

**Missisquoi Bay Basin Project:  
Identifying Critical Source Areas of Pollution**

**Second Interim Report on Modeling  
IJC Deliverable for Task 4, Subtask 2: 22 March 2011  
Executive Summary**

Stone Environmental, Inc. (Stone) is the project contractor for the phosphorus critical source area modeling project, and began work in early June 2010 after workplan approval. The second interim report described progress on the modeling project since the submission of the first interim report submitted November 30, 2010.

**Project Status**

Stone has made significant progress on seven tasks, described below:

1. Construction and testing of SWAT-VSA Model
  2. Data Collection and Evaluation
  3. Model Calibration
  4. Evaluate Climate Scenarios
  5. Compare Simple Critical Source Area (CSA) Methods
  6. Develop Enhanced Hydrologic Network
  7. Site-Specific Modeling
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1. Stone determined an approach for adjusting the surface runoff parameterization to account for variable source area and saturation excess runoff processes at the full watershed scale.
  2. Stone continued compiling and improving datasets including: topographic, land use/land cover, soil, stream channel characteristic, climate, agronomic practice, and residential sources of phosphorus data.
  3. The final delineation of sub-basins and hydrologic response units (HRUs) for the study area has been completed, resulting in 112,394 unique HRUs. The initial parameterization of SWAT-VSA for the full MBB study area model has been completed. A strategy for using data from flow, sediment, and phosphorus monitoring sites within the study area has been developed.
  4. Stone has communicated with EPA regarding acquisition and processing of projected climate trends for use in the SWAT-VSA model; at this time, it is uncertain if data products from the EPA project will be available in time for application to the CSA project.
  5. Two multivariate GIS overlay approaches to identify CSAs were identified from the literature to be applied to the study area. One approach uses a modified Universal Soil Loss Equation method and the other a determination of phosphorus export coefficients weighted by a topographic index.
  6. Stone evaluated an automated GIS approach to delineate the drainage network based on topographic analysis, followed by a manual evaluation to address areas of flow direction uncertainty. The results from this approach will be compared with an existing manual delineation of the hydrologic network in the Rock River watershed and then applied to the study area.

7. Stone has begun a site selection process to identify suitable locations to perform the tactical analysis modeling. The process has involved identifying small clusters of fields and farmsteads that are likely to have a high density of P CSAs.

### **Challenges Encountered**

Compilation of the input datasets for the MBB SWAT model has taken longer than expected. Challenges to this work can be grouped into two categories: delays due to receiving necessary data later than expected and time required to gain acceptance of a given dataset or assumption.

As of March 15, 2011, the project was behind schedule. However, the LCBP is confident that Stone Environmental, Inc. has made its best efforts toward following the schedule and accomplishing the tasks outlined in the workplan. Stone has overcome many data limitations with solid research and best professional judgment, so as to assure the best possible analysis. LCBP staff will work with Stone to ensure that the time lost due to data acquisition and acceptance does not result in a delayed delivery of the final product to the IJC.