V(A). Planned Program (Summary)

Program # 1

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
132	Weather and Climate	50%		25%	
133	Pollution Prevention and Mitigation	35%		65%	
605	Natural Resource and Environmental Economics	15%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	0.9	0.0
Actual Paid	1.5	0.0	1.1	0.0
Actual Volunteer	0.6	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**
84341	0	161354	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
84341	0	136469	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

On-going research activities related to climate change will include both basic and applied research. This research will continue to take place in all academic departments/schools within the College of Food, Agricultural, and Environmental Sciences. Laboratories for experiments, pilot plants, a feedstock processing plant, greenhouses, and research plots and stations will support this program. All functional laboratories and sites will be improved over time as program needs warrant. OSU Extension will provide parallel programs in this Planned Program to advance knowledge, promote adoption and change, and develop human capital. OSU Extension's current primary method of addressing climate change issues is via monthly webinars. OARDC and OSU Extension faculty and staff will engage in appropriate levels of outreach, engagement, and consultation, with both internal and external stakeholders.

2. Brief description of the target audience

Targeted audiences in the Climate Change Planned Program include, but are not limited to:

- Businesses and industries that have expressed a need for climate change information that is derived through new research, extracted from on-going research, or is derived from scientific literature;
- Fellow academic units that partner with program scientists to create systems and processes needed to support not only the research, but also the adoption of the research findings by industrial partners;
- Ag producers and farmers;
- Fellow agencies or support organizations who will not only use the information but will also be brokers of that information, including embedding it into groups to encourage change;
- Populations who have not requested the information but will likely benefit from that information
- Other scientists and scientific groups;
- Political entities;
- Other education, outreach, and Extension personnel;
- Students from elementary school to post doctorate studies;
- News organizations.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	18777	7059	0	0

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	6	59	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of participants attending educational programs of one teaching hour or more.

Year	Actual
2014	2274

Output #2

Output Measure

- number of webinars / online educational and research sessions

Year	Actual
2014	94

Output #3

Output Measure

- # of acres impacted as a result of educational events on the topics related to the management of natural resources

Year	Actual
2014	37168

Output #4

Output Measure

- number of individuals receiving one-on-one consultation or assistance

Year	Actual

2014	919

Output #5

Output Measure

- number of people completing non-formal educational events on water quality and quality of surface water and ground water supplies

Year	Actual
2014	51

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Advance the understanding of soil carbon sequestration research to the point that Ohio farmers can enter the carbon trading market.
2	number of producers using no-till techniques(Extension)
3	create strategies / technology within our program mission to reduce atmospheric pollution that can contribute to global climate change (OARDC)
4	number of strategies / technologies created that reduce atmospheric pollution that can contribute to global climate change (Extension)
5	Advance knowledge of how climate change affects crops (OARDC)
6	proportion of climate change webinar participants who indicated they learned new information and would share their new knowledge with others (OSUE)

Outcome #1

1. **Outcome Measures**

   Advance the understanding of soil carbon sequestration research to the point that Ohio farmers can enter the carbon trading market.

   Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

   number of producers using no-till techniques(Extension)

   Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

   create strategies / technology within our program mission to reduce atmospheric pollution that can contribute to global climate change (OARDC)

   Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

   number of strategies / technologies created that reduce atmospheric pollution that can contribute to global climate change (Extension)

   Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

   Advance knowledge of how climate change affects crops (OARDC)

2. **Associated Institution Types**

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The "polar vortex" winter of 2013-2014 was ruthless to Ohio's wine grapes. The prolonged and extremely frigid temperatures caused growers to lose 97 percent of their profitable vinifera grapes, with total damage to all the state's grape varieties topping $12 million. Vinifera, or European, grapes go into such wines as Chardonnay. Ohio's grape and wine industry has a $786 million annual economic impact and supports more than 5,000 full time jobs.

What has been done
A survey was conducted by OARDC experts and completed by 62 grape producers statewide representing 838 acres, 720 of which are occupied by wine grape varieties. The average coldest temperature recorded at these vineyards was -14 degrees F, with an unofficial low of -27 degrees F.

Results
The survey results reported 97 percent losses of vinifera (European) grape varieties, which are the most popular and profitable for wine production but also the most susceptible to cold weather.

Hybrid grape varieties such as Vidal Blanc, Chambourcin and Traminette, which are more cold resistant than vinifera, experienced an average crop loss of 57 percent.

Finally, cold-hardy American grape varieties such as Concord and Catawba fared better, with reported losses estimated at 29 percent.

These losses amount to nearly $4 million, according to the survey. Total losses to Ohio grape producers (who also grow juice and table grapes) are much larger, considering that there are some 1,900 acres growing this crop in the state.

While these losses are substantial, potential damage to grapevine trunks and vine death is more worrisome, as it would impact growers over a longer period of time.

Several factors made this year's winter particularly damaging to grapevines. First, the coldest temperatures experienced in the state were frequent as a result of the polar vortex that descended into the United States. Second, extremely low temperatures that can kill buds and trunks usually only last a few minutes, while this year such temperatures lingered for hours.

The most important factor, however, was that vine hardiness became compromised this winter due to warm weather in December that tricked vines into believing spring was coming, referred to as "de-acclimation." Additionally, the coldest days of the season were preceded by relatively warm temperatures and basically took the vines by surprise.

OARDC experts responded to this catastrophic event by teaching a statewide workshop series on pruning winter-damaged vines, with the goal of returning Ohio grape growers to full production as soon as possible. Scientists are also developing new, cold-hardy hybrid varieties that can better withstand severe weather.

OARDC's grape and wine research program is the only long-term university-backed research program serving Ohio's grape and wine industry. The program does extensive research on improved grape production methods. Field trials take place in Wooster, at OARDC's Ashtabula Agricultural Research Station in Kingsville and in vineyards of cooperating growers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate

Outcome #6

1. Outcome Measures

proportion of climate change webinar participants who indicated they learned new information and would share their new knowledge with others (OSUE)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	88

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Understanding of issues surrounding climate change is limited. Meaningful public discussion regarding potential policy is difficult without a basic understanding of these issues.

What has been done
Nine climate change webinars have been produced involving 2,274 participants. Those participants represent over 200 organizations from across the United States. Some of the topics addressed in 2014 include: climate change and corn belt agriculture, exploring snowfall, climate change and harmful algal blooms in Maumee Bay, climate change impacts on wildlife, trends and forecasts, and the movement of climate change knowledge through social networks.

Results
Nearly 90% of all participants have indicated that they have learned new information and planned to share it with others. The National Park Service, USEPA, and eight high school or university instructors have used the webinars as teaching tools.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Natural Disasters (drought, weather extremes, etc.)
- Competing Programmatic Challenges

Brief Explanation

Limited resources require choices. Should a more compelling issue surface, it is possible that resources currently devoted to this program and planned for the future could be re-directed. Likewise, natural disasters / climactic extremes may impact the focus of some programming efforts back towards issues regarding climate change. For example, the polar vortex conditions during the 2013 - 2014 winter in Ohio caused great losses to Ohio's wine grape industry, who estimate industry loss at $12 million.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Climate change is a global problem, but a specific subset of its challenges are already affecting the Great Lakes region. Climate change can: affect the safety of drinking water; increase the number of droughts and floods; cause changes in precipitation and higher temperatures, which can lead to a change in the types of trees that grow in the region, thus impacting the timber industry; cause a decrease in crop yield dramatically over time and impact species migration.

Current resources in OSU Extension have limited programming efforts explicitly addressing climate change to webinar delivery. Nearly 2,300 participants representing 200 organizations from around the country have participated in OSUE webinars. 88% of participants acknowledged that they learned new information from the viewed webinar(s) and would share that information with others. The National Park Service, USEPA, and 8

secondary or university level instructors have used the webinars as teaching tools. The webinar archives have been used as an educational resource for more than 56,000 natural resource professionals.

Key Items of Evaluation