



# 2021 KAHSHE AND BASS LAKE STEWARD REPORT

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## ABSTRACT

The findings of all environmental water quality monitoring for both Kahshe and Bass Lakes in 2021 have been summarized and compared to acceptable water quality and aquatic health benchmarks for algal friendly nutrients nitrogen and phosphorus as well as over 30 different chemical parameters. Historical trends in water quality over almost 40 years also have been presented and have identified no major contamination issues or trends in algal-friendly nutrient levels that would explain why Kahshe Lake has been impacted by harmful algal blooms (HABs) in both 2020 and 2021. **Why is this happening? And, Is there anything we can do to help?** We need look no further than our own shoreline water quality to understand why the historical tracking of algal-friendly nutrients based on mid-lake, deep water sampling locations is not identifying water quality degradation. To explore this issue, the KLRA funded a Near-Shore Water Sampling Program that was designed and completed in 2021. This investigation identified some very useful insights and linkages between our changing climate, its impact on water quality and the development of late season HABs in Kahshe Lake. This information provides shoreline property owners with a science-based approach to actions we can and must take to prevent further water quality degradation and reduce the likelihood of another HAB.

**KAHSHE LAKE RATEPAYERS'  
ASSOCIATION – CONSERVATION  
COMMITTEE - NOVEMBER 2022**

# Executive Summary

## 2021 Kahshe and Bass Lake Steward Report

A comprehensive review and analysis of all historical environmental monitoring on Kahshe and Bass Lakes has now been completed and presented in annual Lake Steward Reports from 2012 through 2021. These documents as well as Executive Summaries are posted on the **Lake Health** tab of the KLRA website: <https://kahshelake.ca/Water-Quality>. This report summarizes the findings from sampling and analysis of both Kahshe and Bass Lakes in 2021. The sampling programs include those of two agencies: The District Municipality of Muskoka (DMM) and the Ontario Ministry of Environment, Conservation and Parks (MECP). In the latter, the Lake Stewards of Ontario carry out the water sampling and clarity measurements and the MECP analyzes the samples and coordinates the data reporting.

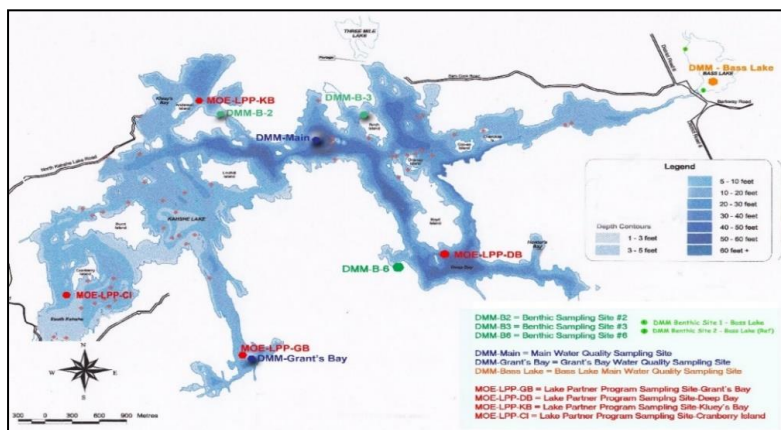
As in 2019 (there was no sampling or analysis in 2020 due to the COVID-19 pandemic), this report has been structured to address the following issues/areas of potential concern for both lakes with emphasis on the development of harmful algal blooms (HABs).

- Nutrients, Water Clarity, Temperature and Algal Growth
- Calcium Depletion
- Lake Acidification
- Metals and Other Chemicals
- Dissolved Oxygen
- Benthic Health

To better understand the chemical and physical data that have been collected, the 2021 report includes an overview of the climatological factors that have the potential to influence lake conditions. This evaluation demonstrated that air temperatures in 2021 were generally similar to the two previous years and to the 30 year normal for most months, with the exception of noticeably warmer conditions in August and October. In the case of precipitation, total monthly amounts were lower than normal from January through May but much higher than normal in June, July and September. Ice-out on Kahshe in 2020 and 2021 occurred around April 9 and 7<sup>th</sup>, respectively. Ice-out records for Deep Bay also have

been recorded dating back to 1987 and have been compared to ice-out times for Muskoka lakes dating back to 1886, and these records show no clear trend towards an earlier or later ice-out condition.

A map showing sampling site locations in Kahshe and Bass Lakes for both the DMM and MECP programs has been inserted.



A full summary of the findings of DMM and MECP water quality and biological monitoring programs can be found in Section 4 of this report. Based on these investigations, the following conclusions have been reached regarding water quality in both Bass and Kahshe Lakes in 2021.

Based on the 2021 water quality and benthic monitoring of Kahshe and Bass Lakes by the DMM and the MECP, no major water quality issues or trends were identified. However, given the documented occurrence of HABs in Kahshe Lake in both 2020 and 2021 as well as the late season population explosion of a zooplankton organism (Holopedium) known to be associated with decreasing levels of available calcium in Muskoka region lakes, it is clear that the tracking of water quality via the mid-lake, deep water sites of the DMM and MECP is not providing a meaningful indication of water quality degradation associated with the onset of these negative impacts on the health of the lakes.

In the case of Bass Lake, the DMM has identified it as a 'Vulnerable' lake and has undertaken a more comprehensive Causation Study in 2021. Hopefully, the findings from those investigations will shed light on the cause of the elevated total phosphorus which has been recorded in Bass Lake since monitoring by the DMM began back in the early 1980s. The report of the DMM's investigation was to be released in early 2022, but was delayed and has not yet been released.

So, for Kahshe Lake, where do we go from here?

Kahshe Lake also has been identified by the DMM as a 'Vulnerable' lake and a DMM-funded Causation Study will be undertaken when funds and staffing are available following the completion of Causation Studies on the first group of vulnerable lakes (including Bass L). Given the uncertainty regarding the implementation of a DMM-funded Causation Study and the concern of property owners regarding the late season HABs in 2020 and 2021, the KLRA decided to fund a Conservation Committee project in 2021. The purpose of this study was to explore the chemistry of near-shore waters over the spring and summer season in an effort to better understand why Kahshe Lake has been impacted by HABs in spite of reasonably low and unchanged phosphorous levels reported by the DMM and MECP over the past 40 years.

The findings from this Near-Shore Water Sampling Project (NSWSP) have been published in a final report available on the KLRA Water Quality web portal. The NSWSP identified some very useful insights and linkages between our changing climate, its impact on water quality and the development of late season HABs in Kahshe Lake. These findings are briefly shown below and should help in the development and implementation of the DMM's Causation Study when it does get funded. Briefly, the NSWSP demonstrated that:

- Mid-lake, deep water sampling in the spring of the year is a reasonable way to track long-term, historical changes in water quality but is not providing a true assessment of water quality in the near-shore environment where HABs have been documented.
- The mid-lake, deep water sampling also has failed to capture much higher total phosphorus levels in the east end of the lake, as there are no DMM or MECP sampling sites in that area.
- Levels of algal-friendly nutrients (phosphorus and nitrogen) tend to increase as the season progresses, further limiting the relevance of the spring sampling of mid-lake sites in terms of assessing the potential for HAB development.

- The near-shore water chemistry findings for some algal-friendly nutrients appear to be associated with effluents from human & animal waste sources and are known to be linked with HABs.
- Although more study is warranted, the near-shore findings point to accelerated leaching and/or runoff of soil-borne nutrients due to a changing climate which is resulting in more intense rainfall events.

Although we have virtually no control over the change that is affecting our climate, there are actions we can and must take to minimize the accelerated leaching of algal friendly nutrients to our shoreline water and thereby reduce the potential for future algal blooms. These actions have been thoroughly explored by the Conservation Committee and are summarized below:

- 1. Divert roof drainage and runoff from paths and other hard surfaces away from your septic system and the shoreline. If necessary, direct rain water into rock-filled drainage pits.**
- 2. Keep most of your shoreline as natural as possible with a zone of trees, shrubs or tall grass between the shore and any lawn area to discourage grazing by Canada geese and to reduce soil & goose poop runoff into the lake.**
- 3. Have a licensed professional pump out and inspect your septic system for failures and deficiencies every 3-5 years and more often for aging systems installed pre-2000. The Town will be inspecting in 2023, but we don't need to wait until then and be subject to system shutdown until failing systems are repaired.**
- 4. Don't use phosphorus or nitrogen fertilizers or cleaning agents anywhere near the shore.**



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Kahshe and Bass Lake Steward - Conservation Committee