Executive Summary

The MLA Water Quality Initiative Report presents data collected at 180 locations during the summer of 2019 and compares it to data collected from 2002 to 2018. Based on our analysis of the long-term data acquired to date, the water quality at most of the sampling locations remains good to excellent.

The objectives of the MLA Water Quality Program are:

- To promote and encourage good stewardship of the lakes;
- To monitor the long-term health of the lakes;
- To identify adverse water quality trends at an early stage; and
- To promote causation studies and remediation by the responsible authorities.

There are multiple cases where the data collected by dedicated MLA volunteers has initiated closer inspection of specific sites. The accountability arising from the Water Quality Program contributes to local improvements of septic systems, changes to municipal sewage treatment practices, and, overall, increased vigilance to protect the qualities of our lakes. This report summarizes the efforts of many committed volunteers and staff. Together, we continue to make a difference!

Area Summary Sheets are used to summarize sampling results and traffic light symbology. The traffic lights were established by the MLA to provide a visual indication of the overall water quality at each Area. A green light indicates the water quality remains consistently good and a yellow light indicates that further investigation is recommended to maintain good water quality. A red light indicates remedial action may be necessary to improve water quality.

The spring freshet of 2019 produced historic flooding conditions. The level in Lake Muskoka was the highest ever recorded and the 2019 flood was the second “100-year flood” in 6 years.

The 2019 sampling season started in mid-May, ended in late August and generally included a total of four sampling events at each location. New deep-water stations were established at Foot’s Bay (FTB-4 and FTB-5) to monitor phosphorus and bacteria levels in 2019. The primary change to the monitoring program in 2019 was the use of a new laboratory (ALS) to complete the analyses. The new lab provided a detection limit of 3.0 µg /L and precision to 0.1 µg /L. Sample bottles similar to the pre-treated bottles used in 2018 were used in 2019.

In 2019, of the 55 Areas tested, there were 42 Areas with a green light, 9 Areas with a yellow light and 2 Areas with a red light. It is noted that the green, yellow and red Areas do not add up to the total number of Areas tested as there are 2 sites with only one or two years of data that are not rated yet. This year, 6 Areas changed from a green light to a yellow light, and 5 Areas changed from a yellow light to a green light.

The water quality parameters sampled during the 2019 program consisted of temperature, Secchi depth (clarity), Total Phosphorus (nutrients), *Escherichia coli (E. coli)* and Total Coliform (bacteria count). There was a total of 238 Secchi depth measurements, 446 Phosphorus samples, and 261 bacteria

samples taken. In 2019, 22 of the 46 duplicate phosphorus samples (48%) were deemed to be bad splits.

Secchi depths recorded in 2019 continue to remain consistent with the depths reported historically and continue to generally support the classification of oligotrophic.

Although there was an overall generally increasing trend in most of the deep-water spring phosphorus concentrations in 2017 compared with values in 2016, that trend was not realized in 2018 or 2019. At the deep-water station sites that were sampled for spring phosphorus, 8 (15%) of the 52 sites showed the lowest spring phosphorus concentration recorded to date, compared to 42 % in 2018. All the sites with the lowest recorded spring phosphorus concentrations to date were either Affiliate sites, or sites located within Lake Muskoka

Conversely, in 2019, five of the deep-water sites recorded the highest spring phosphorus concentrations to date, compared to 4 deep-water sites in 2018. All the sites with the highest spring phosphorus concentrations to date were located within Little Lake Joseph, Lake Rosseau, or the Indian River.

An overall generally static trend in most of the nearshore phosphorus concentrations continued in 2019, similar to the results in 2018. At the nearshore station sites, 10% (9 of 86 sites) of the sites showed an increasing trend in the past 3 years. Of those 10 sites, 5 of them had an increasing trend due to a high value obtained in 2019, all of which were analyzed to be outliers. An analysis of the trend over time at each of the nearshore stations, using all data, shows that at 73 % (63 of 86) of the stations there was a decreasing trend in phosphorus.

Of the watercourse sites sampled for spring phosphorus in 2019, MRV-5 showed the lowest spring phosphorus concentration to date, and HMB-8 showed the second lowest spring phosphorus concentration to date. At watercourse station WIN-7, the 2019 spring phosphorus concentration was the lowest ever recorded, and the yearly mean phosphorus concentration was the lowest recorded in the 6 years of data gathered.

Spring phosphorus levels in Lake Joseph, Lake Rosseau and Lake Muskoka in 2019 were generally below 10 µg/L, indicating oligotrophic conditions. Elevated phosphorus concentrations at the nearshore sites were primarily associated with each site location being adjacent to streams flowing into the three lakes. Spring phosphorus levels in the Affiliate lakes and rivers in 2019 were all below 10 µg/L, except for elevated levels at Brandy Lake (BDY-0) and Indian River (IND-7).

For Harmful Algae Bloom analysis in 2019, the MLA has assigned a red light threshold for those locations with a confirmed blue-green algal (cyanobacteria) bloom in 2019, a yellow light threshold for those locations with a blue-green algal bloom confirmed within the last 3 years, or, a bloom in the current year (2019) with the toxic component (microcystins) measured to be <20 µg/L. Finally, the MLA has assigned a green light threshold for those locations that have never had a blue-green algal bloom, or that have had 3 years since the last bloom. In 2018, HAB's were reported near the Windermere WIN-1 site (base of falls below Clark's Pond), and the Boyd Bay BOY-3 site (near Spirit Bay Harbour). In 2019, a blue-green algae bloom was reported in Brandy Lake (September 12), and Bass Lake (October 24).

E. coli levels are measured in colony forming units per millilitre of sample (cfu/ml). *E. coli* levels exceeded 50 cfu/100 ml at 11 (4.6%) of 240 sampling events for *E. coli* in 2019, compared to 9.2%

reported in 2018. The sites that reported elevated *E. coli* levels (>50 cfu/100ml) in 2019 include Bala Bay (BAL-2), Beaumaris (BMR-4), Moon River (MOO-1), Star Lake (STR-3), and Walkers Point (WAK-6). The focus stations at Minett (MIN-1, MIN-6, MIN-7 and MIN-9), also observed elevated *E. coli* levels and all sites required re-testing. From those sites identified for further *E. coli* analysis in 2019, the Minett station (MIN-6) continues to show elevated *E. coli* levels.

Following analysis of the 2019 results, Beacon recommends that the primary Focus Areas for the 2020 sampling season should continue to be Minett (MIN). Additional focus in 2020 should be directed to Bruce Lake (BRU-3), East Bay (EAS-2), and Windermere (WIN-1 and WIN-5) due to the 2019 nearshore TP measurements being substantially higher than the deep-water TP (yellow traffic light threshold), and to Walkers Point (WAK-6) due to the geometric mean *E. coli* level in 2019 being above the MLA yellow traffic light. Attention should also be focussed on the spring sample at Skeleton Bay (SKB-0) due to the increasing trend in spring TP measurements over last 3 years.

Several lake health concerns in the Muskoka watershed, in addition to levels of total phosphorus, water clarity and bacteria, that are the core of MLA's field monitoring program, have been identified. While not directly part of the MLA Water Quality Initiative, the MLA is keeping up to date on these issues through participation in external committees and task forces to augment its guardianship of lake water quality.

It is important that everyone contribute to the goal of improving water quality and aesthetics of their lakes, while raising public awareness about healthy lake systems. Any stewardship activities will benefit the watershed over the long-term and leave a positive legacy for future generations.