

TOWNSHIP OF THE ARCHIPELAGO REVIEW OF 2013 WATER QUALITY RESULTS

PURPOSE

This review complements the Volunteer Water Quality Monitoring Program Data Report – 2013 also issued by the Township of The Archipelago and provide an overview assessment of the data noting any particular trends or hot spots. Volunteer water quality monitoring has been undertaken in The Archipelago for 15 seasons and this review provides a preliminary and fairly rudimentary assessment and 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 generally does not stay exactly the same over time; small changes and variations in the data both throughout the season and through the years is expected. 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. When looking at the data for an area and/or comparing areas, you should keep in mind a number of factors:

- **differences in the watershed** where a lake is located will cause natural variations to occur between lakes;
- **seasonal variations** in water temperature, rainfall, average temperatures, water levels etc., will all result in seasonal variations in data;
- **bacterial populations can be highly variable.** *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. But, not only humans can introduce *E.Coli* to water. So, 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 **quickly change** 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 100 Total Coliform (TC) and 10 *E. Coli* (EC) for recreational waters in the Township of The Archipelago have proven to be quite useful and accurate for many (but not all) 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**, a relatively large and deep lake, water clarity saw a decline in average water clarity last year to 4.8 metres compared to 5.1 metres the previous year. This is not the lowest annual average that has been posted (4.3 in 2004) but it is warranted to continue to follow water clarity and phosphorus concentrations in this lake more closely. Regardless, an average of 4.8 metres is still indicative of strong water quality.

This water clarity corresponds with a Lake Partner Program posted spring phosphorus level of 6.6 ug/L (2 sample average) which is fairly consistent with the long term average of 6.7 ug/L.

In **Crane Lake**, water clarity is similarly good though depths diminished slightly last year from the high in 2012 but in keeping with depths experienced in previous years. Average Secchi depths ranged from 4.7 to 5.0 metres which is excellent, especially considering that it is downstream of other developed lakes and due to its complex shape and multiple embayments. This water clarity is consistent with last years 2 sample average of 5.7 ug/L which is only slightly higher than the level posted in 2012 and consistent with the long term low phosphorus average of 4.8 ug/L since sampling began with 1997 as part of the Lake Partner Program.

Kapikog Lake's water clarity continues to be quite good ranging from 4.3 to 5.8 with an 'all stations' average of 4.8 metres throughout the year which is only slightly lower than the previous year. This water clarity has been quite consistent over many years although it remains slightly better than in previous years. This corresponds to a historically low Total Phosphorus level of 5.6 ug/L although (years 2002 – 2006). We would encourage Kapikog to restart its sampling under the Lake Partner program.

Healey Lake results are consistent with past years and indicate expected water quality for this type of lake. Results have not measurably changed in the past five years of sampling. Healey Lake has lower water clarity levels than many of the other lakes, though it is suspected that this is due to the lake having a slight brown colouring (normal) indicative of higher dissolved organic carbon (DOC) level (not

measured). Although Station 7 is lower with an average of 1.8 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 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. Regardless, water clarity and phosphorus levels are consistent and good.

Naiscoot Lake was not sampled in 2013. From previous years, although water clarity is not as high as some of the larger lakes in the South Archipelago, ranges of 3.5 to 4.0 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 six years of sampling.

Bacterial Monitoring

In all cases, bacterial levels are appropriate for recreational purposes in these lakes and do not strongly indicate any concerns.

Blackstone Lake continues to have quite elevated TC levels. The variation throughout the year remains quite high (i.e. standard deviation of 1152 for an average of 702 at Station 1). Much of the really high TC level seems to stem from one sample time in July and it would be interesting to see how closely that corresponds with a strong rain event or not. Regardless, the high variability suggests that this is not a constant challenge. Encouragingly, EC levels continue to be quite low and under the long term standards for the Township. 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.

Crane Lake saw an improved bacteria level situation for both TC and EC levels throughout the season. For 2013 there was only one site that had an EC level above the EC standard and all TC averages were below the municipal standard of 100.

Healey Lake bacterial levels remain relatively consistent with few significantly high counts of TC and all EC levels below 10. Water quality remains in good condition for recreational purposes in Healey Lake.

Kapikog Lake bacteria levels have returned and remained at historic levels over those found in 2007 and 2008. None of the locations were above the municipal standard which shows a minor improvement. TC levels continue to be elevated as in previous years but these are based on only two samples. Confidence in the data would be improved with a minimum of 4 sample occasions throughout the year. Water quality conditions on Kapikog Lake remain suitable for recreational uses.

Results for **Naiscoot Lake** were not provided in 2013 however previous results demonstrate good water quality conditions with EC levels consistently low and TC levels at suitable levels throughout the summer. Although some TC levels were higher, they were not inordinately elevated from historic data. 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 **Sturgeon Bay** remains quite poor as the area struggles with chronic algae blooms. There was quite a mild improvement over the previous year, but levels remain consistently low and comparable to long term averages for the area; Secchi depths did not reach much above 2 metres for the past year. This is consistent with the ongoing algae issues in Sturgeon Bay and is corroborated by the provincial Lake Partner program data (collected by volunteers) with ongoing high phosphorus levels (in 2013, P was often above 20 ug/L at a number of stations) being a key driver of the algae issues.

Woods Bay is a very enclosed and convoluted body of water which could be subject to similar pressures as Sturgeon Bay except that the presence of Moon River as well as two accesses to Georgian Bay likely allow for greater flushing of water through the system. As such, water clarity Secchi depths are quite good with the average depths ranging from 3.4 to 4.0 metres. These depths have not dramatically changed over many years although. 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 where you would expect a higher degree of variation between the sites. Water clarity however, remains quite good for the sites sampled and in keeping with long term averages. Average Secchi depths ranged from 3.9 to 7.5 metres, a fairly significant increase from previous years. None of the stations have changed markedly from previous years with small increases at many stations.

Pointe au Baril Islands began water clarity sampling in 2008 and the area typically has good results expected of a middle-to-outer islands area with good flushing from winds. Results in the past year saw a noticeable increase in water clarity at two of the stations, perhaps because a small change in location that needs to be confirmed. Similar to Sans Souci, the proximity to the outer bay allowing for increased flushing

and exchange of water through the area, higher water clarity results should be experienced in this area.

Skerryvore did not have results available to post last year but previous years indicate a mixed result, though one that has been consistent over the years for the areas sampled. It is suspected that some of the lower water clarity results are due to brown colouration in the water and/or some enclosed embayments which may well have significant algae. Because the results aren't changing markedly, there may be little to be concerned about; however, examination of how why the results are indicating lower water clarity may be warranted.

Sans Souci has some of the highest water clarity in the entire township with depths exceeding 10 metres. This is not surprising given its proximity to the open Georgian Bay subject to frequent flushing and exchange of water. While there was some variation in the averages over long term results, they continue to be in keeping with the long term average and no trend is readily apparent.

Bacterial Monitoring

Sturgeon Bay bacterial levels were again very good last year. Average EC levels were all within the municipal standard and TC levels were also within the standard. 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 be consistently good. All sites are at the municipal standards for both TC and EC levels and are indicative of good water quality from a bacterial perspective. The water quality in Woods Bay remains good for recreational use.

Bacteria levels in **South Channel** are consistent with historic pattern of results. The majority of the stations have EC and TC levels within municipal standards while Station 1 and Station 13 have levels that exceed the standard. Station 14 had an average greater than the municipal standard unlike previous years but not significantly.

Station 1's elevated EC levels are not surprising given its location at the bottom of the Seguin River in Parry Sound Harbour. Both Station 13 and 14 are higher but not considerably higher; these two should be watched in the years ahead. Bacterial levels throughout the South Channel sites, with the exception of where the sample is taken in the Parry Sound Harbour, would be deemed to be safe for recreational use given the Township standard guidelines.

Skerryvore data was not available for 2013 but a review of past results indicate bacterial levels are a bit mixed with some sites showing a minor improvements and others showing a slight decline though they are all generally consistent with long term averages. Some of the sites were above the Township standard although only

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on one or two of the sampling dates. Station 6, continues to have levels higher than the municipal standard though it has returned to the lower historic levels that have been experienced. Water quality conditions are generally fine for recreational purposes though some sites continue to indicate periodic higher bacteria levels than the Township standards and should be watched.

Pointe au Baril Islands bacteria levels have improved over previous years to the point that the majority of stations (except 1) have EC levels within the municipal standard. Station 9 has an average EC county of 11 for the summer which is still quite good. Generally good results are expected for this area because it experiences good flushing and exchange with outer Georgian Bay. Recreation water quality in Pointe au Baril Islands continues to be excellent.

Bayfield & Nares Inlet continue to be mostly below the Township standard and exhibit excellent water quality for recreational purposes. A few individual results are higher but they tend to align with periods of higher rain that results in increased runoff of bacteria into local waters.

Sans Souci tends to have quite reasonable bacteria levels over the variety of stations sampled there. One or two locations show slightly elevated levels but this is typically the result of one or potentially two sampling locations. All stations have EC averages below the municipal standard, which is consistent with the long term trend. This area continues to be quite good for recreational purposes.