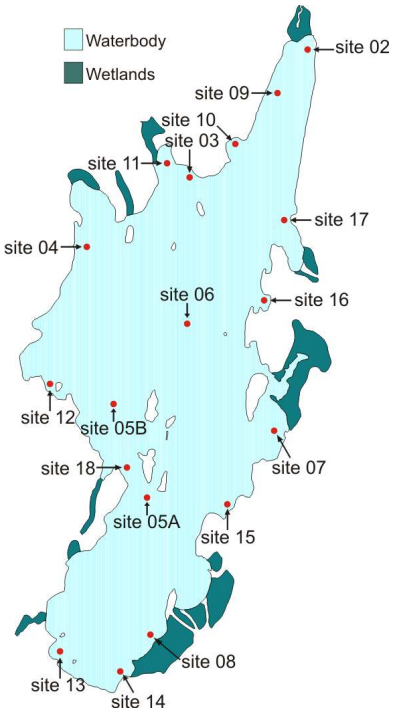
OTTER LAKE LANDOWNER'S ASSOCIATION
2010 WATER QUALITY REPORT

INTRODUCTION

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 once again fortunate to have the assistance of the Rideau Valley Conservation Authority (RVCA) in testing the water quality of Otter Lake. Thanks are due to Patrick Larson, Sarah MacLeod and their qualified team of technologists. RVCA and OLLA both test at least 3 times per year at the same sites. However, RVCA also tests at sites different from ours.

The combined result gives us a good indication of the overall state of health of the lake. The map on the right indicates the location of all the OLLA 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 sites 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. OLLA does not test at all of the sites each year, more often we test at select representative sites usually between May and October.



NUTRIENTS & TROPHIC STATUS

The two key indicators of nutrient load in a lake are phosphorus and nitrogen. These are both principal ingredients of fertilizers. When these two are present in excessive quantities in surface water, they stimulate algae and aquatic plant growth, just as they would stimulate the growth of grass or flowers in a garden The trophic status of a lake (its ability to support plant growth) is principally determined by the levels of these two chemicals. Secchi depth (a measure of water clarity) indicates the amount of algae and chlorophyll (the pigment in algae) in the lake, and therefore the availability of nutrients for its growth. Dissolved oxygen levels can also be used to determine the trophic status as they provide a measure of the impact of eutrophication (due to biological growth and decay). Bacterial pathogens (originating from stormwater runoff and leaking septic systems) can also be introduced into a lake, limiting recreational potential and threatening human health. *Escherichia coli* (bacteria found in the

intestines of mammals) is commonly used as an indicator of faecal contamination.

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 limiting factor in the growth of algae, meaning that algae growth will occur in greater amounts as more phosphorus is added to 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 stimulate algae and plant growth. **Mesotrophic** lakes are in between these two extremes and are typical of the lakes found in our region of Ontario.

Nitrogen is also an important nutrient in aquatic ecosystems. In addition to fertilizers, agricultural waste and wastewater contribute nitrogen in water. In large amounts, ammonia and nitrates can be toxic to aquatic organisms. Total Kjeldahl Nitrogen (TKN) is a measure of ammonia + organic nitrogen. While there currently are no guidelines for TKN according to RVCA, TKN in water bodies not influenced by excessive organic inputs typically range from 100 to 500 µg/L.

Dissolved oxygen and temperature are also important for aquatic life. A sufficient quantity of dissolved oxygen (DO) is required for growth and reproduction of all biological life. As the life cycle of many fish and other aquatic organisms is dictated by temperature, the relationship between DO and temperature is important. Also since temperature determines the ability of water to hold DO, temperature and DO are usually measured together. Cold water can hold more DO than warm water. For example, MNR suggests that the optimal habitat for lake trout requires a level of DO greater than 6 mg/L at a temperature of less than 10°C.

Secchi Depth is a measure of water clarity. A Secchi disk is a black and white 20 cm disk that is lowered into the water until it is no longer visible and then lifted up until it reappears. Both depths are recorded and averaged for the overall Secchi depth reading. A secchi depth of greater than 5 meters indicates an olgotrophic lake, a measurement of 3.5 meters is indicative of a mesotrophic lake, whereas a reading of 3 meters or less would indicate the lake is eutrophic.

BACTERIA

All lakes will contain some bacteria, they are naturally present and 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 a few strains of coliforms produce serious toxins most are not harmful. *Escherichia coli* (*E. Coli*) and coliforms are often used as indicators of possible contamination by fecal matter, thus high *E. Coli* levels in a lake or rivers can be an indication of septic pollution. The recommended safety level of E. Coli in a lake for aquatic life and 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 2010

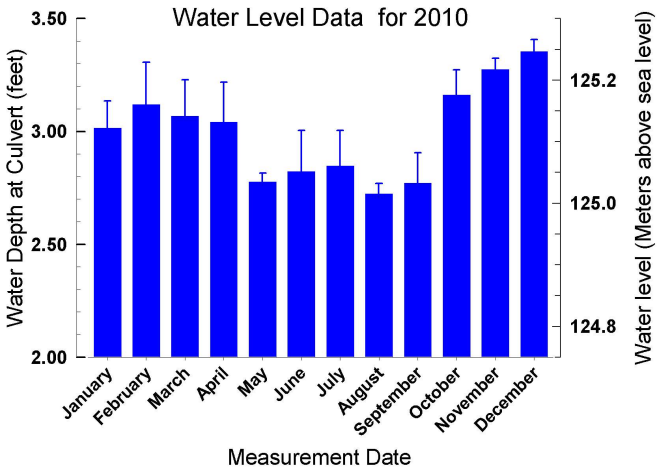
The table below indicates the results of all the water quality testing done in 2010 by OLLA and RVCA (unfortunately RVCA's results for dissolved oxygen levels were not available at the time this report was prepared). Total coliform levels were below

Test Site ID	Total Coliform (cfu/100 ml)		E. Coli (cfu/100 ml				Total Kjeldahl Nitrogen (µg/l)					Total Phosphorous (µg/l)					Sechi Disk (meters)			
	Jun	Sep	Jun	Jul	Aug	Sep	May	Jun	Jul	Aug	Sep	May	Jun	Jul	Aug	Sep	May	Jul	Aug	Sep
OLLA 02																				
OLLA 03				1	0				350	320				6	4					
OLLA 04	30	7	3			2		260			510		6			2				
OLLA 05A							410		310	300		5		5	2		5.25	8.00		4.12
OLLA 05B								200			320		2			2				
OLLA 06							360		360	350		5		16	4		5.75	7.50	6.00	4.42
OLLA 07	8		1					350					7							
OLLA 08																				
OLLA 09				0	5				380	320				6	10					
OLLA10		7				0					470					2				
OLLA 11	2		0					290					6							
OLLA 12	0		0					230					5							
OLLA 13		4				0					500					8				
OLLA 14	6		4					250					4							
OLLA 15											300					6				
OLLA 16																				
OLLA 17		1				0					300					4				
OLLA 18				0	0			320		300				7	2					
	7.22		1.07				335.83					5.25					5.86			
	Tested by OLLA						Tested by RVCA													

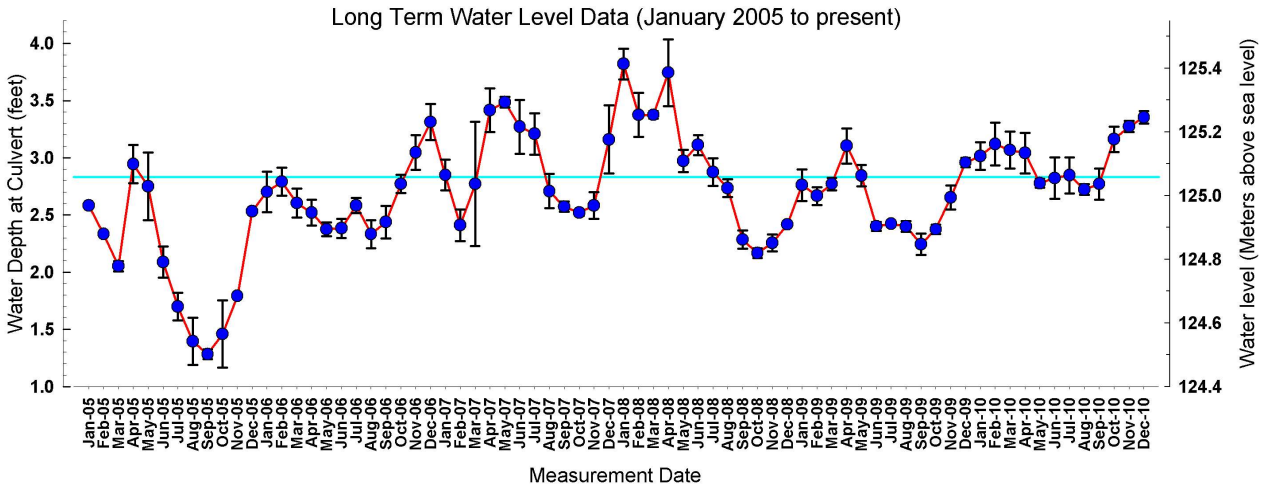
10cfu/100ml at all sites tested except at site 04 in June when a reading of 30 cfu/100ml was obtained. This site is close to where a stream that originates in an extensive wetland area on the east side of Otter Lake Road flows into the lake. Thus, this high reading may have resulted from soil runoff entering the lake. The reading dropped to 7 cfu/100ml when this same site was retested in early September. *E. coli* was generally low or not detectable at all sites tested throughout the summer. Total Kjeldahl Nitrogen levels were all in the acceptable range of between 200 - 400 µg/L at all sites tested. Phosphorous levels were all quite low this year, considerably lower than in 2009. The only reading greater than 10µg/L was at site 06 (a deep water site) that was tested by RVCA in July. This high value did not repeat when this same site was retested in August, and may have resulted from contamination of the sample. Secchi depth readings were between 4 and 5 metres, somewhat lower than last year. However, the fact that the lake experienced several green algae blooms this summer or the fact that the lake's Zebra Muscle population may be declining may have accounted for the slightly lower readings. The average phosphorous level of 5.25 µg/L and an average Secchi depth of almost 6 meters would indicate that the lake is on the borderline between

oligotrophic and mesotrophic. The low coliform and almost undetectable *E. coli* indicates that the overall health of the lake is excellent.

WATER LEVELS



The graph on the right shows the monthly lake level from January to December 2010. As reported at the AGM in July, RVCA did not perform any beaver management in the upper reaches of Otter Creek in 2010 since the Beaver Management Program implemented by RVCA in 2007 ended in December 2009, primarily because of lack of funding.The February/March water level represented our spring "high" since all the snow was gone by the end of March and the ground dried out quickly. April and May were both relatively mild and fairly dry so the lake level dropped significantly and the water level remained relatively constant throughout the summer months at around the “benchmark” level of 34" below the top of the Otter Lake Road culvert. OLLA has been monitoring water levels since 2003 and the graph below indicates how water levels have fluctuated during the past 5 years. The blue reference line indicates the 34-inch “benchmark” level that was proposed by the OLLA Board of Directors at the AGM in July 2007 as a water level that might be acceptable to all property owners.



According to Environment Canada we received over 170mm of rain in September (possibly breaking the record set back in the mid 1970's) hence the rise in water level that began in September and continued throughout October and November. The dramatic increase in October and November was a continuation from September's rainfall along with both months being quite wet. The increase was exacerbated by the

fact that beavers appeared to have once again been busy in the creek this fall since there was very little flow of water in Otter Creek. As a result the water level in November was as high as it was in February and March of 2010.

In November, RVCA issued the following advisory with respect to all lakes and rivers in the Rideau valley watershed. "Most lakes in the Rideau system have had elevated water levels for several weeks. The Rideau Canal reservoir lakes are all above targets for the time of year and levels can be expected to increase. Flows typically increase in the fall with wetter weather. However, the forecast amounts are higher than usual. That, coupled with little vegetation to retain water and frozen or saturated soil, will cause runoff to move quickly to watercourses so that flows can be expected to increase rapidly. Everyone is advised to be cautious around watercourses. Parents need to supervise their children and make them aware of the dangers around our rivers, creeks and streams. Anyone doing construction projects near watercourses will need to take measures to protect the work site and the workers."

Nonetheless, Otter Creek is now flowing well and since the lake is beginning to freeze over and the ground is frozen, the lake level should drop significantly over the winter months provided there is no extremely mild weather with significant rainfall.

Submitted by:

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January, 2011