V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change

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%		1%	
111	Conservation and Efficient Use of Water	15%		1%	
112	Watershed Protection and Management	17%		18%	
125	Agroforestry	5%		3%	
132	Weather and Climate	14%		8%	
133	Pollution Prevention and Mitigation	10%		26%	
135	Aquatic and Terrestrial Wildlife	8%		13%	
136	Conservation of Biological Diversity	15%		16%	
141	Air Resource Protection and Management	2%		2%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	2%		12%	
405	Drainage and Irrigation Systems and Facilities	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	73.0	0.0	11.5	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**
354988	0	842415	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
354988	0	842415	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	52249	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	52249	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

This is a comprehensive effort entailing a wide range of applied research activities and multiple education methods depending on local context and need. Campus-based faculty and extension associates, regional specialists and county-based educators all are involved in designing, implementing, and evaluating tailored applied research and educational efforts depending on the focus and scope of their role. Example targeted activities include a comprehensive "Northeast Climate Impacts Assessment" that details potential impacts on crops, dairy, forests, and invasive pest species for the region and the Cornell Computational Agricultural Project that is compiling daily weather data and using complex computing tools to create a user friendly website and database for farmers to help them make critical decisions as they adapt to the changing environment. Climate change is tied intimately to sustainable energy concerns. Therefore, climate change is an important element of energy literacy initiatives across all audiences.

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, and individual consumers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA	{NO DATA	{NO DATA	{NO DATA
Actual	77999	5654320	34256	497440

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

Patent Applications Submitted

Year: 2010

Plan:

Actual: 2

Patents listed

Flexible, Tunable, Ultra-high Efficiency Continuous Filter System Constructed from Natural and Biodegradable, Green Materials

High-Strength, Environmentally Friendly Building Panels

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	121

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- (2.1a) # of agricultural/natural resources producers, and/or organization and business representatives completing educational programs on the causes and implications of climate change and adaptive or mitigating strategies.
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- (2.2a) # of local government officials and community leaders completing educational programs on causes and implications of climate change and adaptive or mitigating strategies.
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- (2.3a) # of adult and youth consumers, residents, and landowners completing educational programs on causes and implications of climate change and adaptive or mitigating strategies.
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- (2.4a) # of agricultural/natural resources producers, and/or organization and business representatives completing educational programs on managing water resources.
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- (2.5a) # of local government officials and community leaders completing educational programs on managing water resources and the relationship between water resources and land use management.
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- (2.6a) # of adult and youth consumers, residents, and landowners completing educational programs on water resources protection.
  Not reporting on this Output for this Annual Report

Output #7

Output Measure

- (2.7a) # of agricultural/ natural resources producers, and/or organization and business representatives completing educational programs on managing natural resources, invasive species, and/or biodiversity.
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

- (2.8a) # of local government officials and community leaders completing educational programs on managing natural resources, invasive species, open space preservation, alternative land uses and/or biodiversity.
  Not reporting on this Output for this Annual Report

Output #9

Output Measure

- (2.9a) # of adult and youth consumers, residents, and landowners completing educational programs on natural resources protection, invasive species, and/or biodiversity.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	(2.1b) # of agricultural/natural resources producers, and/or organization and business representatives 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, and/or organization and business representatives documented to have modified existing practices or technologies and/or adopted new management practices to minimize their contribution to climate change and/or adapt to climate change effects.
3	(2.1d) # agricultural/natural resources producers, and/or organization and business representatives documented to have successfully adapted to climate change effects enhancing economic viability.
4	(2.2b) # of local government officials and community leaders who demonstrate knowledge gains about causes and implications of climate change and adaptive or mitigating strategies.
5	(2.2c) # of local government officials and community leaders documented to have modified existing practices or technologies and/or adopted new management practices to minimize their contribution to climate change and/or adapt to climate change effects.
6	(2.2d) # of communities documented to have established or modified public policies to minimize contribution to climate change and/or adapt to climate change effects.
7	(2.3b) # of adult and youth consumers, residents, and landowners who demonstrate knowledge gains on causes and implications of climate change and adaptive or mitigating strategies.
8	(2.3c) # of adult and youth consumers, residents, and landowners documented to have modified existing practices and/or adopted new practices to minimize their contribution to climate change and/or adapt to climate change effects.
9	(2.4b) # of agricultural/natural resources producers, and/or organization and business representatives who demonstrate knowledge gains about managing water resources.
10	(2.4c) # agricultural/natural resources producers, and/or organization and business representatives documented to have modified existing practices or technologies and/or adopted new practices to protect/enhance water resources.
11	(2.4d) # agricultural/natural resources producers, and/or organization and business representatives documented to have improved and/or protected water resources.
12	(2.5b) # of local government officials and community leaders who demonstrate knowledge gains about managing water resources and the relationship between water resources and land use management.
13	(2.5c) # of local government officials and community leaders documented to have modified existing practices or technologies and/or adopted new practices to protect/enhance water resources.
14	(2.5d) # of communities documented to have established or modified land use and development policies to enhance and protect water resources.
15	(2.6b) # of adult and youth consumers, residents, and landowners who demonstrate knowledge gains about water resources protection. (
16	(2.6c) # of adult and youth consumers, residents, and landowners documented to have modified existing practices or adopted new practices to protect/enhance water resources.

17	(2.6d) # of adult and youth consumers, residents, and landowners documented to have successfully modified existing practices and/or adopted new practices leading to improved protection/enhancement of water resources.
18	(2.7b) # of agricultural/ natural resources producers, and/or organization and business representatives who demonstrate knowledge gains about managing natural resources, invasive species, and/or biodiversity.
19	(2.7c) # of agricultural/ natural resources producers, and/or organization and business representatives documented to have modified existing practices or technologies and/or adopted new practices to protect/enhance natural resources and/or enhance biodiversity.
20	(2.7d) # of documented instances in which implementation of natural resources management practices by agricultural/ natural resources producers, and/or organization and business representatives lead to increased open space preservation, enhanced/ protected natural resources, biodiversity, land use.
21	(2.8b) # of local government officials and community leaders who demonstrate knowledge gains about managing natural resources, invasive species, open space preservation, alternative land uses and/or biodiversity.
22	(2.8c) # of local government officials and community leaders documented to have modified existing practices or technologies and/or adopted new management practices to protect/enhance natural resources and/or enhance biodiversity.
23	(2.8d) # of documented instances in which implementation of natural resources management practices and/or land use policies lead to increased open space preservation, enhanced or protected natural resources, enhanced biodiversity, and/or incr. alternative land use.
24	(2.9b) # of adult and youth consumers, residents, and landowners who demonstrate knowledge gains about natural resources management, invasive species, and/or biodiversity.
25	(2.9c) # of adult and youth consumers, residents, and landowners documented to have modified existing practices and/or adopted new practices to protect/enhance natural resources and/or enhance biodiversity.
26	(2.9d) # of documented instances in which implementation of natural resources management practices by individual consumers, residents, and/or private landowners lead to increased open space preservation, enhanced or protected natural resources or enhanced biodiversity.
27	Enhancing a Network for Citizen Science Observation of the Response of Plant Phenology to Global Climate Change
28	Adirondack Brook Trout Conservation and Management in a Changing Climate
29	Addressing Climate Change
30	Controlling Invasive and Interfering Plants
31	Invasive Forest Pests Outreach Training

Outcome #1

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

(2.1c) # agricultural/natural resources producers, and/or organization and business representatives documented to have modified existing practices or technologies and/or adopted new management practices to minimize their contribution to climate change and/or adapt to climate change effects.

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

(2.1d) # agricultural/natural resources producers, and/or organization and business representatives documented to have successfully adapted to climate change effects enhancing economic viability.

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

(2.2b) # of local government officials and community leaders who demonstrate knowledge gains about causes and implications of climate change and adaptive or mitigating strategies.

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

(2.2c) # of local government officials and community leaders documented to have modified existing practices or technologies and/or adopted new management practices to minimize their contribution to climate change and/or adapt to climate change effects.

Not Reporting on this Outcome Measure

Outcome #6

1. **Outcome Measures**

   (2.2d) # of communities documented to have established or modified public policies to minimize contribution to climate change and/or adapt to climate change effects.

   Not Reporting on this Outcome Measure

Outcome #7

1. **Outcome Measures**

   (2.3b) # of adult and youth consumers, residents, and landowners who demonstrate knowledge gains on causes and implications of climate change and adaptive or mitigating strategies.

   Not Reporting on this Outcome Measure

Outcome #8

1. **Outcome Measures**

   (2.3c) # of adult and youth consumers, residents, and landowners documented to have modified existing practices and/or adopted new practices to minimize their contribution to climate change and/or adapt to climate change effects.

   Not Reporting on this Outcome Measure

Outcome #9

1. **Outcome Measures**

   (2.4b) # of agricultural/natural resources producers, and/or organization and business representatives who demonstrate knowledge gains about managing water resources.

   Not Reporting on this Outcome Measure

Outcome #10

1. **Outcome Measures**

   (2.4c) # agricultural/natural resources producers, and/or organization and business representatives 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	Quantitative Target	Actual
2010	{No Data Entered}	45

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
141	Air Resource Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
405	Drainage and Irrigation Systems and Facilities

Outcome #11

1. Outcome Measures

(2.4d) # agricultural/natural resources producers, and/or organization and business representatives documented to 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	Quantitative Target	Actual
2010	{No Data Entered}	7

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
141	Air Resource Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
405	Drainage and Irrigation Systems and Facilities

Outcome #12

1. Outcome Measures

(2.5b) # of local government officials and community leaders who demonstrate knowledge gains about managing water resources and the relationship between water resources and land use management.

Not Reporting on this Outcome Measure

Outcome #13

1. Outcome Measures

(2.5c) # of local government officials 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	Quantitative Target	Actual
2010	{No Data Entered}	172

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
132	Weather and Climate
133	Pollution Prevention and Mitigation
405	Drainage and Irrigation Systems and Facilities

Outcome #14

1. Outcome Measures

(2.5d) # of communities documented to have established or modified land use and development policies to enhance and protect water resources.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	65

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
132	Weather and Climate
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities

Outcome #15

1. Outcome Measures

(2.6b) # of adult and youth consumers, residents, and landowners who demonstrate knowledge gains about water resources protection. (

Not Reporting on this Outcome Measure

Outcome #16

1. Outcome Measures

(2.6c) # of adult and youth consumers, residents, and landowners documented to have modified existing practices 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	Quantitative Target	Actual
2010	{No Data Entered}	2925

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
405	Drainage and Irrigation Systems and Facilities

Outcome #17

1. Outcome Measures

(2.6d) # of adult and youth consumers, residents, and landowners documented to have successfully modified existing practices and/or adopted new practices leading to improved protection/enhancement of water resources.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	646

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
133	Pollution Prevention and Mitigation
405	Drainage and Irrigation Systems and Facilities

Outcome #18

1. Outcome Measures

(2.7b) # of agricultural/ natural resources producers, and/or organization and business representatives who demonstrate knowledge gains about managing natural resources, invasive species, and/or biodiversity.

Not Reporting on this Outcome Measure

Outcome #19

1. Outcome Measures

(2.7c) # of agricultural/ natural resources producers, and/or organization and business representatives 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	Quantitative Target	Actual
2010	{No Data Entered}	622

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #20

1. Outcome Measures

(2.7d) # of documented instances in which implementation of natural resources management practices by agricultural/ natural resources producers, and/or organization and business representatives lead to increased open space preservation, enhanced/ protected natural resources, biodiversity, land use.

Not Reporting on this Outcome Measure

Outcome #21

1. Outcome Measures

(2.8b) # of local government officials and community leaders who demonstrate knowledge gains about managing natural resources, invasive species, open space preservation, alternative land uses and/or biodiversity.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	435

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area

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

Outcome #22

1. Outcome Measures

(2.8c) # of local government officials and community leaders documented to have modified existing practices or technologies and/or adopted new management 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	Quantitative Target	Actual
2010	{No Data Entered}	84

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

Outcome #23

1. Outcome Measures

(2.8d) # of documented instances in which implementation of natural resources management practices and/or land use policies lead to increased open space preservation, enhanced or protected natural resources, enhanced biodiversity, and/or incr. alternative land use.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	38

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

Outcome #24

1. Outcome Measures

(2.9b) # of adult and youth consumers, residents, and landowners who demonstrate knowledge gains about natural resources management, invasive species, and/or biodiversity.

Not Reporting on this Outcome Measure

Outcome #25

1. Outcome Measures

(2.9c) # of adult and youth consumers, residents, and landowners documented to have modified existing practices 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	Quantitative Target	Actual
2010	{No Data Entered}	6019

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

Outcome #26

1. Outcome Measures

(2.9d) # of documented instances in which implementation of natural resources management practices by individual consumers, residents, and/or private landowners lead to increased open space preservation, enhanced or protected natural resources or enhanced biodiversity.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	307

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

Outcome #27

1. Outcome Measures

Enhancing a Network for Citizen Science Observation of the Response of Plant Phenology to Global Climate Change

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Annual average temperatures in the Northeast are increasing, yet we do not know the degree to which native plants in central New York will be affected. With climate changes producing warmer temperatures, it is imperative to understand whether these changing conditions could affect the local plant phenology and distribution. Yet we have little data to tease apart influences on plant phenology of factors such as the age of the plant, day length, soil conditions, pests, diseases, and competition from other plants. Data on plant performance in many different habitats and environmental situations must be gathered and analyzed. But even people with interests in environment and plants were unaware of the extent to which local plants might be vulnerable.

What has been done
Project BudBreak is the starting point for this analysis for central New York. To understand the effects warming might have on growth patterns of plants, we have created a network of trained citizen scientists who monitor the seasonal biological events influenced by the environment, including bud break, leaf emergence, flowering, the onset of fall coloration, and leaf drop. By using the power of volunteers, we can create a comprehensive set of observations for analysis of the effects. This network of citizen observers, equivalent to networks of weather spotters, can greatly increase the public's awareness of this problem through direct involvement in scientific data gathering.

Results
300 people participated in this network. Question and answer sessions conducted at 15 public workshops (total attendance was about 450 people) indicated that even those with interests in environment and plants were unaware of the extent to which local plants might be vulnerable. A second goal was to begin the data collection necessary to determine effects. It will take many years of observations to detect whether and what effects might take place. Project Budbreak sets a critical reference point. It also helps increase science literacy through direct involvement in

scientific data gathering. To that end, Project BudBreak created videos to familiarize participants with techniques for making observations, a manual to provide important background information, and an easy-to-use web site for entering observations into a common database. Because only three years of data have been collected thus far, it is too early to determine patterns?so to add value to the data and determine whether hints of trends might develop into significant patterns, we are comparing to several well-established data sets of plant observations. The first records first flowering dates of plants in the Mundy wildflower garden of the Cornell Plantations in Ithaca, NY, dating back to 1994. The second dates from 1935 and contains similar observations for flowering dates in the Leopold Nature Preserve near Madison, Wisconsin. Comparisons between these three data sets help us create a broad picture of phenological events occurring in several localities and regions and will help see if and how Project BudBreak observations relate to the broader picture.

4. Associated Knowledge Areas

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

Outcome #28

1. Outcome Measures

Adirondack Brook Trout Conservation and Management in a Changing Climate

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
How will warmer summers change conditions for coldwater Adirondack fisheries?and thus for the anglers and communities that rely upon them? The Adirondacks represent the southern edge of the geographic distribution of native lake-dwelling brook trout, meaning that these populations are increasingly threatened as the climate warms. Given the increasing evidence of changing climates and a series of unusually warm summers since 1998, concern about conserving and managing Adirondack brook trout populations is growing. Our research group has documented reduced growth and survival of brook trout larger than 14 inches in one representative Adirondack

lake over the past decade.

What has been done
We will study brook trout in six lakes representative of the lake types that can sustain brook trout populations in the Adirondacks. We hope to identify ways to understand and mitigate adverse impacts of warmer water on trout reproduction, growth, and survival. We will also identify upstream locations and land uses that support refuges essential to brook trout survival and conduct a pilot project to modify lake thermal regimes by, for example, piping coldwater from upstream sources to enhance or provide coldwater summer refuges. Stakeholders include angler and conservation organizations, plus state and local agencies. Adirondack communities that rely on recreation and tourism will benefit from improved brook trout conservation and management. The lead PI recently produced a nontechnical summary of potential impacts of climate change on freshwater fisheries in the Northeast as part of an overview organized by the Union of Concerned Scientists and communicate results of this work to broad public audiences.

Results
The first two project years provided a welcome contrast in climate conditions. Summer 2009 was relatively cool; stressful thermal conditions existed for only a short time that year. By contrast, summer 2010 was consistently warm and wet. Meanwhile, a wide range of pH and ANC (acid neutralizing capacity) levels have been found in surface waters and tributaries of our study lakes. A noteworthy observation to date has been that seasonal diet composition of brook trout was generally consistent within each lake in both 2008 and 2009, even though lake-to-lake differences in diet were substantial. Percent water in tissue of brook trout showed similar seasonal trends among study lakes in both study years, indicating that brook trout build up lipid levels during a period of suitable water temperatures and food availability prior to the development of warm summer thermal conditions. Fish tissue lipid levels prior to fall also seem to provide a useful indicator of reproductive output during fall spawning. In the final project year we will confirm whether water content provides a good proxy for brook trout lipid levels by analyzing both lipids and water content from tissue samples collected in 2010. We will also implement a nondestructive bioelectrical impedance analysis (BIA) study to evaluate how food consumption influences tissue lipid levels and water content. Discussing this project with New York State Department of Environmental Conservation staff led to their evaluation of brook trout condition and reproduction in more than 60 western Adirondack lakes during summer 2009, and DEC staff plan to continue surveying brook trout condition and reproduction in several public lakes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
135	Aquatic and Terrestrial Wildlife

Outcome #29

1. Outcome Measures

Addressing Climate Change

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
New York has an abundance of water resources, including two Great Lakes, an additional 8,000 smaller lakes, and thousands of miles of rivers and coastal shorelines. These waters provide a critical underpinning for New York?s economy, acting as the basis for transportation, drinking water supply, agriculture, fisheries, and tourism, as well as community health and well-being.

What has been done
In the past two years, a team of Cornell faculty from the Depts. of Earth and Atmospheric Sciences, Natural Resources, and Horticulture have collaborated on a NYS Energy Research and Development Authority funded, multi-university ClimAid project identifying vulnerabilities and adaptations of New York State to climate change. As part of this process, Cornell worked with the entire NYS county Cornell Cooperative Extension system to get stakeholder input on vulnerabilities and adaptations.

Results
The final report identified that NY?s water resources, if properly managed, will provide the key to adaptation and a source of economic opportunity in coming years as the southern U.S. is impacted by increasing droughts. These recommendations were incorporated into Governor Paterson?s Climate Action Plan ? Interim Report, recently released by the NYS Climate Action Council http://nyclimatechange.us/InterimReport.cfm. It is an excellent example of how Cornell?s applied research and extension programs are directly contributing to sustainable policy development at the state level.

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 #30

1. Outcome Measures

Controlling Invasive and Interfering Plants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Interfering and invasive plants limit the diversity of natural ecosystems and complicate the objectives of owners and managers who strive to sustain the value of rural landscapes. Subtle shifts in climate conditions rapidly shift the mix and distribution of invasive species. Failure to control interfering and invasive plants can increase the costs of management and reduce the economic and ecological values provided to owners and society. Owners and managers need to understand the applicability of vegetation management tools and the circumstances when a particular tool is effective and appropriate. Vegetation management tools include both conventional and organic techniques.

What has been done
During a three-year project that integrated applied research with extension education, more than 30 presentations were given that reached more than 1600 owners and managers that make decisions on more than 200,000 acres of woodlands. The project also involved 24 research and extension collaborators who assisted with flame weeding or herbicide research treatments, or, in addition, by hosting a Cooperative Extension educational workshop.

Results
More than 75% of 260 participants in the beech management and the flame weeding webinars indicated a moderate to significant increase in the knowledge and awareness about control strategies. More than 70% of webinar participants indicated they would implement a component of the training on their property or suggest it to a client. Field workshop participants were solicited for their suggestions on implementation strategies, with those suggestions being incorporated into on-going research to refine the feasibility of techniques.

4. Associated Knowledge Areas

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

Outcome #31

1. Outcome Measures

Invasive Forest Pests Outreach Training

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The need is to increase awareness of the Emerald Ash Borer (EAB) and Asian Longhorned Beetle ALB) especially to those connected to the forest industry (loggers,forest landowners, foresters, mills, etc.). Recent USDA Forest Service information indicates that if New York State were to do a "present liquidation" value of NYS timber the loss in white ash alone would be around $1.9 billion due to EAB and to sugar maple and red maple species around $10 million due to ALB. These figures are only correlated to timber values and not to any other products or values that these species provide to the Forest of New York State. Currently, EAB has spread to 14 States and 2 Provinces and is being detected in more locations throughout NYS. As these two species lack predators, parasites and other means of controlling them.

What has been done
CCE Warren County has been involved in education and outreach of invasive forest pests species in the immediate Warren County area for several years, but this year received a grant to be able to assist in reaching other regions of the state especially in the area of trained logger certification workshops. In the course of five months outreach and education was provided to over 79,846 individuals through workshops, displays, woodswalks, etc. in the eastern part of New York State alone.

Results
More people are aware of the impact that invasive forest pests can have on the forest resources of New York State, as well as the entire northeastern northern hardwood forests. Working together with other agencies and organizations to slow the spread of the insects in order to

minimize economic impact through education and planning in order to develop control strategies will be an important step in the upcoming year. Also it is important to be able to get citizens, forest landowners and others to be aware and to begin surveying street trees, yard trees, and forestlands. The more that the awareness is developed, the more prepared communities, forest owners, and the forest industry will be for these invasive forest pests.

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry
132	Weather and Climate

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. There is growing antagonism between climate skeptics and climate scientists further polarizing the issue.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Evaluation Results

Key Items of Evaluation