

# Lake Carmi Watershed Agricultural Assessment

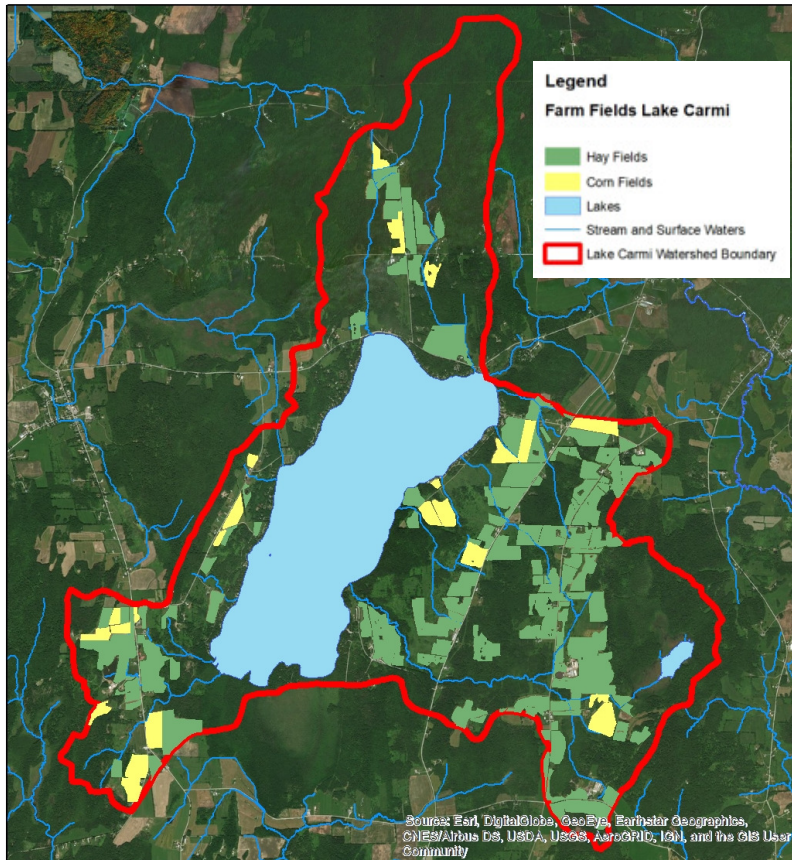
Dr. Heather Darby

April 12, 2018



The University of Vermont

## Lake Carmi Watershed Hay and Corn Fields



Total Acres - 7,538

Agricultural Acres - 1,428

Corn Acres - 229

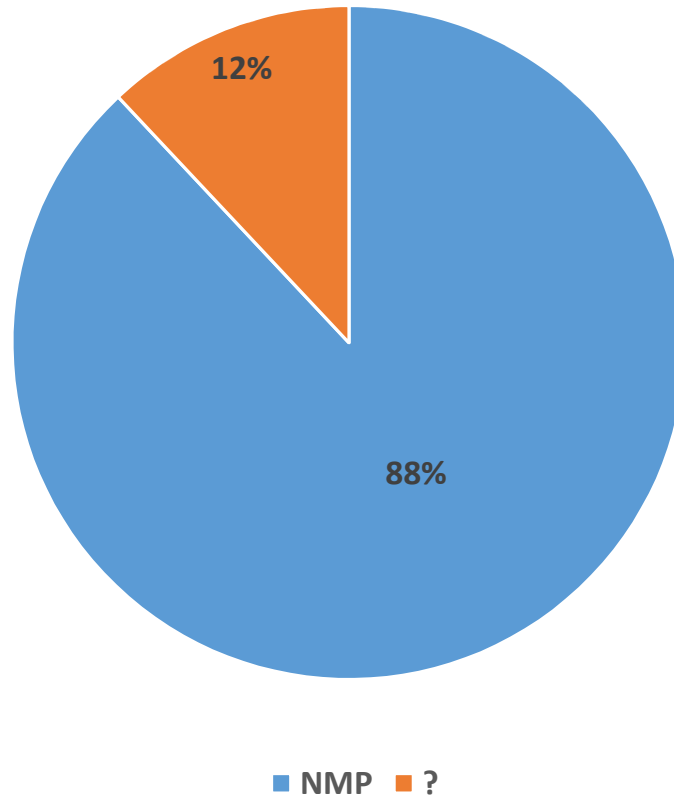
Hay Acres - 1,120

Pasture Acres - 79

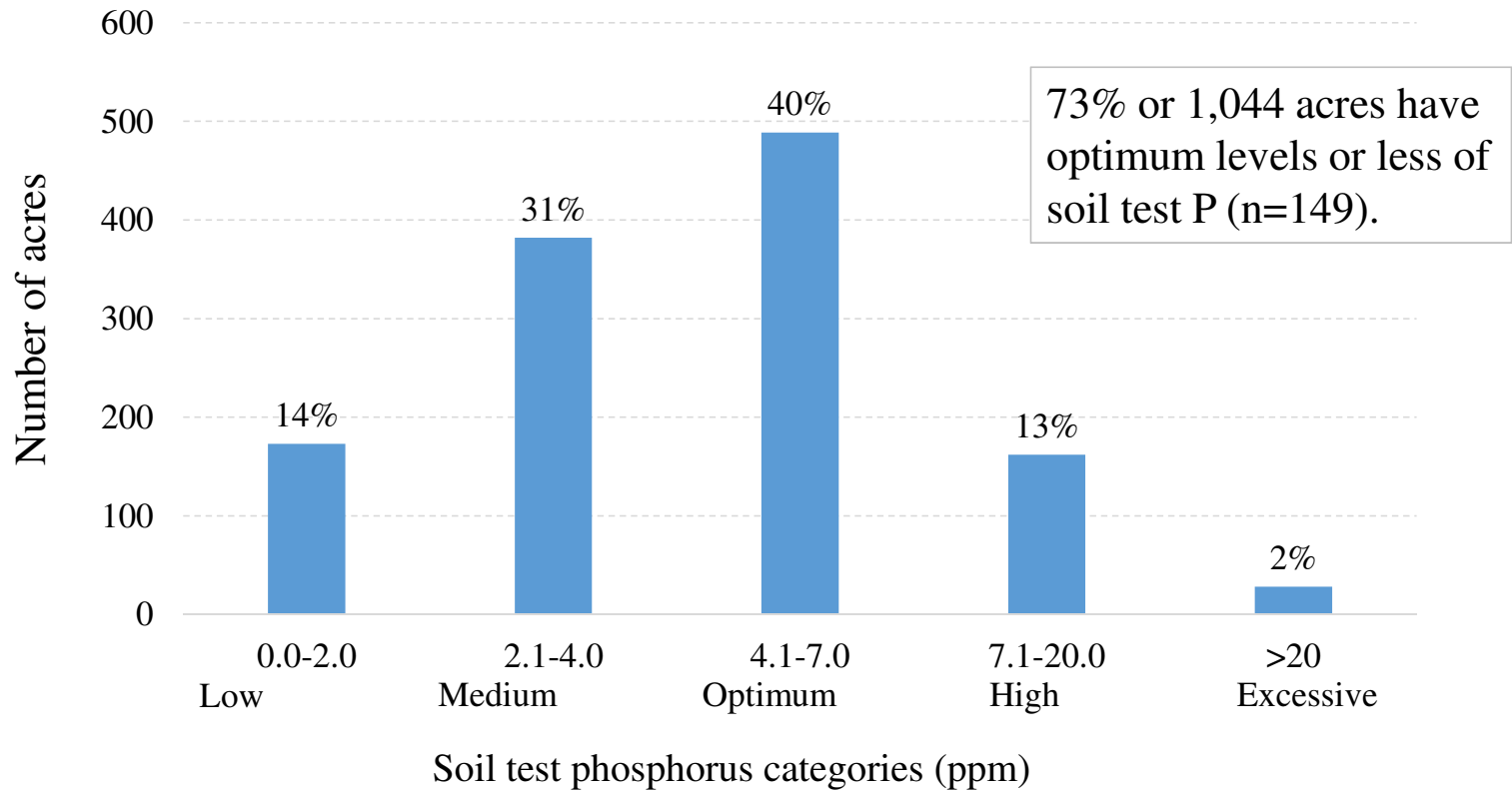
13 Land Operators

480 Heifers Located in Watershed

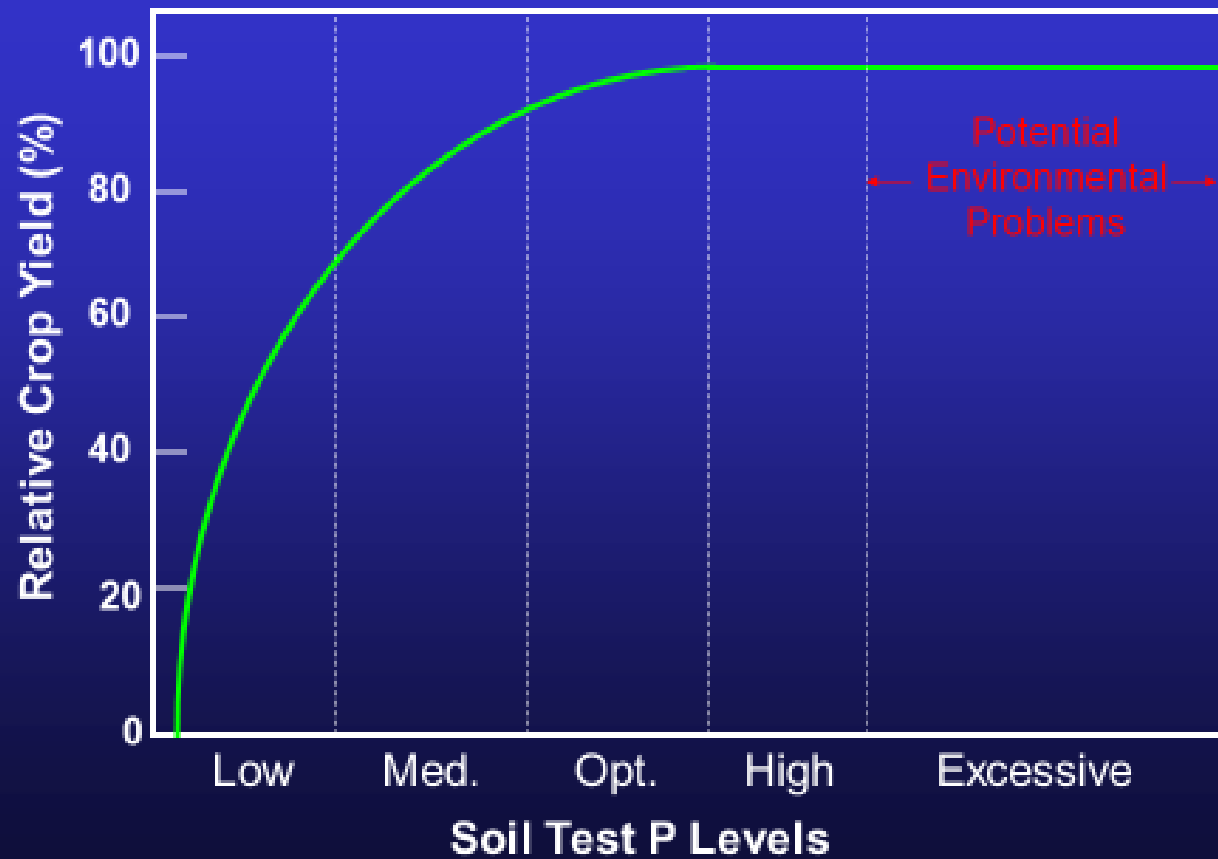
## Nutrient Management



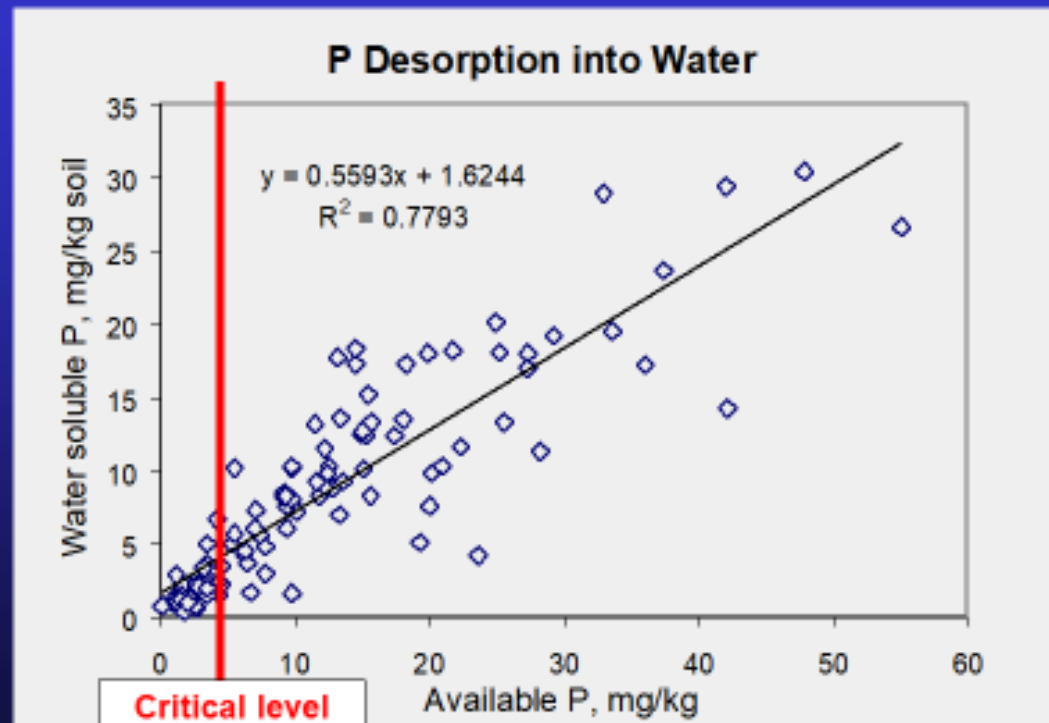
### Soil Test Phosphorus Results by Category and Number of Acres



## Soil Test P



## Using Soil Test P to Predict Potential Runoff P (Modified Morgan's)



**Critical level  
for optimum  
crop yield**

(Un. Of Vermont)

Crop is removing 48%  
more P than is applied.



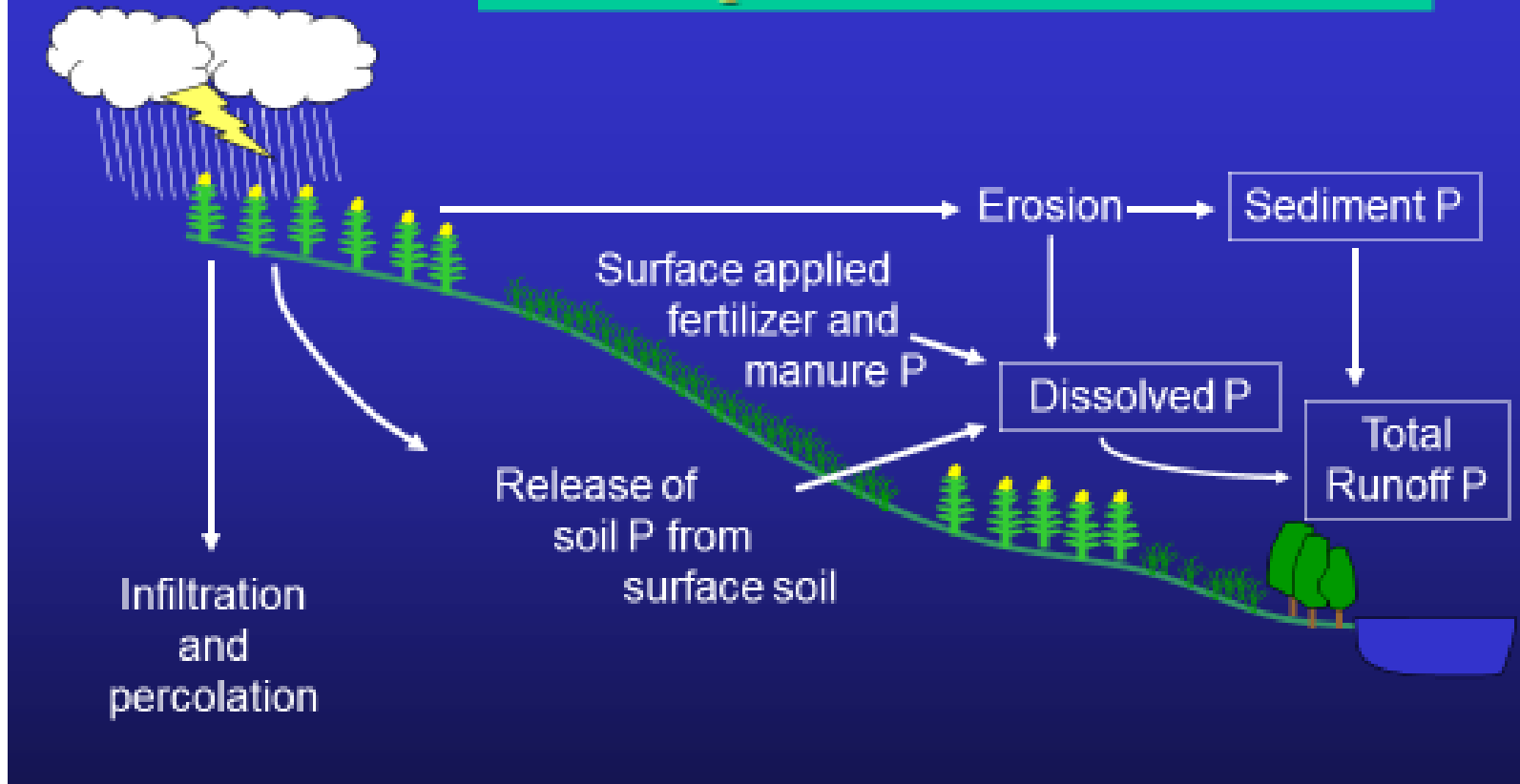
Phosphorus supplied by manure  
fertilizer: 34.3 lbs/acre



Phosphorus crop need:  
65.6 lbs/acre



## P Transport in Surface Runoff





# Vermont P-Index General Approach

**Pathway 1:** Surface Particulate P loss = (Eroded soil P + Manure P) x Scaling Factor

**Pathway 2:** Surface Dissolved P loss = (Soil P + Manure P + Fertilizer P) x Scaling Factor

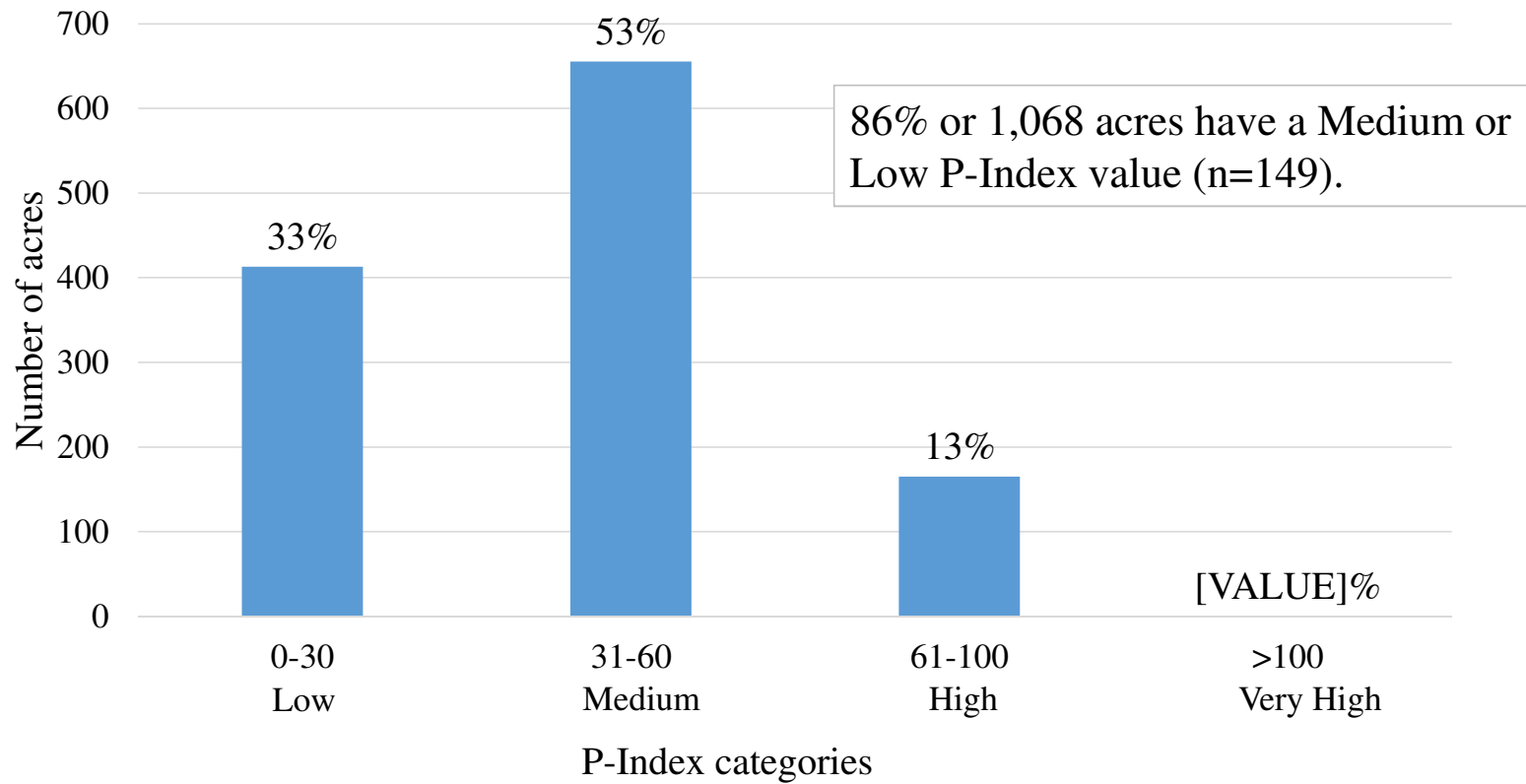
**Pathway 3:** Subsurface Particulate and Dissolved P loss = (Eroded Soil P + Particulate Manure P + Soil P + Manure P + Fertilizer P) x Scaling Factor

**Phosphorus Index** =  $PI_{\text{Surface Particulate}}$  +  $PI_{\text{Surface Dissolved}}$  +  $PI_{\text{Subsurface Particulate and Dissolved}}$

# Vermont P-Index Inputs

- Location in VT
  - Five groupings of counties
- Elevation
- STP
- Reactive Al
- Manure and fertilizer applications:
  - Rate
  - Method
  - Timing (i.e., season)
  - Time to incorporation
- Erosion rate from RUSLE2 or WEPP
- Soil series/type and HSG
- Surface cover at time of planting
- Crop type
- Distance from field to waterway
- Vegetated buffer width
- Manure setback within field
- Presence of pattern tile drainage system

### P-Index Values by Category and Number of Acres



## RUSLE2- Soil Loss Prediction

Developed primarily to:

- guide conservation planning
- inventory erosion rates
- estimate sediment loss from surface erosion

Estimates based on:

- soil characteristics like erosivity and ability of soil to regenerate
- topography and climate
- management practices
  - rotations
  - cover crops
  - cultivation practices

What is “T”?



**MuB: Munson silt loam, 3 to 8 percent slopes**

MUNSON SOILS formed in loamy over clayey glaciolacustrine deposits on lake plains. They are very deep to bedrock and somewhat poorly drained. These soils have a perched water table at depths of 0.5 to 2.0 feet below the surface from late Fall through early Summer. Permeability is moderate in the surface layer, moderately slow to moderate in the subsoil and slow in the substratum.

This map unit is suited to cultivated crops. It is well suited to hay and pasture. Erosion is a hazard. A seasonal high water table may inhibit the establishment of some crops.

<u>Important Farmland Classification:</u> Statewide	<u>Land Capability:</u> 3 w	<u>Vermont Agricultural Value Group:</u> 4d
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Vermont Residential On-site Waste Disposal Group and Subgroup:

IIIc.- This unit is marginally suited as a site for on-site sewage disposal, based on a review of criteria set forth in the Vermont 2002 Environmental Protection Rules. The depth to the seasonal high water table in association with the minimal slope is the major limitation. A detailed, site-specific analysis is generally required. On-site groundwater level monitoring and determination of induced groundwater mounding is often necessary to establish the suitability of this unit. Curtain drains may help lower the water table to an acceptable level, however, the minimal slope may prevent their use in many areas.

<u>PHYSICAL and CHEMICAL PROPERTIES</u>							<u>EROSION FACTORS</u>		
Soil Name	Depth (In)	Typical Texture	Clay (Pct)	Soil Reaction (pH)	Permeability (In/Hr)	Organic Matter (Pct)	Kw	Kf	T
Munson	0-8	SIL	3-10	5.6 - 6.5	0.6-2	3.0-10	.49	.49	2
	8-14	SIL	3-16	5.6 - 6.5	0.2-2	0.5-3.0	.49	.49	
	14-40	SICL	35-60	5.6 - 7.3	0.0000-0.2	0.0-1.0	.49	.49	
<u>WATER FEATURES</u>				<u>SOIL FEATURES</u>					
Soil Name	Hydrologic Group	Depth to Seasonal High Water Table (Feet)	Flooding		Hydric Soil?	Depth to Bedrock (range in inches)			
			Frequency	Duration					
Munson	D	0.5-2.0	None		No	---			

**RaB: Raynham silt loam, 3 to 8 percent slopes**

RAYNHAM SOILS formed in loamy glaciolacustrine deposits on lake plains and terraces. They are very deep to bedrock and poorly drained and somewhat poorly drained. These soils have a water table at depths of 0 to 2.0 feet below the surface from late Fall through late Spring. Permeability is moderate or moderately slow in the solum and slow in the substratum.

This map unit is suited to cultivated crops if adequate drainage is provided. They are well suited to hay and pasture. A seasonal high water table may inhibit the establishment of some crops. Areas of this map unit may be classified as wetland and drainage may be regulated.

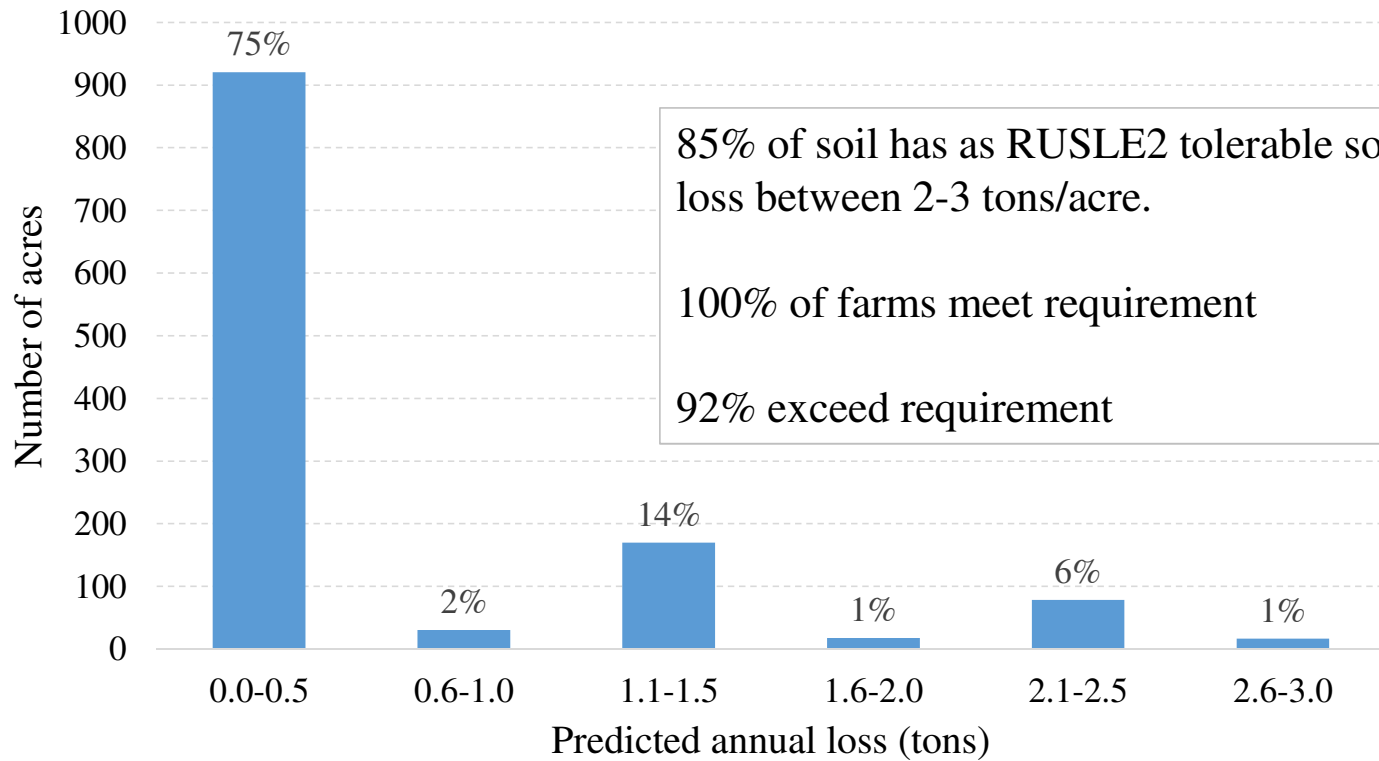
<u>Important Farmland Classification:</u> Prime (b)	<u>Land Capability:</u> 3 w	<u>Vermont Agricultural Value Group:</u> 3d
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Vermont Residential On-site Waste Disposal Group and Subgroup:

IVa - This unit is generally not suited as a site for on-site sewage disposal, based on a review of criteria set forth in the Vermont 2002 Environmental Protection Rules. Excessive soil wetness in association with the minimal slope is the limiting condition. Prolonged periods of saturation at or near the soil surface do not allow for the proper functioning of septic systems. Locating the septic system in a more suitable unit is recommended.

<u>PHYSICAL and CHEMICAL PROPERTIES</u>							<u>EROSION FACTORS</u>		
Soil Name	Depth (In)	Typical Texture	Clay (Pct)	Soil Reaction (pH)	Permeability (In/Hr)	Organic Matter (Pct)	Kw	Kf	T
Raynham	0-7	SIL	3-16	5.1 - 7.3	0.2-2	3.0-10	.49	.49	5
	7-17	SIL	3-16	5.1 - 7.3	0.2-2	0.5-2.0	.64	.64	
	17-60	SIL	3-16	5.6 - 7.8	0.06-0.2	0.0-0.5	.64	.64	
<u>WATER FEATURES</u>				<u>SOIL FEATURES</u>					
Soil Name	Hydrologic Group	Depth to Seasonal High Water Table (Feet)	Flooding		Hydric Soil?	Depth to Bedrock (range in inches)			
			Frequency	Duration					
Raynham	C	0.0-2.0	None		Yes	---			
<u>LAND USE LIMITATIONS</u>						<u>AGRICULTURAL YIELD DATA</u>			

### Predicted annual soil loss (tons/acre)



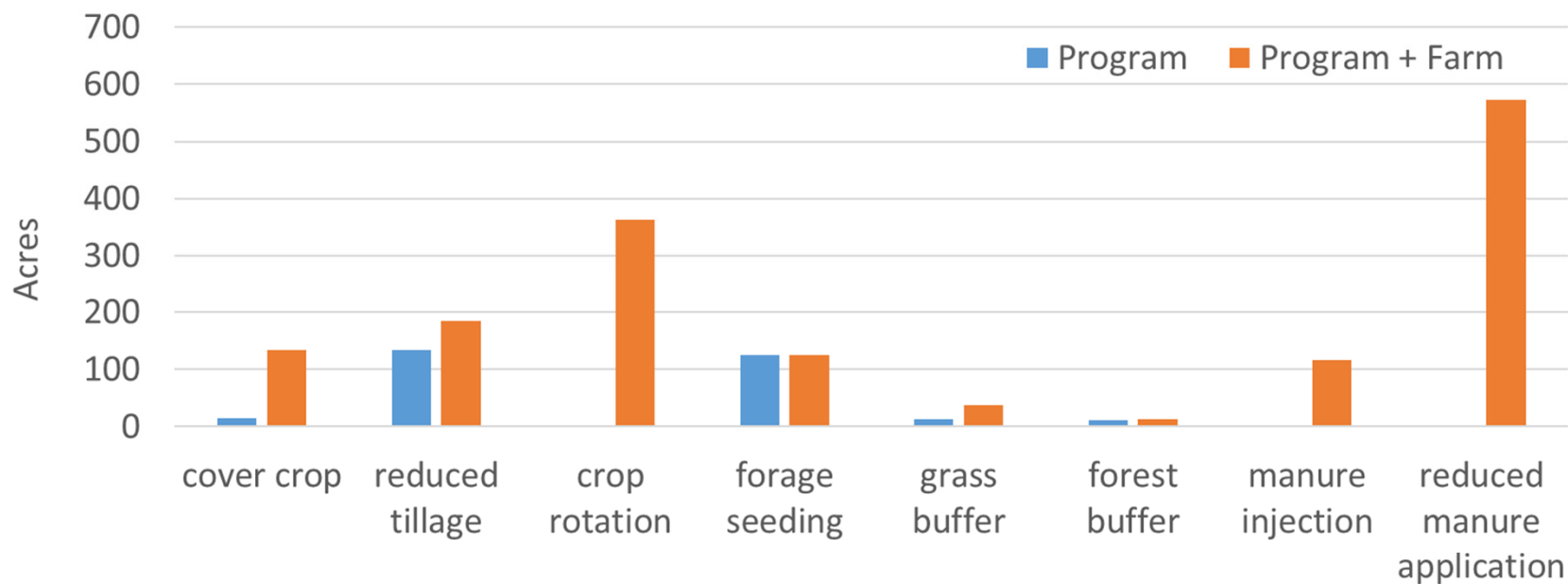


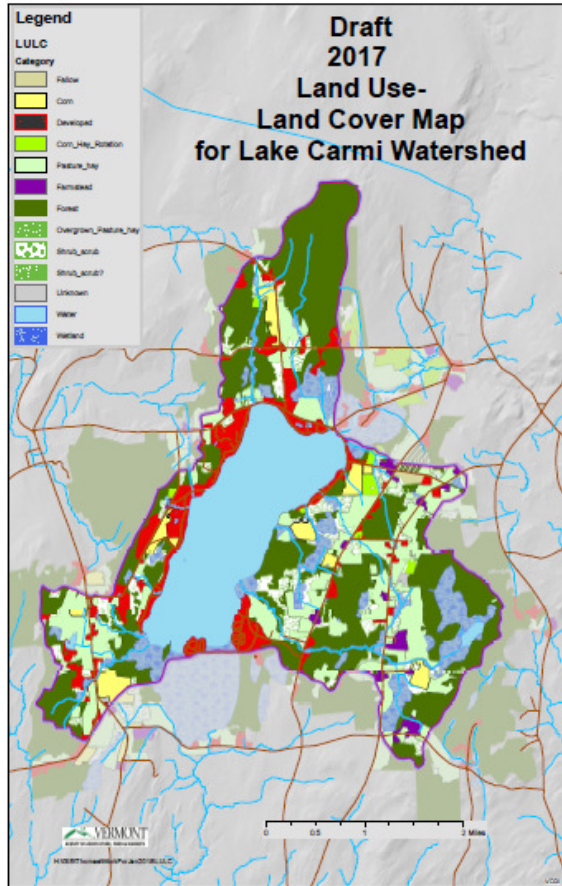
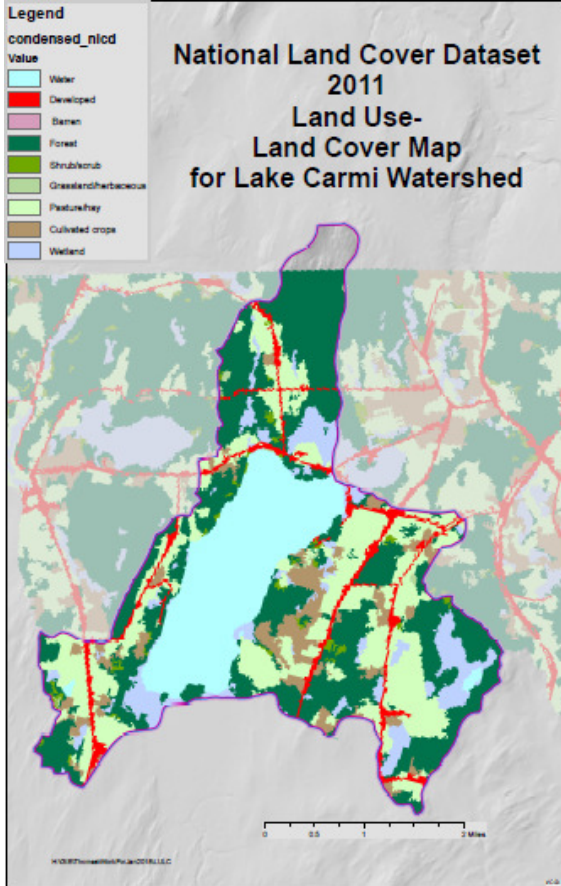
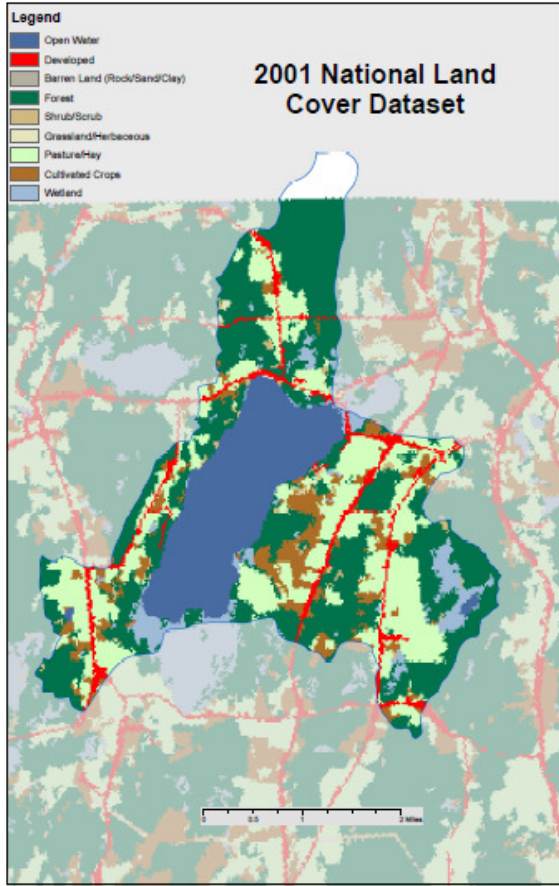


## Percentage of Corn Acres in Various Conservation Practices

Conservation Practice	Acres
Cover Crop/Residue	72%
Reduced Tillage	82%
Crop Rotations (hay/corn)	27%
Manure Injection	63%

### Practice Implementation





## Change in cow population from 2008 to 2018

Location	2008	2018
1	300 dairy cows	300 heifers
2	50 dairy cows	0
3	200 heifers	50 heifers
4	200 heifers	130 heifers
5	50 dairy cows	0

# NRCS-CIG Cooperative Agreement Project No. NRCS-ADS-093

To assist the Hungerford Brook, St. Albans Bay, Rock River, and Pike River watershed groups to increase the implementation of conservation practices on farms within the watersheds.



United States Department of Agriculture

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Natural Resources  
Conservation Service



The University of Vermont  
**EXTENSION**