TOWNSHIP OF THE ARCHIPELAGO
REVIEW OF 2007 WATER QUALITY RESULTS

PURPOSE

This review is to complement the Volunteer Water Quality Monitoring Program Data Report – 2007 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 8 seasons and periodic 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 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 depths were not provided in this past season but historically the average Secchi depths have ranged from 4.5 to 5.6 metres which is deemed to be excellent water clarity. This water clarity corresponds with a low Total Phosphorus long term 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 with one location showing a slight improvement over the past 4 years. Average Secchi depths ranged from 4 to 6 metres which is excellent, especially considering that it is downstream of other developed lakes. This water clarity is consistent with the long term 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 2007 spring phosphorus levels at 3.6 ug/L.

Kapikog Lake'**s** water clarity has not significantly changed in 5 years of sampling although like all areas there are seasonal and yearly changes. The average water clarity depth ranges from 3.7 to 4.1 metres for 2007, slightly lower than the previous two year's averages but comparable to results of 2003 and 2004. Long term total phosphorus levels are quite low, averaging 5.6 ug/L for the lake, again with a similar downward trend seen in other lakes.

Healey Lake's water clarity is typically lower than the other southern Archipelago lakes with water clarity depths ranging from 3 to 3.5 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 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. Water clarity results, with an average depth of 3.9 metres for the season, reveal a good water quality condition.

Bacterial Monitoring

Blackstone Lake had elevated TC and EC levels in 2007 in comparison to previous years. Three stations had averages above the Township standards for bacteria although many of these averages were a result of a one or two elevated samples as opposed to consistently high samples all season. 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. The TC levels have actually declined but EC levels have risen in the past years. It is unclear why this trend exists in Crane Lake, other than to note that the higher EC levels are throughout the lake, including areas with quite limited amounts of development. There may be natural influences at work. Some additional sampling may help to determine whether this is a lake wide trend and possibly due to natural causes or the result of human introductions of bacteria, possibly through faulty septic systems. Regardless, water quality remains acceptable for recreational water use on Crane Lake.

Healey Lake bacterial levels remain excellent. A few locations are showing some signs of an increasing trend, however, all results remain near or below the standards, with a few exceptions of elevated TC that have arisen in the past few years. These areas of elevated TC levels have corresponding low EC levels and are not of significant concern. Water quality conditions remain good for recreational use on Healey Lake.

Kapikog Lake bacterial levels have been traditionally quite good. In the 2007 sampling year some levels have increased to be near or above the Township standards and a number of sites have shown a slow increasing trend in recent years. Three stations were above the standard for EC which is to be carefully watched in subsequent years of monitoring. Regardless, Kapikog Lake remains good for recreational water use.

No long term trends exist for **Naiscoot Lake** to allow effective comparison. It was noted that two of the sites are above the Township standard. In part this is a result of one very high EC level on one sampling period and may not be indicative of general lake condition. Additionally, many of the sites only have 3 sample periods with which to determine a long term average. 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 1.5 to 2.0 metres for this past year which is slightly down from the previous years but is expected given the chronic algae issues. Total Phosphorus for Sturgeon Bay has been gradually decreasing but levels here are the highest of any other measured areas in The Archipelago at 16.3 ug/L. This area is the subject of significant study and current work is being undertaken by Gartner Lee Ltd to review all the gathered information and to outline the potential for various remediation options. A final report is expected in the spring of 2008.

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 4.2 metres. These depths have not dramatically changed in the past seven years and water clarity remains good for this area.

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 2.0 to 6.0 metres and have not changed markedly through time although two sites have shown a small increasing trend in water clarity.

Another area which is in between the inner bays and outer islands is **Skerryvore.** Although results were not provided for all stations, Secchi Depths at these stations range dramatically from sample sites in enclosed areas to the open areas of Shawanaga Inlet. Water clarity for this area is usually quite good and typical of the areas being sampled.

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 3.3 metres in some of the enclosed sampling bays to 10.9 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 were 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. Ongoing monitoring should watch to make sure these levels do not increase. The 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 tell a mixed story. Most of the sites remain unchanged with levels being at or very near the standard guidelines. Station 1 is showing a general improving trend whereas Sites 2 and 3 both had bacterial averages above the standards and are showing a slow increase in counts. However, those sites that fell outside of the standards were not consistently above throughout the season and only one or two measurements indicated high levels of bacteria. The water quality in Woods Bay remains good for recreational use.

Bacteria levels in **South Channel** remain relatively unchanged with the exception of Station 1 which has consistently shown elevated levels of EC. Station 1 is located in the Parry Sound Harbour and is much more prone to storm water runoff from Parry Sound which would likely carry higher levels of bacteria. The rest of the areas remain quite good with only two stations being above the standard, though not in a chronic fashion. Many of the sites are showing a slight declining trend in TC levels. 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 have improved slightly in the past few years although a few sites indicate levels that are still above the standard, as in other years. Station 6 may be of some concern as it has consistently had high levels of EC with associated high levels of TC; however its location in an enclosed bay may partially explain this phenomenom. 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.

Bacteria levels in **Pointe au Baril** continue to be quite low, which is expected of this area that experiences good flushing and exchange with outer Georgian Bay. Only one of the sites (Station 6) had EC levels above the standard, but this occurred on only two sampling occasions and is lower than previously measured in 2004 and 2003. This site would appear to have been influenced by local bird colonies which partially explain the elevated bacteria levels at this site.

Sans Souci bacteria levels remain the lowest in the Township at all of its locations. None of the average EC levels even approach the guideline with all averages being below 4. The recreational water quality in these last two areas (Sans Souci and Pointe au Baril) remain excellent for recreational use.

SUMMARY

The volunteer-based water quality program in The Archipelago continues to be a success. We are continually impressed by the commitment and enthusiasm of the volunteers and the interest of the local community. This speaks volumes. The level of community support and interest alone make this a valuable program for the Township. The overall purpose of the water quality monitoring program remains two-fold. First, the program is 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.

Water quality conditions in The Archipelago remain quite good with only a few spots for concern such as Sturgeon Bay or 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. We look forward to continuing to work with our residents and volunteers to ensure the high water quality and general environment are maintained and preserved in good condition or rehabilitated where possible.