



Wollaston Lake Home & Cottage Association

Wollaston Lake: Environmental Health Score Card - 2016



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Wollaston Lake: Environmental Health Score Card - 2016

Part 1: Wollaston Lake: Background

Wollaston Lake is a 360 hectare lake, located in Wollaston Township near the hamlet of Coe Hill. It is populated by a mix of seasonal cottages, campgrounds and lakefront homes and offers excellent opportunities for boating, sailing, fishing, swimming and watersport activities. The lake generally has clean water. There are over 300 lake-front properties or lots on record.

Wollaston Lake Home and Cottage Association (WLHCA) is a not-for-profit organization representing primarily the interests of lake-front property owners. The WLHCA undertakes environmental programs and social activities for the benefit of its members. Typically, between 50% and 60% of homeowners become paid-up members in any given year.

As part of its environmental mandate, this is the third environmental scorecard report published by the Association. It is intended to be a comprehensive summary of environmental conditions in the lake in 2016, based on all available data.

The Scorecard compiles environmental data from various sources, including

- WLHCA's own testing programs
- Government programs (MOECC and MNRF)
- Crowe Valley Conservation Authority
- Observations made under WLHCA's OWL program
- OFAH/MNRF sponsored invasive species monitoring program

Wollaston Lake – Background Information



Geography

Area: 361 Hectares

Max depth: 32 m

Mean depth 9.4m

Total volume: 34,637,800 m³

Shoreline length: 13 km

Percent Crown shoreline:
12%

CATCHMENT

Area: 11,000 Hectares (Ha -
not including the lake
itself)

Wetland: 928 Ha (8%)

Wooded: 8970 Ha (81.5%)

Cleared: (18%)

FISH

Wollaston Lake has lake trout, largemouth and smallmouth bass and northern pike. From a fishing regulation perspective, the lake is in MNRF's Fisheries Management Zone #15.



Part 2: Summary of WLHCA Environmental Initiatives in 2016

A) Priority A: Water Quality Testing and Observation

WLHCA's monitoring program:

- Phosphorous
- E Coli
- Dissolved Oxygen

Participate in MOECC's Lake Partner Program:

- Phosphorous
- Calcium
- Clarity

Observers of Wollaston Lake (OWL)

B) Priority B: Invasive Species

- Participate in the OFAH / MNRF sampling program
- Monitor ongoing invasions of zebra mussels and Eurasian Water-Milfoil

C) Priority C: Advocacy

- Work with Township issues such as on septic tank re-inspection and education programs
- Keep abreast of trends/issues/opportunities for environmental awareness and information sharing

D) Priority D: Communication & Education

- Newsletter articles
- Website
- Environmental Health Scorecard
- Communication with government agencies and other organizations (MOECC, MNRF, CVCA, CHA, NORKLA, FOCA)
- Wollaston Young Stewards Environmental Camp

This scorecard focuses on Priorities A and B.



Part 3: Summary of Chemical and Biological Monitoring Programs in Wollaston Lake

Program	Parameters monitored ¹	Who is responsible?	Timing, frequency	Program Objective
Chemical Monitoring				
<i>WLHCA water quality monitoring program</i>	Phosphorus	WLHCA Lake Steward	3 samples, 2x year, July, Sept	Assess trends in the lake's nutrient status
	Dissolved Oxygen	WLHCA	Ad hoc: Last done in May and Sept of 2015	Assess whether sufficient oxygen to support trout population
<i>MOECC Lake Partner Program</i>	Phosphorus, Calcium,	WLHCA Lake Steward (for MOECC)	Annually in early May	Assess trends in nutrient status and calcium in shield lakes
	Water Clarity (Secchi disk)		2 x per month, May to Oct	Assess impact of nutrient levels on lake's clarity
<i>MOECC comprehensive lake monitoring</i>	Dissolved Oxygen, Phosphorus, pH, nitrogen, ammonia and other water chemistry parameters	MOECC staff	Planned every 5 years; last done in 2013	Periodically assess trends in water quality in Ontario lakes
Biological Monitoring				
<i>WLHCA water quality monitoring program</i>	E Coli	WLHCA Lake Steward	2x year, July, August	Assess whether lake is safe for swimming
<i>Public Beach sampling program</i>	E Coli	Hastings & Prince Edward Health Unit	5 days in each month for June, July, August.	Required to assess whether public beaches are safe for swimming



Program	Parameters monitored ¹	Who is responsible?	Timing, frequency	Program Objective
<i>OFAH Invasive species</i>	Invasive species	WLHCA (for OFAH/MNRF program)	Annually in July / August since 2009	Determine whether spiny water flea or zebra mussels have invaded the lake

Part 4: Water Quality Testing Results

For 2016, we tested for the following water quality parameters: Total Phosphorus; Water Clarity; and Calcium.

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.

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 which gives allows us to measure down to much lower levels.

The Importance of Phosphorus

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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



Results

Total Phosphorus (filtered - all in micrograms per litre – ug/L)				
<i>Date (2016)</i>	<i>Lake Partner Program (MOECC)</i>	<i>WLHCA Program</i>		
	Main Lake: Deep spot	Main Lake: Deep spot	Second Lake	Third Lake
<i>May 6</i>	6.2			
<i>June 9</i>	4.1			
<i>July 21</i>	5.0	13.5	7.8	7.9
<i>Aug 15</i>	4.7			
<i>Sept 9</i>	4.9	5.4	5.7	6.5
<i>Oct 9</i>	6.0			
<i>Average</i>	5.2	9.5	6.8	7.2
Historical average: 1997 to 2015*	6.7			

*Note: Historical averages for WLHCA program not calculated since most results prior to 2015 were less than the detection limit

Interpretation of results

This year's Lake Partner phosphorus result was very satisfactory, averaging 5.2 ug/L (micrograms per litre), below the historical average of 6.7. The results are quite typical of a Canadian Shield lake, starting and ending the season slightly high (around 6 ug/L), but settling down from June to September to relatively consistent lower levels (around 5 ug/L). The phosphorus levels in our lake are very



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 WLHCA’s own 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 significantly higher in July, at 13.5 ug/L (above the benchmark standard), but recovered to the very satisfactory level of 5.4 in September. However the July result may be spurious as it was inconsistent with the 5.0 mg/l result from the Lake Partner sample taken at the same time. 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 continues and through the summer season continue to be very satisfactory.

B) Water Clarity (Lake Partner Program)

In the Lake Partner Program, water clarity is measured about every 2 weeks from May to October, using a Secchi disk. Clarity, measured in metres, often reflects 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 metres.

Results

	Date (2016)	Clarity - Secchi Disc depth (metres – higher is better)
<i>First reading</i>	May 6	3.6
<i>Last reading</i>	Oct 9	4.8
<i>Low (least clear)</i>	May 20	3.6
<i>High (most clear)</i>	Aug 6 & 15	6.7
<i>Average (of 9 samples)</i>	May 6 – Oct 9	5.6
<i>Prior year’s annual average (2001 – 2015)</i>		5.2



Interpretation of Results

As expected, water clarity reflected phosphorus levels to some extent, starting off with relatively poor clarity in May, and improving as the summer progressed. The annual average was satisfactory (i.e. greater than 5 metres) and in line with the historical average.

Conclusion:

Clarity was satisfactory overall, but was a little poor at the beginning of the season, reflecting higher phosphorus levels.

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. *“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)

In the past, we have been fortunate to have abundant calcium levels – averaging 27.3 mg/L from 2008 to 2015. The lake is therefore highly unlikely to suffer from depletion of daphnia or other crustaceans. This is probably partly due to the fact that Wollaston Lake is considered by MOECC to be ‘not sensitive’ to acid rain and is ranked as a ‘5’ – the least sensitive rating. Lakes sensitive to acid rain are more likely to have calcium depletion due to the excess historical leaching of calcium from nearby soils.

Results

Calcium (mg/L)	
Location	Lake Partner Program (MOECC)
Main Lake – deep spot	26.5
Historical average (2008-14)	27.3



Interpretation of results

At 26.5 mg/L, the 2016 calcium result for Wollaston Lake was consistent with the 8-year prior average of 27.3 mg/L (7 samples); none was below 25 mg/L. These levels are well above the critical threshold and therefore very satisfactory.

Conclusion:

Our calcium levels continue to be extremely satisfactory.

Part 5: Invasive Species

D) Zebra Mussels

For the first time in 2015, adult zebra mussels were found in the Second Lake basin of Wollaston Lake ranging in number from a few on some rocks, to several hundred on a boat hull.

Zebra mussels are invasive molluscs that settle on hard surfaces like rocks and boat hulls. They are present in the Great Lakes, the St. Lawrence, the Severn Trent and Rideau waterways, and other inland lakes in southern Ontario. They spread as hitchhikers on recreational boats and in bait containers, and can rapidly proliferate once established. Zebra mussels are highly adaptable, prolific breeders, whose colonies may result in significant changes to the lake's ecosystem, such as:

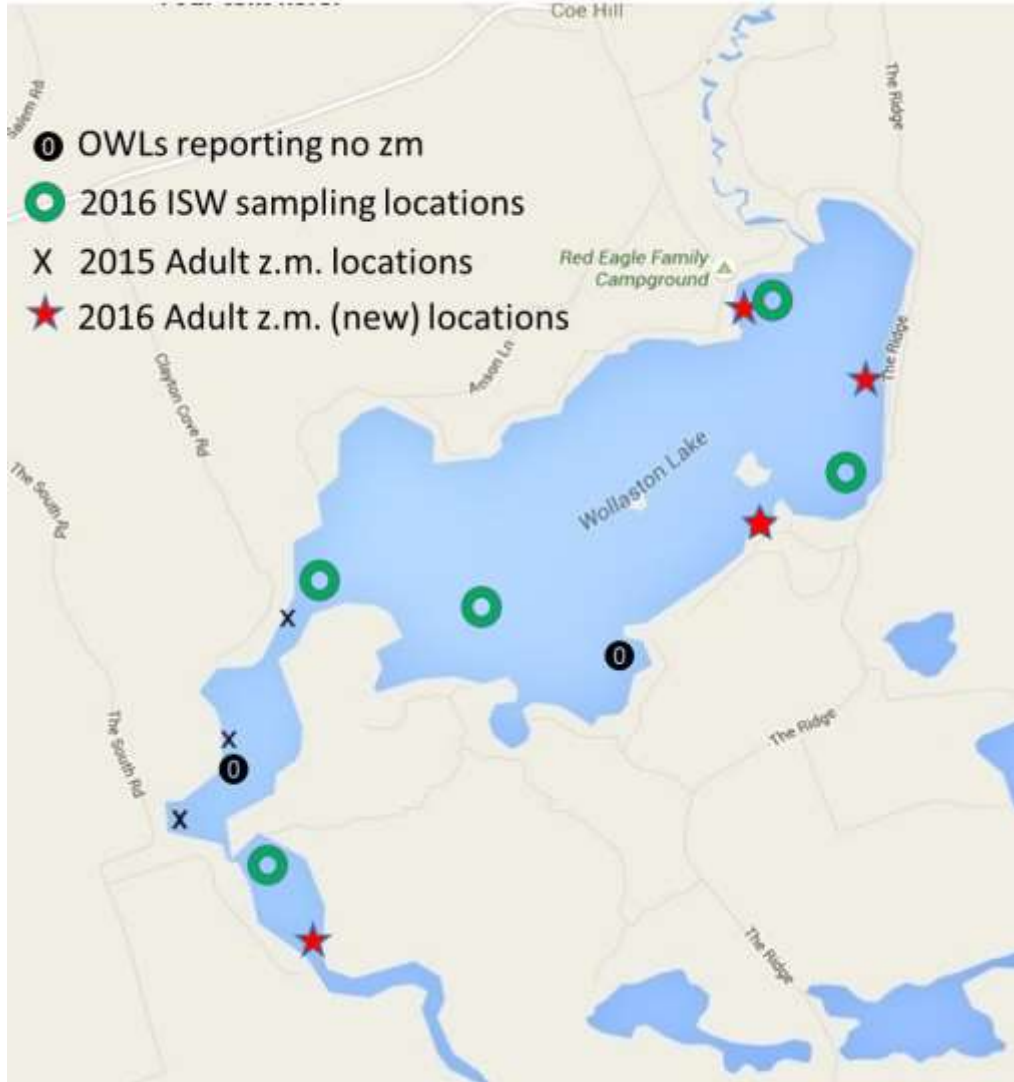
- Filtering out large amounts of phytoplankton from the water, resulting in increased clarity, but decreasing food sources of other species.
- Dramatic declines in native clams and mussels
- Fouling the bottom of boats, docks and blocking water intakes
- Cutting of swimmers' feet.

For 2016, as depicted in the map below, adult zebra mussels have been seen throughout the three lake basins.

As expected, zebra mussel veligers (larvae) were detected in all five locations sampled in August (green circles on map), as part of the Invading Species Watch (ISW) monitoring program, a partnership between the Ontario Federation of Anglers and Hunters and the Ontario MNRF (see table of results). We have participated in this program since 2011, but this is the first year the program has returned positive readings for mussel veligers. However the numbers of veligers found in each location were very low. This may indicate that the adult population is just starting to get established, and is breeding, but not yet in large numbers. We will continue to monitor this issue carefully in 2017 and beyond. Our invasive watch sampling regime has been increased from 2 to 5 locations to better track the progress of the invasion.



Zebra Mussel sightings – Wollaston Lake – 2015/16



Invasive Species Watch Program – Results for August 2016 Sampling

Location (green circles on map)	Zebra Mussels veligers present?	Spiny Waterflea present?
Main Lake – Deep spot	Yes	No
Main Lake – off Red Eagle campground	Suspect	No
Main Lake – off Bear Ridge campground	Suspect	No



Location (green circles on map)	Zebra Mussels veligers present?	Spiny Waterflea present?
Main Lake – outflow into Second Lake	Yes	No
Third Lake – inflow from Second Lake narrows	Yes	No

Note: “Suspect” means identified in very low numbers

What you can do: The Ontario’s Invasive Species Awareness program provides the following advice to anglers and other boaters to help prevent the spread of zebra mussels by taking precautions when moving from one lake to another:

- Inspect your boat, trailer and equipment and remove all plants, animals and mud, and dispose of them on dry land or in the garbage.
- Drain water from motor, live well, bilge and transom wells while on land.
- Empty your bait bucket on dry land, or freeze or salt the bait for later use. It is illegal to release live baitfish from one water body into another.
- Remove organisms you can’t see on your boat, trailer or equipment by rinsing them with hot water (>40°C); spraying with high pressure water (250 p.s.i.); or drying them in the sun for at least five days.
- Submerge hard-to-clean fishing equipment and nets in hot water (40°C) for ten minutes
(condensed from ISAP fact sheet)

E) Spiny Water Flea

The ISW sampling program covers a second invasive species, the spiny water flea.

From 2011 to 2013, spiny water flea was not detected in Wollaston Lake. However in 2014, one of three sample locations tested positive for spiny water flea. Repeat testing in 2015 failed to show any evidence of spiny water flea. For 2016, all five samples were negative for spiny water flea (see table above).

F) Eurasian Water-Milfoil

For the first time a patch of Eurasian Water-Milfoil, an invading aquatic plant, was seen near to the shore just outside the entrance to Mud Bay on the southeast side of the lake. The sighting was confirmed from a photograph by the Invading Species Hotline staff.

Eurasian Water-Milfoil, a fast growing perennial, roots in mainly in shallow water, and forms dense underwater mats that can create stagnant water and reduce biodiversity, by aggressively competing with other plants. In the fall, decaying pants can reduce oxygen levels. Thick mats can hinder boating, swimming and fishing. Eurasian Water-Milfoil has spread to many inland lakes in southern and central



Ontario. Because tiny pieces can grow into new plants, it is easily spread when boat propellers, trailers or fishing gear carry plant fragments to new areas. Boaters should reduce speed when travelling through infested areas (or avoid them entirely), and should remove all plants from boats before moving to a new waterbody.

More detailed information about Eurasian Water-Milfoil can be found at:
<http://www.invadingspecies.com/resources/publications/> - click on "Fact Sheets"

G) Other Invaders

No cormorants were reported in the lake in 2016. The sighting of two Double Crested Cormorants the previous year would appear therefore to be an isolated incident at this point.

Part 6: Biological Testing Results

H) E Coli

The WLHCA tests the lake for the presence of E Coli bacteria (which indicate presence of fecal waste from warm blooded animals). This analysis is designed to show whether a water body should be flagged as unsafe for recreational use (e.g. swimming). Last year we changed our sampling regime and we now test at five common swimming areas in the main lake, in July and August. Results are tabulated below.

E Coli levels: cfu per 100 ml (cfu = colony forming units)		
	Date (2016)	
Location	July 21	August 18
Anson Bay	0	1
Off Red Eagle	9	5
Off Bear Ridge	1	3
Near Jumping Rock	1	5
Kendon Bay	21	7

In both July and August, in all locations, the levels of these bacteria were well below the government guideline for recreational use, which is 100 colony-forming units (cfu) per 100 ml. Somewhat higher



than usual results were recorded in Kendon Bay, especially in July (27 cfu), but this was still well within the government guideline.

Note: While we do compare our lake samples against the government guideline for E Coli, this guideline was intended primarily for the use of Medical Officers of Health to assess the suitability of beaches for swimming and bathing (see below). The guideline requires a calculation of the geometric mean of at least 5 samples to be taken within a one month period. This number is then assessed against the maximum guideline level of 100 cfu. We only take one sample at each location.

Meeting the recreational (swimming) guideline does not mean that the water is safe for drinking without further treatment.

Wollaston Lake Beach:

The Hastings/Prince Edward County Public Health Unit takes monthly E Coli samples at public beaches and other swimming areas during the swimming season. An average of 5 samples is taken over a one week period in each month (June, July and August), to determine whether the government’s recreational standard is being met. (If not, the beach is “posted” as unsafe for swimming). For 2016, the geometric mean level for Wollaston Lake Beach in all three months was 10 cfu, well below the Ministry guideline for recreational use of 100 cfu (colony forming units). No beach postings were required as a result of these readings. For comparison, the average for 2014 was 10 cfu for all three months, while in 2015 a somewhat higher level was recorded only in June (48 cfu). The Health Unit has posted no beach closures since 2008.

Hastings & Prince Edward County Health Unit Beach Sampling, Summer 2016			
E Coli levels at Wollaston Lake Beach			
<i>cfu per 100 ml (cfu = colony forming units): geometric mean of 5 samples in one week each month</i>			
Location	June	July	August
Wollaston Lake Beach	10	10	10

Note: all but one of the 15 samples tested at <10 cfu

During the summer season, the health unit’s sample data can be found at:

<http://forms.hpechu.on.ca/web/index.php/beach-reports/local-beach-reports>

Conclusion: Bacteriological testing did not flag a need to be concerned with respect to recreational use (swimming) in the areas tested.



Part 7: Observations (OWL program)

The section summarizes lake conditions and wild life during the summer season of 2016 of, as observed by 5 “OWL” volunteers (Observers of Wollaston Lake).

General Water and Weather Conditions

- Generally, lake levels remained reasonably high over the first half of the summer.
- Second Lake much clearer than before
- Algae seen in the main lake in reduced amounts, described as small particles suspended in the water, reported to cause a rash after swimming. No other reports of significant algae growth

Native Weeds

- Increase in emergent weeds in Second Lake – where not seen before (associated with increased clarity). Decrease in weeds in the main lake at Ridge Road shore and in Third Lake. Dense weeds observed in main lake on north side of larger island

Fish

- 4 lb **lake trout** caught in May.
- **Largemouth bass**: Fewer breeding nests seen in shallow water at downstream end of Third Lake
- **Smallmouth bass**
- **Walleye** (pickerel) caught in Main Lake in May and June (3 lb).
- 2 **Pike**, caught on Main lake in May
- *Note: MNRF's "Fish On-Line" web site* reports the following fish can be found in Wollaston Lake: White Sucker, Rock Bass, Lake Trout, Pumpkinseed, Brown Bullhead, Small-and Largemouth Bass, Yellow Perch.*
*<https://www.ontario.ca/page/how-use-fish-line>

Other native animals and birds

- Mink, beaver, bullfrog.
- Mergansers (with chicks), buffleheads, mallards, osprey, heron
- Loons – one pair with one chick on 2nd lake, one pair on 3rd lake (could be same), one pair on main lake with one chick.
- Canada geese with goslings seen for the first time
- Somewhat fewer snails / clams than in 2014 (third lake).



Aquatic invading animals

- **Zebra Mussels** were observed in various locations in each of the three lake basin. See the Invasive Species section of the Scorecard for further details about this issue.

Aquatic invading plants

- Dense patch of aquatic weeds seen in the Main Lake just outside Mud Bay for the first time. Investigation confirmed this to be invasive Eurasian Water-Milfoil. See the Invasive Species section of the Scorecard for further details about this issue.

Part 8: Summary and Conclusions

Wollaston Lake generally exhibits good water quality that is enjoyed by the many seasonal and permanent residents around the lake.

The most significant issues for 2016 were the confirmed invasion of all parts of Wollaston Lake by adult zebra mussels and a localized invasion of aquatic Eurasian Water-Milfoil plants. These are early days for these invasions; we have yet to see a significant adverse impact on the lake's ecology or to the recreational enjoyment of the lake. We will closely monitor these invasions as they develop.

Wollaston Lake can be considered to be "oligotrophic," or have low biological productivity, with phosphorus levels generally below 10 ug/L and clarity readings near or above 5 metres. Higher phosphorus levels have historically been recorded on occasion, especially in the shallower bays (including the Third Lake), where phosphorus is typically more variable.

According to the MOECC, monthly sampling for phosphorus for the Lake Partner Program over the last two years indicates that Wollaston Lake's nutrient status exhibits properties typical of a Canadian Shield lake, that is, relatively low in-year variation in phosphorus, aside from sometimes showing higher levels in spring and fall. Therefore, reversion to sampling only once a year in May has been recommended by MOECC as being sufficient to show any long term trends in phosphorus levels.

The most important sources of phosphorus in our lake are likely septic tank effluent and garden fertilizers. It is important that all lakeside residents understand these issues, are vigilant in designing, maintaining and operating their septic tanks systems and refrain from the use of chemical fertilizers.

Unlike some lakes on the Canadian Shield, Wollaston has abundant calcium levels, sufficient to support growth of food source animals with shells and exoskeletons.

Marginal dissolved oxygen readings historically resulted in the designation of the lake as "At Capacity" for planning and development purposes, meaning that no new development should be allowed within 300 metres of the lake. Despite this, based on a 2008 fishery study, Wollaston Lake supports a healthy lake trout population.



Observers of Wollaston Lake (the OWL program) was initiated in 2014. For 2016, 5 OWLs provided observations (a reduction from 7 in 2015). However, for 2017, 3 new OWLs have volunteered as a result of the 2016 AGM. Based on OWL observations over the last three years, Wollaston Lake appears to support a relatively vibrant ecosystem with no excess growth of algae or weeds noted aside from the localized Water-Milfoil invasion noted above.