Sherbrooke Lake 2018 - 2023 Water Quality Report Card

Sherbrooke Lake STEWARDSHIP Committee

Monitoring of Sherbrooke Lake's water quality was led by the Sherbrooke Lake Stewardship Committee (SLSC). This committee was comprised of citizen representatives appointed by the Municipality of Chester (MOC), and the Municipality of the District of Lunenburg (MODL), in addition to a water quality expert, and officials from both Municipalities. The group received technical support from Coastal Action, who are also leading the related LaHave River Watershed Project which has studied water quality throughout the watershed since 2007. Both municipalities provided funding to support the program, while trained property owners around the lake provided hands-on work to collect the samples.

Sherbrooke Lake Sampling

2023 marked the final year of the Sherbrooke Lake water quality monitoring program. Monitoring activities were not completed in 2020 due to COVID-19 pandemic restrictions. In 2017, a preliminary monitoring program determined the best methods and sampling sites for the baseline study. In 2018, hydrocarbons were sampled to assess the impact from motorized boats, but all readings were below detection levels so it was removed from the program in subsequent years. From 2018 to 2023, water samples were collected from lake and inlet stream sites during summer months and tested for total suspended solids, total nitrogen, total phosphorus, E. coli, and chlorophyll-α. A ProDSS YSI unit was used for in-situ measurements of temperature, barometric pressure, dissolved oxygen (% and mg/L), specific conductivity, total dissolved solids, salinity and pH. Four streams were monitored with the lake sites, while seven streams around the lake were tested once annually after a large rain event to monitor water quality changes related to high runoff events. Bottom sediment samples were also collected at three lake sites and one river site once annually, to assess the long-term accumulation of nutrients and metals, which can also influence the lake's water chemistry. In response to concerns about cyanobacteria blooms the lake, MODL purchased a Total Algae Probe in 2021, this probe was fixed to the YSI sampling device used to obtain on-site water quality readings of Chlorophyll, a compound present in all algae species, and Phycocyanin, which is a specific colour found in potentially toxic cyanobacteria (also called blue-green algae).

How is Sherbrooke Lake's water quality?

Bacteria

All lake sites were consistently below Health Canada's 235 CFU/100 mL recreational limits for E. coli– the highest average lake concentration was 3.3 CFU/100 mL, well below the threshold. Lake sites were consistently lower than stream sites. Health Canada guidelines were also not exceeded for stream samples, except during the rainfall-dependent sampling in 2019 and 2022. Associated with this exceedance, and spikes in bacteria concentrations at other streams, were large rainfall events. A spike in bacteria after rainfall is common. Although it does not appear to affect the lake quality, swimming in rivers should be avoided for 24 hours after a rainfall event. Water from the lake and the rivers should always be treated prior to consumption (i.e., bathing, washing, drinking).

Temperature

All lake sites displayed a slight trend of increasing average surface water temperatures in the summer months, and the average annual temperature exceeded the 20°C temperature threshold for cold-water fish species (NSSA 2014) in 2021, 2022 and 2023. There is currently not enough data available for statistical analyses to determine if this trend is significant or due to other factors such as the time of sampling, and the weather before and at the time of sampling . If the lake surface water temperatures are increasing, this could make the lake more vulnerable to increased occurrences of cyanobacteria blooms and changes to the species composition of the lake, due to temperature thresholds that impact survival, reproduction and growth.

Figure 1: 2023 map of Sherbrooke sampling sites.

Did you know?

Algal blooms are a natural part of lake ecology but can be enhanced in size and frequency if pollution sources add extra nutrients into the environment. In a balanced ecosystem, algae and other organisms' growth is limited by the availability of nutrients; however, if nutrients become available in excess (both naturally through fall and spring turnover and sediment resuspension, or from human-caused pollution), algal blooms can occur. Not all blooms are algae (i.e., pine tree pollen forms a film on the water's surface), and not all algae blooms are toxic. Blooms should be treated with caution and should be reported with a photo to the Nova Scotia Environment and Climate Change Office in Bridgewater (902-543-4685).

Nutrients

The average annual surface nitrogen and phosphorus concentrations fell below their respective guidelines for freshwater rivers and lakes; however, both nutrients peaked following rainfall events. The increase in nutrients comes from rain washing nutrients into nearby waterbodies from surrounding sources, including roads, lawns, gardens, etc. Currently, Sherbrooke Lake's nutrient status is at the low end for freshwater lakes. This is encouraging news, but only through continued vigilance will that situation continue in the face of increasing development and alteration of the lake's shoreline and surrounding watershed. Nutrient inputs from human activities should be minimized as much as possible.

Algal Blooms

12 algal blooms were reported over the five years of this project, 2 of which were reported to NSECC (Nova Scotia Environment and Climate Change). Three of these blooms were tested and did not contain detectable microcystin (the main neurotoxin found in cyanobacteria blooms). The remaining blooms dissipated before volunteers could sample them.

Overall Lake Health

Sherbrooke Lake is considered generally healthy but vulnerable. There were no apparent water quality issues found in the baseline study, but human activities such as fertilizing lawns, removing vegetative buffers between lawns and the lake, and improper management of septic fields can all impact the lake's water quality. Additional threats to the lake include invasive species and pollutants from motorized watercraft. A more detailed report on the 2018 - 2023 sampling program is available upon request from the Municipality of Chester and the Municipality of the District of Lunenburg.

Figure 2: Volunteers and staff training for sampling.

Figure 3: Volunteers ready for sampling.

Thank you!

This project was funded by the Municipality of the District of Lunenburg (MODL) and the Municipality of Chester (MOC). Coastal Action would like to thank the volunteers, the Sherbrooke Lake Stewardship Committee, and municipal staff for their contributions that made for the successful completion of this baseline study.

Take Charge of your Environment!

Ask Yourself:

Are you maintaining a natural vegetative buffer along lake shores, streams, ditches and other waterways?

- Grass or wood buffers help filter pollutants and reduce flood damage. This can also help to reduce occurrences of algae blooms.

If you transport your boat or other gear between waterbodies, do you clean, drain, and dry it between sites?

- Aquatic invasive species can be transported between waterbodies on watercraft, fishing gear or other equipment. These invasive species can cause both environmental and economic damage. For more information visit the Nova Scotia Invasive Species Council website: https://nsinvasives.ca/clean-drain-dry/.

Do you have a spill kit in your boat?

- Spills from fuel or oils can impact people, property and the environment. Keeping a spill kit on your motorized watercraft can help contain, clean and dispose of any spilld chemicals on the water.

Have you talked to your neighbour about what they're doing to protect our waterways?

- Protecting our environment and waterways is a community effort. Fostering community engagement protects local resources and the character of the community.

When was your septic pumped last?

- A properly maintained septic system prevents costly repairs and untreated sewage discharge into our streams.

Do you need to fertilize your lawn?

- Many fertilizers add excess nutrients to waterways such as nitrogen and phosphorus, which can contribute to blue-green algae blooms. If you decide to fertilize your property, use the 4 R's: right source, right amount, right place and right time.

DISTRICT OF LUNENBURG INC. 1879

THE MUNICIPALITY OF CHESTER

COASTAL ACTION

Coastal Action is a charitable organization on the south shore of Nova Scotia that believes in safeguarding a healthy environment for future generations. For over 25 years, our goal has been to promote the restoration and conservation of our environment through research, education, action, and community engagement. We work in five core areas: Watersheds & Water Quality, Species at Risk & Biodiversity, Climate Change, Environmental Education, and Coastal & Marine.