V(A). Planned Program (Summary)

Program # 2

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
104	Protect Soil from Harmful Effects of Natural Elements	7%		0%	
111	Conservation and Efficient Use of Water	15%		2%	
112	Watershed Protection and Management	17%		25%	
125	Agroforestry	5%		0%	
132	Weather and Climate	14%		15%	
133	Pollution Prevention and Mitigation	10%		16%	
135	Aquatic and Terrestrial Wildlife	8%		14%	
136	Conservation of Biological Diversity	15%		3%	
141	Air Resource Protection and Management	2%		1%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	2%		0%	
405	Drainage and Irrigation Systems and Facilities	5%		0%	
902	Administration of Projects and Programs	0%		24%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Cornell University

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	140.0	0.0	6.0	0.0
Actual Paid	69.0	0.0	5.0	0.0
Actual Volunteer	4304.0	0.0	0.0	0.0

NY State Agricultural Experiment Station

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	140.0	0.0	6.0	0.0
Actual Paid	0.0	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Institution Name: Cornell University

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
571407	0	634001	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
571407	0	1219243	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

2. Institution Name: NY State Agricultural Experiment Station

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	48965	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	61052	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In the past decade, Cornell researchers have focused on identifying and quantifying the level of climatic disruption caused by heat-trapping greenhouse gasses and the early, measurable impact on weather patterns, geographic bioregions, and living creatures. Now, researchers are exploring the looming challenges, investigating strategies to address expected impacts, and developing new resources to reduce

the human "carbon footprint" that adds to greenhouse gas emissions.

Multidisciplinary researchers, educators, and extension faculty - from plant biologists to economists to climatologists - are engaged in three vital areas of exploration for the well-being of future generations:

- Climate science: quantifying the current trend and predicting future impact
- Adaptation: moderating expected damage and identifying potential opportunities
- Mitigation: reducing the human "carbon footprint" to slow the pace of climate change

2. Brief description of the target audience

Key audiences served, directly and indirectly include: agricultural, horticultural and natural resource producers; consultants and service providers, resource managers, governmental agencies, and local/state/federal governmental leaders and policy makers, non-government organizations, individual consumers, and youth.

3. How was eXtension used?

Cornell Cooperative Extension supports and promotes eXtension communities of practice, the eXtension public site and the professional development offered through eXtension.org. Staff across the state are encouraged to be involved in COPs, and the link to eXtension is promoted on the front page of the Cornell Cooperative Extension public staff site. Currently 365 staff are registered active users of eXtension, 62 of which are faculty members.

Examples of participation in COPs that fall into this plan of work area include:

- Agricultural Disaster Preparedness
- Bee Health
- Climate Change
- Climate, Woodlands, and Forests
- Floods
- Invasive Species
- Urban Integrated Pest Management
- Water Conservation for Lawn and Landscapes

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	88380	3037412	30262	1038964

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

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	30	248	278

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	(2.1b) # of consumers, residents, agricultural/ natural resources producers, organization and business representatives, and/or local government and community leaders who demonstrate knowledge gains about on the causes and implications of climate change and adaptive or mitigating strategies.
2	(2.1c) # agricultural/ natural resources producers, organization and business representatives documented to have adopted recommended adaptation strategies for production agriculture and natural resources management, including invasive species, pest management, pollutant loads, wetlands, etc.
3	(2.1d) # of agencies/ organizations/ communities documented to have adopted recommended climate mitigation practices and policies.
4	(2.4c) # consumers, residents, agricultural/ natural resources producers, organization and business representatives, and/or local government and community leaders documented to have modified existing practices or technologies and/or adopted new practices to protect/enhance water resources.
5	(2.4d) # documented instances when consumers, residents, agricultural/ natural resources producers, organization and business representatives, and/or local government and community leaders have improved and/or protected water resources.
6	(2.7c) # of consumers, residents, agricultural/ natural resources producers, organization and business representatives, and/or local government and community leaders documented to have modified existing practices or technologies and/or adopted new practices to protect/enhance natural resources and/or enhance biodiversity.
7	REDUCED TILLAGE ON VEGETABLE FARMS
8	FINGER LAKES VINEYARDS APPLY ALTERNATIVE PRUNING STRATEGIES IN THE FACE OF WINTER INJURY TO BUDS, REALIZING AN INCREASE IN REVENUE

Outcome #1

1. Outcome Measures

(2.1b) # of consumers, residents, agricultural/ natural resources producers, organization and business representatives, and/or local government and community leaders who demonstrate knowledge gains about on the causes and implications of climate change and adaptive or mitigating strategies.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	6502

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
125	Agroforestry
132	Weather and Climate
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

Outcome #2

1. Outcome Measures

(2.1c) # agricultural/ natural resources producers, organization and business representatives documented to have adopted recommended adaptation strategies for production agriculture and natural resources management, including invasive species, pest management, pollutant loads, wetlands, etc.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1435

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
132	Weather and Climate
133	Pollution Prevention and Mitigation
405	Drainage and Irrigation Systems and Facilities

Outcome #3

1. Outcome Measures

(2.1d) # of agencies/ organizations/ communities documented to have adopted recommended climate mitigation practices and policies.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	494

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
132	Weather and Climate

Outcome #4

1. Outcome Measures

(2.4c) # consumers, residents, agricultural/ natural resources producers, organization and business representatives, and/or local government and community leaders documented to have modified existing practices or technologies and/or adopted new practices to protect/enhance water resources.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5458

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #5

1. Outcome Measures

(2.4d) # documented instances when consumers, residents, agricultural/ natural resources producers, organization and business representatives, and/or local government and community leaders have improved and/or protected water resources.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4871

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #6

1. Outcome Measures

(2.7c) # of consumers, residents, agricultural/ natural resources producers, organization and business representatives, and/or local government and community leaders documented to have modified existing practices or technologies and/or adopted new practices to protect/enhance natural resources and/or enhance biodiversity.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2014	10319

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

Outcome #7

1. Outcome Measures

REDUCED TILLAGE ON VEGETABLE FARMS

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Reduced tillage (RT) disturbs the soil to a lesser extent than conventional tillage and reduces erosion, degradation, and water contamination associated with more intensive practices. Many large-scale farms in the northeast have already adopted RT systems and have improved soil and environmental quality, maintained yields, and reduced costs; however, the majority of farms in NYS are small or mid-sized, with limited machinery and labor. This project focuses on

demonstrating the benefits of adopting reduced tillage methods on smaller and organic vegetable farms.

What has been done
Through a series of field-based experiments, the goals of this project were to evaluate innovative RT systems and equipment for small-scale and organic vegetable farms, identify strategies to integrate and manage cover crops with RT, quantify changes in water movement in deep zone versus conventionally tilled fields, and support growers who are transitioning to these systems by publishing case studies and through consulting and discussion groups. Soil moisture was measured continuously at both deep zone and conventional tillage sites to determine differences in water movement and retention. RT demonstrations, webinars, tours and presentations were reported in 16 NYS counties through CCE in this last year. Extension workshops including Farming in the Basin, No Till Drill, and Soil Health trainings helped farm operations to understand that RT can lower carbon and human input, improve soil health and water quality protection.

Results
Results from field trials comparing deep zone and conventional tillage revealed no significant differences in yield. As part of this project, Cornell scientists and extension specialists performed the first examination of nutrient sources for organic RT. Organic systems often depend upon early season tillage to stimulate soil microbial mineralization of nitrogen. In RT systems that lack this soil disturbance, growers were concerned that fertility might be limiting. Cornell researchers found that fish meal applied as a sidedress three weeks after planting broccoli supported higher yields than poultry compost or no added fertilizer. Overall, these results demonstrated the efficacy of choosing reduced tillage over more conventional, time consuming, and expensive traditional tillage approaches. Less intensive tillage practices did not adversely affect crop yields, and in the long term, can lead to healthier, more resilient soils and surrounding environments. In 2014 1,400 participants in CCE educational programs reported adopting recommended adaptation strategies for production agriculture and natural resources management, like reduced tillage as a result of extension training.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

FINGER LAKES VINEYARDS APPLY ALTERNATIVE PRUNING STRATEGIES IN THE FACE OF WINTER INJURY TO BUDS, REALIZING AN INCREASE IN REVENUE

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
On several nights in January 2014, temperatures in portions of the Finger Lakes region fell to negative 12°F or lower, raising concerns about the potential for significant injury to grapevine buds and trunks. A small amount of damage to buds is normal in most years, with little to no real impact to harvest yields. Early testing of bud survival after these incidents, however, showed the potential for many growers to lose a substantial portion of their crop in 2014, or even cause some vineyards to have to be replanted, either of which could have a significant impact on growers' revenue for one or more years.

What has been done
On February 13, 2014, the Finger Lakes Grape Program (FLGP) hosted a field meeting at a local vineyard to discuss and demonstrate alternative pruning techniques and equipment that growers could use to reduce the potential yield losses in their vineyards. These recommendations were developed by colleagues at Ohio State after a similar event in that state back in 2009, and were directly applicable to growers' situation in the Finger Lakes this year. Growers were also given the opportunity to learn how to collect and examine bud samples for injury in order to monitor their own vineyards for damage.
Fifty-eight growers, representing over 50% of the vineyard acreage in the region, attended this meeting. FLGP staff also made a number of visits to individual growers' vineyards over the next months to provide one-on-one assistance on evaluating bud injury.

Results
As a result of this outreach effort, a majority of the growers who attended the field meeting implemented alternative pruning strategies in at least a portion of their vineyards. Most of those growers reported having higher than expected yields in these areas with good to excellent fruit quality.

One grape grower in Ontario County implemented this alternative pruning practice in one of his two Riesling blocks last winter, while pruning a second block of the same size following standard practices. The block pruned using standard practices had 50% less crop than previous years(about 3.3 tons/acre), while the block using the alternative pruning practice had almost normal yields (just under 5.5 tons/acre). The grower realized an increase in revenue of

$3200/acre as a result of implementing this alternative practice.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

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
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Climate change issues play out in a complex and volatile context involving weather extremes, changing governmental policies and regulations, competitive land uses and shifting development patterns, evolving consumer demands, and globally influenced markets. The specific implications of these external factors vary greatly by locale and across commodities and business forms. Technical knowledge of climate change issues and mitigation strategies is evolving rapidly. Flooding events during recent years continues to elevate consumer and community interest in disaster preparedness and water quality protection for families, communities and farms. The shift in interest, program offerings and campus and research support is evident. These trends are expected to continue.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation Capacity Building: Cornell Cooperative Extension has worked with the Cornell Office of Research and Evaluation (CORE) to strengthen evaluation practice and build evaluation capacity. CORE has developed a Protocol for evaluation that takes a systems approach, recognizing that individual programs and their evaluations are part of larger program portfolios and are shaped by needs and context at multiple levels of the Extension system. CORE has tested and refined this Protocol in partnership with CCE programs since 2006. A key step in the Protocol is to develop program models, in both familiar columnar form as logic models and in a visual form called pathway models. These models form have helped focus evaluation efforts in Extension programs.

Beginning in 2013 and through 2014, CORE and CCE partnered to initiate program modeling and evaluation planning at the level of the statewide Plans of Work. This effort contributed to the review of near and midterm program outcomes and to the review and

planning of several evaluation projects currently underway.

The Protocol has been integrated into professional development in CCE, to promote consistent approaches to evaluation of county-based, regional, and statewide programs.

Regional/Statewide documentation examples. Many of our regional and statewide programs are receiving federal capacity funds. Documentation of outcomes is a requirement of funding. Results shape future program efforts and impact program design. **An example evaluation practice can be found in the section below.**

There is also a requirement for our local and regional programs to report on statewide outcomes/indicators: Program documentation results are aggregated in a statewide accountability database that includes both qualitative and quantitative data for reporting and helping us to better understand impacts.

Key Items of Evaluation