V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Natural Resources and Environmental Systems (OARDC Led)

☑ 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
121	Management of Range Resources	0%		5%	
122	Management and Control of Forest and Range Fires	0%		5%	
123	Management and Sustainability of Forest Resources	0%		5%	
124	Urban Forestry	0%		10%	
125	Agroforestry	0%		10%	
131	Alternative Uses of Land	0%		10%	
134	Outdoor Recreation	0%		10%	
135	Aquatic and Terrestrial Wildlife	0%		35%	
136	Conservation of Biological Diversity	0%		10%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	2.3	0.0
Actual Paid	0.0	0.0	1.5	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	171216	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	264048	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

The natural resources and environmental systems program includes both basic and applied research across the previously mentioned activities. Both laboratories and multiple field sites are available throughout state to permit data gathering and to continue long-term experiments, such as human-wildlife interaction studies. Extensive in-state research takes place as do national and international studies, as is evidenced by programs such as OARDC's avian ecology studies. Close working relationships with the organizations such as the Ohio Department of Natural Resources will continue to greatly enhance program capacity and outputs/impacts. All functional laboratories and sites are improved over time as program need and resources available warrant. OARDC faculty and staff engage in appropriate levels of outreach, engagement, and consultation with both internal stakeholders, such as fellow Extension personnel, and with external stakeholders.

2. Brief description of the target audience

OARDC's targeted audiences include, but are not limited to:

- Specific individuals or groups who have expressed a need for natural resources and environmental research knowledge that is to be derived through new research, extracted from on-going research, or is derived from scientific literature. Often those requests are communicated to OARDC by an intermediary such as a staffer at USDA, ODNR, or a county Extension agent;
- Related 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, e.g. fish and wildlife clubs;
- Populations who have not requested the information but will likely benefit from that information, e.g. people who fish for recreation;
- Other scientists and scientific groups;
- Political entities;
- Extension personnel;
- Students from pre-school to post doctorate studies;
- News organizations;
- Business groups such as Ohio Farm Bureau;
- Community groups such as watershed collations.

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	0	0	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	0	20	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of graduate students completed
  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	In conjunction with companion agencies and organizations, advance research in forest biology and ecology to promote advances in best management practices on and flow of goods and services from Ohio ecosystems.
2	Increase the scientific understanding necessary to maintain flow of environmental goods and services through conservation actions commensurate with regional demand, i.e. Buffer zones in forest riparian zones, reforestation, CREP, carbon sequestration in forests and grassland biomass, outdoor recreation opportunities, urban forest zones.
3	Advance research knowledge, both basic and applied, in the areas of silviculture and horticulture to existing and emerging industry and consumer demand regarding forest genetics, forest biology, seed production, nutrition, and related topics.
4	Meet ODNR, USDA, USDI, local, commodity groups, community, and other stakeholder demands for scientific knowledge to inform existing and emerging issues/practices in aquatic and terrestrial wildlife including human wildlife use/conflicts, and human to human conflicts related to wildlife and use.
5	To contribute to the theoretical knowledge base within this planned program to ensure that where possible all applied research can be grounded in the best science and evaluation available in all knowledge areas selected.
6	Improve the biodiversity and utilization of land use in rural and urban environments

Outcome #1

1. **Outcome Measures**

   In conjunction with companion agencies and organizations, advance research in forest biology and ecology to promote advances in best management practices on and flow of goods and services from Ohio ecosystems.

   Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

   Increase the scientific understanding necessary to maintain flow of environmental goods and services through conservation actions commensurate with regional demand, i.e. Buffer zones in forest riparian zones, reforestation, CREP, carbon sequestration in forests and grassland biomass, outdoor recreation opportunities, urban forest zones.

   Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

   Advance research knowledge, both basic and applied, in the areas of silviculture and horticulture to existing and emerging industry and consumer demand regarding forest genetics, forest biology, seed production, nutrition, and related topics.

   Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

   Meet ODNR, USDA, USDI, local, commodity groups, community, and other stakeholder demands for scientific knowledge to inform existing and emerging issues/practices in aquatic and terrestrial wildlife including human wildlife use/conflicts, and human to human conflicts related to wildlife and use.

   Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

To contribute to the theoretical knowledge base within this planned program to ensure that where possible all applied research can be grounded in the best science and evaluation available in all knowledge areas selected.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Improve the biodiversity and utilization of land use in rural and urban environments

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)
Decades of population losses have left the city of Cleveland, OH with 32,000 acres of vacant land, while some 1,000 homes are demolished every year. Currently, Cleveland plants turfgrass on empty lots, but it's expensive to maintain and offers few benefits. Alternative plant communities could offer greater environmental benefits, such as support of biodiversity and improved storm-water infiltration to reduce flooding.

What has been done
OARDC researchers started a large-scale, never-before-attempted project that examines the impact of eight different landscape treatments on the biodiversity and ecosystem function of 64 empty lots in eight Cleveland neighborhoods. The five-year project's main goal is to gather data that will guide future green space design in Cleveland and other cities engaged or interested in vacant-land management.

With the right combination of plants and increased ecosystem services, urban vacant land can be seen as an asset for community development rather than an eyesore.

The research team is examining what combination of plant species are best for restoration of these blighted lots. The group is also looking at installing rain gardens in the city of Cleveland to determine how these restorations contribute to pollinators, soil health and the reduction of pollutants from storm water.

Results
Hatch funding invested into our faculty has leveraged additional funding by a highly competitive $909,200 Faculty Early Career Development Program grant from the National Science Foundation.

This project also includes the development of a high school science curriculum for use by teachers in Cleveland and throughout the state. The lessons focus on insect-predator-prey relationships and teaching students how to collect data and communicate their findings using scientific arguments.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land

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
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Public policy shifts, regulations, laws, and shifts in demand continue to impact outcomes. Also climatic extremes, coupled with pest and diseases that are often climate related, are also impacting outcomes. Exotic species such as the Emerald Ash Borer is a significant external factor, especially in terms of forest ecosystems. Factors such as the availability of state and federal base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that are exceeding resources, individually and collectively, are affecting outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

For 2014, CFAES-OARDC has conducted no formal studies regarding evaluation of our research program. Surrogate evaluation metrics--inclusive but not limited to--that are

considered indicators of research success are:

- Research contracts and awards received/ongoing/completed ($166 million plus in active projects during 2014);
- Number of referred publications reported elsewhere in this report;
- Number of business, industries an groups engaged in CFAES's research programs;
- Number of patents received;
- Economic impact of this college's research program as reported elsewhere in this report;
- The level of base funding from USDA-NIFA and the State of Ohio in 2014;
- Impacts submitted in this report, and the continued robustness of CFAES' research program throughout 2014, both in terms of breadth of programs and depth of new knowledge generated and applied.

The research reported herein is also supported by an informal yet effective formative evaluation. Very little research is conducted at OARDC without early engagement of business, industry, commodity groups, special interest or community groups, or other interested parties given these are the individuals who have the need for and will be the adopters of our research output/impacts. Even in the case of very theoretical research, fellow researchers in industry, government, and academic institutions are consulted (formative evaluation/needs assessment) in the formulation of studies.

Key Items of Evaluation

Decades of population losses have left the city of Cleveland with 3,600 acres of vacant land, while some 1,000 homes are demolished every year. With the right combination of plants and increased ecosystem services, urban vacant land can be seen as an asset for community development rather than an eyesore. Community members and city leaders partner with OARDC, providing input about their landscape treatment preferences. One partner provided the following feedback:

"Working on ecological research in city neighborhoods requires advanced scientific knowledge and excellent people skills. [OARDC researcher] Mary (Gardiner) embodies both of these things. Her work has the potential to impact people's lives in tangible and lasting ways, and to contribute to new ways of thinking about Cleveland."

--Terry Schwarz, director, Cleveland Urban Design Collaborative