

Septic Inputs to Bouchie and Milburn Lakes

by

Chris Swan, MOE

December, 2009

In August 2002, J. S. Hart & Associates completed a study of the Bouchie-Milburn watershed for the Ministry of Environment (MOE) and produced a report titled: *Phosphorus Sources in the Milburn and Bouchie Lakes Watershed*. In preparation for calculating the phosphorus (P) loading component from septic systems, a sewage disposal system questionnaire was distributed and completed for 11 households on Milburn Lake and 60 households on Bouchie Lake. The questionnaire information was supplemented by reference to sewage disposal system details recorded in permit applications on file with the Ministry of Health. The questionnaire included details about the site (development history, lawns and gardens, soil type, water table etc.), household information (number of occupants, seasonal vs. full-time residence, use of various appliances like dishwashers, well information etc.) and the sewage disposal system (installation date, frequency of maintenance, distance to lake etc.).

On Milburn Lake four out of eleven households did not complete the survey (i.e. not home, seasonal resident, etc.) and on Bouchie Lake twelve out of sixty did not complete the survey. In these cases the average of the lakeshore practices was used for their information in the calculation. The amount of P loading per household was calculated by multiplying the number of residents by the duration (how much of the year they live there) and the P coefficient for septic loading per person per year. The P coefficient came from many other studies where the septic loading was actually measured. To actually measure each septic loading would be very costly and would require permission from every private lot owner. Example:

$$4 \text{ occupants} \times 1 \text{ year} \times 1.3 \text{ kg of P/person/ year} = 5.2 \text{ kg/year}$$

Adding up all 60 households on Bouchie Lake comes out to 70 kg/year of Phosphorus just from septic systems. Of the eleven households on Milburn Lake, the P septic loading was 14.4 kg/year.

This loading amount represents the most likely scenario at this point in time. The worst case estimate of all of the septic fields breaking through (i.e. no longer functioning) would be 30 kg P/yr for Milburn and 161 kg P/year for Bouchie (note that both of these numbers are more than double the “most likely” estimate).

In the context of the overall upland loading to the watershed, the P loading from lakeside septic disposal systems was determined to be 8.6% of the loading entering Milburn Lake and 15.5% of the P loading entering Bouchie Lake. This is a significant amount of P loading to a small shallow lake. Note that this does not take into account any potential P loading from non-lakeshore lot septic fields.

Hart also estimated the Bouchie septic loadings a second way by including the extent of the P plume and the types of soil on each lot. In this estimate the loading was close to the first method at 61.4 kg P/year or 13.9%. Either method produces an estimate which is significant for a small shallow lake.

The overall 2002 estimate of loading to Bouchie Lake from upland and lakeshore sources is:

Phosphorus source	Annual phosphorus input to Bouchie Lake from the watershed	
	Amount (kg)	% of total
Agriculture land (including hobby farms)	190.2	42.2
Lakeshore sewage disposal systems	70.0	15.5
Livestock wintering areas	60.2	13.4
Crown land (excluding lakes and ponds)	37.6	8.3
Lakeshore residential land	36.0	8.0
Rural residential land	28.2	6.3
Atmospheric contributions to lakes and ponds	28.2	6.3
Total	450.3	100.0

Hart estimated that in 25 years (i.e. 2027), the loading would increase to approximately 19.4% (91.6 kg/yr) for Bouchie Lake if there was no further development along the lake and no replacement of septic systems. The loading would increase as the soils become saturated over time and break-through occurs. The watershed loadings can be divided into two separate groups, the upland and lakeshore sources and the internal Bouchie Lake sources. It is important to keep both sources in mind when looking at the overall watershed percentages.

The 2003 Bouchie Lake data was analyzed by C. Perrin of Limnotek Inc in a report completed in 2005 titled: *Limnology of Bouchie and Milburn Lakes: Present Status and Recommendations for Water Quality Improvement*. This is when the significance of the phosphorus source within the lake itself (internal loading) was discovered (estimated at 52% of the entire loading to the lake). This internal loading is a result of a build up in the lake from the upland and lakeshore sources. Before the internal loading became so predominant, the upland and lakeshore sources were bringing in the majority of the phosphorus. Now the upland and lakeshore sources contribute approximately half of the total loading to Bouchie Lake. This means that the percentages in the table above would be reduced in half when talking about the overall watershed loading, or could be reported as shown when talking about the upland and lakeshore loading. This does not diminish the the importance of controlling septic systems i.e. a sewage collection and treatment system, nor dealing with any of the upland/lakeshore sources. Extensive use of P-free soaps and detergents is a good practice, especially on lakeshore lots, and can help reduce loadings when the soil is not already saturated with phosphorus.

Note that if lake restoration was to effectively reduce the internal loading component, then the upland percentages would be as reported in the table above. The important thing to keep in mind about the P loading is that the percentages can help to prioritize restoration activities, but it is the actual number of kilograms that needs to be reduced in order to keep the lake ecosystem balanced.

References:

Hart, J.S. & Associates Ltd. 2002. Phosphorus Sources in the Milburn and Bouchie Lakes Watershed. Prepared for Ministry of Water, Land and Air Protection.

Limnotek Research and Development Inc. 2005. Limnology of Bouchie and Milburn Lakes: Present Status and Recommendations for Water Quality Improvement.