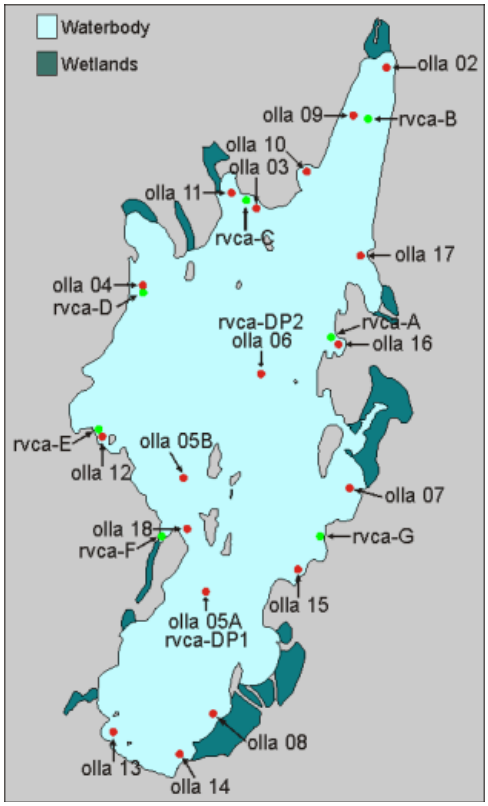
Lake Steward's Report - 2018

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. And 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 often be 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 feces 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 2018

The table below indicates the results of all the water quality testing done in 2018 by OLLA and RVCA. Moderately high Total Coliforms were detectable at sites 04 and 07 in June. 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 wetland and farming area west of highway 15. Low levels of E. coli were also detectable at this site, but were low at all other sites tested throughout the summer. It should

Water Qualiy Data - 2018																		
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	Jun	Jul	Aug	Oct	Jun	Jul	Aug	Oct	Jul	Aug	Oct
RVL-26C	OLLA 03					<2	2		350	350			10	3				
RVL-26D	OLLA 04	20			<2	2	<2	900	340	400		7	10	7				
RVL-26DP1	OLLA 05A							410	360			7	7			5.00	5.50	
	OLLA 05B																	
RVL-26DP3	OLLA 06							360	350	360		6	6	4		6.50	6.00	
	OLLA 07	60			22			460				8						
RVL-26B	OLLA 09					<2	4		370	410			10	4				
	OLLA 11							430				7						
RVL-26E	OLLA 12					2	6		370	360			10	4				
RVL-26A	OLLA 16					<2	4		370	360			9	5				
RVL-26F	OLLA 18					<2	2	510	360	360		13	9	3				
Average		40.00			5.50			406.67				7.10				5.75		
Std. Error		20.00			6.38			120.60				2.70				0.65		
Oligotrophic								660 (310 - 1160)				8 (3 - 18)				9.9 (5.4 - 28)		
Mesotrophic								750 (360 - 1400)				27 (11 - 96)				4.2 (1.5 - 8.1)		
Eutrophic								1,900 (390 - 6100)				84 (16 - 390)				2.4 (0 .8 - 7.0)		

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 site OLLA 04 was quite high in June for unknown. Phosphorous levels were all between 3 µg/L and 13 µg/L and there were no "hot spots" for phosphorous as were seen last year. 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 no significant algae blooms were reported in 2018.

Therefore with an average phosphorous level of 7 µg/L and an average Secchi depth of almost 6 metres the lake remains on the borderline between oligotrophic and mesotrophic but is overall closer to being oligotrophic. These results compare well with the data obtained in 2017 indicating that little is changing with respect to the water quality of Otter Lake. In fact Otter Lake has had total phosphorous levels around 10

µg/L for 15 years which means that Otter Lakes overall water quality is significantly better than any of the other lakes in the Eastern region of the Rideau Valley watershed. The reason is unknown, however possibly our extensive undeveloped wetlands are doing an excellent job of filtering inflow or perhaps we, as property owners we being environmentally conscious and by limiting our use of phosphorous containing detergents and fertilizers!!

Submitted by Doug Franks
Lake Steward