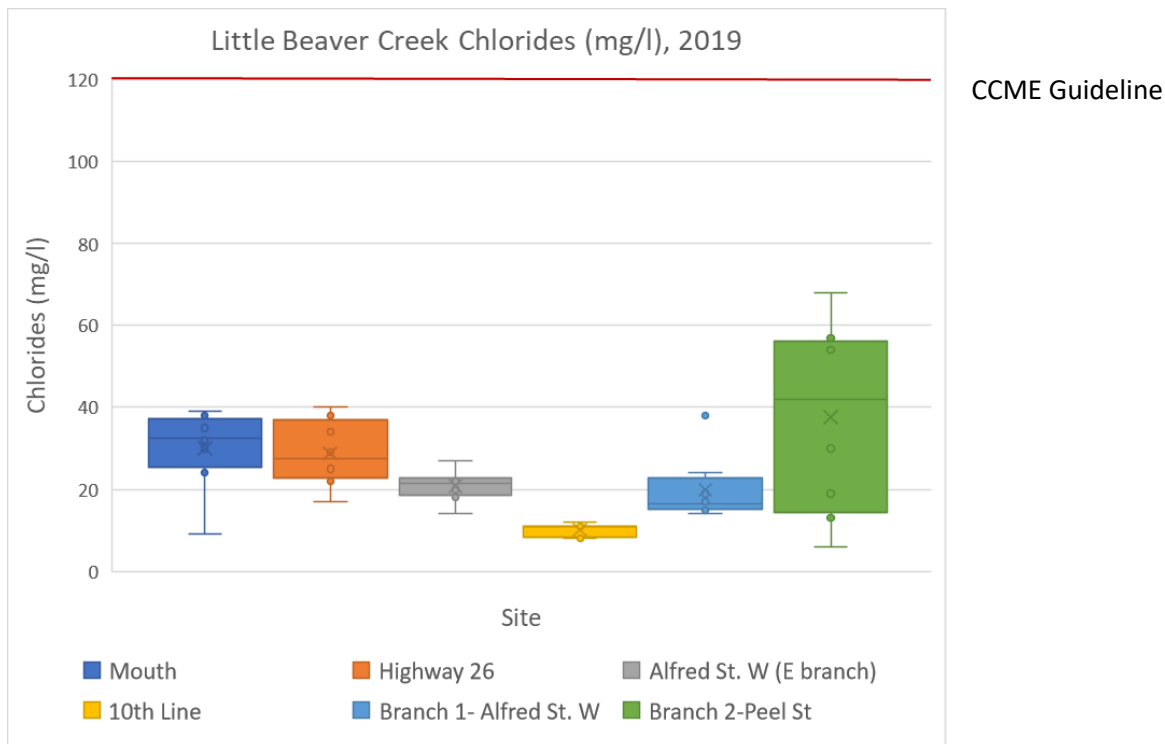


Figure 9. Average Chloride (mg/l) levels per site on Little Beaver Creek, 2019

Suspended solids results are shown in Figure 10. There are no guidelines for suspended solids.

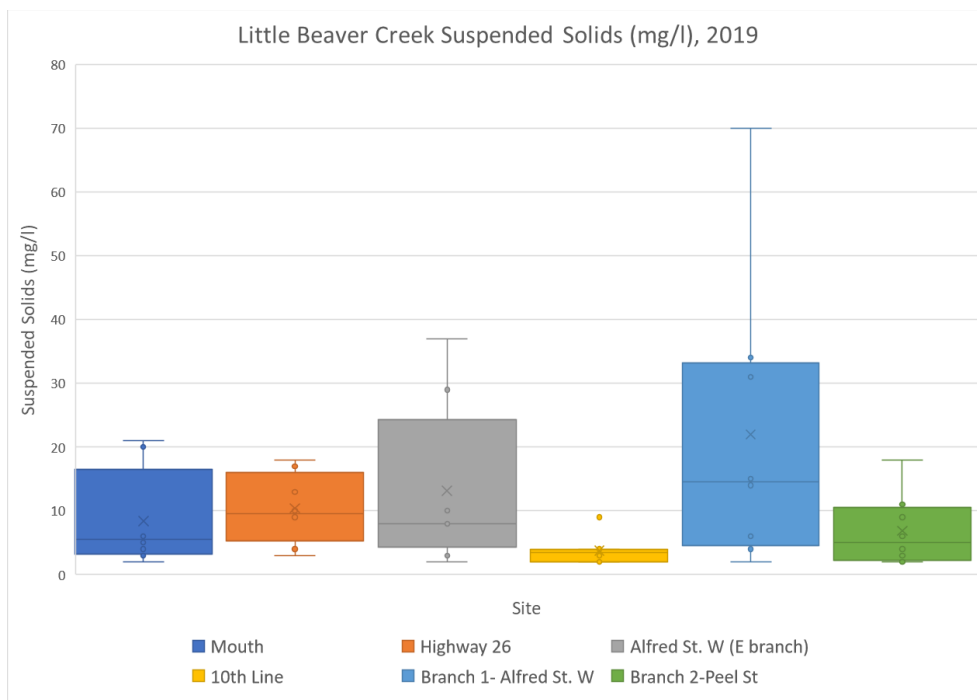


Figure 10. Suspended solids (mg/l) results per site on Little Beaver Creek, 2019

Discussion/Conclusion

As the name suggests, Little Beaver Creek is host to a thriving beaver population. Although beavers are a keystone species, they can create some water quality and quantity challenges. Little Beaver Creek is also a smaller subwatershed with a variety of different land uses, including: orchards or vineyards, improved pasture and forage crops, urban/built up, unimproved pasture and range land, some small patches of productive woodland and one golf course.

The dissolved oxygen in Little Beaver Creek is lowest at Highway 26, Alfred St. W (E branch), 10th Line and Branch 1- Alfred St. W. Potential reasoning for these sites could be a result of beaver dams that are blocking flow. However, it could be that dissolved oxygen is naturally low in this creek based on stream morphology and flow. E.coli is fecal coliform bacteria, which comes from the intestinal tract of warm blooded animals. This is a difficult parameter to pinpoint because it could come from septic systems, manure runoff or wildlife. The only outlier in these data points is on June 24 at Highway 26, where there is high beaver activity. Turbidity and suspended solids were not high on this date, indicating that it was not a storm event and therefore likely a result of beaver presence.

Possible sources of phosphorus in Little Beaver Creek are agricultural and residential fertilizers and runoff, soil erosion and stormwater. All of the sample results were below 0.06 mg/l and the average for all sites was below the PWQO of 0.03 mg/l.

Nitrates are present in water as a result of decay of plant or animal material, agricultural fertilizers, domestic sewage or treated wastewater contamination, and geological formations containing soluble nitrogen compounds. The number of nitrates in all samples was very low throughout this sampling period and is likely a result of natural processes. This is a similar observation with chlorides and suspended solids. Both parameters were well below the CCME guidelines, however it is important to note that this was a dry year and that a significant rain event was not captured.

In conclusion, based on these short-term results and given the dry season, the results for the 6 parameters did not show any alarming results. However, ongoing and more frequent sampling is required to paint a clearer picture. Further studies on Little Beaver Creek are needed, for example, deployment of temperature loggers would allow us to classify the system as warm, cool or cold which may indicate which fish species could be present. The BRWI and GSCA are also interested in learning more about the bridge on the Georgian Trail that goes over Little Beaver Creek to determine if the abutment is acting as a barrier to fish movement. This would involve an engineered study as well as fish population data from the Ministry of Natural Resources and Forestry. Stewardship efforts such as riparian tree planting, fencing livestock out of waterways and use of soil best management practices will be explored through GSCA's stewardship program to attempt to improve the "C-fair" letter grade, to a "B-good". These results are summarized every 5 years, with the next report due in 2023.