State of the Lake Report 2016

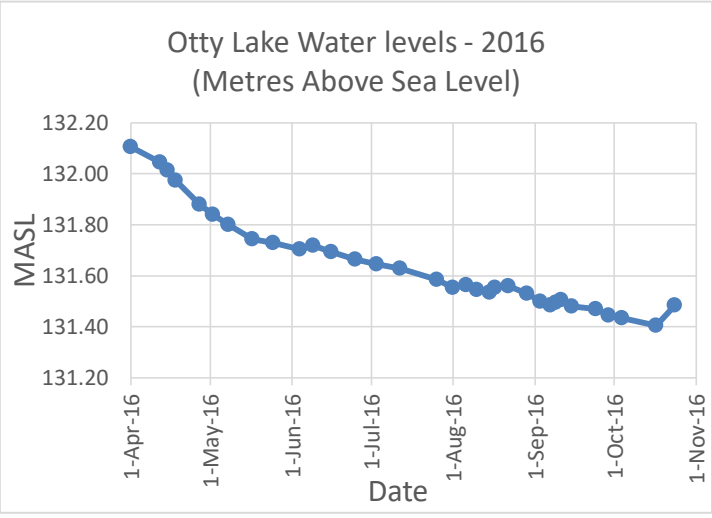
This October, for the third consecutive year, members of the OLA board have produced a short "State of the Lake Report". The report summarizes the condition of our lake and the environmental activities that have been completed on Otty this summer. The report includes sections on physical and chemical monitoring, loon and cormorant sightings, the Otty fishery, zebra mussels and algae conditions, wildlife habitat and shoreline planting activities. Seven OLA board members and associates have contributed to the report this year.

Physical Limnology

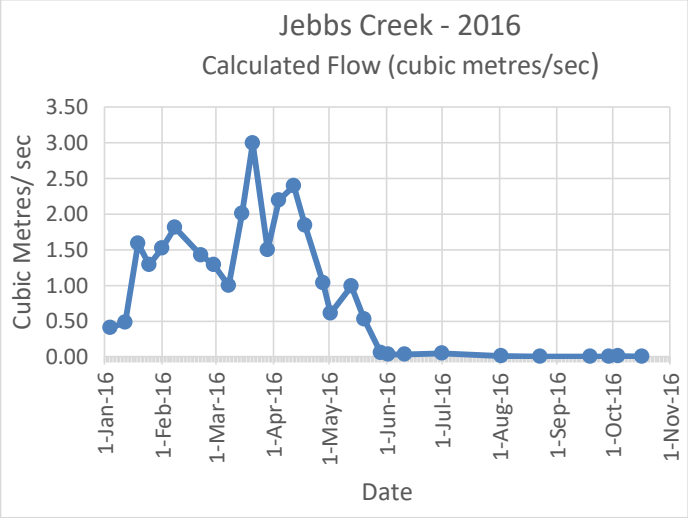
This was an unusual year for weather conditions at Otty Lake. The final winter ice-in occurred on January 18, 2016. This is about four weeks later than the average yearly ice-in. On the other hand, the ice-out occurred on April 3, 2016, earlier than the 30-year average of April 14. This resulted in a short period of 11 weeks of ice cover on Otty.

What was most striking this year were the warm, dry conditions through the late spring, summer and into fall. This caused the Rideau Valley Conservation Authority (RVCA) to declare the Rideau/Tay watersheds in a “Severe Drought Condition” by mid-August. At the time of the preparation of this report in late October, the status of this drought condition was not changed. The lack of rain and warm, sunny weather resulted in very low lake levels and elevated water temperatures.

Lake Water Levels



The water level at Otty Lake was very high at ice-out this year. The unofficial elevation was 132.10 metres above sea level. This was 22 cm. higher than the maximum level in April 2015. However, the persistent dry weather from April this year to mid-October resulted in a significant drop in lake water level of 70 cm. This drop in water level during this period has been continuous, interrupted with a few slight gains from an occasional large rainfall. The significant rainfall of October 21 and 22 resulted in an increase of lake levels to the mid-September level. Please see the chart.

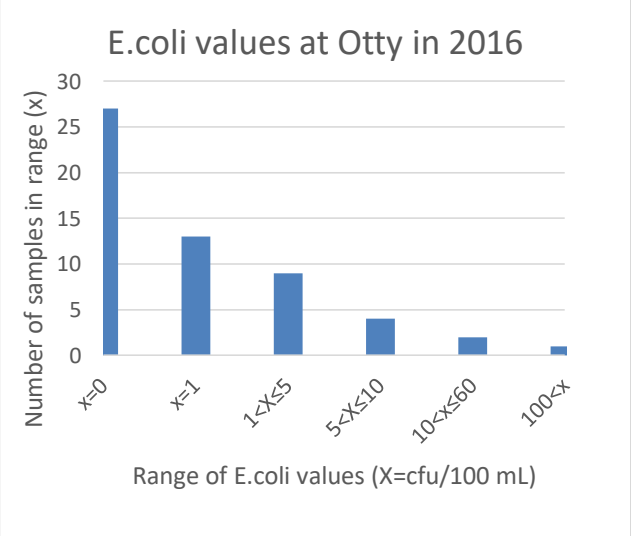


Jebbs Creek

The flow through the outlet stream, Jebbs Creek, was large during the spring runoff reaching a calculated value of about 3 cubic metres/sec in the third week of March. However, the local drought conditions caused the flow to drop to very low values by June, a trickle by late August and no apparent flow by September – a very unusual year. Please see the chart.

Chemical and Bacteriological Sampling results

Lake water quality monitoring was carried out from early May to late September. Sampling was conducted in 2016 by the Otty Lake Association (OLA) for E.coli bacteria, phosphorus and nitrogen. The bacteria work was focused on assuring that nearshore areas of the lake were safe for swimming and boating activities. The nutrient samples were taken to evaluate the nutrient enrichment and the trophic status of the lake. Water clarity was also measured.



A total of 56 samples were taken for E.coli in 2016 by the OLA. Twenty seven of these samples had a value of 0 Colony Forming Units per 100 millilitres (cfu/100 mL). All but three of the 56 samples had E.coli values less than 10 cfu/100. There was one exceedence of the provincial swimming standard of 100 cfu/100 in June. Follow-up sampling at that site produced E.coli values within the swimming standard.

Overall these E.coli values for 2016 were good. Although we are unable to sample the entire lake for E.coli at the frequency of a monitored public swimming beach, these recorded values of E.coli would indicate that Otty can be generally regarded as a safe lake for swimming. Nevertheless, drinking untreated lake water is not advised.

Nutrient samples were taken at the mid-lake, deep point each month from May to September by the OLA and analyzed for Total Phosphorus (TP) and Total Kjeldahl Nitrogen (TKN)

concentrations. A few TP and TKN samples were also taken at two stream inputs to Otty Lake. All the TP samples were within the provincial objective of 20 micrograms/Litre (µg/L) for a mesotrophic lake. There was one elevated value of a TKN sample which exceeded the provincial objective of 500 µg/L for a mesotrophic lake. These nutrient values show an improvement from last year and indicate that nutrient levels at Otty appear stable.

Water clarity is measured by determining the maximum depth that a Secchi disk is visible. The first Secchi depth measurement on May 2 showed a large water clarity of 8.8 metres. This clarity gradually reduced through the summer to 4.3 m. by September 27.

Other Water Quality Sampling

The data we have at this time are from the OLA sampling. The OLA also participates in the Ministry of the Environment and Climate Change, Lake Partner Program. Samples for phosphorus are taken six times a year at Otty Lake and once at McLaren Lake. Calcium levels are also determined. The 2016 data will be available in February 2017.

The RVCA also conducts its Watershed Watch program at Otty and McLaren Lakes, four times each year, with the assistance of an OLA volunteer providing the boat transportation. The RVCA data provides additional information to the OLA beyond our own monitoring. This includes Dissolved Oxygen/Temperature profiles measured at the mid-lake deep points at Otty and McLaren Lakes. Nutrient samples are also taken at one metre from the bottom at these same sites. The presence of invasive species is monitored. As well a program of sampling for macroinvertebrates in shallow waters is undertaken as one indicator of lake health.

The 2016 RVCA data will also be available to us by February 2017. This information will be placed on the OLA website at that time.

The State of the Otty Lake Fishery

Overall, both smallmouth and largemouth bass populations continue to remain stable. As in the past number of years, various year classes of both species appear to be well represented. Principle forage (lake herring, various minnow types, crawfish and panfish) also seem to be stable. No significant upward or downward trend is apparent with respect to Otty's northern pike population.

2016 marked the fourth year of OLA's highly successful Fish and Wildlife Habitat Enhancement project. In May and June of 2016, each of the 250 smallmouth nests constructed during the first three years of this project were monitored for activity. An astounding 50% of these nests were occupied. This result far exceeds initial expectations. In September of this year, volunteers constructed roughly two dozen largemouth bass spawning sites as well as built and installed bird and bat boxes on properties on the lake. Planning for 2017 project work will commence in January 2017.

In last year's State of the Lake report, concern was noted about the appearance of cormorants on the lake. While few in number at that time, it was suggested that should a large number of cormorants take up residence on Otty, there was the potential for negative impact on both the fishery and the surrounding landscape. To date in 2016, the number of cormorants using the lake is very low and pose no serious threat. OLA will continue to monitor cormorant activity, as well as increases in other possible threats, on an on-going basis.

A common misconception is that fresh water lakes and rivers have "lots of fish". In actual fact, the opposite is true. Any ecosystem has a maximum capacity of all species. In a totally natural lake in Ontario, the distribution of adult bass (2 pounds or over in weight) is 2-3 fish per acre of water. Otty Lake is approximately 1500 acres in size. However, Otty is far from being "totally natural". It is heavily populated with corresponding impact on the shoreline and subject to angling. Therefore, the 2-3 per acre ratio doesn't apply. It is far more likely that in Otty, the ratio is half that.

The point of these data are to reinforce the fragility of Otty's fishery. Personal practices such as catch-and-release, not angling during the spawn or at any time during the closed season, and treating the water system with respect are the only ways that Otty will continue to house a healthy and sustainable fish population.

Loons

Once again, a loon survey was conducted at Otty, and the results were submitted to Bird Studies Canada. It was estimated that 4 or 5 pairs of loons and one singleton called Otty Lake home this year. Unfortunately it doesn't appear that any of our pairs were successful in producing young. This year, observations were compiled and displayed on a map shared on Google Maps to allow participants to see the compiled sightings from week to week. Completing the survey was possible due to the support of many lake dwellers/cottagers who tracked sightings and consistently submitted their observations. There will be information in Captain Otty's log in the spring to welcome any others who wish to take part in next year's survey.

Special recognition is due to Richard and Jay Hendry who were very diligent in the frequency of their reports and submitted exceptionally detailed information.

Zebra Mussel Population Survey

The zebra mussel population has declined significantly this summer as compared to the summer of 2015.

Here is brief discussion of our observations and results.

What we measured:
Eight zebra mussel samplers were installed around Otty Lake on the May 24th weekend and were removed on September 21st. The sampling method and duration was identical to the 2014 and 2015 summer sampling procedures. The zebra mussels were removed from the surface of each sampler and counted. Each sampler had a surface area of 0.65 square metres.

2014 Observations
During the summer of 2014, five of the samplers produced very small numbers of mussels (less than 100 zebra mussels per square metre), and the remaining three produced higher numbers (less than 700 zebra mussels per square metre). The highest concentration was found on the rocky shallow shoals around Cloverleaf Island.

2015 results:
There was a significant increase in the density of zebra mussels on 6 of the 8 samplers over the 2014 results. The maximum density on any of the samplers was 2,300 individuals (or a density of approximately 3,500 mussels per square metre). Two of the other samplers were in the 2000 mussels per square metre range and the lowest density was 360 mussels per square metre. A high percentage of the mussels were juveniles on each sampler. We concluded that the zebra mussel population is thriving in Otty Lake.

2016 Results:
Our measurements varied from 48 and 67 individuals per square metre (Kyla's dock and "Loon Island" west of Cherrie Island) to 1717 per square metre near Cloverleaf Island. There was a balance between adult and juvenile individuals on all samplers, except the one off Reid Kilburn's dock which had a concentration of 630 juveniles per square meter and no adults. This represents a significant decrease in population densities compared to 2015 although the results remain very slightly higher than the 2014 concentrations. These results suggest that Zebra mussel populations are cyclical and fluctuations will be expected in future years.

Algae

As mentioned, this winter was warmer than the previous two years, and Otty was ice free by late January. Floating algal mats began developing in late April triggered by the availability of sunlight even though the water temperature was still only 6 C. The predominant species, Spirogyra, a green filamentous algae, proliferated through May and June. The algae mats died off by July 10th and the algal problem has not reappeared since then. There is no clear answer in the scientific literature to explain why algal blooms die off. The reasons given include lack of nutrients, lower temperatures, lack of sunlight and depleted oxygen levels. None of these conditions occurred in Otty this summer.

WILDLIFE HABITAT

2015 was the first year for the OLA Wildlife Habitat project. We had 7 OLA volunteers and 3 RVCA employees who built 10 swallow/bluebird houses and ten wood duck nesting boxes. They've all been installed around the lake. There was nesting evidence in at least 2 of the wood duck boxes which is a greater success than had been expected.

In our second year 20 volunteers including 3 RVCA team members and one Watersheds Canada representative assembled 20 bat boxes, 2 swallow boxes and 5 wood duck boxes in the space of a morning. Fun was had by all. As was the case in 2015, the work was done with ease thanks to all the preparatory work done by Richard and Jay Hendry. Orders had been placed in advance for all these boxes and they have been distributed to their new homes.

It was felt that bat boxes would be a good initiative due to the significant drop in bat numbers over the past few years. Though there is no "best" location for a bat box, the advice was to install them at least 10 feet off the ground with an open area facing south to warm the box as well as making it easy for the bats to take off and return home. One of the RVCA team travelled around the lake on the day of the Fish Habitat work day installing some of the bat boxes.

OLA Shoreline Plants Sale

July 2016 again saw OLA sponsor the sale of potted shrubs and wildflowers. To further enhance the ribbon of life on Otty Lake, large bare-rooted trees were potted and nurtured for two months by resident volunteers prior to this sale.

Type of Plant	**# Ordered/# Sold**	**Cost to OLA Member**
Shrubs (4 varieties)	40 of 40	$3.00
Wildflowers (6 varieties)	44 of 44	$4.00
Newly potted trees (4 varieties)	160 of 160	$2.00

In comparison to 2015, the number of shrubs ordered was reduced from 50 to 40 and the wildflower order was reduced from 72 to 44 to ensure all stock was sold. Although bare-rooted plants had been offered in earlier years of this program, the newly potted trees were introduced for the first time and quickly sold out in both coniferous and deciduous varieties.

Again this year, we were able to provide shrubs that were better able to rebound from animal browsing and offered the 2-gallon pot to ensure stronger root systems. However, the need to protect new shoreline plantings during their early years was emphasized through the demonstration of chicken wire cages as well as the stronger corn crib fencing cages. The use of cages around stock until well settled was encouraged and the positive results in the growth of

our recently planted bare-root trees using the stronger cages was highlighted. Coir mats and tree wraps were made available to protect young trees. Further use of the predator-friendly egg spray was also encouraged for all plant offerings.

This year we offered a comprehensive shoreline planting opportunity that addressed all zones between homes/cottages and the shoreline: tree canopy for upland, shrub understory for riparian and wildflowers for emergent. A subsidy was offered to residents who were members of OLA as this Association offsets the costs of the provision of these plants. Several residents purchased their memberships through this program, resulting in all plants being purchased by members. Further, purchasing was offered only to those who reside on lakefront properties as this is a shoreline planting initiative.

Further monitoring of planting success is recommended through the sharing of photos and provision of feedback by residents who participate in this program. For example, there was less interest in shoreline wild flowers this year than in previous years. Moving to an alternate year program, could allow for such feedback and the determination of best varieties for Otty Lake's shoreline enhancement.

Summary

There has been a great deal of lake stewardship and environmental activity on Otty Lake again this summer.

Regional drought conditions contributed to much lower than normal water levels in Otty. Bacteria and nutrient levels were acceptable again this summer. The warm winter and early ice-out date contributed to an algal bloom that lasted from late April to early July. A significant decrease in the density of zebra mussels was noted across the lake compared to 2015. The fish population is stable. The loon population was monitored and mapped in detail. Unfortunately no young loons were produced this summer. A wildlife habitat program was conducted successfully. The shoreline planting initiative was also successful but will be modified as its success is evaluated.

We will continue these programs next summer. The OLA Board is actively searching for and reviewing new initiatives that can be added to our environmental program. We invite your ideas and participation.

The following people contributed sections to this document:

Physical and chemical limnology: Murray Hunt
Fisheries: Wally Robins
Algae and Zebra Mussels: Derek Smith
Loons: Kyla Haley
Wild Life Habitat: Christine Kilburn
Shoreline plants: Gail Read and Evelyn Dore