

# 2016 Lake Steward Report for Kahshe and Bass Lakes

## Executive Summary

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 2015. These documents are posted on the KLRA web-site (<http://www.kahshelake.ca/ne/lr>). This Executive Summary report captures the findings from sampling and analysis of both Kahshe and Bass Lakes in 2016. 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 2015, the full report has been structured to address the following issues/areas of potential concern for both lakes:

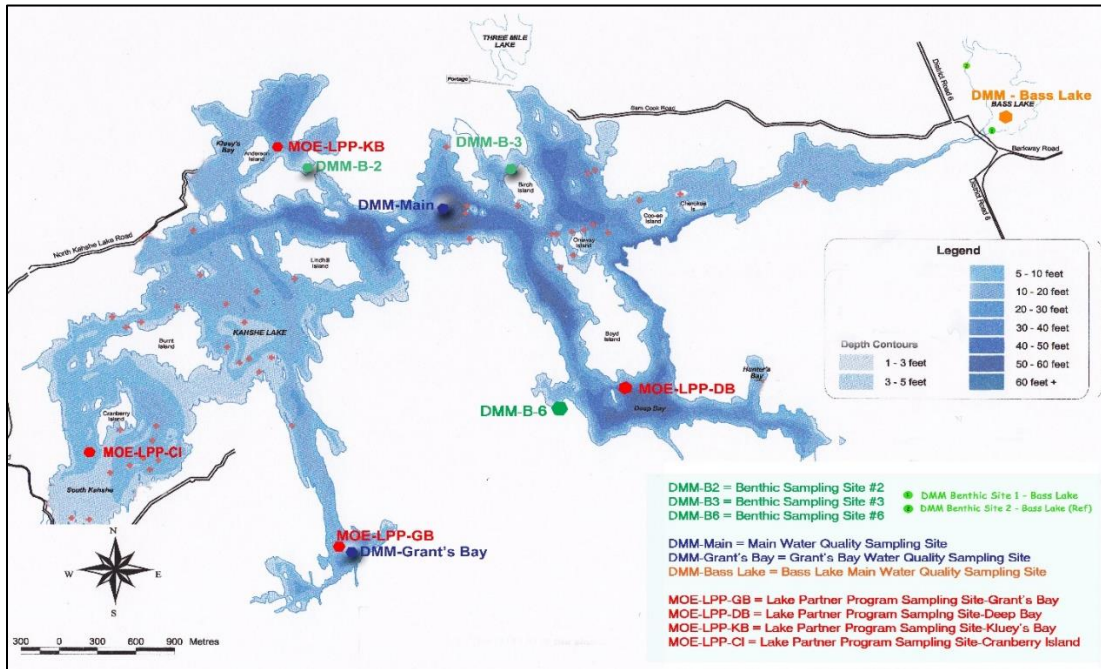
- **Total Phosphorus and Water Clarity**
- **Calcium Depletion**
- **Lake Acidification**
- **Dissolved Oxygen and Water Temperature**
- **Metals and Other Chemicals**
- **Benthic Health**

### **Weather and Water/Ice Conditions in 2016**



In order to better understand the chemical and physical data that have been collected, this year's report includes an overview of the climatological factors that have the potential to influence the analytical findings. This attempts to answer the question: How normal were temperature, rainfall, water levels and ice-out conditions compared to past years?

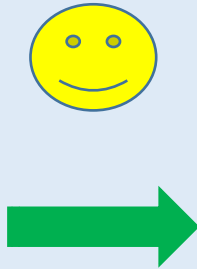
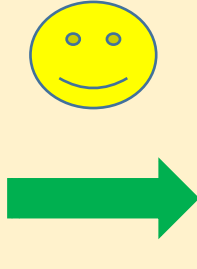
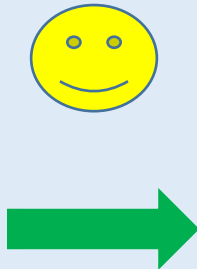
The information on weather and water/ice conditions confirmed that 2016 was warmer and dryer during the summer months, with fairly normal water levels throughout the year. However, consistent with the 125 year trend of earlier ice-out dates for Muskoka Lakes, ice-out on Kahshe Lake was earlier than normal in 2016.





The map below shows the locations of all sampling sites for both DMM and MOECC sampling programs, while the summary table that follows provides brief information on each of the six key issues. The two new new benthic monitoring sites which were added to Bass Lake in 2016 also are shown.



### Summary of 2016 Findings for Kahshe and Bass Lakes

Measure	Why It's Important	Versus Benchmark*	Comments
<b>Total Phosphorus (P) and Water Clarity</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> An indicator of water quality degradation and potential for algal blooms.</li> <li><input type="checkbox"/> Linked to planning &amp; development restrictions.</li> <li><input type="checkbox"/> Total P benchmark set to preserve water quality via a background approach.</li> <li><input type="checkbox"/> Natural tea colour of water complicates clarity findings.</li> </ul>	 	<ul style="list-style-type: none"> <li><input type="checkbox"/> Background-based model review now completed and P benchmarks to be revised.</li> <li><input type="checkbox"/> New DMM approach does not change good water quality status for Kahshe Lake.</li> <li><input type="checkbox"/> Bass Lake was flagged by DMM for further study in 2016 because of elevated phosphorus.</li> <li><input type="checkbox"/> No change in total phosphorus in Bass Lake in 2016 and slightly improved water clarity.</li> <li><input type="checkbox"/> More DMM studies are planned for Bass Lake in 2017.</li> </ul>

Measure	Why It's Important	Versus Benchmark*	Comments
<b>Calcium Depletion</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Calcium is naturally occurring in soils and rocks and is an essential component of the aquatic food chain.</li> <li><input type="checkbox"/> There was enhanced leaching from soil to lakes due to acid rain impacts in 1970s &amp; 80s.</li> <li><input type="checkbox"/> Many Muskoka lakes now at lower end of aquatic threshold and this could affect the growth and survival of sensitive microorganisms.</li> </ul>		<ul style="list-style-type: none"> <li><input type="checkbox"/> Not a shoreline development issue.</li> <li><input type="checkbox"/> Calcium in Kakshe and Bass Lake is currently above the benchmark (good), but need to keep monitoring and watch for signs of decline.</li> </ul>
<b>Lake Acidity (pH)</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> 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.</li> <li><input type="checkbox"/> Most lakes in Muskoka have partially or fully recovered following air emission controls.</li> </ul>		<ul style="list-style-type: none"> <li><input type="checkbox"/> The Ontario objective is to keep pH above 6.5 and below 8.5.</li> <li><input type="checkbox"/> Kakshe and Bass Lakes are 10-20 times above the lower pH limit, so there is no concern for impacts on aquatic species.</li> <li><input type="checkbox"/> However, both lakes have a low buffering capacity – i.e. they don't have the capacity to neutralize acid inputs - so we need to keep monitoring.</li> </ul>
<b>Dissolved Oxygen (DO) And Water Temperature</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Oxygen is essential for all aquatic organisms.</li> <li><input type="checkbox"/> It enters surface water from the air and is transferred down to lower depth waters via spring and fall lake water turnover.</li> <li><input type="checkbox"/> Levels in the bottom waters deplete during the summer and can become anoxic and impact aquatic survival.</li> <li><input type="checkbox"/> Low DO levels also can result in the release of P from sediments.</li> </ul>		<ul style="list-style-type: none"> <li><input type="checkbox"/> The PWQO for DO in warm water lakes is 5 mg/L.</li> <li><input type="checkbox"/> The DO levels in mid and lower layers of water in both lakes often drop below the desirable benchmark.</li> <li><input type="checkbox"/> However, neither Kakshe 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.</li> <li><input type="checkbox"/> The report also charts the 35 year trends in water temperature which show no obvious up or down trend.</li> </ul>

Measure	Why It's Important	Versus Benchmark*	Comments
<b>All Other Chemicals</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> DMM samples and analyzes Kahshe and Bass Lake for over 30 different metals, nutrients and other chemicals.</li> <li><input type="checkbox"/> This report analyzes them relative to current chronic toxicity benchmarks and charts them all since monitoring began in early 2000s.</li> </ul>	 	<ul style="list-style-type: none"> <li><input type="checkbox"/> All 30 have been compared to chronic toxicity benchmarks from Ontario, Canada and the U.S. EPA.</li> <li><input type="checkbox"/> Sampling of Bass Lake in 2016 confirmed that most are well below aquatic benchmarks.</li> <li><input type="checkbox"/> A few historical exceedances are likely due to analytical problems early in the program and/or to benchmarks that are not well supported and require scientific review.</li> </ul>
<p>DMM means District Municipality of Muskoka</p> <ul style="list-style-type: none"> <li> <input type="checkbox"/> Levels are within accepted benchmarks for water quality</li> <li> <input type="checkbox"/> No obvious upward or downward trend has been detected since monitoring began</li> </ul>			

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.

Although there are no detectable environmental issues, we need to continue with our sampling efforts and practice overall lake stewardship to delay the onset of nutrient enrichment and its impact on lake health.

How can we make a difference? 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 based on use;
- 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 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 introduction of both terrestrial and aquatic invasive species.