TOWNSHIP OF THE ARCHIPELAGO
REVIEW OF 2005 WATER QUALITY PROGRAM

PURPOSE

The purpose of this review is to provide an overview evaluation of the Volunteer Water Quality Monitoring Program Data Report – 2005. It will consider program continuity over the past five years, assess general quality of the data provided, and provide some overview interpretive comments where relevant.

WATER CONDUCTIVITY AND pH

The purpose for measuring water conductivity and pH are well described in the report.

In the **Woods Bay** area, water conductivity is typically lower than for most areas of the Georgian Bay coast because of the major influence of the Moon River inflow of low conductivity, Canadian Shield drainage. The average values measured in 2005 ranged from 53 at Station 1 (river mouth) to 63 at Station 5, furthest from the river mouth and showing some influence of mixing with higher conductivity Georgian Bay waters. This is very consistent with previous years' data and represents a consistent, and expected, trend. The pH data appear somewhat suspect. Water pH in the Moon River and Musquash River draining Lake Muskoka is typically in the range of 6.5 to 7.2, which is slightly acidic to neutral. This has been observed and measured in previous years. Readings as high as 9.0 to 10.1, as reported in 2005, are well above the natural range for any waters in this area. This is most likely due to the high level of difficulty in maintaining a well-calibrated pH meter in field conditions. Unlike conductivity meters which are stable and maintain calibration for extended periods, pH meters are very unstable and require frequent recalibration.

The only circumstance when very high pH levels can be found in natural waters is during massive algae blooms, as has been the case on Sturgeon Bay. It is unlikely that this condition has occurred in the Woods Bay area in 2005. It is recommended that the pH meter being used should be tested and recalibrated.

In the **South Channel** area, both the water conductivity and pH readings appear consistent and very descriptive of natural trends in this area. Average water conductivity was lowest near the mouth of the Seguin River (Station 1) and highest in the area with greatest Georgian Bay influence (Station 6). All other locations varied between these, reflecting the variable influences of local runoff (low conductivity) and Georgian Bay water mixing (high conductivity). Station 1 also shows an interesting seasonal conductivity trend from spring to fall. In May, when flows are high in the Seguin River, the conductivity was low at 47, typical of shield drainage rivers. Through the summer, as river flows declined and the influence of Georgian Bay waters increased, the conductivity increased to 164 by mid-October. This is

typical for many coastal areas of Georgian Bay which are influenced by tributary inflow waters.

The pH values measured in South Bay were very close to neutral, with averages ranging from 6.8 to 7.2. These are consistent with previous sampling and are within the expected natural range.

WATER CLARITY

Monitoring of water clarity by means of a Secchi disc is a simple yet effective way of measuring trends in nutrient levels in freshwater lakes. Generally, as nutrient levels increase so does the density of algae (plankton) growth in surface waters which, in turn, reduces water clarity. A higher degree of water clarity is always considered desirable.

In the **Sans Souci** area, water clarity is generally very good because of its outer coastal location. Average water clarity measurements of 7.8 and 8.9 m at outer Stations 1 and 6 are indicative of the clear offshore waters of Georgian Bay. It is of interest, however, that general water clarity at these locations has shown a trend of decline over the past three years. This warrants further observation. Other sampling locations were in more sheltered bays, which generally have lower levels of water clarity. However, the Secchi readings in these bays were reflective of good water clarity and were consistent with previous measurements.

In the **Woods Bay** area, water clarity is typically lower than in the Sans Souci area due to the more inland nature of these channels and the significant influence of the Moon River inflow. Water clarity of 2.8 to 3.4 m (seasonal averages) is typical of this area and consistent with previous years of monitoring.

In the **South Channel** area, average water clarity is typically good due to the greater water depths in this region. Water clarity of 4.5 to 6.5 m is typical, except for locations closer to Parry Sound harbour which are influenced by the Seguin River and the greater amount of lakeshore development and human activity in this area.

In the **Sturgeon Bay** area, water clarity has shown significant decline over the past decade due to elevated nutrient levels and large algae blooms. Seasonal average water clarity at most Sturgeon Bay locations was slightly better than in the prior two to four years, but remained comparatively low at 1.5 to 2.5 m. Seasonal trends at some locations show a progressive decline in water clarity from close to 3.0 m in the spring to 1.6 to 1.8 m by fall. Other locations, in some of the bays and near tributaries, showed a more random seasonal pattern but also had low readings in the mid-October period.

In the **Skerryvore** area, water clarity was good at 4.6 and 5.8 m in the areas away from the lakeshore channels and lower at 3.3 m closer to the more developed lakeshores. These values are generally consistent with prior years of sampling.

In **Blackstone Lake**, water clarity is typically good because of its greater water depth in most areas. Seasonal averages of 4.6 to 5.6 m are excellent and consistent with earlier measurements.

In **Crane Lake**, water clarity also remains excellent, with seasonal averages ranging from 4.5 to 4.8 m. Water clarity has shown an improvement in almost all locations of Crane Lake over the past three years. This trend should continue to be monitored.

In **Healey Lake**, water clarity is lower than Blackstone Lake or Crane Lake, averaging from 2.9 to 3.5 m in all locations except Station 7. These are acceptable values and generally consistent with prior years of sampling. Station 7, in the northwestern bay of Healey Lake, had a seasonal average of 1.6 m, which is consistent with the 1.1 and 1.3 m measured over the past two years. This is a lower level of water clarity than is generally considered normal or desirable, unless there is a specific natural cause in this area.

In **Kapikog Lake**, water clarity was good at all locations, with seasonal averages ranging from 4.3 to 4.6 m. There appears to be a consistent improvement in water clarity at all locations in Kapikog Lake over the past three years, a trend which should continue to be monitored.

BACTERIAL MONITORING

The examination and analysis of bacterial data for natural surface waters should always consider several features of bacterial populations:

- Bacterial populations can exhibit a high degree of natural variation in lakes and rivers. This is particularly true for total coliforms, which can originate from a number of natural sources. *E. coli* are much more specific to fecal sources from warm-blooded animals and thus directly related to the potential for disease-causing pathogens to be present.

- Bacterial populations also can exhibit rapid fluctuations in abundance over only a few days, depending on the nature of the source. For instance, bacterial levels can be elevated after a heavy rainfall which carries bacteria from the land to the water, or if there is a discharge source such as from a live-aboard boat (grey or black water). Of particular concern are areas which have elevated bacteria levels on a chronic basis, implying a continual local source.

The bacterial objectives of 100 TC and 10 EC for recreational waters in the Township of The Archipelago have proven to be useful and practical guidelines to evaluate the presence and degree of potential bacterial contamination. Where TC levels are elevated, a correspondingly high EC level is used to confirm a cause for concern. Higher TC levels in the absence of a higher EC level often indicates a natural, non-fecal source of the TC.

In the **Sans Souci** area, bacterial levels were consistently low at all locations in 2005, falling within the guidelines in all cases. This has been a consistent trend in this area over the past five years, and is likely due to the low density of lakeshore development found here and the large amount of water mixing that occurs with nearby open waters of Georgian Bay.

In the **Woods Bay** area, most locations fell within the guidelines in 2005. Those locations which exceeded the EC guideline did so only slightly, and this was due to one high reading during the five sampling dates, as opposed to chronic high levels. Bacterial levels were generally consistent with the previous four years and pose no concern for recreational water use.

In the **South Channel** area, bacterial monitoring in 2005 confirmed three trends seen in the prior four years:

- Bacterial levels were exceptionally high at Station 1 in Parry Sound Harbour, averaging over 200 EC for the May to October period. Individual sampling dates had EC levels as high as 559 and 938. There is obviously a significant and somewhat chronic bacterial source in this area. The bacterial levels measured in 2005 were significantly higher than found during the prior four-year period, each of which had higher than natural bacterial levels.

- All other sampling locations had very low EC levels, well within the guidelines. These are excellent conditions for recreational water use.

- Several sampling locations had TC levels above the guidelines, as has been observed in the South Channel area in previous years. The low corresponding EC levels indicate that these higher TC measurements are likely due to natural sources and should be of no concern for human health. This pattern of intermittent high TC levels from year to year has been observed in other locations, but is not common, and appears to be related to some unique features in the South Channel area.

In the **Sturgeon Bay** area, bacterial levels, particularly EC, were generally within or close to the guideline values. Several locations had higher average EC levels, due to two or three higher individual measurements over the June to October period. Stations 1, 6, 7, 10 and 12 were in this category, with average EC levels approximately twice the guideline value. This is not yet a concern for safe recreational water use, but does warrant further monitoring of these more isolated bays. It is also interesting to note that all of these locations had higher bacterial (EC) levels in 2005 than was found in any of the previous four years of monitoring at these sites. The occasional higher average TC levels should be of no concern, especially where these are due to a single high measurement influencing the average.

In the **Skerryvore** area, bacterial levels were of concern in 2005. All of the sampling locations showed elevated TC and EC levels, with most sites having EC averages at five to six times the guideline. The corresponding TC levels were also high at all locations. The average EC level at Station 3 was over 500, but this is largely due to one exceptionally high measurement in early August. It is also worth noting that at all locations there was a consistent trend of increasing bacterial levels through the summer period from June to late August. All of August samples were consistently high. This could imply a progressive aggregation of bacteria at some of the locations, or just an increase in bacterial sources during late summer. Higher bacterial levels have been found in this area in previous years, most notably in 2003 when TC and EC levels were somewhat higher than those found in 2005. There appears to be a consistent and troublesome bacterial source issue in the Skerryvore area which certainly warrants future monitoring. Recreational water use is not yet impaired, but some of the August measurements should be of concern.

In the **Pointe au Baril** area, bacterial levels were generally favourable with all locations achieving the guidelines but two, and these were not excessively high. Stations 1 and 2 had average EC levels of 17 to 20, which is higher than measured at these locations during the previous four years, but not at a level which would cause concern. By comparison, average EC levels at Stations 6 and 7 were much lower than those measured in previous years. Several of the average TC levels were above the guideline but, in all cases, this was due to one high reading during the five sampling dates. Bacterial levels in the Pointe au Baril area posed no concern for recreational water use in 2005.

In **Blackstone Lake**, bacterial levels were generally excellent in 2005, as has consistently been the case over the previous four years. EC averages were very low at all stations. Average TC levels were above the guideline at all locations in 2005, which had not happened in previous years. This resulted from high TC readings measured in September and October at all five sampling stations. However, the very low EC measurements recorded on the same dates would strongly suggest that the TC sources were natural and should not be of concern for human health. Water quality conditions remain excellent in Blackstone Lake for recreational water use.

In **Crane Lake**, bacterial levels were very good with all EC averages falling at or below the guideline of 10 during 2005. These levels were very consistent with those measured at the same locations over the previous four years, showing a longer-termed trend of favourable bacterial conditions. Average TC levels were above the guideline at all locations in 2005, a condition which was also observed in 2004 and 2003. As discussed for Blackstone Lake above and earlier in this report, these higher than normal TC levels were not accompanied by high EC levels, which would suggest that the TC source is natural and not a concern for human health. The fact that this condition has persisted for three consecutive years is of interest, and likely reflects some natural phenomenon on this lake. Water quality conditions remain very good for recreational water use on Crane Lake.

In **Healey Lake**, bacterial conditions were excellent in 2005. Average TC and EC levels were well below the guidelines at all locations and showed a high degree of consistency with the measurements taken over the previous four years. Water quality conditions remained excellent for recreational use on Healey Lake during 2005.

In **Kapikog Lake**, bacterial conditions were excellent in 2005. Average EC levels were below the guideline at all locations, and showed a high degree of consistency with EC measurements taken over the previous three years. Two of the TC averages were above the guideline (Stations 1 and 3), but these had low corresponding EC levels and should not be of concern. Water quality conditions remain excellent for recreational use on Kapikog Lake during 2005.

GENERAL OVERVIEW

The use of a community, volunteer-based approach to water quality monitoring was pioneered in Township of The Archipelago in 1999, as provincially-based and funded water monitoring programs were greatly reduced. This program has been so successful and effective that is has now been adopted by cottager associations and municipalities across central Ontario. The value and benefits of this type of program are worth restating and highlighting:

- larger numbers of volunteers have become involved each year;
- all of the major waterfront property owner associations in the Township are now involved in the program, including the entire coastline of Georgian Bay from Twelve Mile Bay to South Channel and Skerryvore to Bayfield Nares, as well as all of the larger inland lakes (Blackstone, Crane, Healey and Kapikog);
- the level of public awareness of water quality issues has grown dramatically throughout the township because of this program, either through direct participation or the reporting of the results;
- positive actions have been taken, which are improving water quality or protecting the resource better. The septic system re-inspection program in the township is a good example of this;
- a water quality database has now become established, which will allow for short- and longer-termed analysis of water quality trends to ensure protection of the resource;
- specific water quality data are now available for some areas of the township, which will provide a necessary and valuable planning tool for assessing future levels and types of lakeshore development;

- as the results of this monitoring program have been released and presented to various public and government agencies, it has received broad acclaim as a very effective way to measure and protect water quality as federal and provincial government programs are reduced. Acknowledgements for this program and the value of the data generated have come from Environment Canada, Ontario Ministry of the Environment, the International Joint Commission for the Great Lakes, Ontario Ministry of Natural Resources, Severn Sound Remedial Action Program, the Georgian Bay Association, and others; and

- as the original pioneer of this type of volunteer-based water quality monitoring program, it has been broadly accepted and adopted in other areas of Ontario, including Lake Muskoka, Lake of Bays, Peninsula Lake, as well as numerous lake stewardship associations in Haliburton, the Kawarthas and the Rideau Lakes.

The 2005 water quality monitoring program carried out by the community volunteers and the Township of the Archipelago demonstrates all of these benefits. The energy, enthusiasm and commitment by all of those involved should be broadly acknowledged. Their contribution to protecting water quality in the Township is large.

The format for presenting 2005 water quality data on a comparative basis for each area is excellent and should be continued in future years.