

Conservation Innovation Grant - Final Project Report

Project Title

Linking Farm Phosphorus Reduction Planner to Total Maximum Daily Load (TMDL) Modeling and Phosphorus Reduction Valuation Analysis

Project Abstract

The Farm Phosphorus Reduction Planner (FarmPREP) is an integrated web-based application developed and maintained by Stone Environmental that aims to help farmers and stakeholders evaluate the impacts of field-level best management practices on farm-scale phosphorus loading reductions and identify modifications to their field operations to help achieve water quality improvement targets. This project involved further developing the tool to compare current management scenarios with the Lake Champlain Basin TMDL base load, piloting it across twelve farms, and evaluating the results to inform a performance based incentive program in Vermont that would pay farmers for modeled phosphorus reductions from the TMDL base load.

Vermont Pay For Performance Program

One major project goal was to use data collected from participating farmers to develop a payment structure for Vermont's first ever performance based agricultural conservation program. After an initial analysis of phosphorus reduction levels from the farm participants, the project team determined the following parameters for the Vermont Pay for Performance (VPFP) Program in consultation with a stakeholder advisory committee

- (1) To be eligible for VPFP phosphorus reduction payments, farms must exceed a 40% reduction threshold and reductions will only be compensated above that threshold.
- (2) Farms can enter a competitive pool for annual phosphorus reduction payment grants, which will pay \$100 per pound of phosphorus reductions per year, up to an annual cap of \$50,000.

"There are substantial resources put into the farm that are not compensated, that are not recognized, and there needs to be education among the public about that. Our land is everything, you can't put a price on healthy land and soil."

- Farm Participant

Water Quality Goals

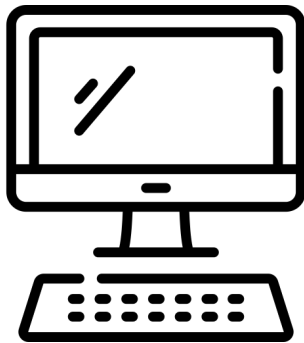
In 2016, the Environmental Protection Agency reestablished a Phosphorus TMDL for the Lake Champlain Basin, which includes phosphorus load reductions on agricultural land ranging from 20.0% to 82.8% per lake segment.

This Conservation Innovation Grant has enhanced the State of Vermont's abilities to track and quantify phosphorus reductions achieved at the field and farm scale and fairly compensate farmers for their land stewardship.

"For us to succeed our land needs to succeed. It is invaluable."

- Farm Participant

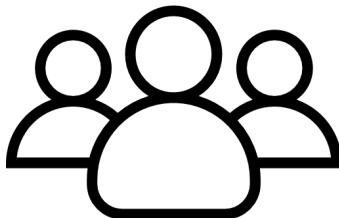
Project Objectives



Modify FarmPREP

- » Add HBMA scenarios
- » Assign HBMA to fields
- » Report functionality

For the Lake Champlain Basin TMDL, the Soil & Water Assessment Tool watershed model generated baseline phosphorus loading estimates using Historic Base Management Assumptions (HBMA). The HBMA were a series of assumed crop management scenarios associated with different crop and soil types. FarmPREP was modified to replicate and model the HBMA as the baseline assessment. FarmPREP now uses field parameters such as soil type, slope, and drainage class to automatically assign one of six HBMA to each field mapped in FarmPREP. FarmPREP users can now view and download all model inputs and outputs for current and baseline management scenarios.



Engage Farms

- » Recruit farmers
- » Survey participants
- » Hold group feedback session

Twelve farms across Vermont of diverse size and management were recruited and shared their field-by-field crop and nutrient management information which we then modeled in FarmPREP. Project participants represented more than 7,800 acres across 600 fields. After initial modeling, eleven farmer participants completed a survey on FarmPREP and a potential pay-for-performance program focused on reducing phosphorus losses. Participant reactions were positive and supportive of ongoing pay-for-performance programs. A group discussion and feedback session was held in July 2022 to share general P-loss results from FarmPREP assessments and to receive farmer feedback on FarmPREP.



Analyze and Evaluate Data

- » Estimate time investment
- » Evaluate capacity for phosphorus reductions
- » Determine cost effectiveness

Results showed the total number of farm fields and diversity in field management are the most important factors to determine the length of time necessary to complete data entry in FarmPREP. It took an average of nine hours to enter all farm and field management per farm. Analysis of FarmPREP results showed that farms can achieve significant reductions in phosphorus loss by implementing conservation practices beyond baseline HBMA. Seven of the twelve participating farms exceeded the 40% reduction threshold, and overall showed an average 55% reduction in total phosphorus loss from the baseline assessment.

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