

## TOWNSHIP OF THE ARCHIPELAGO REVIEW OF 2008 WATER QUALITY RESULTS

### PURPOSE

This review is to complement the Volunteer Water Quality Monitoring Program Data Report – 2008 and provide an overarching assessment of the data noting any trends or hot spots. The volunteer water quality monitoring program has operated in The Archipelago for 9 seasons and reviews such as these are useful to assess and provide commentary on the general quality of the water given the provided results and known characteristics of the various sampled bodies of water. The Ministry of Environment has a volunteer phosphorus-monitoring program which people can undertake. It is relatively easy and would also benefit The Archipelago's program. It is called the Lake Partner program and details can be found at: <http://www.ene.gov.on.ca/en/water/lakepartner/index.php>

Water quality does change for a number of reasons both within the season and between seasons. When looking at the data it is important to think about all the different things that might affect your water quality, both natural and human-caused and be careful not to rush to any one conclusion; off water quality changes for a number of reasons. The examination and analysis of the data (especially bacterial data, for surface waters should keep in mind a number of factors:

- differences in the watershed within which a lake or body of water are situated will cause natural variations to occur between lakes;
- seasonal differences in water temperature, rainfall, average temperatures etc., will all result in seasonal variations in data. As such it is important to consider long term trends in the data;
- bacterial populations can exhibit a high degree of natural variation. *E.Coli* are much more specific to fecal sources from warm-blooded animals and as such are used as an indicator of human influences to water. However, because more than humans can introduce *E.Coli* to water, we must carefully consider long term averages and the location of water samples (i.e. sampling near wetlands may result in increased *E.Coli* counts simply because of the higher likelihood of animal life);
- bacterial populations can also exhibit rapid changes in numbers over a very short period of time (days). It is often difficult to determine the source of bacteria, hence our primary concern is with areas that demonstrate ongoing high levels of *E.Coli* which may imply a constant source.
- The bacterial objectives of 100TC and 10EC for recreational waters in the Township of The Archipelago have proven to be quite useful and accurate for most areas of the Township given long term averages. However, some natural variation away from these areas may be due to the characteristics of the areas and not necessarily a result of a pollution source. Areas that exhibit high TC and a concurrent high EC should be examined more carefully for the potential of a human-caused introduction of bacteria if the results continue on an ongoing basis.

## **INLAND LAKES**

Although each inland lake has its unique characteristics in terms of water depth and shape, there is a certain advantage of looking at the results between the various lakes monitored within the Township. Five inland lakes are monitored including: Kapikog Lake, Healey Lake, Crane Lake, Blackstone Lake in the South Archipelago and Naiscoot (or Six Mile Lake) in the North Archipelago.

### ***Water Clarity***

In general water clarity in the inland lakes is quite good and typical of the type of lakes located in The Archipelago and the characteristics of the individual lakes. In **Blackstone Lake**, water clarity had a good average throughout the year at 5.1 metres. Secchi depths have ranged from 4.5 to 5.6 metres in past years which is deemed to be excellent water clarity. This water clarity corresponds with a low long term Total Phosphorus average of 6 ug/L as provided through the MOE Lake Partner Program. Phosphorus levels are trending downward in Blackstone Lake.

In **Crane Lake**, water clarity is similarly consistently good despite the 2008 year having slightly lower Secchi depths.. Average Secchi depths ranged from 4 to 6 metres which is excellent, especially considering that it is downstream of other developed lakes. Water clarity actually improved throughout the summer which is also a good sign. This water clarity is consistent with the longterm low phosphorus average of 4.7 ug/L since sampling began with 1997 as part of the Lake Partner Program. A similar downward trend in phosphorus levels is evident in Crane Lake since sampling began, with 2008 spring phosphorus levels at 3.45 ug/L slightly down from the previous year..

**Kapikog Lake's** water clarity continues to be quite good ranging from 3.5 to 4.6 metres throughout the year which has been consistent over many years. This corresponds to a continued historically low Total Phosphorus level of 5.6 ug/L which is quite low.

**Healey Lake's** water clarity is typically lower than the other southern Archipelago lakes with water clarity depths ranging from 2.7 to 3.4 metres in all locations except Station 7, but has not measurably changed in the past five years of sampling. Although Station 7 is lower with an average of 1.7 metres, this level has been consistent for the past 5 years of sampling. The location of Station 7 in a back shallow bay with a good quantity of upstream wetlands which may very well explain the reduced water clarity for this Station. The lower water clarity in Healey Lake may be a result of the generally shallow nature of the basin, the greater amount of development, and its location nearer the bottom of the watershed. The lower overall Secchi depths of Healey Lake are somewhat, but not entirely, corroborated by a slightly higher total phosphorus level for Healey Lake, which was measured at 7.1 ug/L in the 2006 season.

**Naiscoot Lake** was added to the lakes being sampled in 2007. Two years of data are difficult to assess trends with but the average in 2008 did reduce somewhat to an average of 3.4 metres over 3.9 metres for the 2007 season. These continue to,

reveal a good water quality condition but it will be important to continue to assess water clarity in this body of water.

### ***Bacterial Monitoring***

**Blackstone Lake** had elevated TC levels in 2008 but both TC and EC levels have improved over the previous sampling season in comparison to previous years and may be returning to low levels of previous years. This year only two stations had TC averages above but no EC averages above the Township standards for bacteria. Many of the averages are result of one or two high readings as opposed to consistently higher averages which would not seem to indicate a systemic issue. The results of subsequent years should be examined to determine whether this is indeed an increasing trend. However, results here indicate that water is still safe and good for recreational use.

Results in **Crane Lake** have been elevated for a number of years with a number of stations being above the standards for the Township however conditions in 2008 improved over the previous two years. The trend of declining TC levels while EC levels have risen in the past years has continued somewhat though EC levels have improved quite a bit over the past two years except at Station 5. As with Blackstone Lake, the higher averages this year are associated more with one or two sampling dates as opposed to being an all-year phenomenon. Regardless, water quality remains acceptable for recreational water use on Crane Lake.

**Healey Lake** bacterial levels continue to be excellent despite having some of the highest concentration of development of the inland lakes. The previous years' slight increasing trend seems to have reversed with bacteria levels almost returning to previous averages. All results remain are below the Township standards which is an improvement over previous years. Water quality conditions remain good for recreational use on Healey Lake.

**Kapikog Lake** bacteria levels continue to be quite good with only one station being above the Township standards. The Total Coliform counts are considerably higher than previous years but with no concurrent increase in E.Coli there would not be a cause for concern. Water quality conditions on Kapikog Lake remain quite good for recreational uses.

No long term trends exist for **Naiscoot Lake** to allow effective comparison. It was noted that only one of the sites is above the Township standard. However, over two years there has been an increase in EC at two stations and a reduction in two others; it will be interesting and important to track this lake over the next few years. Naiscoot Lake is good for recreational water use.

## **GEORGIAN BAY**

Georgian Bay sites have also been characterized in a manner which recognizes a range of waterbody types from enclosed embayments (i.e. Woods Bay, Sturgeon Bay) through to outer islands (i.e. Sans Souci, Pointe au Baril Islands) with areas in between (i.e. Skerryvore, South Channel). The largest difference between these areas has to do with the amount of water circulation and mixing with open Georgian Bay waters that each of these sites might experience.

### ***Water Clarity***

Water clarity in the rather enclosed embayment of **Sturgeon Bay** remains quite poor as the area struggles with chronic algae blooms. Secchi depths ranged from 0.3 to 2.0 metres for this past year which is slightly down from the previous years despite higher water levels and a rainier season. However, given the chronic algae issues the result is not entirely unexpected. Total Phosphorus for Sturgeon Bay had been gradually decreasing but 2008 levels were slightly higher with whole year-all stations averages at 20.6 ug/L compared to 17.5 ug/L in 2007. This area has continued to be the subject of significant study with some work being undertaken by Environment Canada in the spring of 2008 to try and better assess the various sources of phosphorus into the Sturgeon Bay.

**Woods Bay** is similarly enclosed but has the advantage of significant flushing from Moon River. As such, water clarity Secchi depths are much higher with the average depths ranging from 2.8 to 5 metres. These depths have not dramatically changed over many years changed except for Station 5 which should be closely monitored since its Secchi depth was approximately halved over the previous year.

**South Channel** sampling provides a broad range of sampling locations with water clarity which is typically quite good and representative of the diversity of sampling locations. Average Secchi Depths ranged from 2.8 to 7.0 metres and have not changed markedly through time although two sites have shown a small increasing trend in water clarity.

**Skerryvore** has areas which range between inner bays and outer islands. The data is similarly ranging from average Secchi depths of 2.1 to 4.7 which is good for the locations where they are taken. Water clarity for this area is quite good and typical of the areas being sampled although the dramatic decline at Station 1 over previous data should be watched.

Water clarity measurements in **Pointe au Baril Islands** just began last year. As such there is no long term data for this area. However, given the location of some of the sites it would be expected that water clarity would be fairly high. The average however ranged from 1.6 to 8.1 metres which is fine for most areas. It will be important to monitor this area and to ensure that the number of sampling occasions increases to provide suitable calculations of averages.

Water clarity in the outer areas such as **Sans Souci** is quite good as it benefits from the frequent flushing and exchange with the open waters of Georgian Bay. Secchi

depths ranged from 4.3 metres in some of the enclosed sampling bays to 9.1 metres in the more open areas. The lower Secchi depths are consistent with past results and do not indicate a declining water quality condition.

### ***Bacterial Monitoring***

**Sturgeon Bay** bacterial levels continue to be close to or within the standards. A few sites had EC levels higher than the standards but these sites have been elevated for a number of years. These levels remain of interest but do not warrant a concern for safe recreational water use. Sites with high TC levels should not be of significant concerns especially where there are one or two measurements which are in excess while the others remain below; these excessively high levels tend to skew the year's average. At most of the sites the elevated bacterial levels are not chronic in that they are not constantly elevated throughout the season. Sturgeon Bay remains a concern for recreational use more because of the presence of blue green algae blooms with the potential of producing toxins than due to the presence of bacteria.

**Woods Bay** bacteria levels continue to tell a mixed story. Most of the sites remain unchanged with levels being at or very near the standard guidelines. Some of the sites have reversed trends over previous years and are no longer improving while others are now improving where they were previously in a declining trend. Some of the sites such as Station 1 and 3 were consistently above the Township standards for EC for this year. The water quality in Woods Bay remains good for recreational use but some areas should be carefully watched and perhaps additional samples taken throughout the year.

Bacteria levels in **South Channel** remain relatively unchanged. Station 1 continues to have elevated EC levels but this is expected given its location at the bottom of the Seguin River in Parry Sound Harbour. The rest of the areas remain quite good with only one station being above the standard, though not in a chronic fashion. Bacterial levels throughout the South Channel sites, with the exception of Parry Sound Harbour, would be deemed to be safe for recreational use given the Township standard guidelines.

**Skerryvore** bacterial levels are also a bit of a mixed story with some sites showing a slight improvement and others showing a slight decline. Some of the sites were above the Township standard although only on one or two of the sampling dates. Station 6 which was of some concern has dramatically improved to levels very near Township standards. While the bacteria condition appears to be improving throughout Skerryvore, in particular comparison to 2004 and 2005 continued monitoring should be undertaken to ensure that water quality remains in this more positive state. Water quality conditions are generally fine for recreational purposes though some sites continue to indicate periodic higher bacteria levels than the Township standards.

Bacteria levels in **Pointe au Baril Islands** continue to be quite low. This is expected for this area because it experiences good flushing and exchange with outer Georgian Bay. Only one of the sites (Station 9) had EC levels above the standard, but this occurred on only two sampling occasions. This site is higher than previous years and should be watched in future sampling. Recreation water quality in Pointe au Baril Islands continues to be excellent.

**Sans Souci** bacteria levels remain quite good and among the lowest in the Township. A few locations exhibited averages above the Township standards however these were both shortly after a significant rain event (when wasn't it raining in 2008?) and on a single isolated occasion. All of the other stations did not approach the Township standards. The recreational water quality in Sans Souci remains excellent for recreational use.

## **SUMMARY**

The volunteer-based water quality program in The Archipelago continues to be a success. I know that the Township continues to be very impressed with the volunteer spirit and the resounding passion for a quality environment. The continued level of community support is inspirational. The overall purpose of the water quality monitoring program remains two-fold. First, the program exists to ensure that the Township and its residents have a long term database tracking water quality condition. Second, the program is to be used as an educational platform and tool to encourage sound environmental behaviours among residents and visitors to The Archipelago. To ensure that the spirit of this program continues to thrive, make sure to take the next generation out with us for our sampling.

Water quality conditions in The Archipelago remain quite good with only a few spots for concern such as Sturgeon Bay or isolated spots within individual neighbourhoods. Using the water quality results or monitoring protocols to track down problem areas and encourage a strong environmental ethic remains a key asset of this program.