

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Natural Resources Stewardship

- Reporting on this Program
Reason for not reporting
{No Data Entered}

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	10%		5%	
112	Watershed Protection and Management	10%		5%	
121	Management of Range Resources	10%		5%	
122	Management and Control of Forest and Range Fires	9%		0%	
123	Management and Sustainability of Forest Resources	10%		0%	
124	Urban Forestry	5%		0%	
125	Agroforestry	2%		0%	
133	Pollution Prevention and Mitigation	5%		20%	
135	Aquatic and Terrestrial Wildlife	5%		15%	
136	Conservation of Biological Diversity	10%		10%	
213	Weeds Affecting Plants	5%		15%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	2%		5%	
215	Biological Control of Pests Affecting Plants	5%		10%	
403	Waste Disposal, Recycling, and Reuse	5%		5%	
605	Natural Resource and Environmental Economics	2%		5%	
610	Domestic Policy Analysis	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890

Plan	75.0	0.0	25.0	0.0
Actual Paid Professional	70.0	0.0	32.8	0.0
Actual Volunteer	3527.0	0.0	0.0	0.0

2. Institution Name: Washington State University

Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
947581	0	168848	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
947581	0	168848	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
6282618	0	4424530	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Our work in natural resource stewardship was focused in the following areas: Developing innovative applied research and outreach for storm water management, including Low Impact Development techniques to reduce the level of pollutants in storm water runoff; proper planning and management of nonindustrial private forestlands; decreasing the threat of wildfire to property and people; increasing upland water quality; and increasing the production of hardwood biofuels in the Pacific Northwest. Numerous studies are examining habitat and environmental requirements of native and introduced species in relation to habitat conservation and agricultural practices. We are examining the interactions between native and agricultural predator and prey populations as they relate to biological stabilization mechanisms in insect and weed populations.

Research into the ecology and dynamics of forest ecosystems is providing (i) improved understanding of the importance of early- and mid-seral forests for threatened and endangered species, with implications for forest management of interest to the Bureau of Land Management in several areas of the Northwest; (ii) improved data on forest fuel distribution with application to fire management and assessment of community adaptive capacity to wildfire risk at the wilderness-urban interface; (iii) improved hybrid poplar management and resultant product quality; and (iv) quantification of changes in the diets of grizzly and black bears in Yellowstone National Park, showing a large decrease in the amount of cutthroat trout consumed by bears in recent years.

A major study of cougar population, community and landscape ecology has been completed. This research thrust has been replaced by a new project, supported by direct allocation from the Legislature, focused on the reestablishment of the wolves in the State of Washington as a result of the natural migration of breeding pairs from adjacent populations both within the state and from adjacent states. This project will combine research on the population dynamics of the rapidly increasing wolf population in the state as well as extension efforts focused on working with ranchers to minimize stock losses due to

predation.

Numerous studies of rangeland and wetland ecology were continued during 2013, involving various species including Bighorn sheep, black-tailed deer, mule deer, jackrabbit, pygmy rabbit, sage grouse, sharp-tailed grouse, long-billed curlew, leopard frogs and other amphibians. Additional new research was focused on global climate change and the resulting biological and ecological dynamics challenges faced by selected species such as salamanders and other amphibians. This work is integrated with documentation of land management needs and strategies for conservation of biodiversity in agricultural and urban landscapes. Land management agencies and private landowners will use results from these studies to help improve conservation of rare, endangered and vulnerable species in the Pacific Northwest. Another study continued research on the effects of direct oxygenation as a viable remediation strategy for hypolimnetic anoxia in deep lakes and consequent restoration of lake fish habitat.

Extension educators worked with researchers and local communities to develop customized, science-based solutions to local problems and to educate target audiences about new tools to more effectively manage natural resources. This education will lead to behavior change and ultimately to an improved condition of the natural resource base. Additional information on some of these programs can found at the following websites: <http://snohomish.wsu.edu/forestry> ; <http://raingarden.wsu.edu> ; <http://www.shorestewards.wsu.edu> ; <http://county.wsu.edu/jefferson/nrs/water/courses/Pages/default.aspx;resources.html>; <http://raingarden.wsu.edu>; and <http://www.beachwatchers.wsu.edu/regional/index.php>

2. Brief description of the target audience

The target audiences include landowners and managers; state, federal and local natural resource agency personnel; K-12 educators, local and state governments; and the general public, including citizens interested in natural resource issues and the scientific disciplines that relate to them.

3. How was eXtension used?

Five faculty members participated in an eXtension Community of Practice.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	224135	483255	12124	28411

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

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	12	35	47

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of extension workshops, demonstrations, and conferences conducted with a natural resources focus.

Year	Actual
2013	814

Output #2

Output Measure

- Number of peer-reviewed (official) WSU Extension publications produced on natural resource stewardship topics.

Year	Actual
2013	12

Output #3

Output Measure

- Number of graduate students with a significant professional orientation in the area of Natural Resources stewardship.

Year	Actual
2013	43

Output #4

Output Measure

- The number of WSU Master Gardeners trained during the year to address environmental concerns and natural resource stewardship.

Year	Actual
2013	3527

Output #5

Output Measure

- The number of individuals trained in the safe and proper use of pesticides

Year	Actual
2013	5650

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of participants evaluated who applied knowledge acquired from WSU scientists or extension educators.
3	Number of acres of rangelands and forests exhibiting improved condition as a result of WSU programs or program partnerships.
4	Percentage of pesticide training participants who applied the training received in pesticide safety and proper use.
5	Percentage of participants who applied recommended practices and strategies to protect water quality and conserve water resources.

Outcome #1

1. Outcome Measures

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	96

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Washington rivers, lakes and groundwater sources provide water for agricultural, residential and recreational use in addition to providing wildlife habitat. Puget Sound has been rated as unhealthy. Multiple species of salmon are listed as endangered. Runoff from roads, parking lots and rooftops contribute to the decline in water quality. Improper pesticide and fertilizer applications are also an issue.

What has been done

Program efforts included water quality education, proper pesticide use, riparian grazing, and proper fertilizer use. The WSU Master Gardener program was a major component of this work along with other programs including Beach Watchers, Stream Stewards, Native Plant Advisors, and Rain Garden Mentors, which provided training and education to improve water quality, install rain gardens, and maintain a buffer in riparian areas. The Shore Stewards program trained shoreline landowners on best management practices to improve water quality, while Low Impact Development workshops were held to present the newest methods of green infrastructure to planners, engineers, and agency personnel.

Results

Ninety-six percent of program participants who completed evaluations indicated increased knowledge and skill related to one or more learning objectives related to natural resource stewardship and protecting water quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
----------------	-----------------------

111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #2

1. Outcome Measures

Percentage of participants evaluated who applied knowledge acquired from WSU scientists or extension educators.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The demand for water continues to increase as the population and industry expand. Changing weather patterns and modified stream flows to accommodate migrating fish have compounded this problem. To provide adequate water for lawns, gardens, agriculture and natural resources, residents must learn about and implement water saving methods.

What has been done

Field days, workshops, demonstration gardens, applied research, fact sheets and web sites were used to teach and demonstrate proven water conservation methods. These education opportunities demonstrated water conserving garden practices such as mulching, efficient irrigation, planting drought tolerant plants and xeriscaping are the most cost effective and environmentally sound ways to reduce the demand for our limited water supplies.

Results

Over 24,000 residents, grounds keepers and landscape maintenance personnel learned how to conserve water and protect water quality. Over 85% of program participants learned new information about water use and management. Follow-up evaluations showed that over 70% of program participants used one or more water conserving methods, including mulches they produced through home composting, using highly efficient irrigation methods, especially drip hoses, and adjusting watering times to take advantage of precipitation and reducing evapotranspiration.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

Number of acres of rangelands and forests exhibiting improved condition as a result of WSU programs or program partnerships.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	160109

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small-scale forest and rangeland owners manage millions of acres of land throughout the state. This land contributes significantly to environmental, economic, and social well-being. Much of this land is at risk due to land-use conversion, landscape fragmentation, poor health, degraded habitat, and invasive species. This results in increased water pollution, stormwater management problems, elevated wildfire risk, species and biodiversity loss, destabilized hillsides, economic losses to landowners, degraded aesthetics, as well as reduced quality of life for landowners and communities.

What has been done

Multiple series of coached forest stewardship training workshops with extensive collaboration with the Department of Natural Resources; Ties to the Land; eastern and western Washington forest field days; workshops; online coached forest stewardship interactive modules; webinars; e-newsletters; eXtension; television and radio ads; applied field research; biocontrol releases; and websites.

Results

Over 160,000 acres of forest and rangeland were positively impacted by recommended management practices that improved function and condition of the resource. 96% of evaluated participants demonstrated increased knowledge and 93% are likely to implement new practices; 78% will be more likely to retain their land as forestland; 91% have increased enjoyment of their land; and 90% will be more likely to employ a professional forester when harvesting timber. In addition, they will share knowledge with an average of seven other people per year. For field days, 96% reported learning something new that was applicable to their property with 85% reporting an intention to implement new or different practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires

123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #4

1. Outcome Measures

Percentage of pesticide training participants who applied the training received in pesticide safety and proper use.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	88

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pesticide use is controversial in commercial agriculture, the home garden and around the home. Improper use can result in crop and ornamental plant damage, illegal pesticide residues, contamination of water, and possible human and animal poisonings.

What has been done

Incorporation of pesticide use and safety in Master Gardener training; introduction of integrated pest management concepts; revision of the HortSense program; pesticide pre-training; pesticide recertification classes; online pesticide recertification modules; demonstration garden classes on safe use of pesticides; demonstration garden classes on integrated pest management.

Results

Eighty-eight percent of participants indicated intent to apply knowledge gained to improve the safe and appropriate use of pesticides. Participants in the pre-license pesticide training have a 99% test passing rate, and over 88% of participants in the pesticide recertification training obtain new knowledge and apply this information to their job, business, or consulting practice. Gardeners reported implementation of practices such as mulches to reduce weed germination (65%), and 92% reported using at least one integrated pest management technique instead of just using a pesticide.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
136	Conservation of Biological Diversity
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants

Outcome #5

1. Outcome Measures

Percentage of participants who applied recommended practices and strategies to protect water quality and conserve water resources.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Washington rivers, lakes and groundwater sources provide water for agricultural, residential and recreational uses and provide wildlife habitat. Safe, reliable sources of water must be maintained to meet the needs of our growing population. Water-conserving garden practice reduce the demand for our limited water supplies. Stormwater has been linked to pollution of drinking water supplies and declining health of wildlife and fish species and has been identified as the number

one cause of pollution in the Puget Sound region.

What has been done

Master Gardener new applicant training; Rain Garden Mentor training; Stream Steward Training; Master Gardener continuing education; e-newsletters; websites; demonstration gardens; plant clinics; online forums; webinars; fact sheets; online modules; Rain Garden installation clinics; Natural Yard Care workshops; sustainable gardening workshops; integrated pest management workshops. Development and release of the new Rain Garden Manual for Western Washington.

Results

Over 1000 rain gardens were installed in homeowner's yards to collect roof and sidewalk runoff. Over 95% of program participants enhanced their knowledge of water quality protection and over 90% planned to implement at least one yard or garden practice that would protect water quality. The top choices were: eliminate all pesticides use; pull weeds instead of spray; use a slow release fertilizer, and mulch to reduce weed germination and growth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
403	Waste Disposal, Recycling, and Reuse

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations

Brief Explanation

Rules continue to tighten the use of fertilizers and pesticides in urban areas and riparian areas. Alternatives are recommended to maintain or improve water quality.

Until recently, ongoing concerns and limitations with the state and university budgets have impacted our hiring and deployment of human and financial resources, resulting in the loss of faculty and administrative leadership. However, we appear to have reached a stable, albeit much lower, level of funding. The uncertainty with state policy and funding for higher education clearly impacted our ability to take bold initiatives, given contingencies required for additional budget cuts from state and local governments. These "cuts" have created new funding models that have moved our work in research and extension increasingly to more dependence on securing competitive grants to support our system and drive our programs forward. Although we are moving forward with our hiring and additional

program development, competing priorities for limited funds and financial resources were still a significant factor in 2013.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Overall, program participants have a greater awareness, increased knowledge, and application of knowledge in their gardens and ranches. Overall pesticide use is reduced in our target audience and better choices are being made regarding alternative options. Home gardeners are using more efficient irrigation methods and are using less water overall.

Key Items of Evaluation

Pre- and Post-tests of Master Gardeners, Rain Garden Mentors, Beach Watchers and Stream Stewards are used to determine knowledge gain. Follow-up evaluations (telephone call or online surveys) are used for six-month to one year evaluations. End of meeting forms are used for workshops, conferences and demonstration garden events. Major, regional field days are evaluated through personal interview or follow-up online surveys. Continued participation by volunteers is itself evidence of impact.