V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		28%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		3%	
112	Watershed Protection and Management	0%		4%	
123	Management and Sustainability of Forest Resources	0%		28%	
125	Agroforestry	0%		13%	
132	Weather and Climate	0%		11%	
206	Basic Plant Biology	0%		11%	
601	Economics of Agricultural Production and Farm Management	0%		2%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	**1890**	**1862**	**1890**
Plan	0.0	0.0	6.4	0.0
Actual Paid Professional	0.0	0.0	4.4	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	454547	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	383524	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	10585	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Invasive Pests - Monitoring of the Asian Long Horned Beetle & Hemlock Woolly Adelgid; interception and prevention if possible, mitigation through work with bioactive fungi and natural enemy species; work with the US forest service, US-ARS, and the maple industry.

Maple Production - research and extension efforts at the Proctor Maple Center are directed at extending the sugaring season, maximizing yield, and minimizing disease to trees.

Monitoring of the Eastern Forests - Species change and demarkcation levels are being observed, documented and modeled for northern forests through remote sensing and on-the-ground observations.

Invasive Plants - research will continue on the genetic and physiological basis for "invasiveness" of problem plant species and introductions.

Best management practices using vegetation models

Greenhouse Gas Emissions - research has been initiated to evaluate microbial population dynamics in ruminant farm animals in an effort to control/minimize the production of methane and other greenhouse gases. Parallel efforts are underway to understand soil processes that affect the carbon cycle, and that may sequester carbon in soil sinks.

2. Brief description of the target audience

Researchers, Extension Faculty and Staff
Maple producers
Agriculture - Farmers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	16	16

V(F). State Defined Outputs

Output Target

<u>Output #1</u>

Output Measure

- Number of research projects focusing on climate change.

Year	Actual
2013	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content	
O. No.	**OUTCOME NAME**
1	Identify mitigate the invasive species threat to the environment
2	Research regarding the generation of greenhouse gas emissions from farm animals and through soil processes
3	Number of approaches towards maximizing sap yields and profits in maple sap collection systems.
4	Number of climate change management practices on Vermont farms that aid in climate change adaptation.
5	Number of ecological and evolutionary factors that influence invasive grass in Vermont.

Outcome #1

1. Outcome Measures

Identify mitigate the invasive species threat to the environment

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Research regarding the generation of greenhouse gas emissions from farm animals and through soil processes

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of approaches towards maximizing sap yields and profits in maple sap collection systems.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maple syrup producers who use tubing systems would be interested as tubing systems typically become less productive as they age.

What has been done
The researcher constructed an economic model for producers to use as a tool to estimate effects of various strategies on sap yields and net profits.

Results

The use of new spouts annually, the use of check-valve spouts, spout and tubing cleaning, and replacement of droplines increased the yields by varying amounts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry
206	Basic Plant Biology

Outcome #4

1. Outcome Measures

Number of climate change management practices on Vermont farms that aid in climate change adaptation.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Climate change is expected to impact farming through precipitation increases, changes in crop suitability (e.g. apples) and decreases in milk productivity capacity.

What has been done
The researcher has sampled greenhouse gases on farms, photo-documented dozed different farms, created five sets of photo simulations illustrating existing conditions.

Results
Researcher has interfaced project with a related project to create a list of climate change best practices. The researcher has made connections with several farms and will sample greenhouse gases for the next two years. Researcher has disseminated results at a number of workshops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management

125	Agroforestry
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Number of ecological and evolutionary factors that influence invasive grass in Vermont.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Invasive grass species can decrease native species diversity and alter ecosystem processes.

What has been done
Researcher carried out field and greenhouse experiments on both native and invasive species in both native range in Europe and invasive range in North America showing that some invasive populations are very aggressive.

Results
Continued introduction of different variants for horticultural or agronomic plant species can increase the invasive potential of these species and increase the grass ability to spread into new areas. Changes in key traits like C:N content of leaves can result in increased aggressiveness of reedcanary grass making it more likely to take over wetlands.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}