



Blue-Green Algae Monitoring 2019 Report

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Background

Cyanobacteria, commonly called 'blue-green algae', are microscopic, plant-like bacteria that occur naturally in many aquatic and terrestrial environments throughout the world. Individual organisms are not normally visible, but aquatic populations can increase rapidly when conditions are favorable, causing the bacteria to congregate in large masses or 'blooms' that are often, though not always, easily visible.

These blooms most commonly occur in summer or early fall, when surface waters are warmest, but they can also occur at other times during the year. In addition to water temperature, a key factor contributing to the growth of blue-green algae and the formation of a bloom is the amount of available nutrients such as phosphorus and nitrogen in the water.

Many species of blue-green algae can produce toxins that are potentially harmful to humans and animals. The most common blue-green algae toxins encountered and monitored in Canadian waters are microcystins. Health Canada has established guidelines for the cyanobacterial toxin 'microcystin-LR'. The guidelines are "believed to be protective of human health against exposure to other microcystins (total microcystins) that may also be present" (Health Canada, 2016).

Health Canada's '*Guidelines for Canadian Drinking Water Quality*' recommend that microcystin-LR not exceed 1.5 µg/L. There are also '*Guidelines for Canadian Recreational Water Quality*' that recommend total cyanobacteria not exceed a density of 100,000 cells/mL and total microcystins not exceed 20 µg/L (expressed as microcystin-LR).

Summaries of blue-green algae monitoring in the province for the years 2007 to 2018, are available on the Department of Municipal Affairs and Environment website at:

<https://www.mae.gov.nl.ca/waterres/quality/background/bgalgae.html>

Blue-Green Algae Occurrences in 2019

In partnership with National Research Council (NRC) Canada, weekly monitoring of Miller's Pond was undertaken from May 15 to September 4, 2019. As in recent past years, a blue-green algae bloom occurred in the pond starting around mid-June. The bloom appeared to peak in early July and then quickly dissipated. (Figure 1)

Water samples were collected at the same location during each weekly visit to Miller's Pond by WRMD staff. Samples were analyzed for routine water chemistry (to determine nutrient levels) and for blue-green algae and associated toxins. Blue-green algae blooms are often associated with high levels of phosphorous and nitrogen in surface waters.

Solid Phase Adsorption Toxin Testing (SPATT) sampling devices, used to monitor cyanobacteria toxin levels, were provided by NRC. These passive sampling devices were suspended in the water and retrieved weekly. The samples have been provided to NRC but have not yet been analyzed.

Results

Lab analysis has determined that the cyanobacteria bloom which occurred in Miller's Pond in 2019 was, as in all previous years, a proliferation of cyanobacteria belonging to the *Anabaena* genus. None of the grab samples collected contained detectable levels of microcystins, all were reported as <0.10 µg/L. The highest cell density count reported was 54,000 cells/mL from a sample collected on July 3.

As noted above, samples provided to NRC have not yet been analyzed, but preliminary results indicate that the bloom in 2019 did not produce detectable levels of microcystin toxins.

Analysis of the Miller's Pond water chemistry samples (from weekly grab samples collected at the same location) indicates that Miller's Pond contains low levels of nitrogen (0.17 – 1.57 mg/l) and moderate levels of phosphorous (0.010-0.021 mg/l). This nutrient data was collected in 2019 to see if the appearance of a cyanobacteria bloom could be associated with elevated or unusual nutrient levels.

The data that has been collected is not sufficient to make a definitive statement about the trophic state of Miller's Pond and whether nutrient levels play a role other than to suggest that the cyanobacteria bloom does not appear to be associated with unusually high water nutrient levels at the sampling location. Total Nitrogen levels appeared to rise during the bloom but this could be the result of the nitrogen fixing capabilities of *Anabaena*.

No other occurrences of cyanobacteria blooms were observed or reported in 2019.



Figure 1: Miller's Pond (Portugal Cove – St. Philip's) June 30, 2019