V(A). Planned Program (Summary)

Program # 6

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	10%			
133	Pollution Prevention and Mitigation	20%			
205	Plant Management Systems	10%			
601	Economics of Agricultural Production and Farm Management	10%			
605	Natural Resource and Environmental Economics	20%			
608	Community Resource Planning and Development	30%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	15.0	0.0	0.0	0.0
Actual Paid	16.0	0.0	0.0	0.0
Actual Volunteer	53.0	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**
789314	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
789314	0	0	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 planned program is expanded to address Climate Change and Energy Needs, anticipating the 2015 combined research and extension joint report. University of Wisconsin-Extension and UW Agricultural Experiment Station campus specialists and county educators in both agriculture and community development program areas are being called on to respond to questions about sustainable renewable energy as well as soil, water, air, and agricultural quality concerns in the Great Lakes and Mississippi River basins. Interdisciplinary regional and tribal collaborations are providing professionals and community leaders tailored, locally relevant, science-based climate change and energy needs information and strategies to incorporate into economic development and resource management planning processes.

2. Brief description of the target audience

The audience includes state, tribal, Great Lakes Region and national colleagues, other professionals and educational partners, youth and adult dairy and livestock producers and workers, producer associations, growers and grower associations, agronomists, crop consultants, professional nutrient applicators, coalitions and cooperatives, composters and recyclers, coastal and other community leaders, business owners and executives, town, city, county and tribal governments, elected officials, planning and emergency management departments, planning commissions, economic development practitioners, natural resource managers, public health officials, school districts, 4-H youth and trained volunteer leaders, and others adapting to and mitigating effects of the region's changing climate.

Serving under-represented communities: As climate changes, tribal place-based culture and economies must adapt to changing conditions. The Changing Climate, Changing Culture Teacher Institute and the Gikinoo'wizhiwe Onji Wabaan (G-WOW, Guiding for Tomorrow) educational exhibit at the Northern Great Lakes Visitor Center trained 57 tribal members to recognize climate impacts and adaptation strategies, and raised the awareness of around 3,300 other visitors about the effects of climate change on tribal lifeways. UW-Extension's role in planning and delivering the Institute for Tribal Environmental Professionals Climate Adaptation Planning Workshop in Oneida, Wisconsin, resulted in 21 representatives of 12 tribal nations building capacity to develop plans leading to climate adaptation and mitigation by the tribes: http://www.g-wow.org/en-us/default.aspx

Wisconsin Initiative on Climate Change Impacts (WICCI): This statewide collaboration brings scientists and stakeholders together to find adaptation strategies to reduce potential negative impacts of climate change in Wisconsin. WICCI issued its first comprehensive report in February 2011, Wisconsin's Changing Climate: Impacts and Adaptation. Wisconsin extension statewide climate specialist David S. Liebl leads

the WICCI outreach effort, chairing the WICCI Outreach Committee and serving on the WICCI Science Council. WICCI's outreach program focuses on building capacity among regional decision makers to integrate climate projections into resource management decisions as they take strategic steps to preserve jobs, invest resources wisely, build resiliency, and protect built and natural environments in the face of a changing climate: http://www.wicci.wisc.edu

3. How was eXtension used?

University of Wisconsin-Extension campus and county faculty and staff participate in various communities of practice, engaging with colleagues around the country to improve the educational content of research-based programs, community engagement projects and assistance delivered to residents across the state and region. Extension colleagues are connected by email ListServ, blogs and online newsletters, and shared resources such as teleconferences and webinars, eXtension Communities of Practice, and the national Extension Disaster Education Network (EDEN) to quickly address critical and emerging issues such as responding to extreme weather. Interdisciplinary colleagues and other professionals in this network include University of Wisconsin researchers on the Madison, Platteville, River Falls, Stevens Point and Superior campuses and centers, working with 3 tribes, and at 11 agricultural research stations.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	46953	0	1309	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	0	11	11

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	Develop, implement and evaluate outreach programs that reduce carbon, nitrogen, energy and water footprints in their communities.
2	Reduce atmospheric greenhouse gas emissions.
3	Maximize carbon sequestration potential in agriculture and forests.

Outcome #1

1. Outcome Measures

Develop, implement and evaluate outreach programs that reduce carbon, nitrogen, energy and water footprints in their communities.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	14700000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Even as agricultural lenders are looking harder at farm financial performance, Wisconsin farmers face increasing regulatory pressures due to agricultural nutrient contributions producing non-point source pollution to all water resources. Dairy and livestock owners increasingly need nutrient management plans for environmental and cost-sharing compliance. Government agricultural programs, zoning, large farm licenses, state animal feeding operation permits, and farmland preservation tax credits as of 2010 all require farms to have nutrient management plans. Regulations aside, improving nutrient management practices can also improve farm profitability and water quality.

What has been done
The University of Wisconsin-Extension Nutrient Management Team researches and updates guidelines and software to help farmers credit nitrogen from legumes and manure to save fertilizer cost and prevent loss of nutrients from fertilizers and manure to groundwater, lakes, streams, the Gulf of Mexico and the atmosphere. The Nutrient Management Farmer Education (NMFE) curriculum combines classroom instruction, individual consultation, and on-farm field trials to engage farmers in designing nutrient management plans they can understand and follow. Funding, local delivery and collaboration among extension faculty and staff, agency partners, trained agricultural educators and consultants reach farmers most at risk who can benefit the most.

Results
Reducing the nitrogen footprint improves sustainability: Since 2000, an estimated 1,554,390 acres farmed in 55 counties by the 5,360 producers trained by University of Wisconsin-Extension Nutrient Management Farmer Education (NMFE) are now covered by a qualified nutrient

management (NM) plan. So as of 2014, at least 1,554,390 acres of cropland and grazing land are covered under an NM plan that meets all local, state and federal regulations. NM plans cost about $7 per acre for farmer time and effort. Thus, with 1,554,390 acres under NM plans as of 2014 due to NMFE, the farmer benefit values at least $10.8 million. As an added benefit, farmland preservation tax credits starting in 2010 range from $5 to $10 per acre and require compliance with state soil and water conservation standards, including filing NM plans. Conservatively assuming only half of the acres under NM plans as of 2014 due to NMFE claim this tax credit at the minimum $5 per acre, the farmer benefit values nearly another $3.9 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Reduce atmospheric greenhouse gas emissions.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Maximize carbon sequestration potential in agriculture and forests.

2. Associated Institution Types

- 1862 Extension

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)
As of the 2012 U.S. Census of Agriculture, 87 million acres of corn were harvested, valued at $79.8 billion. This highly versatile crop employs millions and produces affordable food for people and livestock, fuel ethanol, and thousands of other non-food products. Global and domestic demand for corn continues to rise. However, there is increasing uncertainty about how long-term climate trends are impacting corn-based cropping systems and agricultural investments. Farmers are seeking new ways to ensure continued productivity of corn and other crops grown in rotation while protecting the land and water quality. Given increasingly extreme weather such as the Corn Belt?s record flooding in 2008 and severe drought in 2012, climate change threatens sustainability of corn systems unless mitigation and adaptation strategies are identified and implemented.

What has been done
Coordinated by Iowa State University, the 9-state Climate Change, Mitigation, and Adaptation in Corn-Based Cropping Systems (CSCAP) project is assessing and communicating environmental, economic and social impacts of long-term climate variability on corn-based cropping systems and productivity, creating a suite of practices that:

o Retain and enhance soil organic matter, nutrient and carbon stocks.
o Reduce off-field nitrogen losses that contribute to greenhouse gas emissions and water pollution.
o Better withstand droughts and floods.
o Ensure productivity under different climatic conditions.
o Are shared among all stakeholders at: http://sustainablecorn.org

Richard Wolkowski trained as the Wisconsin extension educator with the project network, working with 22 selected farmers in learning the science behind climate change, providing feedback for management changes and keys for developing resiliency. From these farmers, he solicited annual cropping information for two of their corn production fields. Project modeling and socio-economic groups use these data. He presented his research locally, regionally and nationally, comparing and evaluating no-till, strip-till and chisel system management (A3883) with how these systems vary in different climatic conditions, and what management changes are needed to keep each system at peak production levels. This work draws from 8 Wisconsin and 20 network colleagues, the 12-state Useful to Useable (U2U) resources and the Wisconsin Initiative on Climate Change Impacts: http://www.wicci.wisc.edu

Results
Maximizing carbon sequestration potential: Extension scientists are describing affects of climate change in corn production systems and creating recommendations for growers to develop resiliency. Corn Belt growers are making informed management decisions based on scientific evidence. As Wisconsin extension educator for the 9-state Sustainable Corn Project, Dick Wolkowski is building relationships between 22 locally respected growers and University of Wisconsin-Extension. Project farmers understand climate change impacts on agriculture, test and evaluate adaptation strategies, and engage in public dialog with their peers about climate change impacts on agricultural systems and adaptation strategies. Participating in this group, a recent president of the Wisconsin Soybean Association shared his views on climate change and the project's efforts on a panel with selected producers from other states at the 2014 project conference.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Database development)

Brief Explanation

Database development: University of Wisconsin-Extension is in the process of replacing the legacy planning and reporting database, which was closed in 2012. For this report, the 2014 direct contacts for adults reported are the 4-year average of past performance of relevant statewide teams in 2008-2011. Program participation is in alignment with previous years.

The 2014 trained volunteers participating and direct contacts for youth reported are from the 2013-14 ES-237 form.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nutrient Management Farmer Education curriculum annual survey results: The Nutrient Management Farmer Education (NMFE) curriculum is produced, evaluated and updated jointly by interdisciplinary Wisconsin Discovery Farms and Nutrient and Pest Management Program integrated campus and county extension faculty and staff. The NMFE curriculum combines classroom instruction, individual consultation, and on-farm field trials to educate farmers on methods for improving NM practices from both an economic and environmental perspective. Once this is accomplished, the next step is to involve farmers in the design of their own NM plans. To measure results, NMFE curriculum coordinators complete an annual survey. These coordinators are county extension agriculture educators, land conservation department staff, and Wisconsin Technical College instructors.

Survey results show continued increases in the number of Wisconsin NMFE-trained farmers

and acreages among participants over the 2004-2008 five-year annual average. During 2014, around 173,630 additional acres of Wisconsin cropland were planned by NMFE-trained producers whose major agricultural enterprise was dairy. Data from 2000 to 2014 show that as a result of local delivery of NMFE workshops, more than 5,360 producers farming around 1,554,900 acres in 55 counties have received in-depth education on nutrient management planning based on University of Wisconsin research and extension field-tested recommendations.

Key Items of Evaluation