

Addendum on the target load and new load allocation in Missisquoi Bay

The States of Vermont and New York are in the process of preparing a Total Maximum Daily Load (TMDL) for phosphorus in Lake Champlain. The U.S. Federal Clean Water Act requires states to identify waters for which normal wastewater treatment requirements are not enough to attain state water quality standards, and to establish maximum allowable loads for the pollutant of concern. The states are using the phosphorus loading and modeling analysis in the Lake Champlain Diagnostic-Feasibility Study and the phosphorus reduction agreement in the Lake Champlain Basin Program plan *Opportunities for Action* as the basis for the TMDL for Lake Champlain. The TMDL will refine the previous phosphorus plan by assigning individual load allocations to each wastewater treatment facility discharge, and by subdividing the allowable nonpoint source loads in each watershed into categories of forest, agriculture, and urban sources.

A draft of the Vermont portion of the TMDL document was provided to the U.S. Environmental Protection Agency (USEPA) in March 2001, requesting informal technical review. An April 4, 2001 memorandum from the USEPA New England Office indicated that there was a major technical issue with the draft TMDL concerning the load allocation for Missisquoi Bay.

The problem with the load allocation for Missisquoi Bay relates to the modeling procedures used for the Lake Champlain Diagnostic-Feasibility Study (Vermont DEC and New York State DEC 1997). The phosphorus mass balance model and cost optimization procedure used to derive the loading targets in *Opportunities for Action* were constrained so as not to exceed the maximum load reductions thought to be possible from agricultural best management practices (BMPs) in each watershed. In the case of the Missisquoi Bay watershed, the model was unable to find a load allocation that attained the 0.025 mg/l in-lake criterion without exceeding this constraint. The total load allocation of 109.7 mt/yr for Missisquoi Bay listed in *Opportunities for Action* was consistent with a modified in-lake concentration of 0.027 mg/l, but not 0.025 mg/l.

The decision to change the modeling endpoint for Missisquoi Bay to 0.027 mg/l was necessary in 1996 to generate a set of preliminary loading targets that could be accepted for *the Opportunities for Action* plan. However, the actual criterion in the Vermont Water Quality Standards is 0.025 mg/l, and the goal endorsed for Missisquoi Bay by New York, Québec, and Vermont in the 1993 Lake Champlain Water Quality Agreement is also 0.025 mg/l. For these reasons, and because of the USEPA comments on the Draft TMDL, the loading target should be changed to a value consistent with the 0.025 mg/l criterion.

A further consideration is that the technical basis for the constraints regarding the maximum phosphorus reductions possible with agricultural BMPs is fairly weak. The assumptions did not consider all the possible nonpoint source BMPs. Riparian buffers, stable stream restoration, and whole farm phosphorus mass balance approaches were not considered, for example. No information was available at the time about phosphorus reduction opportunities in the Québec portion of the watershed.

The result of using 0.025 mg/l as the modeling endpoint for Missisquoi Bay is to reduce the total allowable load from 109.7 mt/yr down to 97.2 mt/yr. This new load allocation was calculated using the same phosphorus mass balance model used for the Lake Champlain Diagnostic-Feasibility Study, but without the constraints on the amount of nonpoint source load reduction targeted to the Missisquoi Bay watershed. This revised load allocation of 97.2 mt/yr should be divided on a 60/40% basis between Vermont and Québec as previously recommended. The Vermont portion of the allocation should be 58.3 mt/yr, and the Québec portion should be 38.9 mt/yr.

The proposed *Agreement on Phosphorus Reduction in Missisquoi Bay between the Government of Québec and the State of Vermont* should be modified to include these revised loading targets for Vermont and Québec.

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