

Executive Summary

Innovative Methods for the Determination of Water Quality in the Lakes Muskoka, Joseph and Rosseau. Gartner Lee Ltd. December, 2001.

An ambitious program was undertaken in the summer of 2001 in order to gather preliminary information on innovative means of water quality determination in the Muskoka lakes. The 2001 program was one component of a larger initiative by the MLA. The objectives of the long term initiative were:

- a) to review and summarize existing information on water quality in Lakes Muskoka, Joseph and Rosseau;
- b) provide an opinion on the water quality stresses of most significance to the Muskoka Lakes and the MLA;
- c) develop a research and monitoring program based on the results of task b;
- d) liaison with management initiatives being undertaken elsewhere; and
- e) advice on stewardship initiatives and other follow-up activities.

Our initial review (Tasks a and b) concluded that most of the potential stresses to the Muskoka lakes were either being addressed by management activities beyond the immediate influence of the MLA (i.e., acid rain, shoreline development policies) or that management activities were required but were beyond the direct influence of the MLA (contaminants, climate change). Our review did, however, indicate that past management programs were focussed on the open waters of the lake and that they may not be capturing the responses of most interest to lake users.

In spite of the overall excellent water quality in the main portions of the lakes, the attention of lake residents and scientists has been increasingly focussed on the nearshore, shallow areas of the lakes in recent years. The nearshore areas are important biologically, as the waters are well lit and provide habitat for much of the aquatic life in the lake. They are important to lake users, as the nearshore is where they most often view water quality – while swimming, standing on a dock or boating. Any problems in these areas will be immediately visible to the lake user.

The nearshore areas are also those portions of the lake that are most likely to suffer from the stresses that users may exert on the shoreline. If septic systems are old or poorly maintained, swimming in the nearshore area and water supply will be impaired by bacterial contamination. If the shoreline is cleared of its natural vegetation, the nearshore waters may become more muddy (turbid) as soils and attached nutrients wash into the lake with a rainstorm. If the natural vegetation is replaced with a manicured lawn then algal growth may proliferate as fertilizer residues are washed into the lake. In spite of these

concerns, no management efforts have been directed to the nearshore areas of Lakes Muskoka, Joseph and Rosseau. Our review therefore concluded that a research and monitoring program which was focussed on the nearshore area could be taken on by the MLA, was amenable to implementation by the Marine Patrol, would potentially reveal relationships between land use and nearshore water quality and could potentially generate results which could guide future management and stewardship activities in the lakes.

The MLA's 2001 program was therefore focussed on the nearshore areas of the lakes. A set of three tests were developed and applied at up to ten sites in each of Lakes Muskoka, Joseph and Rosseau over the course of the summer.

The 2001 studies investigated:

- a) bacterial levels in nearshore areas;
- b) levels of the plant nutrient phosphorus in nearshore waters; and
- c) algal growth in nearshore areas of higher human activity.

The program was to be implemented by the MLA's Marine Patrol under the supervision of Gartner Lee Limited for survey design, quality control and reporting.

The results confirmed that, although water quality in the lakes is generally excellent, specific patterns of nutrient enrichment, algal growth and bacterial growth suggest that water quality in the nearshore areas is not as good as in offshore areas. This further suggests that sampling programs which focus only on offshore, mid-lake water quality may not be sensitive enough to detect the more subtle effects of shoreline usage and development by humans.

Although there were no consistent and significant patterns relating shoreline use to degraded water quality, there were indications of impacts to nearshore nutrients, bacteria and algal density for specific land uses. These impacts were neither large nor dramatic, but do warrant further study to confirm if patterns exist. A combination of urbanization, agriculture and high density trailer park development appeared to have a consistent influence on the Indian River and more detailed studies in this location are warranted. Golf course runoff appears to result in increased phosphorus levels and algal growth in other nearshore areas.

Analysis of the algal data did not reveal clear indicators of cause and effect and many factors beyond land use may alter algal growth. We therefore recommend that subsequent programs focus on phosphorus and bacterial indicators until such time as scientific research by other investigators can be brought to bear on the questions at hand. Analysis of turbidity (water cloudiness) along with phosphorus may help identify sites for future algal work.

We conclude that the 2001 sampling program was successful, in that it demonstrated the feasibility of looking at nearshore indicators of water quality and the utility of the results. The MLA should consider means to improve the program by :

- a) providing a greater focus on water quality through hiring environmental scientists and biologists as part of the Marine Patrol and increasing their training. These students may also benefit themselves and the MLA by incorporating their summer work into an independent study project for their course requirements;
- b) maintaining and increasing the involvement of the MLA staff in the day to day running of the water quality program to develop and maintain internal expertise within the MLA. Identification of an internal “champion” of water quality issues will allow greater continuity of programs and increased cost savings in program implementation;
- c) allowing an earlier start to the program, to allow the collection of more than 4 samples over the summer;
- d) adding new sites, but only if there are sufficient resources to do so without straining the energy or good will of staff;
- e) reduced reliance of Gartner Lee Limited for data analysis and report preparation, and increased reliance on Gartner Lee staff to train and assist MLA staff in carrying out the water quality program. Again, this method allows greater continuity, develops internal expertise and maximizes cost efficiencies for the MLA; and
- f) supporting graduate student research into factors influencing the growth of nearshore algae. I have contacted Professor Frances Pick at the University of Ottawa. She is an expert in periphyton in streams and lakes, is currently supervising graduate student investigations and expressed great interest in the MLA program. I have made an extra copy of this report for Dr. Pick and will provide it to her, with the permission of the MLA.

These recommendations made above will allow the MLA to move from an ambitious and successful Year 1 program to a consistent and “self perpetuating” program in the years to come.

In the end, this was an ambitious program. This report represents a landmark in the level of investigation carried out by an association and is, in several aspects, cutting edge. Although results are not clearly unequivocal they do support our initial concerns that management programs of the agencies may not be revealing the true health of the lakes. The program confirmed that water quality in Lakes Muskoka, Joseph and Rosseau is generally excellent but does point to problem areas which require further investigation.

Gartner Lee Limited welcomed the opportunity to help the MLA launch this program. We look forward to continued involvement in program design and interpretation and encourage the MLA to maintain their internal resources for the sampling and implementation of the program. We also thank the MLA Marine Patrol for their dedication to and enthusiasm for the work, Cheryl Watt and Cheryl Hollis of the MLA office for dedication to the program and “Coli Plate” expertise and to the MLA Board for their support for this initiative.