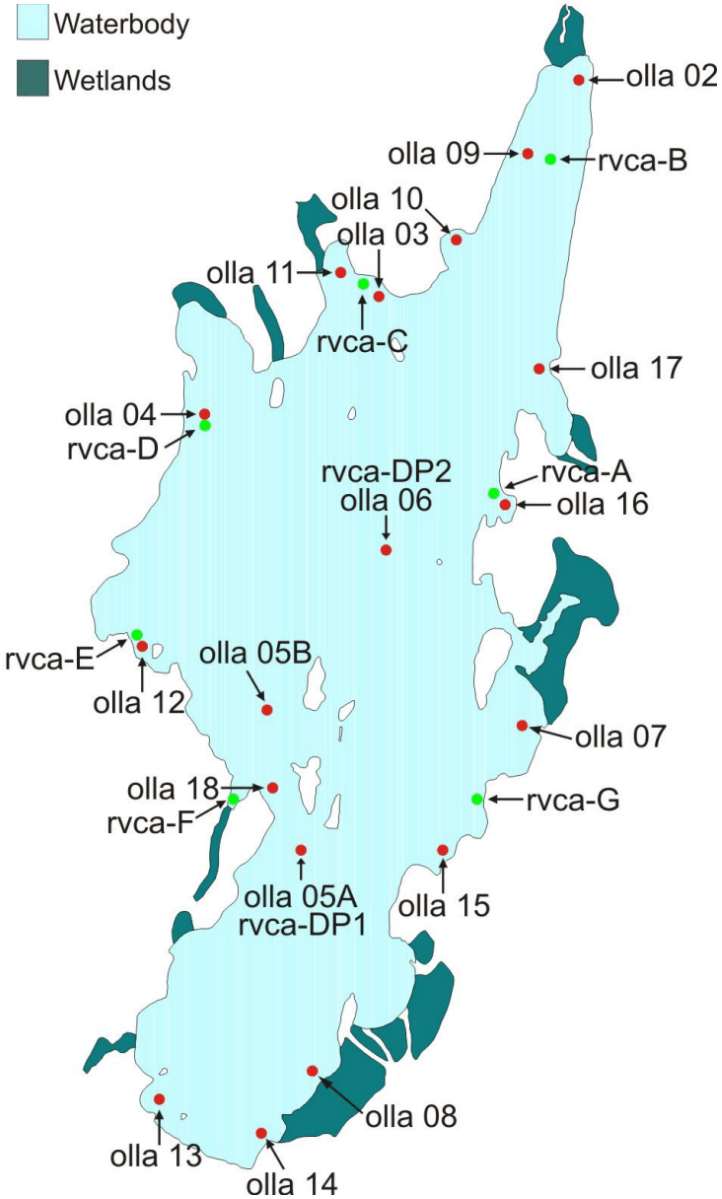
LAKE STEWARD'S REPORT - 2016

Water quality testing is an important diagnostic tool to help residents of Otter Lake determine the health of the lake. We need early warnings to predict important changes in the lake's ecological process. By systematic testing and monitoring over time, it is possible to evaluate if water quality is improving or declining. By selective testing at strategic sites, water quality indicators can help determine the source or cause of contamination. The ecological and trophic status of a lake is generally determined by the levels of nutrients it contains.

As in previous years OLLA was fortunate to have the assistance of the Rideau Valley Conservation Authority (RVCA) in testing the water quality of Otter Lake. Thanks are due to Sarah MacLeod, Kaitlin Brady and their qualified team of technologists for allowing us to include their data in this report. Both RVCA and OLLA test at least 3 times per year but at different sites. The map on the right indicates the location of all the current OLLA and RVCA test sites. These sites have been chosen to be representative of the whole lake. Sites 05A, O5B and 06 represent the 3 deepest water sites (more than 90ft). Sites 04, 07, 08, 11 and 18 are in areas where there are known inflows from streams and wetlands into the lake. Other sites are in shallow bays where there is an increased tendency for weed and algae growth.



NUTRIENTS & BACTERIA

Recreational water quality can oftenbe expressed in terms of how clear the water appears. Water clarity is influenced by the amount of soil sediment and phytoplankton, or microscopic algae, present in the water. Clarity is measured by a simple visual test using a Secchi Disk, a 20 centimeter black and white disk attached to a measured line. The disk is then lowered into the lake until it is no longer visible and the depth recorded.

Additional information on

water quality is gained through analysis of samples for nutrients, specifically phosphorus and nitrogen, which gives an indication of how much nutrient and energy is available for the growth of algae and aquatic plants.

Nitrogen in various forms is an abundant and essential nutrient in aquatic ecosystems. In addition to fertilizers, agricultural waste and wastewater contribute nitrogen into lakes. In large amounts, ammonia and nitrates can be toxic to aquatic organisms. Total Kjeldahl Nitrogen (TKN) which is what we and RVCA measure, determines the concentration of all forms of nitrogen in the lake. While there are no precise guidelines for acceptable levels of TKN, according to RVCA, TKN in water bodies not influenced by excessive organic inputs such as Otter Lake typically range from 100 to 500 µg/L.

Phosphorous is generally recognized as the limiting nutrient in freshwater ecosystems and the major nutrient contributing to eutrophication in lakes. Since phosphorous is the principal source of energy for all living organisms the amount of phosphorous in the environment will determine how fast an organism grows and proliferates. Phosphorus is therefore the principal limiting factor in the growth of algae, meaning that algae growth will occur in greater amounts as more phosphorus is added to a lake. Most of the phosphorous that enters a septic system from phosphorous containing detergents will emerge intact, enter the water table and eventually the lake. Phosphorus levels below 5 µg/L are typical of **oligotrophic** lakes that generally are clear and deep with few nutrients. Such lakes are typically found in the northern regions of Ontario. Phosphorous levels above 20 µg/L are typical of **eutrophic** lakes that are laden with nutrients which lead to excessive algae and plant growth. **Mesotrophic** lakes have phosphorous concentrations between these two extremes and are typical of the lakes found in our region of Ontario.

Bacteria are present in all lakes, they will be found in the faeces of the wildlife (fish, waterfowl, beavers, etc.) that inhabit the lake. Coliforms are bacteria found in the large intestine of humans and other mammals and are usually present in soil. While some strains of coliforms do produce toxins, most are not harmful to humans. Some such as *Escherichia coli* (*E. Coli*) do produce pathogenic toxins. Therefore levels of *E. Coli* are often used as indicators of possible contamination by fecal matter. Thus high *E. Coli* levels in lakes or rivers can be an indication of septic pollution. The recommended safety level of *E. Coli* in a lake for recreational safety is not more than 100 colony-forming units (cfu) per 100ml of water. *E.coli* at any level is unacceptable for drinking water, therefore some form of treatment and purification is necessary for anyone who draws water from the lake for drinking purposes.

RESULTS FOR 2016

The table below indicates the results of all the water quality testing done in 2016 by OLLA and RVCA. Total Coliforms were detectable at sites 04 and 07. The latter site is close to Barker's Creek, the major inflow into the lake and coliforms at this site are not uncommon since Barker's Creek drains an extensive

Water Qualiy Data - 2016 OLLA + RVCA

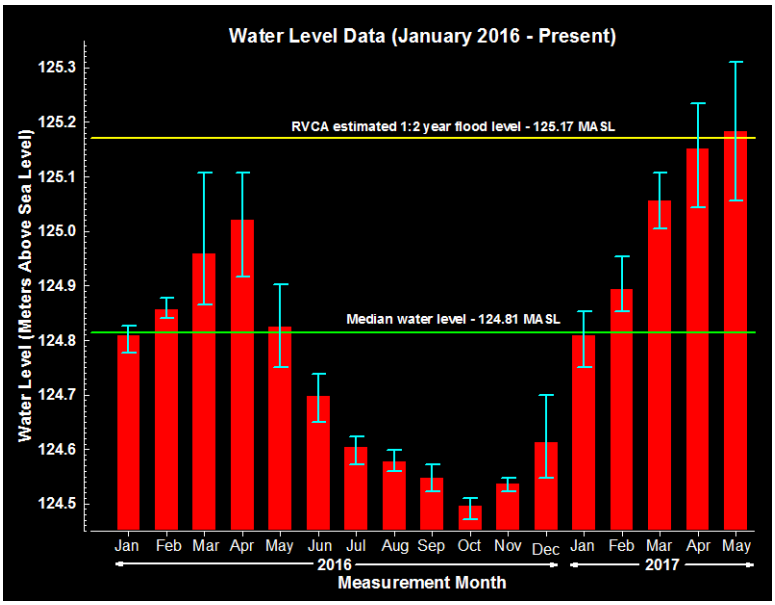
RVCA ID	OLLA ID	Total Coliform (cfu/100 ml)			E. Coli (cfu/100 ml)			Total Kjeldahl nitrogen (µg/l)				Total Phosphorous (µg/l)				Sechi Disk (meters)		
		Jun	Jul	Aug	May	Jul	Aug	May	Jul	Aug	Oct	May	Jul	Aug	Oct	May	Aug	Oct
	OLLA 02																	
RVL-26C	OLLA 03		2	2					440	690			12	21				
RVL-26D	OLLA 04		90	10		2	0		360									
RVL-26DP1	OLLA 05A							300	380	710	570	3	9	15	9		5.45	7.0
	OLLA 05B																	
RVL-26DP3	OLLA 06							340	290	660	500	3	5	12	7		5.50	7.0
	OLLA 07		30			0			350				8					
	OLLA 08																	
RVL-26B	OLLA 09		2	2					390	1290			8	23				
	OLLA10								320	300			7	8				
	OLLA 11																	
RVL-26E	OLLA 12									890				19				
	OLLA 13																	
	OLLA 14																	
	OLLA 15									280				5				
RVL-26A	OLLA 16									540				12				
	OLLA 17								540				8					
RVL-26F	OLLA 18					2	2		380	690			9	10				
Average		31.00			1.20			509.55				10.14				6.24		
Std. Error		29.34			0.41			50.69				1.11				0.33		
	RVCA																	
	OLLA																	

wetland and farming area west of highway 15. Very low levels of *E. coli* were also detectable at sites 04, however it should be noted that a value of 2 cfu is the minimum detection limit for *E. coli* . Total Kjeldahl Nitrogen levels were generally in the acceptable range of between 200 - 500 µg/L though some sites were a little higher this year for both OLLA and RVCA. The reasons are not known but could be related to the low water levels we experienced last summer, since these high values occurred in August when the water levels were quite low and the surface water temperatures were high. Phosphorous levels were all between 5 µg/L and 15 µg/L except for readings of 20 µg/L by RVCA at sites 03 and 09 in August which which could have been an analysis error. Secchi depth readings were generally between 5.5 and 7 metres indicating that the lake remains very clear. Increased water clarity means that sunlight can penetrate deeper and may often result in algae blooms over the summer months however despite the higher than normal water temperatures were no significant algae blooms last summer. Therefore with an average phosphorous level of 10 µg/L and an average Secchi depth of 6 metres the lake remains on the borderline between oligotrophic and mesotrophic. These results compare well with the data obtained in 2015

indicating that little is changing with respect to the water quality of Otter Lake.

WATER LEVELS

The situation with respect to the very low water levels we experienced in the summer of 2016 was commented on in the OLLA 2016 Fall Newsletter and will not be repeated here. Suffice it to say that the last statement in that report stated that “the only hope for water level recovery over the winter is mild weather with a lot of rain or a cold winter with a higher than average snowfall accumulation!!” Well that is exactly what happened **and with a vengeance**. The graph on the right depicts the water level in Otter Lake from January 2016 to the present. The “error” bars represent the highest and lowest water level recorded for each measurement month. As can be seen, our maximum low occurred in October 2016 and the lake level then began to recover with the significant rain and snow we received in November and December. The lake level continued to rise throughout the winter months, a winter that overall was quite mild with an average snowfall and fluctuating temperatures. With the snow melt and significant rain in April it looked as if our spring “high” was reached in mid April when the water level exceeded RVCA’s 1:2 year flood level of125.17 MASL. However, that was not the case since following the incredible rain event in early May when we received over 100 mm of rain in 2 days the lake rose to levels we have not seen since water levels in Otter Lake began being recorded. On May 9th. there was only 16 inches of air space at the culvert on Otter Lake Road. So in the first 2 weeks of May there would have been considerable flooding of low lying areas and access roads. Other lakes in the region suffered the same fate. The situation on Bob’s lake (the major source of the Tay River) was particularly serious until Parks Canada opened the dam at Boilingbroke and transferred the problem downstream to Christie Lake and the town of Perth. Water levels in Otter Lake are now beginning to decline but with continued rain in the forecast it will be quite some time before the water level returns to what we would consider as “normal” for this time of year.



Doug Franks
Lake Steward