Vermont Environmental Stewardship Program Pilot

Working Lands for a Better Vermont

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Ryan Patch
Sr. Ag Development Coordinator
Vermont Agency of Agriculture, Food and Markets
Confirmed: Regenerative Soils - Climate Solutions Caucus
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VERMONT
AGENCY OF AGRICULTURE, FOOD & MARKETS

Soil Health & Regenerative Soils

- "NRCS Soil Health": **Agricultural Soil Health Management Systems** include practices such as no-till or reduced tillage, cover crops, advanced nutrient, pest and livestock management, crop rotations, and buffers where appropriate, used together as a system. Other practices can also help improve the soil health on Vermont's grasslands and in Vermont's forestlands. The goal is to **achieve improved soil health** and **long-term productivity** on land throughout Vermont and to **reduce soil erosion**, **increase soil organic matter** and **improve water quality**.

- "Regenerative Agriculture" describes farming and grazing practices that, among other benefits, reverse climate change by **rebuilding soil organic matter** and **restoring degraded soil biodiversity** – resulting in both carbon drawdown and improving the water cycle

  – Regen Ag Initiative, CSU Chico

4 Principals of Soil Health

- 1. Disturb the soil as little as possible
- 2. Grow as many different species of plants as practical
- 3. Keep living plants in the soil as much as possible
- 4. Keep the soil covered year-round

What is it?		What does it do?	How does it help?
Conservation Crop Rotation Growing a diverse number of crops in a planned sequence in order to increase soil organic matter and biodiversity in the soil.		• Increases nutrient cycling • Manages plant pest (weeds, insects, and diseases) • Reduces sheet, rill, and wind erosion • Holds soil moisture • Adds diversity so soil microbes can thrive	• Maximize nutrients • Decreases use of pesticides • Improves water quality • Conserves water • Improves plant production
Cover Crop An un-harvested crop grown as part of planned rotation to provide conservation benefits to the soil.		• Increases soil organic matter • Prevents soil erosion • Conserves soil moisture • Increases nutrient cycling • Provides nitrogen for plant use • Suppresses weeds • Reduces compaction	• Improves crop production • Improves water quality • Conserves water • Maximize nutrients • Decreases use of pesticides • Improves water efficiency to cro
No Till A way of growing crops without disturbing the soil through tillage.		• Improves water holding capacity of soils • Increases organic matter • Reduces soil erosion • Reduces energy use • Decreases compaction	• Improves water efficiency • Conserves water • Improves crop production • Improves water quality • Saves renewable resources • Improves air quality • Increases productivity

Mulch Tillage

Using tillage methods where the soil surface is disturbed but maintains a high level of crop residue on the surface.

- Reduces soil erosion from wind and rain
- Increases soil moisture for plants
- Reduces energy use
- Increases soil organic matter

- Improves water quality
- Conserves water
- Saves renewable resources
- Improves air quality
- Improves crop production

Mulching

Applying plant residues or other suitable materials to the soil surface to compensate for loss of residue due to excessive tillage.

- Reduces erosion from wind and rain
- Moderates soil temperatures
- Increases soil organic matter
- Controls weeds
- Conserves soil moisture
- Reduces dust

- Improves water quality
- Improves plant productivity
- Increases crop production
- Reduces pesticide usage
- Conserves water
- Improves air quality

Nutrient Management

Managing soil nutrients to meet crop needs while minimizing the impact on the environment and the soil.

- Increases plant nutrient uptake
- Improves the physical, chemical, and biological properties of the soil
- Budgets, supplies, and conserves nutrients for plant production
- Reduces odors and nitrogen emissions

- Improves water quality
- Improves plant production
- Improves air quality

Pest Management

Managing pests by following an ecological approach that promotes the growth of healthy plants with strong defenses, while increasing stress on pests and enhancing the habitat for beneficial organisms.

- Reduces pesticide risks to water quality
- Reduces threat of chemicals entering the air
- Decreases pesticide risk to pollinators and other beneficial organisms
- Increases soil organic matter

- Improves water quality
- Improves air quality
- Increases plant pollination
- Increases plant productivity

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Soil Health, Regenerative Soils & State Law

- 6 V.S.A. § 4802(3) **"Healthy soil"** means soil that has a well-developed, porous structure, is chemically balanced, supports diverse microbial communities, and has abundant organic matter.

- 6 V.S.A. § 4810a(4)(B) Establish standards for nutrient management on farms, including: recommended practices for improving and maintaining soil quality and healthy soils in order to increase the capacity of soil to retain water, improve flood resiliency, reduce sedimentation, reduce reliance on fertilizers and pesticides, and prevent agricultural stormwater runoff.

Soil Health, Regenerative Soils & The RAPs

- 1.1 Preamble Soil quality and soil health are critical elements of an overall agricultural non-point source pollution reduction program. Agricultural soils are recognized as a critical resource for the overall prosperity of Vermont's agricultural community and for the public at large. Efforts to build soil organic matter, increase biological activity, and reduce compaction, including reduced tillage, use of composts, establishing crop rotations, cover cropping, and the elimination of annual cropping on highly vulnerable lands, will be essential to the success of programs whose goal is to improve Vermont's water quality. The Vermont Agency of Agriculture, Food and Markets supports and endorses all practices that lead to the goal of healthy soils and productive agricultural lands.
- Section 6.04 Soil Health Management; Cover Crop Requirements

RAPs and Impact on Soil Health

Using the NRCS COMET planner tool, the statewide implementation of RAPs

75,000 acres of cover crops

+ 42,000 acres of filter strips/buffers

=

80,750 tonnes (0.00008 Pg) of CO_2 equivalent per year, which is similar to removing 21,400 cars from the road.

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Program Overview

- The goal of VESP is to **accelerate water-quality improvements** through additional voluntary implementation efforts, and **provide recognition to farmers who strive for environmental excellence.**
- **Baseline Requirements**: Must be actively farming, must meet existing environmental regulations
- **Assessment:** Nutrient management, sediment and erosion control, soil health, and air quality and carbon sequestration, and pasture health
- **Conservation Planning:** For farms that need to change management, conservation planning services are available through existing NRCS and partner programs
- **Incentives:** Focuses on recognition based incentives, potential to expand into financial incentives
- **Certification Structure:** 3rd party verification, 5 year certification period

VERMONT AGENCY OF AGRICULTURE, FOOD & MARKETS AGENCY OF NATURAL RESOURCES

USDA Vermont United States Department of Agriculture Natural Resources Conservation Service

UNIVERSITY OF VERMONT EXTENSION

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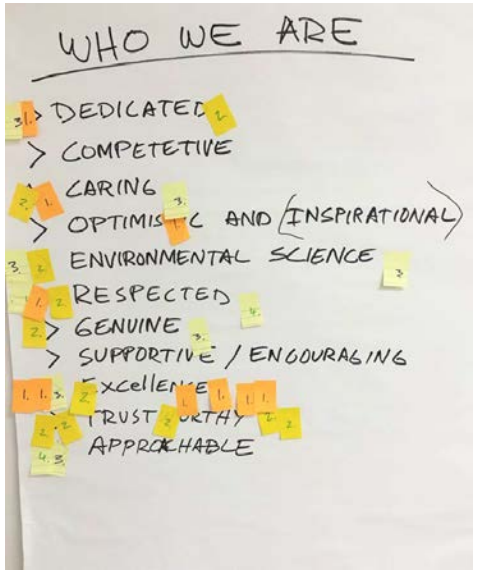
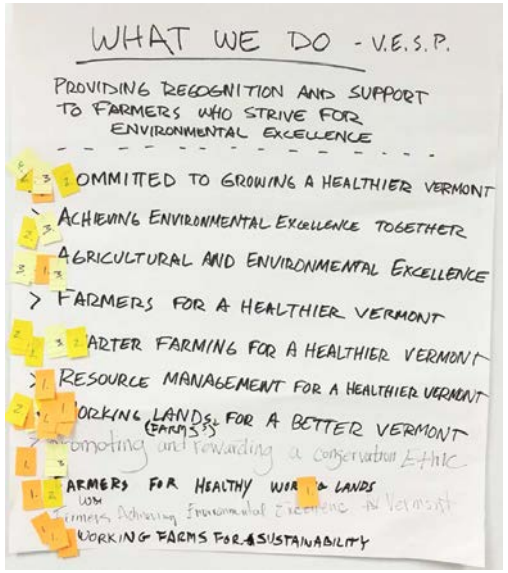
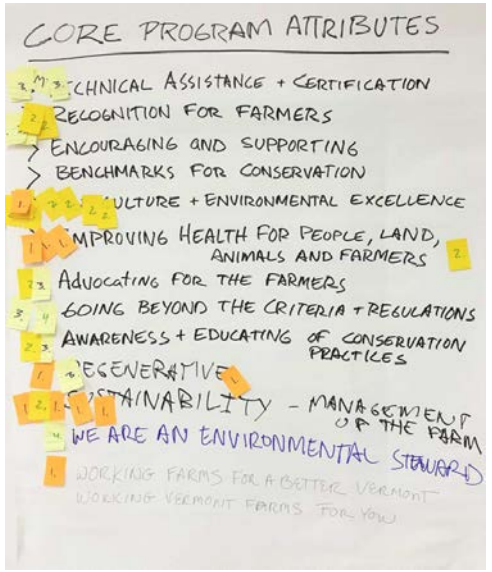
Background

- Began development after 2013 Vermont Ag Working Group
- Funding for program development originally came from NRCS VT CIG grant for the development of a "Certainty" Program
- Series of stakeholder meetings informed what farmer's wanted most:
  - Science-backed social recognition
  - Eligible even if nothing is wrong with their farm!







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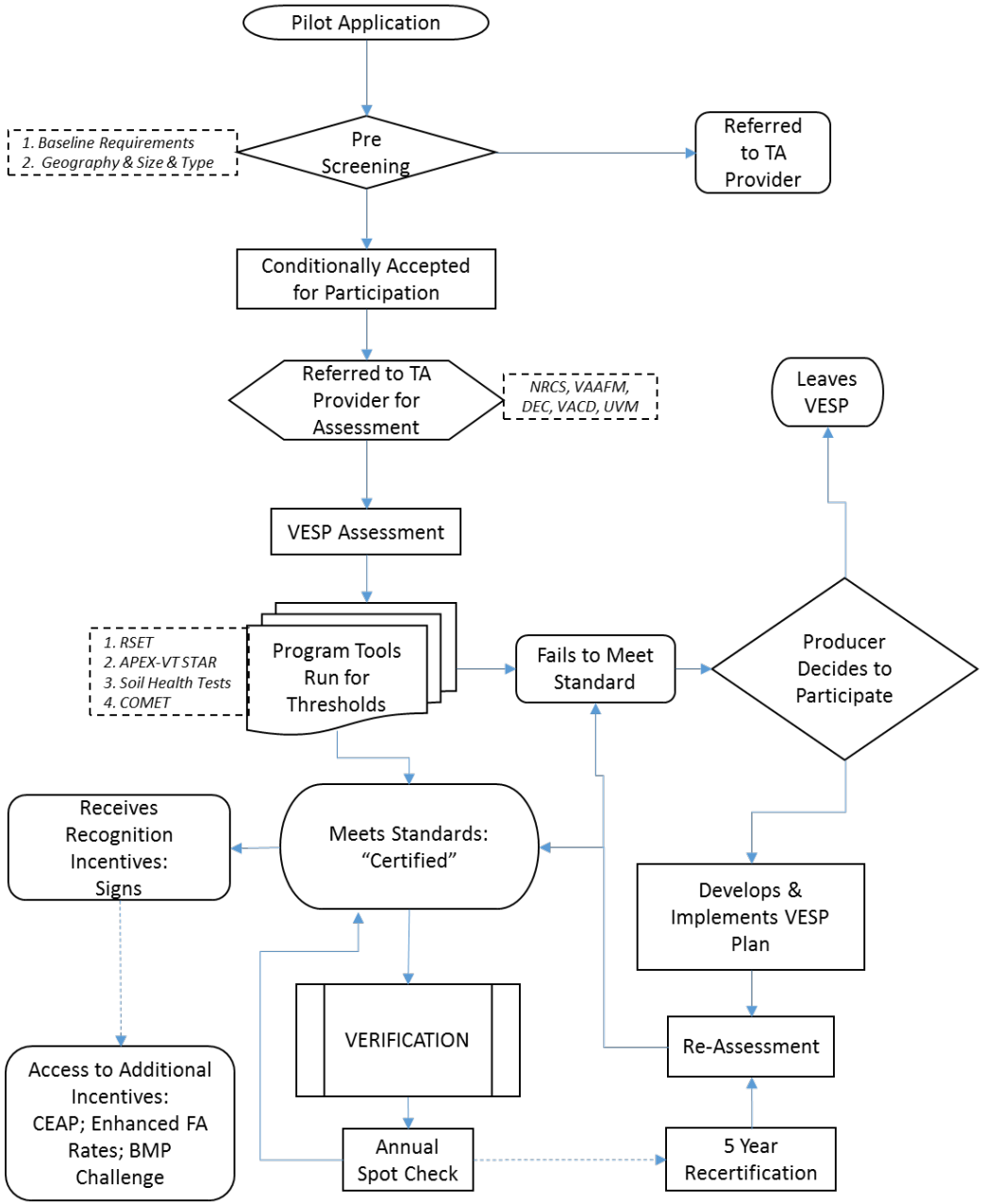
Vermont Environmental Stewardship Program Pilot Program Process Flowchart



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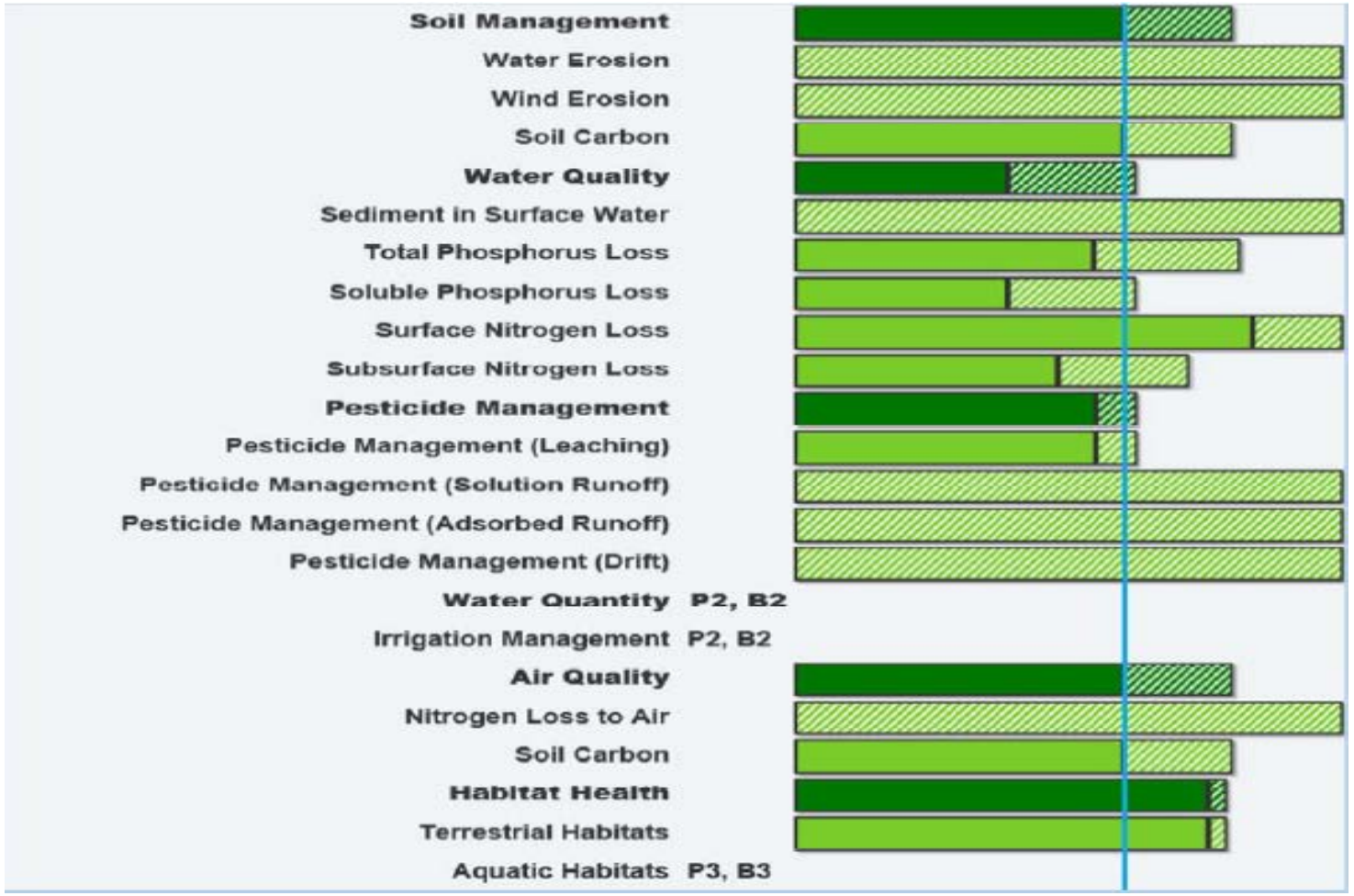
Assessment Tools and Certification Criteria



- Must meet threshold requirements on at least 90% of land base, and have plan in place to meet requirements on remaining land base

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Cornell Soil Health Assessment

Rachel T's Organic Grains
Hill Rd.
Newfield, NY, 14111

Agricultural Service Provider:
Mr. Bob Consulting
Farmland TSP
rrs3@cornell.edu

Sample ID: Jj_1204
Field/Treatment: Low Field
Tillage: 7-9 inches
Crops Crown: COG, COG
Date Sampled: 4/13/2015
Given Soil Type: Bath silt loam
Given Soil Texture: Silt Loam
Coordinates: Coordinates Not Provided

Measured Soil Textural Class: Silt Loam **Sand: 33%** **Silt: 57%** **Clay: 10%**

Test Results

	Indicator	Value	Rating	Constraint
Physical	Available Water Capacity	0.22	88	
Physical	Surface Hardness	230	25	Rooting, Water Transmission
Physical	Subsurface Hardness	390	15	Subsurface Pan/Deep Compaction, Deep Rooting, Water and Nutrient Access
Physical	Aggregate Stability	77.1	93	
Biological	Organic Matter	3.0	35	
Biological	ACE Soil Protein Index	6.1	43	
Biological	Respiration	0.68	62	
Biological	Active Carbon	440	25	Energy Source for Soil Biota
Chemical	pH	5.5	11	Low pH: Toxicity, Nutrient Availability
Chemical	Phosphorus	6.4	100	
Chemical	Potassium	67.3	93	
Chemical	Minor Elements Mg: 166 Fe: 4.2 Mn: 6.6 Zn: 1.9		100	
	Overall Quality Score	57	Medium	

Cropland key indicators and thresholds

	Key Indicator	Threshold
Soil Management	Erosion Management (Water)	½ Tolerable Soil Loss (½ T)
	Soil Organic Matter Management	Maintaining or Improving Soil Organic Matter
Water Quality	Nutrient Management (Total P)	P loss less than or equal to 3 lbs./acre
	Nutrient Management (Soluble P)	P loss less than or equal to 1 lbs./acre
	Nutrient Management (N to Surface Water)	N loss less than or equal to 15 lbs./acre
	Nutrient Management (N to Ground Water)	N loss less than or equal to 25 lbs./acre
	Sediment Management	Sediment loss less than or equal to 2 tons/acre
	Pesticide Management	Low Risk
Air Quality	Carbon Sequestration	Maintaining or Increasing Soil Carbon
	Nitrogen Loss to Air	N loss to air minimized

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Pilot Program Goals

- Goal: 10-12 farms to participate from 2017-2019, looking for a diversity of farm types, sizes, and geographic location
- Vetting new assessment tool: RSET
- Vetting new data collection methods: Drones and LiDAR
- Workload assessment
- Needed environmental baseline of various agricultural management styles
- Will result in recommendations for a full program structure

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Incentives for Stewardship

- Pilot
  - Recognition Based Incentives
  - Soil Health Tests
  - Increased technical and financial assistance for farms needing conservation plans
  - BMP challenge opportunity to protect against yield loss risk

- Full Program: Seeking Partnerships
  - Lump-sum Cash Incentives
  - Flexible Lending Options
  - Low to Zero Interest Revolving Loan Fund?
  - Insurance Rates Adjustments
  - Other ideas?

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Current Status and Existing Needs

- Status
  - 8 farms have applied:
    - 2 LFO Dairy
    - 1 MFOs Dairy
    - 3 CSFO Dairy
    - 1 SFO Beef
    - 1 SFO Diversified
  - We have shifted towards an open enrollment process
  - Focusing on encouraging small, non-dairies to apply.

- 2018
  - Partner staff trained on RSET and Soil Health Tests
  - Coordinate with UVM spatial lab on Drone pilot plots
  - Begin Field Work

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More Information

Please contact me:

Ryan Patch

Sr. Ag Development Coordinator

Ryan.Patch@Vermont.gov

802-272-0323

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