V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Management of Rangeland Resources (SMRR)

☑ 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
101	Appraisal of Soil Resources	5%		5%	
102	Soil, Plant, Water, Nutrient Relationships	5%		5%	
103	Management of Saline and Sodic Soils and Salinity	5%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		5%	
111	Conservation and Efficient Use of Water	5%		5%	
112	Watershed Protection and Management	5%		5%	
121	Management of Range Resources	5%		5%	
123	Management and Sustainability of Forest Resources	5%		5%	
131	Alternative Uses of Land	5%		5%	
132	Weather and Climate	5%		5%	
135	Aquatic and Terrestrial Wildlife	5%		5%	
136	Conservation of Biological Diversity	5%		5%	
205	Plant Management Systems	5%		5%	
206	Basic Plant Biology	5%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		5%	
213	Weeds Affecting Plants	5%		5%	
306	Environmental Stress in Animals	5%		5%	
311	Animal Diseases	5%		5%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	5%		5%	
605	Natural Resource and Environmental Economics	5%		5%	
	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	13.0	0.0	6.0	0.0
Actual Paid Professional	14.0	0.0	5.1	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
212872	0	216700	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
212872	0	216700	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 programs will reach out to a broad spectrum of constituents throughout Wyoming using a variety of sources. Workshops on sustainable rangeland and animal management principles will be offered within each extension area within the state. Provide professional development opportunities for rangeland professionals. Develop written educational materials on rangeland and animal management practices and principles (fact sheets, bulletins, media, presentations, Web). Conduct technical consultation on rangeland and animal management, and monitoring of rangelands. Develop media on rangeland management principles (radio, TV, press). Conduct research and demonstrations on sustainable natural resource management principles. Work with individual rangeland managers on developing, implementing, and evaluating sustainable management practices.

Develop and/or present programs on natural resources at youth activities. Produce or update currently produced educational materials targeted to youth on natural resource education. Produce information/education modules emphasizing natural resource topics for 4-H leader use in 4-H project with large enrollment.

2. Brief description of the target audience

The University of Wyoming is committed to reaching underrepresented groups and individuals and to implementing the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in programs regardless of their race, national origin, gender, age, religion, or disability. The College of Agriculture and Natural Resources is committed to transmitting unbiased scientific-based information to solve local and regional natural resource conflicts involving state, federal, and private resources. All efforts will be made to provide information through direct contact, publications, newsletters, Web sites and other methods. The general public and exurban landowners, agricultural producers and federal and state land management agency personnel are the target audience.

General youth and traditional 4-H are among the target audiences for natural resource youth programs.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The University of Wyoming Extension Web site prominently displays the eXtension link on the home page. Additionally, professional development opportunities through eXtension are publicized for Extension employees.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2897	100000	1783	5000

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	12	24

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of programs implemented. Target is number of programs.

Year	Actual
2013	185

Output #2

Output Measure

- Documented media efforts implemented. Target is number of media efforts such as magazines, TV, radio, newspaper inserts.

Year	Actual
2013	60

Output #3

Output Measure

- Number of individuals participating in educational programs or activities. Target is number of participants.

Year	Actual
2013	4680

Output #4

Output Measure

- Number of agency personnel, range professionals, and general public participating in training. Target is number of participants.

Year	Actual
2013	2897

Output #5

Output Measure

- Number of youth related natural resource programs implemented. Target is number of programs.

Year	Actual
2013	25

Output #6

Output Measure

- Number of youth participating in natural resource educational programs or activities. Target is number of participants.

Year	Actual
2013	1783

Output #7

Output Measure

- Conduct research on sustainable rangeland production and watershed management. Target is number of projects.

Year	Actual
2013	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Raise the understanding of the general public on the interaction of natural resource use in Wyoming's economy. Citizens will make better informed decisions on natural resource issues and topics. Target is number of participants reporting outcome.
2	Increased enrollment in 4-H natural resource programs (projects, camps, activities). Target is number of increased youth participation in natural resource programs.
3	Raise awareness, knowledge, and skills for development, implementation and evaluation of land management plans that include management of grazing and browsing animals, and adjusting managment as necessary to meet objectives. Target is number of participants reporting outcome.
4	Research: Transfer knowledge and increase appreciation of sustainable rangeland production. Target is number of projects.
5	Research: Transfer knowledge and increase appreciation of watershed management. Target is number of projects.

Outcome #1

1. Outcome Measures

Raise the understanding of the general public on the interaction of natural resource use in Wyoming's economy. Citizens will make better informed decisions on natural resource issues and topics. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	100000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many Wyomingites are not directly tied to natural resources and agriculture. This results in lack of knowledge and experience regarding natural resource systems, their management and the industries they support. Unfortunately, a segment of the general public appears to believe that any use of even renewable resources is damaging. There is often conflict and occasional litigation among interest groups that differ on how resources should be used and managed. Natural resources are important to all segments of the Wyoming population.

What has been done
The Sustainable Management of Rangeland Resources initiative team has produced over 321 seventy second TV spots which air twice weekly on commercial TV station in Casper. The segment titled 'Exploring the Natural Wonders of Wyoming' (ENOW) covers natural resource topics to provide education to the general public. The ENOW spots have also been placed on You-Tube to reach a national audience. Articles on natural resource issues appear in Barnyards & Backyards, rural living in Wyoming Magazine quarterly and statewide newspaper inserts.

Results
In the eighth year of airing these spots, the team receives regular feedback from Wyoming citizens and now national viewers on the positive aspects of the spots. The videos have been transferred to DVD's for public distribution and also distributed to schools though the state. The spots posted on You-Tube with viewership growth from 2,400 in 2007 to 57,000 views in 2013. Total views exceed 600,000 since inception. It is difficult to measure impact, though the audience response has generated enough impact that the energy industry now provides partial funding for the segments aired twice weekly. Barnyards and Backyards magazine has over 3000 paid subscribers. Raising awareness of natural resource issues expands UW Extension's audience

base and enhances knowledge for citizens.

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
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
135	Aquatic and Terrestrial Wildlife
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Increased enrollment in 4-H natural resource programs (projects, camps, activities). Target is number of increased youth participation in natural resource programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1783

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Extension is uniquely positioned in that we have existing volunteer youth development programming infrastructure already built in the 4-H program featuring offices in all of Wyoming's 23 counties, several thousand volunteer staff and thousands of youth already acquainted with the 4-H program. These youth present an immediate natural resource education audience and an opportunity to reach the broader youth audience with the educational resources we have. Building stronger natural resource programs, enhancing natural resource teaching opportunities within existing high-interest projects (like market livestock and shooting sports projects) and increasing youth development opportunities are key. This will continue to foster interest in natural resource careers. Science, engineering, and technology emphasis of 4-H align with SMRR educational efforts.

What has been done
Educators conducted 28 educational programs including an ag expo, GPS training, plant anatomy, native plants and noxious weeds, and nature awareness. Alternative energy, windmill science and wind workshops were also conducted. Over half the counties in Wyoming conduct summer camping programs which include natural resource education. Extension educators and specialists actively participate in implementing Wyoming Resource Education Days (WyRED)a joint effort with the Society of Range Management and local conservation districts.

Results
Enrollment in 4-H livestock projects continues to increase. Shooting Sports which is also closely tied to natural resources is also experiencing increased enrollment. All youth participating in targeted natural resource education programs report increased knowledge and skills. The increased awareness and knowledge will enhance natural resource and range career choices for youth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
132	Weather and Climate
135	Aquatic and Terrestrial Wildlife

Outcome #3

1. Outcome Measures

Raise awareness, knowledge, and skills for development, implementation and evaluation of land management plans that include management of grazing and browsing animals, and adjusting managment as necessary to meet objectives. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1763

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rangelands comprise over 80 percent of Wyoming's land base. Range livestock production, recreation, and wildlife habitat are some of the dominant uses of rangelands. Rangelands also provide water for homes and municipalities, irrigation, industries, fisheries, wildlife and livestock. In semi-arid Wyoming, rangeland uses need to be compatible with maintaining the quality and quantity of water resources. Livestock grazing and wildlife habitat management must also be compatible as both are important for the sustainability of the State's rangeland resources and its economy.

What has been done
Extension educators in the SMRR initiative conducted 74 educational programs, tours, or workshops on range monitoring. Most classes were targeted toward permittees reaching 1763 individuals. Reclamation 101 School has been implemented to assist producers and industry in mitigating energy impacts. Annie?s project and Women in Range were new program in 2013 targeting female producers.

Results
100 percent of participants in educational programs reported increased awareness, knowledge, and skills of range monitoring. Over one third of individuals reported implementing or adjusting management plans as a result of the workshops. Participants reported a 20% increase in knowledge and 90% reported their expectations in the course were met. In Rangeland Management Schools over 80% of participants reported gaining some new knowledge, with 10% reporting significant knowledge gained.

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
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land

Outcome #4

1. Outcome Measures

Research: Transfer knowledge and increase appreciation of sustainable rangeland production. Target is number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Non-native, invasive weed species threaten the economic and ecological well-being of western rangelands. An invasive weed of particular concern is Russian knapweed, which infests more than 1.5 million acres of rangelands, particularly in Colorado, Idaho, Washington and Wyoming. Russian knapweed is toxic to horses, unpalatable to cattle, and highly competitive with desirable forage grasses. An extremely widespread distribution and deep root system makes Russian knapweed difficult and costly to manage using herbicides. In 2009, a new insect biological control agent became available for management of Russian knapweed. The insect is a fly from Uzbekistan that is specific to knapweed and is anticipated to reduce the seed production and growth of Russian knapweed, if successful.

What has been done

This project has been studying seasonal and annual changes in the population of the new biological control agent at a biological control site near Riverton, Wyoming. The goals of the study are to (a) identify strategies for collecting the fly to introduce to new Russian knapweed infestations, and (b) document one measure of the impact of the fly on Russian knapweed, the percentage of shoots attacked. Population surveys of the fly and of Russian knapweed shoots have been conducted since 2010. This research has shown that the ideal time to collect the fly for release at new infestations is from mid-June to mid-July. In addition, over the 2010-2013 time period, a consistently small fraction of knapweed shoots have been attacked by the fly, however, individual shoots were more heavily attacked and fly numbers were three times higher in 2013 than in previous years.

Results

Determining whether new insect biological control agents are effective is critical for determining whether the costs of implementing biological control by weed managers are justified. The results of this study were shared with weed managers via a presentation at a regional meeting and an article in a popular-press periodical. One of the impacts of this study is to transfer crucial information to weed managers about how to implement biological control of Russian knapweed using the newly available insects. Another impact of this study is to inform weed managers about the types of outcomes they might expect from biological control of Russian knapweed, so that they can make better decisions about how to manage this important invasive weed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

213	Weeds Affecting Plants
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

Outcome #5

1. Outcome Measures

Research: Transfer knowledge and increase appreciation of watershed management. Target is number of projects.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Landowners and residents of the Green River Basin have begun to look for ways to encourage land management practices that maintain and enhance riparian habitat for wildlife and water quality for downstream users. Payments for Ecosystem Services (PES) is a way to provide financial incentives or compensation to private landholders for engaging in socially or environmentally beneficial activities that might not otherwise be undertaken or continued.

What has been done
Our team has completed a feasibility analysis of establishing a PES market in the upper Green River Basin. We conducted focus groups and interviews with potential buyers (energy companies), sellers (landowners), and regulators of relevant federal and state land management agencies. We have determined that stakeholders are sufficiently interested in a PES market to justify moving forward to establish a PES market in the Green River Basin. Three ecosystem services are of particular interest in the region: Greater sage-grouse habitat, mule deer habitat, and riparian function. We have also engaged the U.S. Fish and Wildlife Service on market design, because the Greater sage-grouse is a candidate species under the Endangered Species Act.

Results
Our initial feasibility analysis has successfully identified locations and specific ecosystem services within the Green River Basin that are suitable candidates for a PES program. Our work thus far has raised landowner awareness in the Green River Basin about the value of ecosystem services provided by ranch operations and spurred discussion among stakeholders about how best to monetize this value.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
605	Natural Resource and Environmental Economics

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
- Other (Technology changes)

Brief Explanation

UW Extension has experienced several educators resigning during this period. Searches are in progress to bring this team of educators back to full capacity. Weather extremes and funding are factors which impact both Research and Extension efforts.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Educational classes, workshops, schools utilized end of session evaluations with informal follow-up to document actual practices implemented. 100 percent of participants indicated increasing knowledge and skills as a result of educational efforts. Over one-third indicated they had used the information to make a positive change on their land.

Just a sample of program evaulation data collected include:

A survey was developed and administered to assess pre-and post-workshop knowledge about cheatgrass,and what changes participants anticipated making in their management of invasive species,specificall ycheatgrass, as a result of the workshop.

The participants knowledge increased for allof the key points in the pre-and post-self

assessment. The three key points that participants reported thei rknowledge increased the mos on a scale of 1 to 5 (1 is low and 5 is high) were:

Knowledge of th ecurrent options for chemical control: Pre-workshop average knowledge 2.77; Post-workshop average knowledge 4.21

Familiarity with selecting an appropriate monitoring technique for the question of interest: Pre-workshop average knowledge 2.72; Post-workshop average knowledge 4.08

Familiarity wit hways to prioritize locations for cheatgrass management actions: Pre-workshop average knowledge 2.78; Post-workshop average knowledge 4.12

Respondents reported they could apply the information they learned during the workshop to the area they manage (average 4.34 on a scale of 1 to 5) . Additionally, they reported they are more confident in their ability to identify cheatgrass, and to develop a management strategy average 4.29 on a scale of 1 to 5, with1being strongly disagree to 5 being strongly agree).

A eight session series High Plains Ranch Practicum school reported in end evaluations:

- Producers who attended the class resulted in $494,000 in improvement in net income to their operation in total.
- 90 % would use decsiion making skills gained to help them make management decisions.
- 96% reproted they would improve range management or natural resource managment.

Key Items of Evaluation

Permittees have implemented range monitoring plans which improve sustainability of their land.

Natural resource media efforts have enhanced knowledge of Wyoming citizens on rangeland, natural resources, water conservation and preservation of the land.