

## **TOWNSHIP OF THE ARCHIPELAGO REVIEW OF 2009 WATER QUALITY RESULTS**

### **PURPOSE**

This review is to complement the Volunteer Water Quality Monitoring Program Data Report – 2009 and provide an overview assessment of the data noting any trends or hot spots. The volunteer water quality monitoring program has operated in The Archipelago for 10 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.

It is important to recognize that 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 cause variations in your water quality data, both natural and human-caused, and be careful not to rush to any one conclusion. Your consideration 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 to 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 results for the inland lakes are quite good and typical of the type of lakes located in The Archipelago. Variations between the lakes are characteristic to and natural to each of the individual lakes. In **Blackstone Lake**, water clarity had a good average throughout the year at 4.8 metres. Secchi depths have ranged from 4.5 to 5.6 metres in past years. This should be 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 good with water clarity results improving from the previous year at all locations. Average Secchi depths ranged from 4.3 to 5 metres which is excellent, especially considering that it is downstream of other developed lakes. This water clarity is consistent with the historic 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 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 3.7 to 4.9 metres throughout the year. This water clarity has been consistent over many years although it is slightly better in 2009 than in previous years. This corresponds to a historically low Total Phosphorus level of 5.6 ug/L.

**Healey Lake's** water clarity is typically lower than the other southern Archipelago lakes with water clarity depths ranging from 2.7 to 3.7 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** continues to have good water clarity. Although not as high as some of the larger lakes in the South Archipelago, ranges of 2.9 to 3.9 represent a good water clarity for the lake which is not a headwater lake and has a good amount of

development. Averages have not changed markedly in the three years of sampling though some declines are indicated at a few of the stations.

### ***Bacterial Monitoring***

In all cases, Bacterial levels are slightly higher at some stations. It is suspected that this corresponds with higher rain levels throughout the sampling season of 2009, especially since most increases are in TC levels.

**Blackstone Lake** had quite elevated TC levels in 2009. EC levels however continue to be quite low and under the standards for the Township. This year only two stations had EC averages above the Township standards for bacteria on two sampling occasions. There are times when TC can be elevated for the lake (see previous results for Crane Lake), however, because EC levels remain low 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 2009 as they did in 2008 continued to improve. Station 5 continues to show elevated TC and EC levels as in previous years though the averages are less than previous years.. Regardless, water quality remains acceptable for recreational water use on Crane Lake.

**Healey Lake** bacterial levels continue to be good despite having some of the highest concentration of development of the inland lakes. TC levels seem to be rising in this lake although EC levels, which have also risen at many locations, are still below the Township standards at all but Station 2 (Average 10.7). It is suspected that the increase in TC is similar to what occurred in Blackstone Lake and Crane Lake and as such, water quality conditions remain good for recreational use on Healey Lake.

**Kapikog Lake** bacteria levels showed a marked increase in EC levels over previous years. In some cases the levels are quite a bit higher than the Township standards and the long term average for the lake. This is perhaps due to precipitation events throughout the summer. TC levels continue to be elevated as in previous years. Water quality conditions on Kapikog Lake remain suitable for recreational uses although these trends of increasing levels will want to be watched throughout 2010 and the next year.

After three years of sampling, results for **Naiscoot Lake** continue to demonstrate good water quality conditions with EC levels consistently low and TC levels at suitable levels throughout the summer. It was noted that only two of the sites has TC levels above the Township standard. EC levels are well below the Township standard at all locations. Naiscoot Lake is good for recreational water use.

## **GEORGIAN BAY**

Georgian Bay sites have also been characterized in a manner that recognizes a range of water body 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 0.9 to 2.1 metres for this past year. This is slightly raised from previous years despite probably due to higher water levels. Although, algae issues were somewhat diminished in 2009, the low Secchi depths still indicate a high level of nutrient loading in Sturgeon Bay. This is corroborated by the provincial Lake Partner program data (collected by volunteers) with ranges in the north basin of Sturgeon Bay between 16 and 23 ug/L throughout the season. While not as high as previous years, this elevated phosphorus remains at the core of algae issues and poor water clarity.

**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 3 to 4 metres. These depths have not dramatically changed over many years. Station 5 which in 2008 had halved its Secchi depth (2.2 m) has recovered slightly to 3.2 metres which is much closer to long range data for that station. Overall, the water clarity of Woods Bay is good and typical for its location and water chemistry.

**South Channel** sampling provides a broad range of sampling locations with typical water clarity being quite good and representative of the diversity of sampling locations. Average Secchi Depths ranged from 2.7 to 7.6 metres, a slight increase from previous years. None of the stations have changed markedly from previous years with small increases at many stations.

**Skerryvore** has areas which range between inner bays and outer islands. The data is similarly ranging from average Secchi depths of 2.1 to 5.8 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 Station 1 continues to have lower water clarity than the original two years of sampling and should continue to be monitored.

Water clarity measurements in **Pointe au Baril Islands** began in 2008. As such there is limited 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. Water clarity results for all the stations ranged from 2.9 to 7.8 metres. Averages for all but one of the stations improved from the previous year and Station 3 that declined still had very acceptable water clarity depths throughout the season.

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 3.7 metres in some of the enclosed sampling bays to 11.9 metres in the more open areas. The lower Secchi depth areas are consistent with past results and do not indicate a declining water quality condition. In fact, all stations showed an increase in Secchi depth in 2009 from previous years.

### ***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** improved slightly for both TC and EC throughout most of the stations. Station 1 continues to have elevated EC levels but this is not surprising given its location at the bottom of the Seguin River in Parry Sound Harbour. The rest of the areas remain quite good with no stations being above the municipal standard for EC. 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 a bit mixed 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 in previous years, has levels above the municipal standard but still lower than long term averages. Water quality conditions are generally fine for recreational purposes though some sites continue to indicate periodic higher bacteria levels than the Township standards.

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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. Three of the sites (Stations 6, 8 and 10) had EC levels above the standard, but this occurred on only two sampling occasions. It will be good to continue monitoring these areas to see if they return to previous low levels. Recreation water quality in Pointe au Baril Islands continues to be excellent.

**Bayfield Inlet** restarted its monitoring program in the last couple of years. It is great to be able to provide results for this area, the most northern in The Archipelago. Results for bacteria are all below the Township standard and exhibit excellent water quality for recreational purposes. The quality of reporting on annual averages would be improved with a minimum of four but preferably five sample periods throughout the season. However, the consistently low results for the three sample periods suggests ongoing good water quality.

**Sans Souci** bacteria levels remain quite good and among the lowest in the Township. Only one location exhibited an average above the Township standard for EC however this was a result of one sampling session right after a high rainfall event. All of the other stations did not approach the Township standards. The recreational water quality in Sans Souci remains excellent for recreational use.

### **SUMMARY**

Water quality conditions in The Archipelago remain quite good for recreational purposes. In some instances, isolated locations within individual neighbourhoods remain above the Township developed standards. Care should be taken to assess whether they have been above the standard for a long time and whether there are any trends in the data; however these areas should continue to be monitored and perhaps deserve an extra focus to determine why they might be elevated.

The volunteer-based water quality program in The Archipelago is exceptional and provides valuable insight into water quality conditions and provides us with continued focus on the importance of our area waters. I know that the Township continues to be very impressed with the volunteer spirit and the resounding passion for a quality environment. To ensure that the spirit of this program continues to thrive, make sure to take the next generation out with us for our sampling.

Report Prepared by:

Greg Mason, B.Sc., MES  
Georgian Bay Generations  
gbgreg@gmail.com  
(705) 774-0978

For Information regarding the program please contact:

Ted Thompson  
Township of The Archipelago  
(705) 746-4243