

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Climate Change - Natural Resources and Environment

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%			
121	Management of Range Resources	20%			
123	Management and Sustainability of Forest Resources	20%			
135	Aquatic and Terrestrial Wildlife	10%			
136	Conservation of Biological Diversity	10%			
216	Integrated Pest Management Systems	10%			
605	Natural Resource and Environmental Economics	20%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	3.4	0.0	0.0	0.0
Actual Paid Professional	3.9	0.0	0.0	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
49362	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
146387	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct workshops that will address specific topics such as forest stewardship and controlling pests for Extension Professionals and clientele.

Conduct workshop/clinics on calibrating spray equipment and making plans for weed/pest control.

Partner with local and state associations and organizations that are concerned about natural resource issues.

Prepare MontGuides (fact sheets) and information for web sites on natural resource topics (water, range, forest, etc.)

Conduct workshops on water quality and quantity.

Develop Range Monitoring systems, conduct the Rangeland Institute and design range management seminars.

2. Brief description of the target audience

- Private Forest Land Owners
- Graduates of the Forest Stewardship Program
- County Weed Boards
- Farmers/Ranchers/Ag Producers
- Private Land Owners
- Small Acreage Land Owners
- Producers who operate Animal Feeding Operations
- Professional loggers/foresters
- Tribal Members and Tribal Colleges

3. How was eXtension used?

One of MSU Extension specialists is a national coordinator of the rangeland community of practice (CoP) in eXtension. This brings first hand knowledge of the resource eXtension to extension professionals and clientele. It is used to obtain resource materials and information on specific issues or concerns they may have in all natural resource areas.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10416	86218	1174	12726

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	33	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Forestry: Number of private forest owners who attend one/two workshops to understand the timber sale process allowing them to complete a successful timber sale. Number of people attending the forestry mini-college, a one-day educational program that includes 10 forestry related courses that provide knowledge or sources of assistance necessary to implement their forest stewardship plans. Number of people completing a forest stewardship plan. Number of people attending Forest Stewardship programs.

Year	Actual
2012	1511

Output #2

Output Measure

- Small Acreage Lands: Number of people attending workshops or participating in private consultations about pest control, weed management and other related/management topics. Number of people who participate in field days and demonstration opportunities for land owners to observe techniques and best practices for land stewardship. Number of subscribers to Big Sky Small Acres publication.

Year	Actual
-------------	---------------

2012 80

Output #3

Output Measure

- Environmentally Sensitive Management Systems: Number of people attending workshops or requesting private consultation for developing a management plan. (forestry, animal feeding operations, small acreages, etc) Number of demonstrations of sprayer calibrations, GPS usage and other technical practices that provide environmental protection. To provide up-to-date guidance for operators through an AFO/CAFO website and electronic library, MontGuide fact sheets and field days.

Year	Actual
2012	5875

Output #4

Output Measure

- WATER QUALITY: Number of people attending Well Educated programs, starting a file to track water quality, regularly testing their wells and receiving materials for interpreting results and gaining insight on ways to help protect ground water resources. Number of people attending water quality workshops that specifically address issues related to reservations. Number of people viewing the documentary "Tribal Waters: The Clean Water Act in Indian Country". Number of people viewing the video series for well and septic owners - 8 part educational video. Number of people attending the watershed - citizen water quality monitoring workshops.

Year	Actual
2012	659

Output #5

Output Measure

- Range: Number of people participating in Range Monitoring programs. Number of people attending the Range Management Institute. Number of requests to identify new weeds found, GPS assistance, use of sprayers for small weed infestation control. Number of producers working through the Livestock Environmental Management Systems self assessment for their operation.

Year	Actual
2012	3465

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Forestry: Participants will be able to sell their timber because of information learned in Extension workshops. Landowners will develop plans and implement activities that will enhance the sustainability of their forest lands and meet their individual forest stewardship objectives. Private forest landowners will manage their forests lands so they will continue to provide environmental, economic and social benefits to Montana citizens.
2	Small Acreages: Producers and small acreage landowners will be aware of insect, weed and disease infestations as they are developing so they can make management decisions in a timely manner. Applicators will learn the risks associated with applying pesticides and safety precautions recommended to mitigate those risks, while at the same time, learn techniques in applying chemicals appropriately. Small landowners will develop a plan and take action steps to manage their property to meet their individual stewardship objectives.
3	Environmentally Sensitive Management Systems: Producers will understand the current rules and regulations for animal feeding operations and how to evaluate their own operation. This also applies to forestry plans, grazing land plans and any other plans appropriate to the individual operation. Landowners will implement best practices in adopting weed, crop, pest and forage management strategies. Landowners will be more profitable while protecting the environment. All operations that develop and implement a Comprehensive Nutrient Management Plan (CNMP) to protect ground and surface water, apply manure at agronomic rates and utilize technologies that allow them to better operate and/or monitor their operation. All operations will remain economically viable and environmentally friendly.
4	Water Quality: Participants will learn the importance of and steps to do well testing, and will follow recommendations resulting from tests. Forage producers/participants will learn proper timing and implementation of control techniques and methods appropriate to their operations. Participants will understand the importance of water and related issues as a result of information from water projects such as Water Monitoring Activities, Well and Septic Programs and video, film and website materials.
5	Range: As a result of participating in Range Monitoring programs, ranch managers/producers will learn to identify plants, determine phenologic stage of plant growth, determine monitoring site location and determine appropriate time for monitoring activities which leads to improvement in resource management strategies. As a result of attending the Extension Range Management Institute, participants will be able to apply basic principles of range management and related topics determined at the planning stage. People will request information on identifying new weeds found, GPS assistance and use of sprayers for small weed infestation control. Producers will work through the Livestock Environmental Management Systems self assessment to understand how their operation affects the environment and to prioritize and develop action plans for addressing any environmental risks.

Outcome #1

1. Outcome Measures

Forestry: Participants will be able to sell their timber because of information learned in Extension workshops. Landowners will develop plans and implement activities that will enhance the sustainability of their forest lands and meet their individual forest stewardship objectives. Private forest landowners will manage their forests lands so they will continue to provide environmental, economic and social benefits to Montana citizens.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1511

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The loss of a forest products mill infrastructure has contributed to a decline in the wood product industry from \$1B in 2007 to less than \$400M in 2011. To remain economically viable, large tracts are being divided into small ones. There continues to be a preferred market for small forested ranchettes (29,112 family forest owners own parcels of 10 acres or more and equal or greater number own tracts between 5-10 acres). In 2011, 62% of the wood harvest was from private lands (including 29% nonindustrial and 33% industrial). Retaining healthy and productive forests on private lands in Montana remains a high priority as these lands provide critical wildlife habitat, watersheds and wildland fire buffer zones between federal lands and urban populations.

What has been done

In 2012, 17 intensive workshops (5 Stewardship, 1 mini-college, 6 Master Forest Steward and 5 post-wildfire rehabilitation/restoration) and ten shorter workshops (through Master Gardener classes, Tree Farm and Rotary Club meetings) were offered to private landowners. Five programs were offered for natural resource professional service providers and/or policy/legislative bodies. Four programs were held for youth. Programs focused on how to apply science based practices for conservation and management of forest resources and providing experiential learning opportunities for both youth and adults. A daily forestry educational radio broadcast provided 260 one-minute Forestry Minutes to an estimated listenership of 50,000 people.

Results

Because of the interactive, educational programming 251 landowners (68 Stewardship, 42 re-verification visits, 151 master forest steward and mini-college) gained proficiency in forest inventory, ecological processes conservation, management plan development and

implementation of desired forest practices. Surveys of participants showed that skills in implementing improved forest conservation and management practices increased by 44%. 1174 youth learned about natural resources and developed skills related to forestry, wildlife and noxious weed management. 86 teachers learned how to use Project Learning Tree curriculum in their classrooms. Overall the programs impacted some level of forest management on an estimated 4,000 acres in 2012 and cumulatively 1,300,000 acres over the past 20 years. One landowner who attended a wildfire restoration/rehabilitation workshop following the Dahl fire replied that this program took him from a state of total despair at the sight of his burned-over forest to knowing what to do and where. He now understands how to help his land recover and cannot wait to get started.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Small Acreages: Producers and small acreage landowners will be aware of insect, weed and disease infestations as they are developing so they can make management decisions in a timely manner. Applicators will learn the risks associated with applying pesticides and safety precautions recommended to mitigate those risks, while at the same time, learn techniques in applying chemicals appropriately. Small landowners will develop a plan and take action steps to manage their property to meet their individual stewardship objectives.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There are a growing number of families living on small acreages ranging from 5 to 30 acres. The income for most of these families is not dependent on the acreage, but they enjoy having horses, chickens, sheep or beef animals. In general, their knowledge about land stewardship is limited, so information about weed control, pasture management, water quality and quantity, forest management among other issues is needed. Extension Education has been helpful for this

population in making decisions about living on their acreage

What has been done

County Extension Agents consult regularly with small acreage landowners. In Park County alone, nearly 80 one-on-one interactions occurred creating the ability to address specific topics at an elevated level in a personal setting. Workshops occur across the state throughout the year meeting local needs. One of the most successful efforts for Extension has been publication of the Big Sky Small Acres magazine. During the past year, articles included pruning fruit trees, how to identify and control underground rodents, grasshopper control, wolf identification and reducing wildlife conflict, selecting the right tractor for the job and much more.

Results

Small acreage landowners and homeowners gained knowledge of weed identification, the impacts of weeds, laws relating to managing weeds, and effective controls; leading to better overall management of noxious weeds. Property owners who requested and received site visits reported saving significant costs because they used less pesticide, or learned another method of control, or they used a better product or learned how to use spray equipment more efficiently. One example of this is illustrated in Madison County where 602 acres of forage crops were inspected and certified weed free yielding approximately \$21,070 in additional revenue for those selling forage. In addition, site visits and consultations have saved clientele significant amounts of money because they purchased the right trees and also because they have saved trees that otherwise might have died from lack of proper care.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
136	Conservation of Biological Diversity
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Environmentally Sensitive Management Systems: Producers will understand the current rules and regulations for animal feeding operations and how to evaluate their own operation. This also applies to forestry plans, grazing land plans and any other plans appropriate to the individual operation. Landowners will implement best practices in adopting weed, crop, pest and forage management strategies. Landowners will be more profitable while protecting the environment. All operations that develop and implement a Comprehensive Nutrient Management Plan (CNMP) to protect ground and surface water, apply manure at agronomic rates and utilize technologies that allow them to better operate and/or monitor their operation. All operations will remain economically viable and environmentally friendly.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	5875

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) is the federal law regulating pesticide usage. FIFRA authorizes the EPA to require certification of applicators who want to use restricted use products. In Montana, the Department of Agriculture (MDA) is the lead agency for implementation of applicator training, in accordance with FIFRA. In 1983 the MDA and MSU Extension signed a memorandum-of-agreement for Extension to assist with Private Applicator Training (PAT) and established a set of guidelines. This MOA continues today. The MSU Pesticide Safety Education Program, coordinated regionally by the Extension Pesticide Specialist, ensures local PAT coordinators have the tools necessary to train applicators in meeting these requirements locally.

What has been done

The Pesticide Safety Education Program strives to increase the competency of private applicators when using pesticides. This decreases the risk of human and environmental damage caused from pesticide misuse and also increases the profitability and sustainability of land for producers. In 2012, MSU Extension awarded 625 credit hours of material to private applicators. Through 195 recertification programs and 11 initial private applicator programs, 4,875 citizens were directly reached. In addition, 2 TV and Radio news releases and 16 publications were delivered on the topic of pesticide education by Extension. Three tribal programs were conducted on two reservations with 75 tribal applicators participating.

Results

Surveys indicated 90% of applicators gained knowledge through the seminars. Eighty percent indicate they will change at least one practice to make their application methods safer for themselves and their families. Because of the efforts of local agents to inform current applicators of deadlines and requirements, as many as 90% of applicators got their credits and renewed their licenses on time and with no problems. The number of casual pesticide users (those not becoming certified but interested in the subject) who brought their sprayer equipment to the clinics for calibration grew exponentially demonstrating an interest and appreciation for the training and safety information.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

136	Conservation of Biological Diversity
216	Integrated Pest Management Systems
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Water Quality: Participants will learn the importance of and steps to do well testing, and will follow recommendations resulting from tests. Forage producers/participants will learn proper timing and implementation of control techniques and methods appropriate to their operations. Participants will understand the importance of water and related issues as a result of information from water projects such as Water Monitoring Activities, Well and Septic Programs and video, film and website materials.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	659

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Groundwater quality is of growing concern for private well and septic owners across the state. Families and businesses need assurance that the water they are using is safe for human consumption. Inappropriately protected well heads and improperly functioning septic systems can pose a public health risk and or contaminate groundwater. In Montana, most counties have 20-80% of their residents relying on a private well for their domestic water source. Homeowners on a private well are not protected under the Safe Drinking Water Act and have the responsibility of testing their water and understanding their water quality.

What has been done

During 2012, the funding source for Well Educated ended. MSU Extension Water Quality (MSUEWQ) was not able to advertise the program and had to raise the administrative fee from \$2.00 to \$5.00 to cover maintenance costs. However, Well Educated received a record number of participants with 659 homeowners testing their water quality; a testament to the growing popularity and need for this program. Since 2005, over 3,800 private well owners have tested their water quality through the program. The MSUEWQ YouTube channel has seen an increase in viewership with the Shock Chlorination of a Private Well video receiving over 30,000 views reaching private well owners not only in Montana but across the country.

Results

As a result of the program, well and septic owners are testing their water quality, addressing issues with their well heads and maintaining their septic systems. Outreach activities and data associated with the project have led to focused groundwater studies in both the Gallatin and Judith watersheds and data has been used in public presentations and in conferences to inform Montanans about water quality concerns and how we can work together to protect groundwater resources. The final program evaluation for the Well Educated project was conducted in 2012 which found that 96% of participants would participate again, 17% of well owners identified an issue with their well head, and 91% of participants found the educational materials included with their results informative.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
136	Conservation of Biological Diversity

Outcome #5

1. Outcome Measures

Range: As a result of participating in Range Monitoring programs, ranch managers/producers will learn to identify plants, determine phenologic stage of plant growth, determine monitoring site location and determine appropriate time for monitoring activities which leads to improvement in resource management strategies. As a result of attending the Extension Range Management Institute, participants will be able to apply basic principles of range management and related topics determined at the planning stage. People will request information on identifying new weeds found, GPS assistance and use of sprayers for small weed infestation control. Producers will work through the Livestock Environmental Management Systems self assessment to understand how their operation affects the environment and to prioritize and develop action plans for addressing any environmental risks.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3465

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rangeland in Montana makes up a substantial portion of the land area and much of it is managed by people involved in agriculture. To maintain healthy and productive range is a priority for these landowners. They need assistance in such things as monitoring their rangelands to determine needs, identifying plants, addressing noxious weed control as well as livestock management systems. The use of GPS and other electronic systems are important tools for producers to target specific issues related to their rangelands. It is important for landowners to stay current on information and technologies that can help them successfully manage their properties.

What has been done

Nearly 3500 people attended 49 unique workshops/seminars taught by the Extension range specialist, including topics such as the Montana Range Days: Rangeland Health Assessment to Grazing Management After Drought and Fire to MSU Extension Weed Certification Workshop: Targeted Grazing, a Tool for Invasive Plant Management. Agents and specialists answer phone calls and emails requesting specific rangeland management information and distribute resources including MontGuides, Ag Alerts and news releases. Ranch visits, one on one contact, forage testing and ration balancing, Cows and Coffee Seminars, providing nitrate tests and water quality tests are all regular activities of MSU Extension.

Results

Montana has nearly 65 million acres of public and private rangeland with conditions that vary significantly from one area to another. Extension is successful due to having agents across the state leading one-on-one consultations which add up to statewide impact. In Stillwater County, which supports 35000 cattle and 9000 sheep, the high levels of sulfur, salts, molybdenum and iron in feed and water, make ration formulation and mineral balances extremely significant. The local agent provided range management information to 98 rangeland managers. Some indicated they increased production from ¼ ton/acre to over 1 ton/acre using barley hay. In Fergus County, the agent was able to increase the usable AUMs on 2500 acres of summer pasture by developing a pasture rotation system to better distribute grazing cattle. The ranch had been getting 600 AUMs per summer and increased to nearly 800 AUMs while having less impact on sensitive riparian areas. These examples are replicated throughout the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
135	Aquatic and Terrestrial Wildlife
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Montana has abundant natural resources and Montanans have a desire to preserve and protect them, while also making a living and enjoying these treasures. Management and stewardship are necessary to maximize outputs while minimizing negative outcomes. Goals in this area were met in a number of specific and significant ways.

Landowners with forested acreage became knowledgeable in forest conservation and management practices through a series of intensive classes. Youth learned about forestry, wildlife and noxious weed management in classes catered to them and teachers learned great resources and lessons in the subject all through the MSU Extension Forestry programming. To date more than 1.3 million acres have been directly impacted by these programs.

Small acreage owners were visited directly by Extension agents statewide to learn about noxious weeds, programs for increasing value of forage, the best trees to plant in various areas, and much more. The Big Sky, Small Acres Magazine was widely requested, distributed and celebrated five years of success as a quarterly publication of MSU Extension.

A vast majority of certified Pesticide Applicators received their re-accreditation credentials on time and with no difficulty thanks to the intense efforts of MSU Extension agents to inform them of deadlines, offer local programming and connect resources. New Pesticide Applicators were trained and certified as well with over 80% involved in the overall programming efforts indicating they would make changes to their procedures to be more safe and efficient.

Water Quality continued to be a priority for Extension through the Well Educated Program despite the end of funding. Homeowners had to pay more for sampling and still a record number participated. In addition the MSU Extension Water Quality Program used a YouTube channel to virtually share information. The "Shock Chlorination of a Private Well" video had over 30,000 views nationally.

Extension agents connected with Montanans over Range issues on a one-on-one basis to identify unique conditions and make suggestions accordingly. Through range management techniques shared by Extension, landowners were able to increase the value

and quality of pasture while also reducing the impact on riparian areas.

Key Items of Evaluation

FOREST

251 landowners gained proficiency in forest inventory, ecological processes conservation, management plan development and implementation of desired forest practices.

~Surveys showed that skills in implementing improved forest conservation and management practices increased by 44%.

1174 youth and 86 teachers learned about natural resources and developed skills related to forestry, wildlife and noxious weed management.

Overall the programs impacted some level of forest management on an estimated 4,000 acres in 2012 and cumulatively 1,300,000 acres over the past 20 years.

SMALL ACRES

Small acreage landowners and homeowners gained knowledge of weed identification, the impacts of weeds, laws relating to managing weeds, and effective controls; leading to better overall management of noxious weeds.

Property owners who requested and received site visits reported saving significant costs because they used less pesticide, learned another method of control, used a better product or learned how to use spray equipment more efficiently.

ENVIRONMENTALLY SENSITIVE SYSTEMS

Surveys indicated 90% of applicators gained knowledge through the Pesticide Application Seminars.

~Eighty percent indicate that they will change at least one practice to make their application methods safer for themselves and their families.

WATER QUALITY

Gallatin and Judith watershed studies have begun due to the water quality program.

96% of participants in the Well Educated program would participate again.

17% of well owners identified an issue with their well head.

91% of participants found the educational materials included with their results informative.

RANGE

Some rangeland managers in Stillwater County indicated they increased production from ¼ ton/acre to over 1 ton/acre using barley hay after attending Extension programs.

In Fergus County, the agent was able to increase the usable AUMs on 2500 acres of summer pasture by developing a pasture rotation system to better distribute grazing cattle. The ranch had been getting 600 AUMs per summer and increased to nearly 800 AUMs while having less impact on sensitive riparian areas.