

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

**Final Workplan for Modeling
IJC Deliverable for Task 4, Subtask 2: 13 May 2010
Executive Summary**

On April 13, 2010, the LCBP Executive Committee – based on a thorough review process including recommendations from five confidential peer reviewers, the LCBP Technical Advisory Committee (TAC), and the IJC Study Board – approved the project proposal of Stone Environmental, Inc. to model and identify sources of phosphorus pollution in the Missisquoi Bay Basin of Vermont. During workplan development, Stone Environmental received guidance from LCBP staff and TAC members, as well as the IJC Missisquoi Bay Study Board and IJC representatives. The LCBP submitted this workplan, as written by Stone Environmental as the “final workplan for modeling.”

Project Summary (from Workplan)

Stone Environmental will conduct strategic identification and ranking of phosphorus (P) critical source areas (CSAs) at the Missisquoi Bay Basin (MBB) scale based on best available basin-scale data sources using a variable source area hydrology adaptation of the Soil and Water Assessment Tool (SWAT-VSA). SWAT-VSA accounts for the dynamic and spatially variable distribution of runoff contributing areas across the landscape based on terrain and soil characteristics. We will apply the latest science and spatial analysis techniques to identify critical model inputs with greater precision and at a higher resolution than is commonly performed. This approach will yield sub-field-level model simulation results and facilitate CSA identification at levels not typically achieved at the basin scale, allowing concurrent achievement of both strategic and tactical-level objectives. We will address model uncertainty by taking a probabilistic approach to ranking CSAs that provides planners with both predictions and their associated confidence levels. Model validation is essential, so we will complement standard desktop watershed modeling validation procedures with on-the-ground field verification of model-predicted high-and low-priority P source areas. To produce a product appropriate for watershed management, we will scale up our high-resolution CSA results into field units for identification and prioritization.

Having prioritized CSAs at the field level, we will assess the potential impacts of alternative management scenarios on P loads at multiple scales by comparing loads from simulations assuming both random and targeted implementation of best management practices (BMPs) across the MBB. Taking the results of our high-resolution strategic analysis one step further, we will conduct a more detailed tactical analysis at a micro-watershed scale where we can obtain high-quality, site-specific data and apply a farm-scale model to validate our basin-scale approach, provide more site-specific CSA definition, and evaluate the effectiveness of BMPs targeted directly at the local conditions. Finally, we will extrapolate our work by testing GIS-based multivariate overlay procedures against our more complex modeling approach in an effort to validate simpler tools that can be readily applied to other regions of the Lake Champlain Basin (LCB) before an intensive modeling analysis can be implemented.

Deliverables

According to the workplan, project tasks will occur between June 2010 and August 2011, when the final report and all data deliverables are due to the LCBP. Deliverables anticipated from this project include:

- Secondary Data QAPP
- Quarterly Progress Reports
- Spatial Data Layers
- SWAT-VSA Model
- Enhanced Hydrologic Network Spatial Dataset
- Final Report

In collaboration with the Lake Champlain Basin Program (LCBP), the project investigators will convene a Project Advisory Committee (PAC) to provide advice and guidance throughout the project. The advisory committee will include representatives from state and federal agencies, MBB farmers, agricultural professionals, conservation groups, and land use planners. The PAC will assist in disseminating the project results in their respective agencies, departments, and organizations.