

**1. Title:                    Estimating Soil Phosphorus Concentrations along Erodible  
Stream Corridors in Chittenden County, Vermont**

2. Project Type: Research

3. Focus Categories: Nutrients, Nonpoint source pollution, water quality

4. Research Category: Water Quality

5. Keywords: soil phosphorus, soil mapping, spatial variability, soil-landscape, P transport

6. Start date: March 6, 2010

7. End date: March 5, 2011

8. Principal Investigators:

Donald S. Ross  
Research Associate Professor  
Department of Plant and Soil Science  
University of Vermont  
dross@uvm.edu

Leslie A. Morrissey  
Associate Professor  
Rubenstein School of Environment and Natural Resources  
University of Vermont

Cooperators:

Caroline Alves, GIS Specialist/Soil Scientist, USDA-NRCS, Williston  
Steven H. Gourley, State Soil Scientist, USDA-NRCS, Colchester  
Donna M. Rizzo, Associate Professor, School of Engineering and Mathematical Sciences, UVM  
Thomas Villars, Soil Scientist, USDA-NRCS, White River Junction

9. Congressional District: Vermont-at-large

## 10. Abstract

Phosphorus (P) loss from stream bank erosion is thought to be a major and underestimated contributor of P loading to Lake Champlain. Soil variability strongly influences the chemical and physical properties of riparian areas. Results from our recent research funded by the UVM Water Resources and Lake Studies Center demonstrated that riparian soil P concentrations varied significantly by soil type, texture (e.g., sand, silt, and clay distribution), and drainage at three riparian sites in the Lake Champlain Basin (Lewis Creek, Rugg Brook, and Rock River), suggesting that detailed soil maps may be used to estimate P concentrations. Parent material and drainage vary widely in Vermont's riparian landscapes, making it difficult to produce accurate soil maps. Since drainage and texture are the two main factors that determine soil types, traditional and novel mapping techniques show promise for estimating riparian soil P availability. Building on our previous research, this project will combine high-order soil mapping and soil testing to estimate P levels at riparian sites in Chittenden County, VT. This approach will generate soil-specific P concentrations for each of the study sites. Year one of the project focused on sampling along Allen Brook and Indian Brook, where historical channel migration measurements have occurred. In year two, we will sample along two attainment streams, Alder Brook and the upper reaches of the LaPlatte River. Both are undergoing detailed stream bank erosion mapping by co-investigators Morrissey and Rizzo. We will target two types of erosion features: i) those with the same soil series as the year-one samples and ii) other important stream corridor soil series that were underrepresented in year-one sampling. Using our accumulated dataset, we will evaluate the applicability of our approach to other stream corridors in VT by how well soil type and other properties predict P concentrations in the year-two samples from the same soil series. When coupled to historical measurements of streambank erosion, results from this project will provide improved estimates of P mobilized by fluvial systems and contribute to a greater understanding of P dynamics in the Lake Champlain Basin.