

2017 Kahshe and Bass Lake Steward Report - Executive Summary

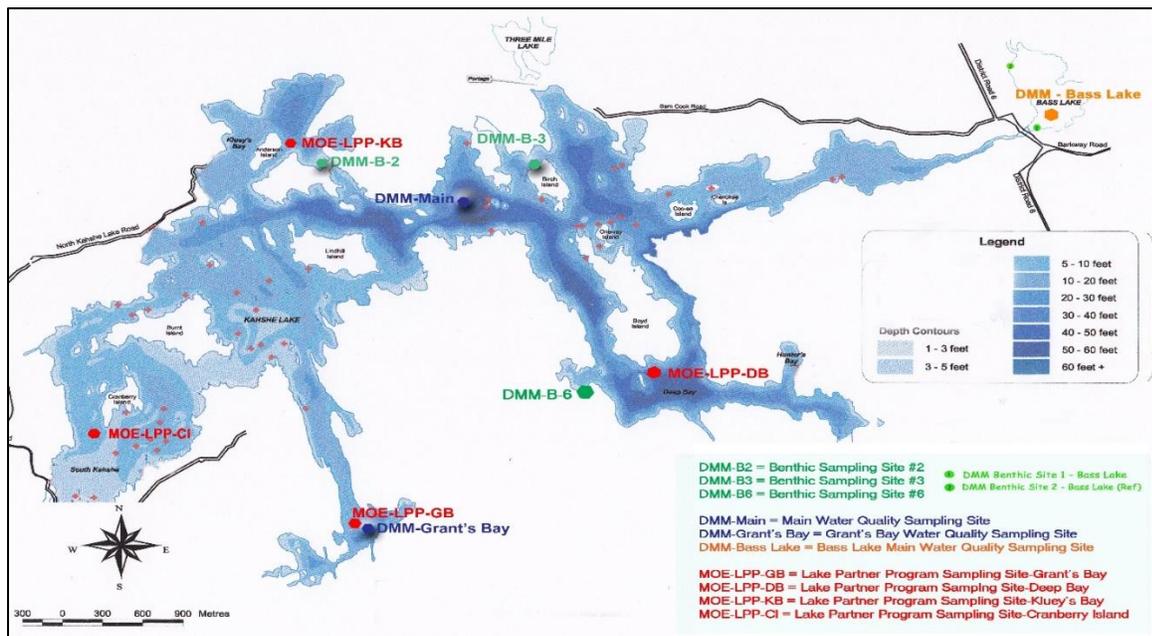
In accordance with the goals and objectives for the Kahshe Lake Steward, a comprehensive review and analysis of all historical environmental monitoring on Kahshe and Bass Lakes has now been completed and presented in annual Lake Steward Reports from 2012 through 2016. These documents are posted on the KLRA web-site (<http://www.kahshelake.ca/ne/lr>). This report captures the findings from sampling and analysis of both Kahshe and Bass Lakes in 2017. The sampling programs include those of two agencies: The District Municipality of Muskoka (DMM) and the Ontario Ministry of Environment and Climate Change (MOECC). In the latter, the Lake Stewards of Ontario carry out the sampling and measurement and the MOECC analyzes the samples and coordinates the data reporting.

As in 2016, this report has been structured to address the following issues/areas of potential concern for both lakes:

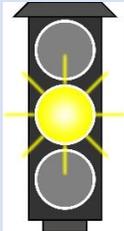
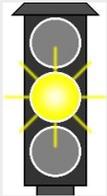
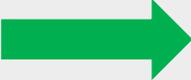
- **Total Phosphorus and Water Clarity**
- **Calcium Depletion**
- **Lake Acidification**
- **Dissolved Oxygen and Water Temperature**
- **Metals and Other Chemicals**
- **Benthic Health**

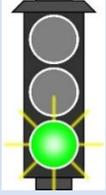
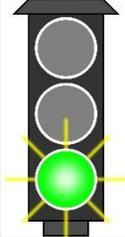
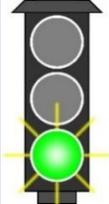
Weather and Water/Ice Conditions in 2017

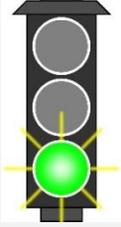
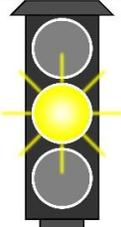
The information on weather and water/ice conditions confirmed that 2017 was fairly normal in terms of temperature but well above normal for rainfall during the spring and summer months. The map below shows the locations of all sampling sites for both DMM and MOECC sampling programs.



Summary of 2017 Findings for Kahshe and Bass Lakes

Measure	Why It's Important	Level of Concern*	Comments
Total Phosphorus (P) and Water Clarity	<ul style="list-style-type: none"> ❑ An indicator of water quality degradation and potential for algal blooms. ❑ Linked to planning & development restrictions. ❑ Total P benchmark set to preserve water quality via a background approach. ❑ Natural tea colour of water complicates the relationship between water clarity and water quality findings. 	<div style="text-align: center;">  <p>Kahshe & Bass</p>  </div>	<ul style="list-style-type: none"> ❑ Background-based model review now completed and phosphorus benchmarks may need to be revised. ❑ New DMM approach does not change good water quality status for Kahshe Lake, where total P levels continue to be low and below background. ❑ However, because of a late season algal bloom that was reported, continued caution is required. ❑ Bass Lake was flagged by DMM for further study in 2016 and 2017 because of elevated phosphorus above 20 µg/L. ❑ No change in total phosphorus in Bass Lake in 2017 and slightly improved water clarity. ❑ Special DMM studies will continue for Bass Lake in 2018.
Calcium Depletion	<ul style="list-style-type: none"> ❑ Calcium is naturally occurring in soils and rocks and is essential component of aquatic food chain. ❑ There was enhanced leaching from soil to lakes due to acid rain impacts in 1970s & 80s. ❑ Many Muskoka lakes show a decline in calcium and are now at lower end of the growth limiting threshold for some aquatic species. 	<div style="text-align: center;">  <p>Kahshe & Bass</p>  </div>	<ul style="list-style-type: none"> ❑ Not a shoreline development issue. ❑ Calcium in Kahshe and Bass Lake is currently above the growth limiting threshold (good), but margin of safety is small, so need to keep monitoring and watch for signs of decline due to possible impacts on some sensitive zooplankton species.

Measure	Why It's Important	Level of Concern*	Comments
Lake Acidity (pH)	<ul style="list-style-type: none"> ❑ In mid to late 1900s, sulphur and other acid gasses from the Sudbury basin plus transboundary air flows from the U.S. acidified many lakes. ❑ Most lakes in Muskoka have recovered following emission controls. 	 <p style="text-align: center;">Kahshe & Bass</p> 	<ul style="list-style-type: none"> ❑ The Ontario objective is to keep pH between 6.5 and 8.5. ❑ Kahshe and Bass Lakes are 10-20 times above the lower pH limit, so there is no concern for impacts on aquatic species. ❑ However, both lakes have a low buffering capacity, so continued monitoring is warranted.
Dissolved Oxygen (DO) And Water Temperature	<ul style="list-style-type: none"> ❑ Oxygen is essential for all aquatic organisms. ❑ It enters surface water from the air and is transferred down to lower depth waters via spring and fall water turnover. ❑ Levels in the bottom waters deplete during the summer and can become anoxic and impact aquatic survival and also release P from sediments. 	 <p style="text-align: center;">Kahshe & Bass</p> 	<ul style="list-style-type: none"> ❑ The PWQO for DO in warm water lakes is 5 mg/L. ❑ The DO levels in mid and lower layers of water in both lakes often drop below the desirable benchmark. ❑ However, neither Kahshe nor Bass Lake is considered anoxic and the lower DO levels are limited to late summer and fall and are unlikely to impact aquatic organisms. ❑ The 35 year trends in water temperature show no obvious up or down trend.
All Other Chemicals	<ul style="list-style-type: none"> ❑ DMM samples and analyzes Kahshe and Bass Lake for over 30 different metals, nutrients and other chemicals. ❑ This report analyzes them relative to chronic toxicity benchmarks and charts them all since monitoring began in early 2000s. 	 <p style="text-align: center;">Kahshe & Bass</p> 	<ul style="list-style-type: none"> ❑ All 30 have been compared to chronic toxicity benchmarks from Ontario, Canada and the U.S. EPA. ❑ Sampling of Bass Lake in 2017 confirmed that most are well below aquatic benchmarks. ❑ A few historical exceedances are likely due to analytical problems early in the program and/or to benchmarks that are outdated or poorly supported.

Measure	Why It's Important	Level of Concern*	Comments
Benthic Monitoring	<ul style="list-style-type: none"> ❑ The study of benthic organisms living in the bottom sediment is undertaken as an early warning activity for water quality impairment. ❑ The population of benthic organisms can detect very subtle changes due to alteration in species richness and in the survival or decline of groups of species that respond differently to impaired water quality. 	 <p>Kahshe</p>  <p>Bass</p>	<ul style="list-style-type: none"> ❑ There are 3 locations on Kahshe Lake, but they have not been monitored since 2015. ❑ The DMM considers all 3 to be Reference Locations, and adds the findings to a database of Reference Levels across Muskoka. ❑ DMM has conducted benthic assessment at one Reference Site and one Potentially Impacted site on Bass L as part of the Transitional Lake study in both 2016 and 2017. ❑ While there is some indication of potential impacts at one of the sampling locations compared to Muskoka Reference levels, there is insufficient data and significant variability to determine if any negative trend is taking place. ❑ DMM plans to continue the benthic program in 2018.

 Green = Normal and Not a Concern
 Amber = Flagged for continued monitoring as margin of safety is low
 Direction of green arrow indicates no detectable upward or downward trend since monitoring began

In conclusion, based on the foregoing summary of the environmental monitoring of Kahshe and Bass Lakes, no major issues in terms of environmental quality have been detected. However, continued sampling and overall lake stewardship is imperative to delay the onset of nutrient enrichment and algal growth, the depletion of calcium and the introduction of invasive species.

Each of us can do our part to maintain the quality of the water by:

- managing our septic systems properly and having tanks pumped out regularly;
- avoiding the use of products containing phosphorus (detergents and cleaners);
- disposing of toxic wastes (batteries, paint, oil, old gas, pressure-treated lumber and other construction waste) at approved land fill sites;

- minimizing near-shore removal or management of vegetation (lawns) and ensuring that any shoreline disturbance is conducted in compliance with permitted uses;
- avoiding the use of any chemical fertilizers or pesticides in areas close to the shore; and,
- taking precautions to minimize the potential for introducing both terrestrial and aquatic invasive species

A handwritten signature in black ink, appearing to read "Ron Pearson", with a horizontal line extending to the right.

Ron Pearson

Kahshe and Bass Lake Steward