



## Wollaston Lake Home and Cottage Association

### **2017 Water Quality Testing Results**

For 2017, we tested four water quality parameters: Total Phosphorus, Water Clarity, Calcium, and Dissolved Oxygen.

#### **A) Phosphorus (Lake Partner Program & WLHCA)**

Prior to 2015, under the Lake Partner program, we sampled for phosphorus once a year in early May in the main part of the lake. For Canadian Shield lakes, this is the best way to consistently assess year-to-year trends, since the water is unstratified (i.e. uniformly mixed) due to the “spring turnover.” For 2015 and 2016, with the agreement of the MOECC, we sampled phosphorus monthly during the summer season to assess whether the lake behaves more like a non-Canadian Shield lakes i.e. exhibits more seasonal variation in phosphorus. In 2017 again with the agreement of the MOECC we returned to a once a year sample in May.

For our own sampling program (“WLHCA Program”) we measure phosphorus levels in the three main lake basins in midsummer (July) and in the fall (September); i.e. in the Main Lake, Second Lake, and Third Lake. Since 2015, we have been using a new analytical lab (Trent university at Dorset) which has allowed us to measure down to much lower levels of Phosphorus.

### **The Significance of Phosphorus**



Phosphorus is a vital nutrient for the growth of plants and algae and is a critical measure of the nutrient status of the lake. Excessive levels have the potential to trigger unwanted growth of plants and algae blooms.

To prevent such problems, it is important to keep the phosphorus below 10 micrograms per litre (ug/L), which is the Ministry objective for our lake



<b>Total Phosphorus</b>				
<b>(filtered - all in micrograms per litre – ug/L)</b>				
<i>Date (2017)</i>	<i>Lake Partner Program (MOECC)</i>	<i>WLHCA Program</i>		
	Main Lake: Deep spot	Main Lake: Deep spot	Second Lake	Third Lake
<i>April 28</i>	7.6			
<i>July 21</i>		9.0	6.4	6.7
<i>Aug 15</i>				
<i>Sept 17</i>		5.4	6.4	7.9
<i>Oct 9</i>				
<b><i>Average</i></b>	<b>7.6</b>	<b>7.2</b>	<b>6.4</b>	<b>7.3</b>
Historical average: 1997 to 2016*	6.7	N/A	N/A	N/A

\*Note: Historical averages for WLHCA program could not be calculated since most results prior to 2015 were less than the detection limit of the lab.

**Interpretation of results**

This year’s Lake Partner phosphorus result was satisfactory, 7.6 ug/L (micrograms per litre), although above the historical average of 6.7. The results are typical of a Canadian Shield lake, starting and ending the season somewhat higher (usually around 6 ug/L and this year 9.0 ug/l in July), but settling down from June to September to relatively consistent lower levels (around 5 ug/L). The phosphorus levels in Wollaston lake historically are consistent from year to year, with a range from 6.0 to 8.5 in the 14 years since 2003, when the program started to use filtered samples.

For the WLHCA’s program samples, the phosphorus levels in the Second and Third Lakes were satisfactory at just below 8 ug/L, slightly higher than the long term averages. The concentration in the



Main Lake was higher in July, at 9.0 ug/L but recovered to the very satisfactory level of 5.4 in September. Historically, the Third Lake has tended to show higher phosphorus levels which may be due to the shallower depth.

**Conclusion:**

**Phosphorus levels at the spring turnover and through the summer season continue to be satisfactory according to MOECC guidelines.**

**B) Water Clarity (Lake Partner Program)**

For the Lake Partner Program, we measure water clarity about every 2-3 weeks from May to October, using a Secchi disk. Clarity, measured in meters, can reflect changing phosphorus levels: increased phosphorus stimulates more algae growth which in turn decreases clarity. Typically oligotrophic – or unproductive - lakes (like Wollaston) have phosphorus at less than 10 ug/L and Secchi readings of greater than 5 meters.

**Results**

	Date (2017)	Clarity - Secchi Disc depth (metres – higher is better)
<i>First reading</i>	April 28	4.2
<i>Last reading</i>	Oct 6	4.8
<i>Low (least clear)</i>	May 22, July 9	3.2
<i>High (most clear)</i>	Sept 23	5.1
<i>Average (of 11 samples)</i>	May 6 – Oct 6	4.2
<i>Prior year's annual average (2001 – 2016)</i>		5.6

**Interpretation of Results**

As anticipated, water clarity reflected phosphorus levels, starting off with relatively poor clarity in May, and improving as the summer progressed. The annual average was slightly *less than* satisfactory (i.e. less than 5 meters) and below the historical average.



**Conclusion:**

Clarity was less than satisfactory overall, it was a little poor at the beginning of the season, reflecting higher phosphorus levels and also dropped in early July – most likely due to the higher than average rainfall.

Note: Historical results available on MOECC’s web site at <http://www.desc.ca/programs/LPP>

**C) Calcium (Lake Partner Program)**

Calcium is measured in early May, as part of the Lake Partner program. We are looking for high levels of calcium to maintain a healthy population of zooplankton organisms (such as Daphnia - water fleas), as well as other animals with shells or exoskeletons (such as snails and crayfish). These are all important food sources for fish and larger aquatic animals. According to MOECC, the critical lowest survival threshold is 1.5 mg/L and “Many lakes on the Precambrian Shield in Ontario are nearing or have recently crossed (below) this important threshold.... 35% of 770 Ontario lakes are below it.” (MOECC)

Our historical readings for Wollaston show that we have been fortunate to have abundant calcium levels – averaging 27.2 mg/L from 2008 to 2016. The lake is therefore unlikely to suffer from depletion of daphnia or other crustaceans due to lack of Calcium.

**Results**

Calcium (mg/L)	
Location	Lake Partner Program (MOECC)
Main Lake – deep spot	26.2
Historical average (2008-16)	27.2

**Interpretation of results**

At 26.2 mg/L, the 2017 calcium result for Wollaston Lake was consistent with the 8-year prior average of 27.2 mg/L (7 samples); none was below 25 mg/L. These levels are well above the critical threshold and therefore very satisfactory.



**Conclusion:**

**Calcium levels in Wollaston Lake continue to be satisfactory (according to MOECC guidelines).**

**D) Dissolved Oxygen (WLHCA Program)**

Adequate dissolved oxygen is important for the survival of lake trout population present in the deeper, colder layer of the main lake. The MOECC guideline for lake trout lakes is an average of 7mg/l in the cold layer – known as the hypolimnion. The average is calculated from a complete depth profile dataset as the “mean volume-weighted hypolimnetic dissolved oxygen” (MVWHDO).

Using an electronic probe borrowed from and calibrated by the MOECC, we measured dissolved oxygen and temperature every meter from the surface down to the lake bottom, at the deepest part of the Main Lake (about 30 meters). The measurements were taken in September 2017, when the dissolved oxygen tends to reach its lowest levels in a stratified lake. The fall profile is shown in the graph below.

For September 2017, the average level (MVWHDO) was calculated as 5.5 mg/L, which is below the Ministry standard of 7mg/L and below the previous 2015 average of 6.7 mg/L and the 2013 average of 6.6 mg/L when the MOECC last tested. While all three of these averages are below the Ministry standard, the 2017 average is bordering on the level considered critical enough to threaten the survival of our lake trout population. However, it is important to note that this one sample is not enough to be able to determine if this is the start of a downward trend.

While it is not possible, at this time, to conclude the cause of the lower readings in 2017 there are a number of possible explanations. These include a net increase in the total algae and plant matter in the lake (possibly due to the increase in Eurasian milfoil, climate change effects (2016 was a warmer than normal summer followed by a wetter than normal summer), calibration of the testing meter, or other reasons.

Given the potentially concerning readings the WLHCA requested (April 22, 2018) that the MOECC conduct the dissolved oxygen testing in Wollaston lake for 2018. On May 15, 2018 the MOECC responded that they would plan to test our lake in late July and late September (resources permitting).

**The Significance of organic matter decay**



“excessive plant and algae growth, resulting in a loss of water clarity, depletion of dissolved oxygen and a loss of habitat for species of cold water fish such as lake trout.”

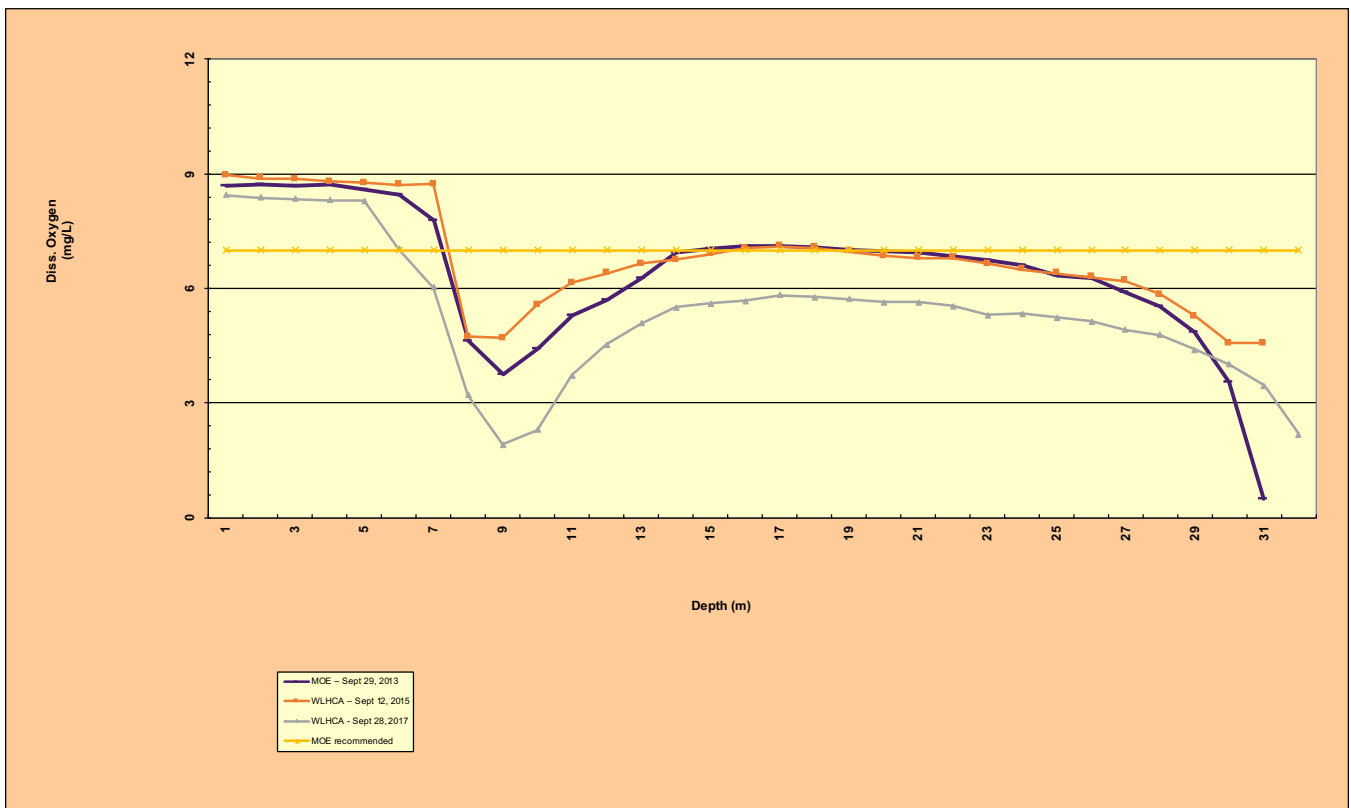
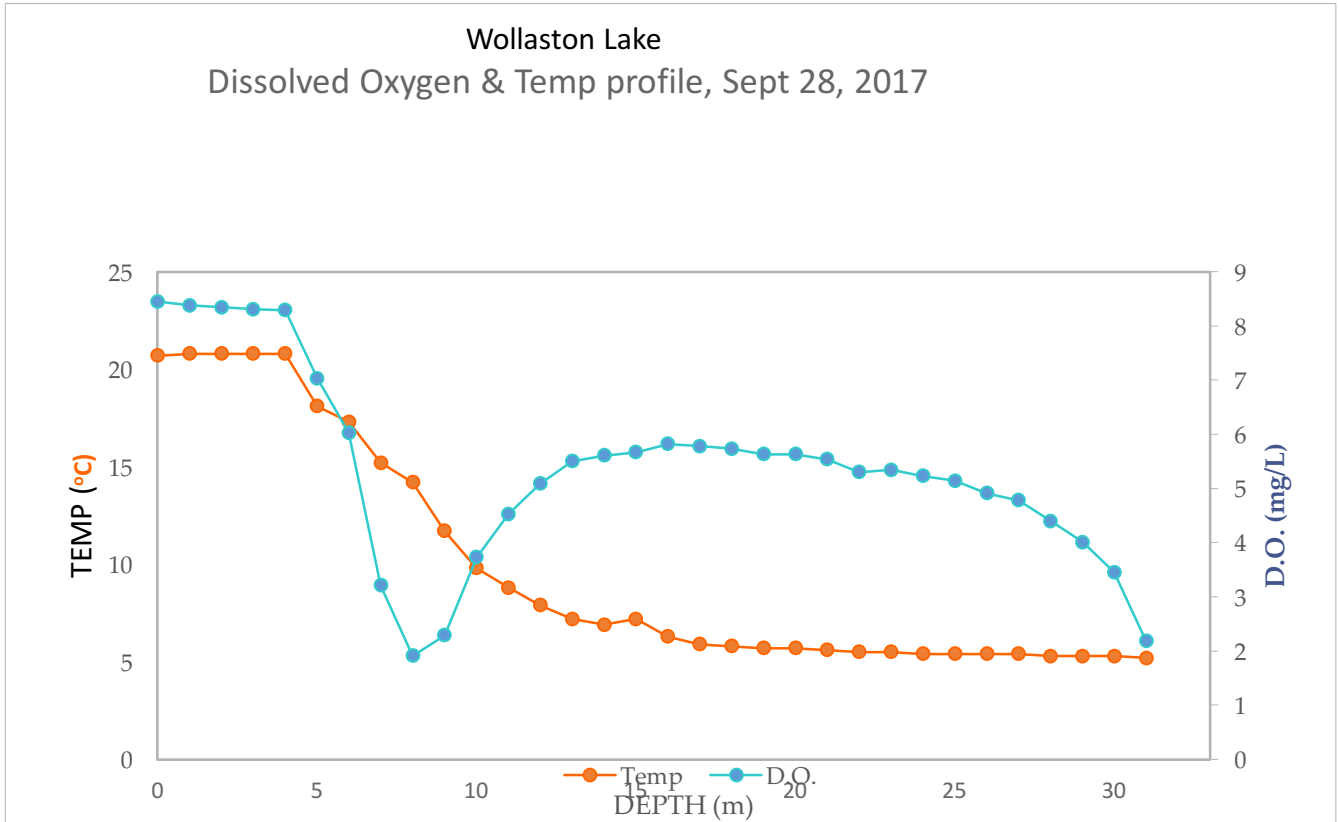
Source: MOECC Lakeshore Capacity Assessment Handbook



***Conclusion:***

**Readings for dissolved oxygen are lower than the MOECC guidelines for deep cold lake trout lakes. The Ministry has agreed to themselves conduct the 2018 testing in Wollaston Lake.**

Wollaston Lake: Water Quality Test Results - 2017



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