

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
122	Management and Control of Forest and Range Fires	0%		5%	
123	Management and Sustainability of Forest Resources	0%		20%	
124	Urban Forestry	0%		15%	
125	Agroforestry	0%		10%	
134	Outdoor Recreation	0%		10%	
135	Aquatic and Terrestrial Wildlife	0%		25%	
136	Conservation of Biological Diversity	0%		15%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	3.0	0.0
Actual Paid Professional	0.0	0.0	2.0	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	241390	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	394459	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

Natural resource and environmental systems program includes both basic and applied research. 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

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; and community collations 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

2012	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: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	25	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 private forest land in Ohio.
2	Improve the flow of forest raw materials to the extent it meets the needs of Ohio industries within ten years.
3	Increase the production of oak and reduce maple to eventually achieve a balance equivalent to forest with natural fire regimes.
4	Meet federal and state needs for research data related to Ohio ecosystems as the demand arises
5	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.
6	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.
7	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.
8	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.

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 private forest land in Ohio.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Improve the flow of forest raw materials to the extent it meets the needs of Ohio industries within ten years.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Increase the production of oak and reduce maple to eventually achieve a balance equivalent to forest with natural fire regimes.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Meet federal and state needs for research data related to Ohio ecosystems as the demand arises

Not Reporting on this Outcome Measure

Outcome #5

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.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Created wetlands have potential to increase groundwater, reduce runoff from agricultural lands, restore hydrological process, sequester carbon, sequester pollutants, enhance wildlife populations, etc. Once artificial wetlands, the question is how do we add plants to them to increase functionality or should we?

What has been done

In a nearly 15-year study, OARDC scientists have led the effort to compare the behavior of two experimental marshes on the Columbus Ohio campus. One wetland was planted in 1994 with wetland vegetation, and the other one was left to colonize plant and animal life on its own. When the two marshes were created, researchers planted 13 common wetland species in one marsh and left the other to develop naturally. Water from a nearby river has been continually pumped into both marshes at rates designed to mimic water flow in a freshwater river wetland setting.

Results

The two wetlands now contain nearly the same number of plant species, and almost 100 more species than existed 15 years ago. The two wetland general similarities have persisted even after muskrats spent the winter of 2000-01 destroying most of the plants in both wetlands, either eating them or using them to build dens. These developments suggest that the initial conditions of the wetlands matter less than how they develop naturally on their own. Both wetlands are examples of what the lead scientist calls self-design with humans involved in the beginning, but ultimately the system designs itself over time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

Outcome #6

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.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What is the value of an urban tree? Urban governments spend a substantial amount on the planting and care of trees, often with an eye to only the aesthetics.

What has been done

OARDC scientists investigated the value of urban trees relative to the crucial environmental services that they provide. Trees (3,229) in Wooster, Ohio was inventoried and attributes recorded, such as tree trunk circumference and foliage condition. The U.S. Forest Services' i-Tree Streets software was used to calculate the value of the environmental services, including carbon storage and air-pollution removal.

Results

Given the loss of trees in Ohio to invasive species such as the emerald ash borer, and emphasis on better understanding carbon sequestration, the research is most timely. The result: \$270,153, or roughly \$83 per tree, in annual services. This figure includes \$85,310 in aesthetic and related benefits, \$83,343 in energy conservation, \$77,457 in storm water remediation, \$13,361 in air-pollution removal, and \$10,682 worth of carbon (646 tons) removed from the atmosphere. Wooster's street trees also store 3,980 tons of carbon, valued at \$65,808, in above ground tissues, such as branches and stems. The value of carbon storage is not included in the \$270,153 figure because it's not considered an annual function of the trees.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
134	Outdoor Recreation

Outcome #7

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.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tracking and monitoring the health, behavior, and population stability of birds has long been accomplished at the state level. Understanding these parameters is both ecologically and economically important. Underlying the importance of this type of ornithological study is a recently completed Ohio Sea Grant project showing that bird watching along Ohio's Lake Erie coast contributes more than \$26 million annually and 283 jobs to northern Ohio's economy.

What has been done

OARDC and OSU Extension have led in the completion on an Ohio Breeding Bird census. This was a six-year citizen science project involving nearly 700 volunteers, making over one million bird observation. These Ohioans annually contribute approximately \$300,000 in in-kind support through donated time. Over two hundred species were recorded; 193 are confirmed breeding birds.

Results

The study yielded critical data for those who manage birds, are recreational watchers, or whose business is impacted by bird population trends. Understanding these impacts will help local governments, park managers, and conservation groups to better support bird watching and

market Ohio to attract more bird enthusiasts. There are nearly 2.4 million birders throughout the state and birding makes up a large portion of Ohio's \$39 billion tourism industry. The compilation of the six-year study will be published as the Ohio Breeding Bird Atlas II in 2013.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

Outcome #8

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

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

All factors noted above impact what we do. In particular as resources have become more scarce, our ability to allocate additional resources, money and personnel, to this planned program has been limited. In particular our inability to fill faculty and staff vacancies in this area has been a key limiting factor.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The following is an example of the type of program feedback this planned program is receiving:
All of the workshop participants completing the pre-post evaluation reported significant increases in knowledge (100% response rate in 2 workshops and 81% in the third workshop).

Participants reported the greatest increase in understanding about the options available to reduce erosion, how to take action without spending too much time or money, who to contact about questions, and how to find incentive programs for taking action. All of the short course participants completed the course evaluation and reported a significant increase in knowledge. Specifically, when asked, "Because of this course, I have gained knowledge and/or skill that will help me do my job better" 83% (5/6) of respondents agreed with this statement and 16% (1/6) strongly agreed. Change in action. All of the workshop participants completing the pre-post evaluation reported significant increases in intentions to engage in new conservation practices on their property. Specifically, 52% strongly agreed that they would use knowledge gains in the workshop, specifically by improving streamside buffers and dedicating more time to evaluating their stream's health and finding more information about healthy stream practices. 90% of participants stated that they planned to try a practice learned about in the workshop (e.g., improving buffer zones, not dumping yard waste). 83% of participants in the online short course stated that they plan to use the knowledge gained in their professional life. Specifically that they would think more deliberately about communication efforts, use other techniques to surveys such as focus groups, connect theory to practice and knowing what strategies work or do not work, and change the way they communicate about an upcoming watershed health workshop. 67% agreed that they could prepare and implement a communication plan because of this course, and 50% agreed that they were able to communicate better because of the course. Change in conditions. Plain and Jefferson Township administrators were in attendance for the community workshops and have requested that they be offered annually as part of their municipal storm water education program. Plain township administrators also agreed to host a spring 2013 streamside landowner workshop in conjunction with the installation of a streamside buffer on municipal property. OSU Extension and the Franklin County SWCD will also offer two more spring field focused workshops on streamside buffer installation, while the Ohio Watershed Network will host a national webinar on Effective Stream Health Communication in early 2013.

Key Items of Evaluation

From one of the impacts reported in this planned program.....

OARDC and OSU Extension have led in the completion on an Ohio Breeding Bird census. This was a six-year citizen science project involving nearly 700 volunteers, making over one million bird observation. These Ohioans annually contribute approximately \$300,000 in in-kind support through donated time. Over two hundred species were recorded; 193 are confirmed breeding birds.

The contribution of this much time and effort by this many volunteers is a surrogate feedback measure attesting to the value placed on OSU Extension and OARDC work by these citizen scientists.