2015 University of Wyoming Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

Agriculture is at a crossroads and faces many challenges and opportunities in the 21st century. New demands are placed on the industry to ensure that agriculture remains profitable and sustainable, while addressing environmental concerns. Issues involving production agriculture, natural resource management, and quality of life generate diverse research and extension directives. Stakeholders play a vital role in identification and prioritization of needs at the University of Wyoming.
The College of Agriculture and Natural Resources has a mission to serve the educational needs of students, Wyoming citizens, and the global community by providing and distributing unbiased, scientifically sound information. Research and Extension programs at the University of Wyoming focus on five initiatives: 4-H and Youth Development, Community Development Education, Nutrition and Food Safety, Agriculture and Horticulture, and Sustainable Management of Rangeland Resources. The five NIFA priority programs added spring 2010 Global Food Security and Hunger; Climate Change; Sustainable Energy; Childhood Obesity; and Food Safety, have been integrated with existing initiatives or have been added as standalone plans. The University of Wyoming Research and Extension efforts have been addressing issues outlined in the new plans for several years. Fiscal year 2015, the University of Wyoming research and extension programs reported success in all initiative areas. The College of Agriculture and Natural Resources is second at the University of Wyoming in total grant dollars brought in for research and extension. In-depth educational programs such as the Ranch Management Institute, Body Works, Food Safety, 4-H After School programs, and Wyoming Municipal institutes report strong impacts for citizens of the state. Each of the above UW Extension programs is multi-session educational classes with 8 to 70 hours of class contact time with participants. These are just a few examples of high impact educational efforts by the University of Wyoming. Research and Extension Centers at UW and across the state are producing research which is relevant and vital to agriculture, families, and communities. Being an energy rich state, UW researchers are looking at possible alternative fuels. Reclamation of mined lands is an important issue being addressed through the Department of Ecosystem Science and Management and UW Extension. The two newer planned programs on Climate Change and Sustainable Energy are not only timely, but very important to the state of Wyoming due to the energy resources which we have in abundance. In 2009, UW Extension partnered with the UW School of Energy Resources to fund an Energy Extension Coordinator. This position has allowed for expanded partnerships within the University and with agencies and organizations both state and federal levels.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	100.0	0.0	43.8	0.0
Actual	103.0	0.0	35.9	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

The merit review process for extension programs covers all programs conducted by UW Extension. A team leadership model is utilized to review program plans and chart direction for UW Extension educational programs. Program initiative teams develop and review programs on an annual basis. Teams make decisions to maintain, modify, or create new programs to meet the needs identified through external and internal stakeholder input. Five area external advisory boards comprised of stakeholders review extension programs annually. Spring, 2007 UW Extension held a CSREES program review of the total extension program. The review report was used as a guide to move forward with the academic plan for 2009 to 2013. FY 2013 UW Extension completed a comprehensive internal and external stakeholder survey and focus groups to review current programs and develop the 2014 - 2018 academic plan. All projects supported with formula funds (Hatch, Multi-State, McIntire-Stennis, Animal Health) must be approved projects. The project proposal is transmitted to a minimum of two scientific reviewers who are knowledgeable in the field to review the proposal. After a proposal is revised to satisfy reviewer comments and concerns, it, along with appropriate supportive documents, is transmitted to the University of Wyoming Office of Research and Economic Development for signature of the Assurance Statement. The proposal is then approved by the Experiment Station Director before being transmitted to NIFA for final approval. The Wyoming Agricultural Experiment Station also administers an internal competitive grants program using a portion of federal dollars. Proposals are reviewed by a ten member university wide grant panel. Each proposal is also sent to a minimum of two external reviewers. Proposals recommended for funding are transmitted to NIFA for approval following signature of the Assurance Statement and subsequent approval by the Experiment Station Director. Both AES and UW Extension require an outreach plan in proposals which demonstrates integration of research and extension.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups

- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public

Brief explanation.

During the past year stakeholder input came to the College of Agriculture and Natural Resources, UW Extension, and Agricultural Experiment Station through a variety of methods. As part of the UW Extension academic plan, a working group has explored methodology to gather statewide stakeholder input. This group recommended moving from traditional area advisory committees to a focus group model which will be rotated between counties in each of the five areas over a five year period. This systematic collection of data will be shared with county, area, and state initiative teams for program planning. FY 2015 four area stakeholder meetings were held which included five concurrent focus groups representing the five initiatives that identified issues of importance. The data was compiled to identify themes common across the state in each extension discipline. In addition, UW Extension gathers on-going input through a variety of methods which is utilized in program planning. This input is summarized and shared statewide with both UW Extension and AES. All counties have had targeted advisory meetings to gather stakeholder input through 4-H Expansion and Review committees to specifically address outreach efforts toward underserved youth audiences. County personnel also utilize collaborative partners to learn the needs within communities of the state. Both Research and Extension went through an academic planning process which was integrated into the College of Agriculture and Natural Resources plan. Each of the four Research & Extension Centers held an advisory committee meeting to gather input on existing research and outreach programs and to identify new priorities in relation to research. UW Extension and AES gathered stakeholder input through targeted meetings and surveys to move forward with the 2014 UW Academic Plan. The College of Agriculture and Natural Resources maintains a separate statewide advisory committee which meets twice annually.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

There are five geographic Extension areas. Modified focus groups meet in each area annually to gather stakeholder input. Selection to participate in focus groups is based on gender, geographic representation, race, national origin, and underserved audiences. In 2015, a variety of both formal and informal methods were used to gather stakeholder input. These methods ranged from written and on-line surveys to discussion groups and targeted meetings to identify program needs. The Wyoming County Commissioners Association has formed an advisory committee of county commissioners who meet with the UW Extension Director during quarterly meetings of their association. Research and Extension Center Advisory Committees and Focus Groups are

represented by UW Extension educators, industry leaders, and landowners (government and private) in all counties that they service. Focus Group members are nominated by UW Extension, AES personnel, and or current members of the Advisory committee or Focus Group. Meetings are held one or two times per year. In addition to these systematic methods of gathering stakeholder input, both AES and UW Extension utilize both individuals and groups throughout the state to identify relevant issues of critical importance. Just a few examples include: commodity groups - such as Wyoming Wool Growers, Stock Growers, Wyoming Wheat Growers, the Wyoming Crop Improvement Association, local and state nutrition councils, and youth organizations such as Big Brothers, Big Sisters, and school districts. These groups and individuals provide input through both formal and informal discussions with both research and extension personnel. Faculty, UW Extension specialists, and educators also gather relevant input from professional colleagues in Wyoming and across the nation.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

Brief explanation.

Stakeholder input is collected through a variety of methods to reach the broadest scope of individuals and groups in Wyoming. UW Extension has utilized annual area advisory meetings which involve both traditional and non-traditional stakeholders. Pilot efforts using on-line surveys, focus groups, Extension cafe' have been explored by UW Extension. 2015 focus groups were conducted in each extension area to identify needs by initiative area. The AES also utilizes annual advisory meetings to gain input on research activities. Surveys both mail and on-line are used to assess needs. UW Extension educators and researchers target key stakeholders such as agriculture commodity groups, youth organizations, and schools through meetings where discussion is held on needs and issues. University of Wyoming educators and faculty assess needs throughout the year based on individual contact with citizens at meetings and in local communities. Faculty and Extension specialists and educators gather relevant input from professional colleagues through personal contact and interaction at professional meetings.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

Stakeholder Input is used by AES and Extension in developing research priority needs, program direction, program improvement, and identification of emerging issues. Stakeholder input gathered through modified focus groups is summarized and shared with county, area, and state initiative teams as they develop and evaluate programs. In addition UW Extension utilizes input from stakeholders in identifying staffing priorities.

A comprehensive list of applied research priorities identified by our stakeholders, identified through stakeholder surveys and meetings, is available at http://www.uwyo.edu/uwexpstn/_files/docs/production-ag-research-priorities.pdf.

Brief Explanation of what you learned from your Stakeholders

4-H and Youth Development

• Increase parent or adult involvement to provide positive adult modeling of behavior and interaction with youth. Mentoring by both adults and peers can be beneficial.
• Youth and adults face competing priorities for their time. Lack of facilities and more coordination of community youth activities is needed among youth serving agencies. Many youths across the state are not aware of opportunities in 4-H. Increased communication and marking of the program is needed.
• Leadership training is needed for volunteers; many lack the skills and confidence to become fully engaged in the program.

Community Development Education

• Economic development including training for employees to enhance skills. Infrastructure needs such as affordable housing and transportation. Extension's role may be to facilitate networking and dialogue among government and local agencies to discuss needs and solutions. Personal finance as it relates to entrepreneurs.
• Facilitate opportunities for municipal and county agencies, organizations, and chamber of commerce to meet and form systematic relationships to allow for more collaborative planning in communities.
• Market the personal and community benefits of rural towns to attract growth.
• Communities need help with developing volunteerism, and service learning for youth and adults.

Nutrition and Food Safety

• Accessibility of food and where food comes from. Many rural communities have limited access to fresh foods. How to prepare and preserve local foods was an issue identified.
• Target youths in education on nutrition and basic food preparation skills.

• Education on improving healthy food choices; preparation, storage and food safety.
• Time management in relation to cooking at home versus convenience foods and restaurant meals, and food budgeting were identified as important issues facing families.

Agriculture and Horticulture

• Invasive species: new varieties of weeds and biological controls. Soils, how to mitigate damage from fires and other erosion. Endangered species is also a concern.
• Education on how to speak about the agriculture industry; including understanding of how food is grown or raised. More effort is needed to encourage young people to choose production agriculture as a career.
• Profitability; focus on income and expenses. Development of specialty crops and markets.
• Environmental information for agriculture and horticulture which is research based.

Sustainable Management of Rangeland Resources

• There is a need for facilitation and communication and information dissemination between agencies, (local, federal, and state) and landowners. Energy companies were also identified.
• Invasive species, noxious weeds, and endangered species, for agriculture lands are key issues.
• Small acreages need basic education on all natural resource management.
• Grazing management, including economics of grazing system implementation, water development and drought mitigation.
• Keeping the agriculture industry alive for future generations. Encouraging K-12 curriculum to cover agriculture career possibilities.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1637798	0	2009490	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1637798	0	2009509	0
Actual Matching	1637798	0	2009509	0
Actual All Other	0	0	161300	0
Total Actual Expended	3275596	0	4180318	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	882856	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

4-H and Youth Development

☑ 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
801	Individual and Family Resource Management	10%		0%	
802	Human Development and Family Well-Being	25%		0%	
806	Youth Development	65%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	34.0	0.0	0.0	0.0
Actual Paid	33.3	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**
529877	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
529877	0	0	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

Activities included volunteer leader training in the Eight Essential Elements of Positive Youth Development; Risk Management; Non-profit Management/Coordination; Financial Management/IRS Issues; Project Training; Parental Involvement; Club Maintenance; Recruitment and Retention. Traditional 4-H focused on project and leadership activities; county needs assessments were used to determine program direction; educational programs were facilitated through project work, camps, clinics, and contests; recruitment of new members and volunteer leaders occurred through traditional efforts as well as social media.

Non-traditional 4-H activities included: Cloverbuds (pre 4-H); After school programs; School enrichment; Youth Leadership; and Camps. Marketing for non-traditional programs utilized social media, relationships with other youth organizations, and schools.

2. Brief description of the target audience

The University of Wyoming College of Agriculture and Natural Resources reached underrepresented groups and individuals, and implemented the objectives of equal opportunity regulations relative to the consideration and treatment of clientele for participation in Extension programs regardless of their race, national origin, gender, age, religion, or disability. 4-H Volunteers were recruited from the following groups: adults in the community, other agencies, civic groups, youth groups, and the general public.
Traditional 4-H audiences targeted youth, adult volunteers, families, and community members.
The target audience for non-traditional 4-H included: Underserved and high risk youth who do not participate in the traditional 4-H Youth program in Wyoming.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all Extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert" and when appropriate those in the 4-H Initiative respond to clientele request.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	15430	778753	44371	383565

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of youth enrolled in the traditional 4-H program. Target is number of youth enrolled in traditional 4-H club programs.

Year	Actual
2015	7488

Output #2

Output Measure

- Number of educational events, camps, training workshops, clinics implemented. Target is number of programs and events.

Year	Actual
2015	802

Output #3

Output Measure

- Number of volunteers enrolled as leaders in the 4-H program. Target is number of volunteers enrolled in the 4-H program.

Year	Actual
2015	1845

Output #4

Output Measure

- Number of volunteers participating in formal training programs. Target is number of volunteers participating in training programs.

Year	Actual
2015	3858

Output #5

Output Measure

- Number of non-traditional programs established. Target is number of non-traditional programs.

Year	Actual
2015	168

Output #6

Output Measure

- Number of youth enrolled in non-traditional youth development programs. Target is number of youth enrolled in non-traditional programs.

Year	Actual
2015	6604

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Wyoming youth will acquire knowledge which builds life skills including critical thinking, public speaking, teamwork, self-discipline, responsibility, decision making, self-esteem, communication, and leadership. Target is number of youth reporting outcome.
2	Wyoming youth build assets and essential life skills to lead productive, responsible, and healthy lifestyles. Target is number of participants reporting outcome.
3	Non-traditional youth participating in programs serve in leadership roles, serve on governing bodies, act as mentors, and teach other youth.Target is number of participants reporting outcome.
4	Volunteers demonstrate knowledge of youth development principles. Target is number of participants reporting outcome.
5	Trained adult volunteers will demonstrate skills and abilities in which they are able to foster youth to become responsible adults. Target is number of participants reporting outcome.

Outcome #1

1. Outcome Measures

Wyoming youth will acquire knowledge which builds life skills including critical thinking, public speaking, teamwork, self-discipline, responsibility, decision making, self-esteem, communication, and leadership. Target is number of youth reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	44371

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The four concepts of Belonging, Mastery, Independence and Generosity are vital to the growth and development of youth. These essential elements create a positive environment where youth feel nurtured in a safe environment, master new skills and abilities, and are empowered to contribute to their environment and communities in a positive way. Youth, adults, employers, civic organizations, governments and communities all benefit when youth make positive contributions to society.

What has been done
4-H youth educators taught and/or facilitated 802 educational programs through the traditional 4-H program and 168 programs to a non-traditional youth audience. These programs were designed and delivered to meet the learning objectives of the program and appropriate to the audience. Delivery methods included short workshops, one day and multi-day camps, multi-session workshops over several weeks, and leadership retreats.

Results
A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data. 44,371 youth in traditional and non-traditional programs reported an increase in knowledge and skills that positively affected their life.

Qualitative evaluations such as focus groups, individual interviews, and observations of adult club leaders and extension educators documented growth of leadership skills in teens who assumed roles as camp counselors, Jr. Leaders, project leaders, and representatives on elected and appointed government boards. One teen camp counselor commented ?I have learned that caring and being nice is not a weakness, that by being nice I have more confidence and I am also more assertive?.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Wyoming youth build assets and essential life skills to lead productive, responsible, and healthy lifestyles. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	17364

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A recent stakeholder survey conducted by the Wyoming 4-H program indicated both intrapersonal (soft skills) and job/trade skills make up 44% of what respondents feel is not being addressed by youth serving agencies. Employment and lack of skills were identified by 26% of the respondents as a significant emerging issue. Within our schools, academic rigor and increased testing and accountability measures have left little time for soft skill development and career exploration. There has lacked a coordinated effort to connect youth with professionals and employers in the community who can help guide and mentor youth towards educational and career pathways.

What has been done
Following are examples of programming conducted to help youth explore career paths and develop business skills: Career Awareness, coordinated by community organizations, exposed 8-12 graders to a variety of local professionals, business owners and tradesmen through a career fair. The Business Relationship Workshop taught youth how to properly develop business relationships such as business etiquette, presenting yourself and exchanging business cards. Two programming efforts focused on entrepreneurship.

Results
250 youth, grades 8-12, participated in a half day career fair. Students chose two break-out sessions from 18 career areas. Within each break out session, two to four local professionals, business owners or tradesman presented information about their career area including education and skills required, job opportunities and outlook, and what a typical day in the job would look like.

Although formal evaluation response numbers were low, 88% of those that did respond rated the event from good to excellent. Informal responses and reactions from students, teachers and the panel participants indicated this event was well structured and instrumental in connecting students with mentors and professionals in their field of interest. Several students and business representatives shared that the opportunity allowed them to find potential employees and employers as well as opportunities for students to connect with a summer internship and/or job shadowing possibilities.

55 youth in the entrepreneurship workshops developed and presented business plans to Chamber of Commerce members. Youth were provided feedback on their ideas, plans and presentation. A pre/post test evaluation showed a 36% increase in knowledge when assessed on how to start their own business. 100% of the youth were able to complete a business plan of work.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #3

1. Outcome Measures

Non-traditional youth participating in programs serve in leadership roles, serve on governing bodies, act as mentors, and teach other youth.Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	714

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local citizens can often be unaware of youth services and agencies that provide educational programs for youth. The struggle for youth organizations to advertise their services and programs can be compounded by a lack of formal partnerships between youth related agencies. Many of these youth serving organizations have leadership roles for youth but lack of awareness results in low participation.

What has been done
4-H youth educators taught and/or facilitated 168 programs to a non-traditional youth audience. These programs were designed and delivered to meet the learning objectives of the program and appropriate to the audience. Delivery methods included short workshops, one day camps, multi-session workshops over several weeks, and leadership retreats.

For example, the 4-H Youth Development Educator in Goshen County partnered with other youth serving organizations to host a Community Kids Day where families could learn about services and opportunities for their children. Weekly radio time along with the local newspaper promoted and advertised the event free of charge. Flyers were also developed and distributed throughout the school district. In addition, lunch was donated by Community Hospital. Leadership roles were designed for teens in 4-H, Girl Scouts and Boy Scouts in the hands-on activities conducted during the event.

Results
Over 100 families participated in hands-on activities, were exposed to services available to youth and learned how to join youth serving organizations in their community. Organizations involved in the first Community Kids Day have formed a county-wide coalition to continue providing the event as well as meeting regularly to share ideas, resources and opportunities to help raise awareness of youth opportunities.

Teens who helped plan and lead the hands-on activities gained experience in planning and organizing a large community event, expressing their ideas to their peers, and making group decisions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #4

1. Outcome Measures

Volunteers demonstrate knowledge of youth development principles. 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
2015	1845

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
County based 4-H Educators recruit and train adult volunteer leaders to help deliver the 4-H Youth Development Program. Adult volunteer leaders are responsible for managing 4-H clubs, contributing to county project committees and county 4-H councils, and organizing and teaching clinics and camps. To successfully support the philosophy of positive youth development, those volunteer leaders need to be trained in club management, group processes, and the Essential Elements of Positive Youth Development. In the 2014-15 program year there were 1845 adult volunteer leaders enrolled in the Wyoming 4-H Program.

What has been done
At the county level, 4-H youth development educators provided orientation and training for adult volunteer leaders. To reinforce the mission of 4-H, and communicate the importance of the volunteer role and responsibilities to prospective 4-H volunteer leaders, an orientation that provided consistency in the message was created and available in statewide in three formats: group training, individual training, and on-line. Advanced training was also offered for existing volunteer leaders at the county level. Topics for this training was determined by needs identified at the local level.

Results
New Leader Orientation ensured that the 230 new adult volunteer leaders understand their role as a volunteer, the philosophy of positive youth development, the structure and funding of 4-H, risk management policies, child abuse and bulling, and basic club meeting / project training strategies.

Almost 50% of the counties had at least one individual complete the on-line orientation. A retrospective post-then-pre evaluation asked participants (N=56) to self-report their understanding of and/or level of knowledge about the concepts presented in the New Leader Orientation. The evaluation also included a section which asked participants to list what they learned that would be most helpful in their volunteer role. A sample of the responses is highlighted below.

63% indicated an increase in their knowledge about volunteer protections. "Knowing who to contact, and how to protect myself and others. I teach harassment classes for my office, so I am familiar with this. Thank you for making sure that all volunteers know this important information".

80% indicated an increase in their level of knowledge about appropriate uses of the 4-H Name and Emblem. "I didn't realize there were restrictions on emblem use. I thought Wyoming 4-H was basically independent from the federal government. I had no idea there was a partnership with USDA".

90% indicated an increase in their level of knowledge about strategies to manage risk. "I never thought about the multitudes of risks during an event, not only physical potentials, but also the personal risk of not being a proper role model".

Knowledge gain from pre-post evaluations in the county face to face trainings revealed similar results.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Trained adult volunteers will demonstrate skills and abilities in which they are able to foster youth to become responsible adults. Target is number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1384

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the 2014-15 program year there were 1845 adult volunteer leaders enrolled in the Wyoming 4-H Program. County based 4-H Educators recruit and train adult volunteer leaders to help deliver the 4-H Youth Development Program. Adult volunteer leaders are responsible for managing 4-H clubs, contributing to county project committees and county 4-H councils, and organizing and teaching clinics and camps. Regional and statewide volunteer training supplement training provided at the county level and included shooting sports certification, horse raters certification, Wyoming Judges Training, State 4-H Leaders Conference, and Master 4-H Volunteer Training.

What has been done
The goal of Master 4-H Volunteer Training is to strengthen and enhance the 4-H volunteer's educational background so they are more effective in their volunteer roles and the local, area, and state levels. The educational program for Master Volunteer Training included 15 hours of specialized training in True Colors, (recognizing personality traits and working effectively with others), and the Essential Elements of Positive Youth Development (positive relationship with a caring adult, inclusive environment, opportunity for mastery, engagement in learning and experiential learning, active participant in the future, self-determination, opportunity to value and practice service to others, and a safe emotional and physical environment with risk management). The majority of programming for Master Volunteer training was delivered in a group setting with three topics delivered on-line following the face to face training.

Results

Participants in the face to face Master 4-H Volunteer training reported the greatest change in knowledge and skills in their ability to generate discussion questions to guide youth through the experiential learning process, and to choose appropriate activities that teach mastery to youth. Following the on-line training, participants were asked how they will apply what they learned. Several participants noted being more intentional about considering risk management when planning 4-H events and activities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

External factors which affected the 4-H Youth Program include: continued high turnover of staff, financial support from the county partner, changing demographics of potential adult volunteers, and competing programs for time and financial resources.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation methods, appropriate to the audience and delivery method were used to gather impact data. 44,371 youth in traditional and non-traditional programs reported an increase in knowledge and skills that positively affected their life.
Over 300 youth participated in workshops which focused on career preparedness and entrepreneurship. 55 youth in the entrepreneurship workshops developed and presented business plans to Chamber of Commerce members. Youth were provided feedback on their ideas, plans and presentation. A pre/post test evaluation showed a 36% increase in knowledge when assessed on how to start their own business. 100% of the youth were able to complete a business plan of work. Qualitative evaluations such as focus groups, individual interviews, and observations of adult club leaders and extension educators documented growth of leadership skills in teens who assumed roles as camp counselors, Jr. Leaders, project leaders, and representatives on

elected and appointed government boards. Teens who helped plan and lead the hands-on activities gained experience in planning and organizing a large community event, expressing their ideas to their peers, and making group decisions.
Training for 4-H volunteer leaders was delivered in three formats to meet the needs of current adult volunteers: face to face, individual consultation and on-line. In the 2014-15 program year there were 1845 adult volunteer leaders enrolled in the Wyoming 4-H Program. New Leader Orientation ensured that the 230 new adult volunteer leaders understand their role as a volunteer, the philosophy of positive youth development, the structure and funding of 4-H, risk management policies, child abuse and bulling, and basic club meeting / project training strategies. In addition, regional and statewide trainings were provided for leaders regardless of their volunteer role in the program. Examples of those trainings included shooting sports certification, horse raters certification, Wyoming Judges Training, State 4-H Leaders Conference, and Master 4-H Volunteer Training.

Key Items of Evaluation

44,371 youth in traditional and non-traditional programs reported an increase in knowledge and skills that positively affected their life. Over 300 youth participated in workshops which focused on career preparedness and entrepreneurship. Qualitative evaluations documented growth of leadership skills in teens who assumed roles as camp counselors, Jr. Leaders, project leaders, and representatives on elected and appointed government boards.
In the 2014-15 program year there were 1845 adult volunteer leaders enrolled in the Wyoming 4-H Program. New Leader Orientation ensured that the 230 new adult volunteer leaders understand their role as a volunteer, the philosophy of positive youth development, the structure and funding of 4-H, risk management policies, child abuse and bulling, and basic club meeting / project training strategies.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Community Development Education

☑ 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
601	Economics of Agricultural Production and Farm Management	5%		20%	
602	Business Management, Finance, and Taxation	5%		5%	
604	Marketing and Distribution Practices	5%		20%	
608	Community Resource Planning and Development	50%		25%	
801	Individual and Family Resource Management	25%		10%	
802	Human Development and Family Well-Being	5%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	2.5	0.0
Actual Paid	11.5	0.0	4.0	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**
176625	0	206997	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
176625	0	206997	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

Educational programs in Community Development Education are designed to help individuals, families, organizations, and communities increase knowledge and skills to improve their personal lives and the communities in which they live.
Educational efforts targeted toward elected officials and community members were delivered through the following programs: Leadership Institutes; Board Roles and Responsibilities; Managing Community Conflict; Leading with Excellence: Tools for Effective Boards; Facilitation Basics: Getting Results with Groups: Facilitator Bias in Public Participation; Managing Change; Working Across the Generations; and Understanding Personality Differences to Improve Your Ability to Lead at all Levels.
CDE educators also facilitated strategic planning sessions for municipal boards, county and state government, chambers of commerce, school districts, Wind River Reservation, and non-profit community groups.
Educational programs targeted toward the development of individuals and families included: Communication Essentials, Difficult Conversations, Estate Planning, Financial Literacy and Managing Credit, and Evaluating and/or Developing Business Plans.
Research efforts included economic analysis of potential public land management decisions and rural community planning.

2. Brief description of the target audience

The University of Wyoming College of Agriculture and Natural Resources 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 ultimate consumer of educational efforts in financial management programs was all individuals (including youth and senior citizens), families (including low-income families), and in general people at risk of experiencing financial stress.
Targeted audiences for leadership development included: elected officials, members and leaders of formal and informal community organizations, faith-based leaders and members, business owners/managers/employees, trade/produce groups, educational entities, and federal/state/local agency leaders/members.

Entrepreneurship programs targeted audiences who will manage or may develop ventures relating to food and agricultural systems, a non-farm extension of a farm business, forestry, home trades, crafts, services, etc. Other audiences through which UW Extension programs may be delivered include: teachers, public and private agencies, business owners/managers/employers, trade/produce groups, educational entities,

identified publics, youth groups/students, and small acreage owners.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all Extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert" questions; CDE educators and specialists respond to clientele request when appropriate.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24143	100000	243	5000

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	4	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Family Resource Management programs will ultimately benefit all families in Wyoming. Short term effects may be increased grant funding and increased involvement in regional and multi-state projects.Target is number of programs.

Year	Actual
2015	14

Output #2

Output Measure

- Number of individuals participating in programs. Target is number of individuals.

Year	Actual
2015	3546

Output #3

Output Measure

- Number of programs in group process, leadership, facilitation, and other CD topics delivered. Target is number of programs.

Year	Actual
2015	121

Output #4

Output Measure

- Entrepreneurship output targets include: number of individuals assisted.

Year	Actual
2015	77

Output #5

Output Measure

- Research efforts will include community economic analysis on efficiency of existing firms, ability to capture and retain dollars, potential to attract new businesses, ability to make informed decisions on resource management and community development, and socio-technological change and resource management affecting individuals, families, and communities. Target is the number research publications, bulletins, reports, and presentations.

Year	Actual
2015	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Permanent changes in practices as determined by follow-up surveys with those attending meetings, events, and workshops. Target is number of participants reporting positive practice changes.
2	One or more management principles from educational programs on personal finance management are adopted by workshop participants. Target is number of participants reporting outcome.
3	Participants of leadership classes will develop skills and confidence necessary for community participation, find resources to enhance community capital, recognize the needs for community vision, capacity building, and direction, and strengthen inner-community relationships. Target is number of participants reporting positive outcomes through program evaluations.
4	Research leading to the development of decision support tools on resource management and individual, family, and-or community development. Target is the number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Permanent changes in practices as determined by follow-up surveys with those attending meetings, events, and workshops. Target is number of participants reporting positive practice changes.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	3191

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Public participation is increasing in importance and complexity fueled by citizens' desire to be engaged in decisions that impact them, and public officials' desire to engage the public in useful, civil ways. Those that facilitate and manage public involvement need the knowledge and skills to create the best possible outcomes. The need for public participation has been expressed as a need by both area and statewide stakeholder groups. Additionally, public input has become a requirement of state and national agencies to comply with rules, legislation and funding opportunities.

What has been done
This training was developed as a 12-hour workshop, over 2 days, for individuals who desire increased understanding and skills in public participation. Support and resource materials were also created and provided. While open to any interested party, it was marketed to those who work in state and federal agencies who frequently engage in the practice of gathering public input, such as the US Forest Service, Bureau of Land Management, Health and Human Services & Environmental Quality. 55 individuals were trained in 3 workshops.

Results
Two evaluation processes gathered information from the 55 participants. 48 individuals returned the evaluation emailed two days after the training. A sample of participant responses follows: 92.5% indicated they were challenged to think critically and, 92.5% expressed a belief that they will be more effective after the training. 36 individuals completed the 6 month follow-up evaluation. Their responses are highlighted here: 60% indicated their leadership, decision making, and problem solving skills improved; 80% indicated their communication skills improved; 100% indicated their conflict management skills improved; and 50% expressed themselves or their agency changed a practice after the training. In a phone interview, a participant stated "Our agency puts more thought into engaging the public. We constantly remind ourselves that just

informing the public isn't really engaging them".

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
608	Community Resource Planning and Development
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #2

1. Outcome Measures

One or more management principles from educational programs on personal finance management are adopted by workshop participants. 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
2015	191

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Information collected from UW Extension Area Advisory committees identified retirement planning, consumer decision making skills, estate planning and family resource management as the top issues in the state. The first critical need is the management of credit and debt. Seven out of ten low and middle income households report using their credit cards as a safety net. In Wyoming about 2,500 people file for bankruptcy protection each year.

What has been done
Workshops on basic finance, planning for succession with agriculture families, and starting over making the most of your money targeted to those filing for bankruptcy were held. "Budgeting: The 5 P's" a roundtable discussion on financial literacy was also introduced in the Wind River Indian Reservation in 2014.

Results
End of session evaluations indicated over 80 percent of participants increased knowledge and skills in implementing financial principles. Over 50 percent reported adopting at least one financial principal as a result of the classes. These included improved credit management; financial recovery after bankruptcy; and initiating a savings plan. In addition, participants reported developing a plan for transfer of property and discussions with family on estate planning.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #3

1. Outcome Measures

Participants of leadership classes will develop skills and confidence necessary for community participation, find resources to enhance community capital, recognize the needs for community vision, capacity building, and direction, and strengthen inner-community relationships. Target is number of participants reporting positive outcomes through program evaluations.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1870

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Following is a sample of the types of agencies consulted to identify needs to effectively fulfill leadership roles: Association of Municipal Clerks and Treasurers; County Treasurers Association, Wyoming Nonprofit Network; Small Business Development Center; Wyoming Entrepreneur / Small Business Development Center; and Economic Development Association. Identified issues included the need for more citizens with adequate skills to assume leadership roles in their community; additional facilitation personnel and/or services for groups and organizations; need for education on succession planning for small businesses and firms.

What has been done
Educators provided 121 educational programs in group process skills, leadership development, and facilitation strategies for businesses, community organizations, government agencies, volunteer boards, elected officials, and a variety of administrative groups. The educational

programs were designed to meet the learning objectives of the audience and were delivered in a variety of formats including one day workshops, institutes organized over multiple months, and webinars.

Results
Participants in the leadership classes completed end of session evaluations as well as 3-6 month follow up evaluations. Respondents reported that the class helped them be more effective in their respective role(s) and that they would/have apply information they learned. One participant commented, "I have participated in 4 or 5 dialogues with Tara and WAM [Wyoming Association of Municipalities], and I'm not sure any other training throughout my career has had more of an impact on me and how I view leadership".

At the end of each Leadership Institute, class members have volunteered to serve on the steering committee for the next class. Anecdotal evidence has shown that more Institute graduates are being promoted at their jobs and getting more involved in their communities through board service and other, informal leadership opportunities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #4

1. Outcome Measures

Research leading to the development of decision support tools on resource management and individual, family, and-or community development. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Current trends in off-road vehicle (ORV) use indicate the potential for increased concerns and regulation of this recreational activity. Some areas of public lands in Wyoming have been closed to ORV use in recent years.

What has been done
Travel cost data, ORV-user socio-demographic data, and recreational site attribute data were used to calculate the potential change in recreation benefits if some or all of Wyoming trails and roads were closed to ORV use.

Results
Closing ORV access to Wyoming sites dominated by US Forest Service land would result in a mean recreation loss of $4,460,261 per year, and closing all ORV sites in Wyoming would yield a mean loss of $8,494,365 per year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (changes in technology)

Brief Explanation

Factors external to the College of Agriculture and Natural Resources that influence programs and results include: formation of collaborations; a shift in demographics; a shift in state and regional economic situations; shifts in local, state, university, and national policy, and changes in technology. External factors which can affect leadership activities include competing public priorities which affect participation; competing programmatic challenges and limited resources. Resources will continue to be scarce and may diminish. Leadership training has become a popular subject of concern across the nation, which increases the opportunity and need for UW Extension programming, but also increases the competition from other sources offering leadership training and community facilitation.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Several types of evaluation methods, over different time periods, were gathered from

participants (N=55) who completed the Public Participation trainings. 92.5% of the participants expressed their belief that they will be more effective after the training. Responses from participants (n=36) who completed the 6 month follow-up evaluation indicated improved communication skills; conflict management skills; or expressed that they or their agency changed a practice after the training. In a phone interview, a participant stated "Our agency puts more thought into engaging the public. We constantly remind ourselves that just informing the public isn't really engaging them."
End of session evaluations were completed for workshops around financial literacy. 80% of the participants increased knowledge and skills in implementing financial principles. Over 50 % reported adopting at least one financial principal as a result of the workshop.
Participants (N=1,870) in the leadership classes completed end of session evaluations as well as 3-6 month follow up evaluations to gather impact data. Respondents reported that the class helped them be more effective in their respective role(s) and that they would apply or have applied information they learned. One participant commented, "I have participated in 4 or 5 dialogues with Tara and WAM [Wyoming Association of Municipalities], and I'm not sure any other training throughout my career has had more of an impact on me and how I view leadership".
At the end of each Leadership Institute, class members have volunteered to serve on the steering committee for the next class. Anecdotal evidence has shown that more Institute graduates are being promoted at their jobs and getting more involved in their communities through board service and other, informal leadership opportunities.
Research: Travel cost data, ORV-user socio-demographic data, and recreational site attribute data were used to calculate the potential change in recreation benefits if some or all of Wyoming trails and roads were closed to ORV use. Closing ORV access to Wyoming sites dominated by US Forest Service land would result in a mean recreation loss of $4,460,261 per year, and closing all ORV sites in Wyoming would yield a mean loss of $8,494,365 per year.

Key Items of Evaluation

A variety of evaluation methods, over different time periods, document that participants in the Community Development planned program area will be more effective in their civic leadership roles. Anecdotal evidence has shown that more participants who have completed the leadership classes are getting more involved in their communities through board service and other, informal leadership opportunities.

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: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	6.0	0.0
Actual Paid	16.4	0.0	4.0	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**
240852	0	249980	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
240852	0	249980	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 reached out to a broad spectrum of constituents throughout Wyoming using a variety of sources. Workshops on sustainable rangeland and animal management principles were offered within each extension area around the state. Professional development opportunities for rangeland professionals were provided. Educational materials on rangeland and animal management practices and principles (fact sheets, bulletins, media, presentations, Web) were developed. Technical consultation on rangeland and animal management, and monitoring of rangelands were conducted. Media on rangeland management principles (radio, TV, press) were developed and distributed. Research and demonstrations on sustainable natural resource management principles were conducted. Individual rangeland managers were engaged to develop, implement, and evaluate sustainable management practices.

Programs for youth on natural resources were developed and conducted at youth activities. Produced or update current educational materials targeted to youth on natural resource education. Produced 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 implement 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 transmits unbiased scientific-based information to solve local and regional natural resource conflicts involving state, federal, and private resources. All efforts were 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 were the target audience.

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

3. How was eXtension used?

eXtension is used as a resource in Wyoming. The link to eXtension if prominently displayed on the UW Extension Web site home page. In addition, professional development opportunities through eXtension are publicized to Extension employees. UW Extension participates in "Ask an Expert" and responds to clientele questions posed through eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	38551	326492	7876	90825

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	2	25	27

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2015	177

Output #2

Output Measure

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

Year	Actual
2015	355

Output #3

Output Measure

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

Year	Actual
2015	38551

Output #4

Output Measure

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

Year	Actual
2015	696

Output #5

Output Measure

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

Year	Actual
2015	48

Output #6

Output Measure

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

Year	Actual
2015	1998

Output #7

Output Measure

- Conduct research on sustainable rangeland production and watershed management. Target is number of research publications, bulletins, reports, and presentations.

Year	Actual
2015	110

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	Conduct research to increase sustainability of rangelands. Target is the number of projects reporting this outcome.
5	Conduct research that will increase appreciation of watershed management. Target is number of projects reporting this outcome.

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
2015	300000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Rangeland and forestland in Wyoming is a critical resource for livestock grazing, wildlife habitat, recreation, water, and many other important ecosystem services. It has never been more important for ranchers and agency employees to understand the latest scientific research about rangeland issues to make the best decisions in dealing with the complex issues. Unfortunately, accessing and understanding scientific research is not easy. Scientists typically for their scientific colleagues, not the general public. Ranchers and agency employees have expressed a frustration with the limited access to and understanding of research

What has been done
The blog "Rangelands 4 You" (http://wyoextension.org/rangelands4u/) was started in May of 2015 to make rangeland scientific research accessible and palatable for all. Examples of the research or policy decisions that have been summarized and posted follow: Decision on Greater Sage-Grouse Listing Under the Endangered Species Act; Can Small-Scale Range Improvement Practices Benefit Sage-Grouse; Long-term trends in Sheep Growth and Wool Quality; Influence of Stocking Rates and Grazing Systems on Cattle Gains in Northern Mixed Grass Prairie; Do Habitat Measurement Methods Matter?; Grass Height and Sage-grouse Nest Survival in the Powder River Basin; Livestock Grazing to Engineer Grassland Bird Habitat.

Results
The maximum number of page views in a single day was 125 (5/20/2015) and the maximum number of users in a single day was 108 (7/26/2015). Total number of sessions is 2,735, total number of users is 2,547, and total number of page views is 3,328. Users have come from around the world. The greatest numbers of users by state have been from Wyoming, California, Texas, Colorado, and Montana. The most popular post has been on habitat measurement methods. News releases to the public have been printed in numerous newspaper and magazines including

Tri-State Livestock News, The Prairie Star, Wyoming Livestock Roundup, and Northern Ag Network.

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
2015	349

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth are a viable natural resource education audience in formal and non-formal educational settings. Educators in the Sustainable Management of Rangeland Resources partnered with 4-H volunteers, 4-H educators and other agencies/organizations to provide programming in natural resources for youth. Strong natural resource programs, to increase youth development in these projects 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 39 educational programs including an ag expo, GPS training, plant anatomy, native plant and noxious weed identification, rangeland monitoring and management, insect scavenger hunt, and nature awareness. Alternative energy, windmill science and wind

workshops were also conducted. Extension educators and specialists helped implement Wyoming Resource Education Days (WyRED) a joint effort with the Society of Range Management and local conservation districts. Extension educators and specialists taught sessions on estimating forage production and soil textures, grass seedhead identification and conducted a camp range contest.

Adventure camp, created in 2014, is a cross program initiative that introduces youth to careers in natural resources.

Results
Enrollment in 4-H projects which have a natural resource component continue to increase. The shooting sports project has the highest enrollment in the Wyoming 4-H Program. 4-H livestock projects, particularly beef and sheep, which rely on range management are also in the top 10 project 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
2015	313

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Resource managers are concerned that Wyoming's sagebrush steppe may experience a conversion to cheatgrass-dominated rangelands. Aside from direct effects on forage production, cheatgrass-driven loss of critical sage grouse and other wildlife habitat may result in indirect impacts to Wyoming's resources. This issue is evident from resource concerns identified at multiple levels throughout the state. Several collaborative resource management groups have identified cheatgrass and other annual bromes as primary resource concerns and are actively attempting to restore cheatgrass-invaded habitats. This emphasis on cheatgrass control demonstrates the need to develop a clear set of guidelines for cheatgrass control and restoration.

What has been done

To effectively manage cheatgrass across Wyoming a strategic prioritization identifying high-value areas with strong probability of recovery is needed to identify adequate leverage opportunities for expending limited resources. A series of research projects completed in 2015 and peer-reviewed journal articles from that research are in preparation. Some of the accomplishments include: developed two statewide cheatgrass models (one for occurrence, and one for potential cheatgrass dominance) based on survey data from around the state, assessed the potential for multi-species grazing as a means of reducing cheatgrass populations, and explored a novel method for eliminating cheatgrass seed contaminants from native grass seed used for reclamation. Information from these three projects was presented in local, state, and national outlets.

Results

This program has affected the way cheatgrass is being approached in Wyoming. Multiple weed and pest control districts have reported that they are using our 'recovery potential' estimated from vegetation monitoring as a way to prioritize areas to treat cheatgrass. Wyoming NRCS is now incorporating our cheatgrass distribution models into their statewide conservation planning, and leads of three state agencies have discussed how we will work cooperatively to prioritize four areas of the state for in-depth cheatgrass management based on our modeling efforts.

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

Conduct research to increase sustainability of rangelands. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	8

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local adaptation of many plant species represents a challenge in ecological restoration because little is known about the distance that seeds can be transferred with reasonable assurance of planting success.

What has been done
Seed transfer zones are being tested for true mountain mahogany, which is an important reclamation species in the Rocky Mountain region.

Results
Mountain mahogany seeds are more likely to germinate and survive in local environmental conditions. Development of seed zones that effectively describe the odds of transplanted seed survival will improve restoration success, which will ultimately decrease costs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
132	Weather and Climate
136	Conservation of Biological Diversity
205	Plant Management Systems
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Conduct research that will increase appreciation of watershed management. Target is number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The amount of snow water present in western mountains is the single greatest predictor of stream flow. Better measurement of snow water will allow water resource managers, flood engineers, and ecologists to predict and prepare for spring and summer runoff.

What has been done
Geophysical instruments were mounted onto snowmobiles that allow a rider to measure snow water content and snow depth underneath the snowmobile at the speed of driving.

Results
Knowledge gained from this technique is being transferred to state and federal land managers charged with water resource management.

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
132	Weather and Climate
135	Aquatic and Terrestrial Wildlife

205	Plant Management Systems
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

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

Many conditions and situations that exist in Wyoming are similar to those in other parts of the country. For example, coordination and cooperation of federal agencies and state partners; existence of local collaboration; level of funding from federal, state, and local agencies; and willingness of private sector-funders, such as corporations, foundations, and community organizations, to collaborate with the University of Wyoming Extension.

Weather extremes and drought may affect producers in agriculture and natural resources issues. Funding is vital to this program; changes in appropriations could impact funding. Additionally, global market changes impact both research and extension programs in sustainable management of rangeland resources.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Educational classes, workshops, schools utilized end of session evaluations with informal follow-up to document 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. A sample of program evaluation data collected include:
Evaluations of Building Farmers and Ranchers in the West demonstrated participants learned how to develop a business plan, keeping records for taxes, maintaining financial records and where to obtain loans/funding.
Participants in Annie's Project indicated a 60% change in their knowledge regarding rangeland seeding, and range improvements. When asked how they would use the information they gained, responses included "Set Goals"; "Analyze where I need to go with property"; "Mixing the seed types"; and, "Improving oil fields on purchased property that has mostly crested wheatgrass and cactus"
Plant Identification and Rangeland Monitoring classes engaged ranchers, small acreage owners, relators, youth, and colleagues all of whom learned how to identify plants and their ecological relationship. This information helps them in native landscaping decisions, grazing management, and career exploration. The workshop participants are able to ID

common range plants - both beneficial plants as well as noxious weeds, techniques to control cheatgrass, protect the environment and develop rangeland monitoring plans. The members who increased their skill level in collecting rangeland monitoring data in a consistent manner for the Collective Monitoring Project will benefit future research efforts. The goal of the Collective Monitoring Project is to have at least one monitoring location in each of the 23 counties and the Wind River Reservation within the next five years. Collected data will include biomass, species composition, and precipitation during "key" times of the year.
Research: Mountain mahogany seeds are more likely to germinate and survive in local environmental conditions. Development of seed zones that effectively describe the odds of transplanted seed survival will improve restoration success, which will ultimately decrease costs.
Research: The amount of snow water present in western mountains is the single greatest predictor of stream flow. Geophysical instruments were mounted onto snowmobiles that allowed a rider to measure snow water content and snow depth underneath the snowmobile at the speed of driving. Knowledge gained from this technique is being transferred to state and federal land managers charged with water resource management.

Key Items of Evaluation

Range monitoring plans have been implemented which improve sustainability of range land. Natural resource media efforts have enhanced knowledge of Wyoming citizens on rangeland, natural resources, water conservation and preservation of the land.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Global Food Security and Hunger, Crop, Livestock and Horticulture Systems

☑ 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	5%		5%	
111	Conservation and Efficient Use of Water	5%		5%	
202	Plant Genetic Resources	5%		5%	
204	Plant Product Quality and Utility (Preharvest)	5%		5%	
205	Plant Management Systems	10%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		5%	
212	Pathogens and Nematodes Affecting Plants	5%		5%	
213	Weeds Affecting Plants	5%		5%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	5%		5%	
301	Reproductive Performance of Animals	5%		5%	
302	Nutrient Utilization in Animals	5%		5%	
305	Animal Physiological Processes	5%		5%	
307	Animal Management Systems	10%		5%	
311	Animal Diseases	5%		5%	
502	New and Improved Food Products	5%		5%	
601	Economics of Agricultural Production and Farm Management	5%		5%	
704	Nutrition and Hunger in the Population	5%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890

Plan	24.0	0.0	21.2	0.0
Actual Paid	25.0	0.0	15.6	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**
385364	0	891610	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
385364	0	891610	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	161300	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension specialist and area educators delivered educational programs in crop and livestock production, horticultural and nutrition issues. A variety of delivery methods were used to meet the needs of the audience based upon the learning objectives of the program. Formats to deliver the educational programs included one day classroom workshops, field tours, multi day schools organized over a period of months, conferences and expos, trial plots, and involvement in research projects.
The emphasis in livestock systems included the following areas: herd management, herd development, cropping systems and livestock development, risk and operation management techniques and alternatives to enhance the stability of Wyoming livestock and crop producers.
Fostering development of local food systems, included promoting the use of local foods, improved energy efficiency of the food system while yielding many other benefits. UW Extension also improved relationships among local food producers and consumers through the following efforts:

- collaborating to provide Wyoming Local Food Expos;
- development and distribution of the Wyoming Local Foods Guide (print and electronic versions) which included a directory of specialty crops and other local food products, nutrition and food safety resources, recipes for using local foods, factsheets related to local foods in Wyoming, and tips on sustainable living. The Foods Guide will be uniquely Wyoming but will draw from several existing examples.
- professional development for UW Extension educators to successfully promote local foods.

All media methods are used to familiarize the public with UW College of Agriculture and Natural Resources areas of research and extension programming and personnel. Newsletter articles distributed both electronically and through the mail, web sites, blogs, newspaper features, radio, and T.V. reached producers locally, statewide, regionally, and nationally.

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. All efforts will be made to provide information through direct contact and through publications, newsletters, Web sites and other methods. The general public and exurban landowners, agricultural

producers and specific target audience groups.

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. UW Extension participates in "Ask an Expert". Educators and specialists respond to clientele questions submitted through eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	36306	381188	1361	102178

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	8	41	49

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs focusing on global food security and hunger, crop, livestock, or horticulture systems. Target is the number of programs.

Year	Actual
2015	326

Output #2

Output Measure

- Number of participants attending programs focusing on global food security and hunger, livestock, crop, and horticulture systems. Target is the number of individual participants

Year	Actual
2015	36306

Output #3

Output Measure

- Number of partnerships formed with other agencies,or organizations and volunteers integrated into programs. Target is the number of partnerships and/or volunteers.

Year	Actual
2015	120

Output #4

Output Measure

- Increased adoption of sustainable agriculture methods and practices which result in increased production of the food supply. Target is 10 to 20% of total Wyoming Ag Operations participants reporting outcome.

Year	Actual
2015	2330

Output #5

Output Measure

- Research publications, bulletins, reports, and presentations on crop, livestock, and horticulture systems.

Year	Actual
2015	123

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased knowledge of agriculture producers on sustainable cropping and livestock systems. Target is number of producers reporting outcome.
2	Improved sustainable agriculture production practices resulting in an increased food supply. Outcome is number of producers reporting outcome.
3	Awareness created through extension and research efforts. Target is number of participants in extension and research programs reporting that they have gained awareness on topic.
4	Wyoming producers will benefit through an increased value of livestock and crops related to improved cropping practices, herd selection, and management. Target is number of producers reporting positive outcome as a result of educational efforts.
5	Increase appreciation of research on plant production systems. Target is the number of projects reporting on this outcome.
6	Increase appreciation of research on animal production systems. Target is the number of projects reporting on this outcome.

Outcome #1

1. Outcome Measures

Increased knowledge of agriculture producers on sustainable cropping and livestock systems. Target is number of producers reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	30306

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming Agricultural producers are in a battle to protect their properties and businesses from invasive and noxious weeds. Noxious weeds present a problem that can severely affect the bottom line of the Ag businesses. One tool that producers can use is chemical. Quite often the chemical that would work the best in a situation is a restricted use chemical. In order for producers to utilize and use restricted use chemicals they need to have a restricted use license. Restricted use licenses are issued from the Wyoming Department of Agriculture and UW Extension is required to provide the training to receive the license. The educational requirement is delivered in a three hour class.

What has been done
Extension educators and state specialist in the Agriculture and Horticulture Initiative Team developed the curriculum to provide the training for Wyoming producers. Sixty-nine pesticide applicator classes were held for the general public, employees who sell pesticides, farm and ranch employees, and producers. 1,803 individuals attended the classes held across Wyoming. Classes were marketed through direct mailings, flyers, radio, and Weed and Pest district offices.

Results
1,803 individuals from the general public, employees who sell pesticides, farm and ranch employees, and producers participated in the class to become a licensed pesticide applicator. This is a crucial part of managing properties in Wyoming with restricted use chemicals. 73% (n=1,316) of the participants passed the test to receive the required license to apply restricted pesticides.

Master Gardeners assisted in extending skills and disseminating information to 57,897 contacts and recorded 8,161 volunteer hours contributing $188,763.93 to Wyoming Horticulture outreach

efforts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
307	Animal Management Systems
502	New and Improved Food Products

Outcome #2

1. Outcome Measures

Improved sustainable agriculture production practices resulting in an increased food supply. Outcome is number of producers reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	3675

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Southeast Wyoming dryland crop producers face challenges in maintaining soil productivity because large-scale production and low profit margins prevent extensive use of soil amendments. More than 20 percent of Wyoming wheat producers are certified organic, which makes maintaining soil productivity even more challenging because of intensive tillage used for weed control.

What has been done
In collaboration with researchers from Utah State University and Washington State University, a three-year trial was established in 2015 to evaluate effects of different rates of compost applied one time, along with interactions with different cultivars and cover crops, on soil quality and profitability in dryland winter wheat cropping systems.

Results
Results are allowing both conventional and organic wheat farmers to evaluate the option of a one-time, high-rate compost application; this could increase soil water-holding capacity and support use of cover crops, which could result in healthier, more productive soil.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
307	Animal Management Systems
502	New and Improved Food Products

Outcome #3

1. Outcome Measures

Awareness created through extension and research efforts. Target is number of participants in extension and research programs reporting that they have gained awareness on topic.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	8989

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The total value of all Wyoming crops is estimated at $473 million (2014). Plant diseases caused by viruses, bacteria, fungi, and nematodes cause significant losses in Wyoming's crop yield and quality each year. An annual loss attributed to Rhizoctonia root and crown rot (RRCR) is estimated at 2-3% total sugar loss for 185,000 acres of sugar beet grown in the irrigated High Plains region (CO, MT, NE, and WY). Western Sugar producers have identified this disease as their number one disease concern. Sugar beets rank third for crop value in Wyoming ($32.6 million value) and Wyoming ranks ninth in the nation for sugar beet production.

What has been done
Economic losses attributed to plant diseases are significantly reduced by prevention, early detection diagnostics, and initiation of appropriate integrated pest management practices. Approaches to disease suppression comprise the main thrust of field research and demonstration plots established at the SAREC near Lingle, WY and the PREC near Powell, WY.

Results
A trial at the PREC revealed that currently available fungicides (Proline, Priaxor and Vertisan) were just as efficacious or slightly better than Quadris for management of Rhizoctonia root and crown rot. Trials at SAREC revealed that in-furrow fungicide application and subsequent foliar banded application, protected plants from seedling decay and subsequent root and crown rot

disease caused by Rhizoctonia. Results from fungicide timings and chemistry efficacy are being utilized by regulatory agencies for developing use labels for a number of new compounds or formulations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
311	Animal Diseases
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management
704	Nutrition and Hunger in the Population

Outcome #4

1. Outcome Measures

Wyoming producers will benefit through an increased value of livestock and crops related to improved cropping practices, herd selection, and management. Target is number of producers reporting positive outcome as a result of educational efforts.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2015 1606

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agriculture is one of the foundations of the Wyoming economy. In 2013, Wyoming agriculture produced 2.0 billion dollars of value (Wyoming Agriculture Statistics 2015). Livestock production accounts for 76% of the cash receipts of agriculture in Wyoming (Wyoming Agriculture Statistics 2015). It is imperative that ranches in Wyoming remain economically viable and environmentally sustainable in order to support this important part of Wyoming's economy. Sustainable ranch businesses require a systems approach to decision-making for successful working relationships and effective management of business finances, livestock, forage and natural resources.

What has been done
The High Plains Ranch Practicum School is a comprehensive ranch management school focused on a systems approach to ranch management. It is an applied learning experience consisting of eight full days spread out over seven months of combined classroom learning and hands-on field application of the concepts and skills. Firsthand experience and discussion about changes that occurred to cattle and range conditions solidified concepts taught throughout the course. In 2014-15, 49 producers and/or agricultural production workers participated in the school. The Ranch Practicum is a partnership between the University of Wyoming Extension and University of Nebraska Extension.

Results
On the final day of the school participants were asked to complete a survey to capture their knowledge gained, skills and practices adapted, economic benefit to their business and a scope of the impact of school on the resources they control or have influence over. A total of 32 surveys were returned. Those completing surveys indicated that knowledge gained would influence 288 people, management for 15,500 beef cattle and 351,000 acres of land. Producers reported that the class resulted in $385,000 improvement in net income to their operations in total.

Practicum participants indicated that because of knowledge gained:
88% would be likely or very likely to use cow body condition as a management tool.
94% would be likely or very likely to use Unit Cost of Production (UCOP) as a decision making tool.
94% reported that they would be likely or very likely to use tools and knowledge to improve range management or natural resource management.
79% reported that they would be likely or very likely to use skills and knowledge gained to address how family/business relationship are handled or addressed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
301	Reproductive Performance of Animals
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Increase appreciation of research on plant production systems. Target is the number of projects reporting on this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alfalfa weevil is a consistently problematic pest for growers of Wyoming's highest acreage crop, alfalfa.

What has been done
Alfalfa producer fields in southeastern Wyoming and the Big Horn Basin were sampled to measure pest and natural enemy abundance.

Results
Parasitism of alfalfa weevil occurred in most fields, but the parasitism rate varied from 0-40%. Field size and weevil density are both associated with parasitism rate. Future analyses will determine other factors that could drive parasitism. Considerable economic and environmental costs of chemical pest control highlight a critical need to develop more effective and efficient management strategies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #6

1. Outcome Measures

Increase appreciation of research on animal production systems. Target is the number of projects reporting on this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Brucella ovis is a bacterial pathogen present in most major sheep-producing regions of the world. Infection spreads through direct contact between rams and ewes. The implications of a B. ovis infection for the flock include: ram infertility, decreased ewe conception rates, more abortions in pregnant ewes, higher numbers of premature lambs, and valuable genetics being lost when infected rams are culled.

What has been done
Determining the seroprevalence of Brucella ovis in US domestic sheep.

Results
Producers are given data to help them make management decisions about improving reproductive health of their flocks, increasing economic returns, and preventing losses due to infection.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
305	Animal Physiological Processes
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management

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

Brief Explanation

Many conditions and situations that exist in Wyoming are similar to those in other parts of the country. For example, coordination and cooperation of federal agencies and state partners; existence of local collaboration; level of funding from federal, state, and local agencies; and willingness of private sector-funders, such as corporations, foundations, and community organizations, to collaborate with the University of Wyoming Extension.

Weather extremes and drought may affect producers in agriculture and natural resources issues. Funding is vital to this program; changes in appropriations could impact funding. Additionally, global market changes impact both research and extension programs in sustainable management of rangeland resources.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Systematic evaluation utilizing a variety of methods was used to document outcomes and impact to clientele. This program includes four focuses: global food security and hunger, livestock systems; crop systems; and urban horticulture. Educational activities use written evaluations following the program, as follow-up; pre-and post -test to measure knowledge and aspirations. Follow-up evaluations either by mail, phone, or personal visit document medium and long term outcomes.

Beef cattle production in the Intermountain West is focused primarily on cow and calf operations that include a small proportion as grass-fed beef production. Supplementation of grazing beef heifers with calcium salts of fish oil using the dried molasses delivery system would provide producers with a low input method to increase omega-3 fatty acids in the meat of grass-fed beef, or in reproductive tissues of the heifers to increase fertility through enhancing conception and retention of embryos and insuring greater overall production.
Stand persistence and economic returns are the major concerns in grass-legume production systems. The 50-50% mixture of grass-legume provided with improved net economic return compared to monoculture grass and legume.
Southeast Wyoming dryland crop producers face challenges in maintaining soil productivity because large-scale production and low profit margins prevent extensive use of soil amendments. Results from a 3-year trial to evaluate effects of different rates of compost application are allowing both conventional and organic wheat farmers to evaluate the option of a one-time, high-rate compost application; this could increase soil water-holding capacity and support use of cover crops, which could result in healthier, more productive

soil.
On the final day of the High Plains Ranch Practicum School, participants were asked to complete a survey to capture their knowledge gained, skills and practices adapted, economic benefit to their business and a scope of the impact of school on the resources they control or have influence over. A total of 32 surveys were returned. Those completing surveys indicated that knowledge gained would influence 288 people, management for 15,500 beef cattle and 351,000 acres of land. Producers reported that the class resulted in $385,000 improvement in net income to their operations in total. Before the course participants reported monitoring native range about ½ of the time; after the course all participants reported almost always monitoring native range.
Over 90% of individuals enrolling in the master gardener program complete the course and pass the certification test. 118 Master Gardeners reported 8,161 volunteer hours, reaching 57,897 contacts. The value of volunteer time as documented by the independent sector shows that MG volunteers contribute $188,764 to the Extension program in Wyoming.
Research: A trial at the PREC revealed that currently available fungicides (Proline, Priaxor and Vertisan) were just as efficacious or slightly better than Quadris for management of Rhizoctonia root and crown rot. Trials at SAREC revealed that in-furrow fungicide application and subsequent foliar banded application, protected plants from seedling decay and subsequent root and crown rot disease caused by Rhizoctonia. Results from fungicide timings and chemistry efficacy are being utilized by regulatory agencies for developing use labels for a number of new compounds or formulations.
Research: Parasitism of alfalfa weevil occurred in most fields, but the parasitism rate varied from 0-40%. Field size and weevil density are both associated with parasitism rate. Future analyses will determine other factors that could drive parasitism. Considerable economic and environmental costs of chemical pest control highlight a critical need to develop more effective and efficient management strategies.
Research: Brucella ovis is a bacterial pathogen present in most major sheep-producing regions of the world. Producers are given data to help them make management decisions about improving reproductive health of their flocks, increasing economic returns, and preventing losses due to infection.

Key Items of Evaluation

High Range Practicum school participants described the scope of the impact the school had on the resources they control or have influence over. A total of 32 surveys were returned. Those completing surveys indicated that knowledge gained would influence 288 people, management for 15,500 beef cattle and 351,000 acres of land. Producers reported that the class resulted in $385,000 improvement in net income to their operations in total.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change

☑ 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
104	Protect Soil from Harmful Effects of Natural Elements	10%		10%	
112	Watershed Protection and Management	10%		10%	
132	Weather and Climate	20%		20%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%		10%	
205	Plant Management Systems	10%		10%	
306	Environmental Stress in Animals	10%		10%	
307	Animal Management Systems	10%		10%	
605	Natural Resource and Environmental Economics	10%		10%	
608	Community Resource Planning and Development	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	2.6	0.0
Actual Paid	2.0	0.0	2.4	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**
32114	0	152118	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
32114	0	152118	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

UW Research and Extension activities focused on best species and variety selection as well as effectiveness of production practices as aspects of climate changes. Invasive species, and drought were addressed through educational programs which enhance strategies to control global warming and will likely create opportunities for Wyoming agriculture to both profit and contribute to mitigation of forces driving change in climate.

Basic work in carbon storage in ecosystems, the implications of agricultural and land management practices on storage, and education related to these questions were addressed. Plant species and variety adaption to the changing ecosystem are critical to maintaining the agricultural productivity for the state. Educational programs helped producers and land managers understand the implications of drought for grasslands and cropping ecosystem management. The implications of climate change for invasive species and ecosystem management implications are important opportunities for UW AES and Extension.

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 all programs regardless of their race, national origin, gender, age, religion, or disability. Specific target audience groups for the climate change program include agriculture producers, commodity groups, and agriculture agencies. Horticulture and small acreage audiences will also benefit from water conservation and risk management components of the program.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert", educators respond to clientele questions on this topic when appropriate.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	941	75688	0	111353

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	18	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of agriculture producers participating in educational programs. Target is number of program participants.

Year	Actual
2015	941

Output #2

Output Measure

- Number of educational programs conducted targeting climate change. Target is the number of programs.

Year	Actual
2015	28

Output #3

Output Measure

- Research on production practices in the face of climate changes. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2015	28

Output #4

Output Measure

- Research to determine the relationship between climate change and competition among native and invasive plant species. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2015	16

Output #5

Output Measure

- Research on strategies to mitigate release of greenhouse gases into the atmosphere. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2015	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Awareness created through extension and research efforts. Target is the number of participants in extension and research programs reporting that they have gained awareness on topic.
2	Agriculture, horticulture and small acreage participants will increase awareness of climate change and the impact on horticulture production. Target is number of participants reporting outcome.
3	Producers will implement practices in animal and plant production which will mitigate climate change. Target is the number of producers reporting outcome.
4	Research that will create awareness of production practices, invasive plant species, and potential to mitigate greenhouse gas emissions in the face of climate change. Target is the number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Awareness created through extension and research efforts. Target is the number of participants in extension and research programs reporting that they have gained awareness on topic.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	941

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Small changes in temperature, amount and timing of precipitation can affect the growing season and have a dramatic effect on the success of plant communities in Wyoming's ecosystem. Invasive species are a particular problem in the dry cold desert ecosystem as small changes in climate can shift the competitive relationship among plant species. This can have a significant effect on plant community diversity and rangelands productivity which results in loss of income and increased expenses for ranchers and farmers.

What has been done
Control of invasive species, best species for the eco system, and variety selection as well as effectiveness of production practices were the topics of educational programs which addressed aspects of climate change. Basic work in carbon storage in ecosystems, the implications of agricultural and land management practices on storage, and education related to these questions were also addressed.

Results
Nine hundred and forty one (941) individuals participated in educational programs where mitigating climate change was one of the topics. 100% of the participants reported an increase in awareness about the effect climate change can have on production and over 50% of the participants stated they plan to implement practices to mitigate climate change. These educational programs helped producers and land managers understand the implications of drought for grasslands and cropping ecosystem management.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements

112	Watershed Protection and Management
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
306	Environmental Stress in Animals
307	Animal Management Systems
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Agriculture, horticulture and small acreage participants will increase awareness of climate change and the impact on horticulture production. 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
2015	941

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming has a semi-arid climate where small changes in temperature, amount and timing of precipitation effect the growing season and can have a dramatic effect on the success of plant communities in the ecosystem. In urban areas, small acreages, and towns, horticulture has become an important component of UW Extensions agriculture efforts. There is also an increasing interest in the use of high tunnels for season extension and production of high value locally grown vegetables

What has been done
UW Extension educators in crop and livestock systems and horticulture addressed climate change in numerous production programs. Landowners with 50 acres or less are targeted in small acreage management programs which is a foci in the state. A new program in 2014 involved a train the trainer model for real estate professionals who are first contact with new residents to the state focusing on soils and climate. Trained Master Gardeners participated in 2552 continuing education hours which include climate and impact on horticulture production.

Results

100 percent of participants indicated they had gained awareness and knowledge as a result of educational programs. Over 50 percent of participants in UW Extension programs on xeriscape, landscape design, water conservation, and plant selection and livestock production have made changes in practices as a result of educational efforts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
306	Environmental Stress in Animals
307	Animal Management Systems
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Producers will implement practices in animal and plant production which will mitigate climate change. Target is the number of producers reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	470

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming has a semi-arid climate where small changes in temperature, amount and timing of precipitation effect the growing season. The use of high tunnels for season extension and production of high value locally grown vegetables has become important to producers. Over 100 high tunnels have been built in Wyoming since 2008 through the specialty crop program. Nutrients requirements for vegetables produced under high tunnels tend to be greater due to relatively higher yields compared to field grown vegetables. Therefore, sustainable nutrient management is critical in high tunnel production systems.

What has been done
A study during 2013-2015 was conducted in a high tunnel at the Sustainable Agriculture Research and Extension Center. Fertilizer treatments included organic (fishmeal, veggie mix, and seabird guano), inorganic (commercial; NPK), and control. The experiment was laid out as a randomized complete block design with three replicates. Pepper, tomato, carrots, spinach, and radish were used as test crops. The number of people who attended the field days ranged from 100-160 per year. Because of its proximity to the main building almost 100% of the attendees visited the high tunnel before attending any other demonstration stations. The results obtained from this high tunnel study were disseminated in many ways, especially through Field Days, Demonstrations, and One-on-One consultations.

Results
From pre- and post-observations and one-on-one consultations, it was clear that growers' knowledge on the potential for organic high tunnel production had increased from zero to about 100%.

At least 300 growers/producers from three SAREC Field Days came into close contact with the high tunnel project and improved their current knowledge on organic high tunnel production system. These all high tunnel growers are beneficiaries of this study. Results from this study also benefited 48 Master Gardeners statewide.

Vegetable yield and fruit yield per plant, especially for carrot and tomato, were significant in high tunnel. This high tunnel vegetable production research showed promise not only through high yield and quality but also by showing the additional revenue potential of organic production during times when no crops could survive in field conditions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
306	Environmental Stress in Animals
307	Animal Management Systems
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Research that will create awareness of production practices, invasive plant species, and potential to mitigate greenhouse gas emissions in the face of climate change. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Identifying dry bean genotypes tolerant to drought and physiological traits associated with that tolerance will help growers select which dry bean variety to grow under conditions of limited water.

What has been done
Commercial cultivars and experimental genotypes are being screened for drought tolerance.

Results
Results will guide growers on how to improve water use efficiency, to develop management tools that will increase profitability, and reduce dry bean's environmental impact.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Weather extremes and drought often affect program participation. Funding is vital to this new program, changes in appropriations could impact funding. Additionally, global market

changes impact both research and extension programs in agriculture.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nine hundred and forty one (941) individuals participated in educational programs where mitigating climate change was one of the topics. 100% of the participants reported an increase in awareness about control of invasive species, best species for the eco system, and variety selection as well as effectiveness of production practices. Over 50% of the participants stated they plan to implement practices to mitigate climate change. These educational programs helped producers and land managers understand the implications of drought for grasslands and cropping ecosystem management.

Vegetable yield and fruit yield per plant, especially for carrot and tomato, were significant in the high tunnel. This high tunnel vegetable production research showed promise not only through high yield and quality but also by showing the additional revenue potential of organic production during times when no crops could survive in field conditions. From pre- and post-observations and one-on-one consultations through demonstrations with the high tunnel, growers' knowledge on the potential for organic high tunnel vegetable and fruit production increased from zero to 100%. At least 300 growers/producers from three SAREC Field Days came into close contact with the high tunnel project and improved their current knowledge on organic high tunnel production system. All of these high tunnel growers are beneficiaries of this study.

Research: Commercial cultivars and experimental genotypes are being screened for drought tolerance. Results will guide growers on how to improve water use efficiency, to develop management tools that will increase profitability, and reduce dry bean's environmental impact.

Key Items of Evaluation

The study on high tunnel production was invaluable for trainings, and demonstrations that benefit farmers and extension educators on sustainable nutrient management strategies to improve yields and vegetable quality in the high tunnel organic vegetable production systems. Wyoming specialty crop producers, especially organic growers, needed organic production research to help generate more farm income in extended growing season systems.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Sustainable Energy

☑ 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	20%		20%	
121	Management of Range Resources	20%		20%	
131	Alternative Uses of Land	0%		10%	
133	Pollution Prevention and Mitigation	0%		10%	
401	Structures, Facilities, and General Purpose Farm Supplies	10%		10%	
402	Engineering Systems and Equipment	20%		20%	
608	Community Resource Planning and Development	30%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	3.2	0.0
Actual Paid	1.0	0.0	1.6	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**
48170	0	145889	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
48170	0	145889	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

Educational programs with invited speakers and extension specialists and educators presenting research-based information were held in response to local, state, and national energy sustainability. Demonstrations of technology and skills training was included in education curriculum to enhance educational effectiveness. Field tours were organized to provide producers with the opportunity to observe industry procedure (i.e., tour of an ethanol plant).

The Sustainable Agriculture Research and Extension Center (SAREC) located at Lingle, Wyoming provided a resource base for integrating agriculture production and renewable energy based programs.

Educational programs emphasized sustainable energy practices such as bio-fuels and wind energy, reclamation and restoration of disturbed lands, and energy conservation practices. Other methods included individual interaction with landowners regarding resources available to assist them with sustainable energy practices. UW Extension coordinated programs with other colleges on the UW campus such as Engineering and the School of Energy Resources, state and federal agencies for education on this topic, and funding for this effort.
Media was used to familiarize the public with UW College of Agriculture and Natural Resources areas of programming and personnel in regard to sustainable energy. Media releases in local newspapers, radio spots and television advertisements informed the public of upcoming extension programs. Newsletter articles distributed both electronically and through the mail by county offices, area teams, and the University of Wyoming reached the general public and agriculture producers locally, statewide, regionally and nationally.

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 all programs regardless of their race, national origin, gender, age, religion, or disability. Audiences will include policy makers for county, state, and federal government agencies, crop producers, livestock producers, energy companies, general public, and the scientific community.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all Extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert" and when appropriate those who employees who have expertise in Sustainable Energy

respond to clientele request.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	372	151375	24	22706

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	3	7	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in sustainable energy programs. Target is the number of contacts.

Year	Actual
2015	399

Output #2

Output Measure

- Determine ecosystem services affected by energy development and reclamation efforts. Target is the number research publications, bulletins, reports, and presentations.

Year	Actual
2015	10

Output #3

Output Measure

- Evaluate the potential for production of bioenergy. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2015	4

Output #4

Output Measure

- Number of educational programs or activities focusing on sustainable energy by UW Extension. Target is the number of educational programs implemented.

Year	Actual
2015	17

Output #5

Output Measure

- Number of collaborative partnerships formed to address sustainable energy in Wyoming. Target is the number of partnerships.

Year	Actual
2015	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Awareness created focusing on sustainable energy topics. Target is the number of individuals reporting this outcome.
2	Partnerships will be developed with agencies and organizations to expand sustainable energy efforts. Target is the number of partnerships formed.
3	New technologies or devices used in ag production systems and/or farmsteads. Target is the number of new technologies developed.
4	Create awareness of research on ecosystem services affected by energy development and reclamation efforts. Target is the number of projects reporting this outcome.
5	Create awareness of research on the potential to produce bioenergy. Target is the number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Awareness created focusing on sustainable energy topics. Target is the number of individuals reporting this outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	399

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The State of Wyoming is well known for being a critical source of the nation's supply of natural resources. Because fossil fuels are essentially an irreplaceable base for Wyoming's energy industry, the College of Agriculture and Natural Resources conducts research and direct extension programming efforts to help ensure prudent use of the state's resources.

In addition to fossil fuel resources, Wyoming also possesses abundant renewable energy resources including wind, solar, hydroelectric, geothermal, and biomass. Both small-scale, such solar photovoltiacs or geothermal heat pumps, and utility-scale, primarily wind energy, are important issues.

What has been done
Efforts in sustainable energy focus on efficiency and conservation specifically in relation to farm and agriculture production. In addition, residential and public conservation education is targeted toward the general public and businesses. In addition to educational programs to raise awareness and knowledge, UW Extension has developed a Web site for information, publications, and a set of educational videos. UW Range specialists and area educators have partnered with the UW Reclamation and Restoration Center to develop and implement Reclamation 101 schools for agriculture land owners and agency personnel.

Results
UW area educators and specialist conducted 17 workshops and demonstrations which reached 399 individuals. 100% of the participants reported an increase in their awareness of the topic.

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Partnerships will be developed with agencies and organizations to expand sustainable energy efforts. Target is the number of partnerships formed.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The State of Wyoming is well known for being a critical source of the nation's supply of natural resources. Because fossil fuels are essentially an irreplaceable base for Wyoming's energy industry, the College of Agriculture and Natural Resources conducted research and directed extension programming efforts to help ensure prudent use of the state's energy resources.

In addition to fossil fuel resources, Wyoming possesses abundant renewable energy resources including wind, solar, hydroelectric, geothermal, and biomass. Both small-scale, such solar photovoltiacs or geothermal heat pumps, and utility-scale, primarily wind energy, are important issues. Development of renewable technologies such as specific systems that can be used in agriculture production and/or farmsteads and small scale power generation where power can be sold such as wind energy are also important issues.

What has been done
To maximize outreach efforts, partnerships have been developed with the College of Engineering and Applied Science, School of Energy Resources, the Wyoming State Energy Office, Wind Energy Resource Center, USDA Rural Development, Natural Resource Conservation Service, and the Wyoming Business Council. The UW Reclamation and Restoration Center, Energy

Industry, local partners focusing on local food production are additional partners

Results
Partnerships have increased resources, both financial and human capital to maximize outreach efforts. Integrated program efforts are in progress.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

New technologies or devices used in ag production systems and/or farmsteads. Target is the number of new technologies developed.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Create awareness of research on ecosystem services affected by energy development and reclamation efforts. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oil and gas development and subsequent reclamation influence distribution and functional connectivity of sage-grouse in NE Wyoming. Sustaining and enhancing sage-grouse populations are critical management goals for the energy industry and management agencies.

What has been done
Mapped predictions of sage-grouse connectivity for focal study areas, including ranking the importance of potential reclamation and offset sites. Analyzed the generalizability of functional connectivity models for sage-grouse across Wyoming.

Results
Degree of functional connectivity can be operationalized to identify reclamation sites likely to be most effective in meeting management objectives in the context of a mitigation hierarchy. Science-based management tools may be developed to support sage-grouse mitigation actions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
131	Alternative Uses of Land
608	Community Resource Planning and Development

Outcome #5

1. Outcome Measures

Create awareness of research on the potential to produce bioenergy. Target is the number of projects reporting this outcome.

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

Brief Explanation

Funding for this new program is essential in development and implementation of both research and extension efforts. Volatile market conditions and public policy changes regarding non-renewable energy resources create a need for research and programming in alternative energy sources. Weather extremes are a factor in agriculture production outcomes regarding crops for alternative fuels.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

UW area educators and specialist conducted 17 workshops and demonstrations focusing on efficiency and conservation which reached 399 individuals. 100% of the participants reported an increase in their awareness of the topic. Program participants reported that in some instances, alternative energy options are not cost effective therefore contributed to decision making which is a positive outcome.
Partnerships with other colleges and UW schools, state and federal agencies, as well as local non-profit organizations have been established. These partnerships capitalize on both financial and human resources to produce the highest impact for programming efforts.
Educators and professional agency personnel who participated in training on renewable energy and reclamation issues reported increased knowledge, skills and increased confidence in disseminating information on these topics.

Key Items of Evaluation

Increased awareness and knowledge on sustainable energy issues. Program participants reported that in some instances, alternative energy options are not cost effective therefore contributed to decision making which is a positive outcome.
These partnerships capitalize on both financial and human resources to produce the highest impact for programming efforts.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Childhood Obesity, Nutrition, and Health

☑ 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
305	Animal Physiological Processes	0%		25%	
703	Nutrition Education and Behavior	10%		25%	
704	Nutrition and Hunger in the Population	80%		25%	
724	Healthy Lifestyle	10%		25%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	6.3	0.0
Actual Paid	10.8	0.0	5.8	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**
176626	0	296801	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
176626	0	296801	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

UW educators and specialist conducted 73 educational programs targeted to youth which reached 1,784 youth. In addition to the youth audience, 3,113 adults participated in educational programs around childhood obesity, nutrition, and health. The educational programs were designed to meet the learning objectives of the audience and were delivered in a variety of formats including one day workshops, multi session series, webinars, health fairs, and school presentations.
Examples of the educational programs for individuals include sports nutrition; healthy snacks and exercise; lessons on fats, sodium, sugar and portion sizes; dietary guidelines; nutrition labeling; nutrition of local and organic foods. Body Works is a program which was designed for and delivered to families to improve family eating and activity habits.
A special effort to educate individuals with diabetes was also offered in Wyoming. UW Extension Nutrition and Food Safety Educators teamed up with local diabetes educators and/or dietitians, to conduct Dining with Diabetes. In addition a collaboration was formed between the Downtown [Laramie WY] Clinic, UW Medical Students, UW Extension, UW Health Sciences, and UW Family & Consumer Sciences to provide diabetes education to a population that is uninsured in Laramie.
Media outreach efforts included newsletters, radio, articles in newspapers, and social media.

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 all programs regardless of their race, national origin, gender, age, religion, or disability. Specific target audience groups for the CNP (EFNEP) program: Low-income adults, and youth in Title I schools.
All other nutrition efforts were targeted to the general public, both adults and youth, and policy makers.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert". Questions from clientele receive responses on nutrition topics from Nutrition and Food Safety Educators as appropriate.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3113	100000	2332	5000

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

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	7	8

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs delivered to youth. Target is number of programs.

Year	Actual
2015	73

Output #2

Output Measure

- Number of youth participating in educational program targeting childhood obesity. Target is number of youth participating.

Year	Actual
2015	1784

Output #3

Output Measure

- Number of partnerships formed in local counties of professionals to collaborate on childhood obesity,nutrition, and health issues. Target is number of partnerships formalized.

Year	Actual
2015	12

Output #4

Output Measure

- Conduct research on obesity, nutrition, and health. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2015	21

Output #5

Output Measure

- Number of participants in educational programs offered in Nutrition initiative. Target is number of participants.

Year	Actual
2015	15287

Output #6

Output Measure

- Increased adoption of healthy food practices and participation in regular physical activities. Target is number of participants reporting outcome.

Year	Actual
2015	3812

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improved knowledge of My-plate, serving sizes, and physical activity. Targets are the number of participants reporting outcome.
2	Improved eating behavior practices, food choices, and lifestyle habits. Targets are the number of participants reporting outcome.
3	Individuals gain awareness, knowledge and skills related to: improved attitude about healthy eating; increased knowledge of healthy food choices; improved skills in selection of healthy foods; improved body image. Target is number of participants reporting outcome.
4	Youth incorporate skills and change behaviors related to: increased physical activity; increased knowledge of healthy food choices; improved selection of healthy foods; understanding of serving sizes; improved body image.
5	Youth and families experience: improved nutritional health; reduced medical costs; health improved through community opportunities; healthier weight; decreased risk factors for nutrition-health related problems. Target is number of participants reporting outcome.
6	Create awareness of research on obesity, nutrition, and health. Target is the number of projects reporting this outcome.

Outcome #1

1. Outcome Measures

Improved knowledge of My-plate, serving sizes, and physical activity. Targets are the number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	5445

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the State of Obesity: Better Policies for a Healthier America, Wyoming has the 27th highest adult obesity rate in the nation, currently at 29.5 % up from 16.6% in 2000. In a recent report published by the CDC, statistics on youth indicate that 13% of adolescents were overweight and 11 % were obese. Many adolescents also reported being inactive: 76% did not attend daily physic led classes on all 5 days of school; 72% were not physically active at least 60 minutes per day; and 22% of adolescents watched television 3 or more hours on an average school day.

With hectic lifestyles, convenience foods and eating out has increasingly become more common along with a decrease in physical activity. As a result obesity related health issues, such as diabetes, coronary heart disease, stroke and some cancers, have continued to increase.

What has been done
Workshop topics related to My-plate, serving sizes, and physical activity were delivered to 5,445 youth and adults. Youth were reached through series of classes conducted in schools by 4-H, Nutrition and Food Safety and Cent$ibile Nutrition educators. Examples of formal classes taught in the school include: How Big is Big: Portion Distortion; Supermarket Persuasion; Healthy Snacks and Exercise; Watching Fats, Sugar, and Sodium.

Examples of topics taught in non-formal workshops included: Twelve Weight-loss and Nutrition Myths; Feeding Your Picky Eater; Balanced Living Classes: Feeding Your Body; Managing Your Stress; Reading Nutritional Information on Labels; and Watching Fats, Sugar, and Sodium.

Outreach to the general included newsletter articles, newspaper columns, radio spots and educational displays at farmers markets and health expos.

Results
UW Extension Educators reported reaching 2,332 youth in nutrition programs. Youth learned about healthy nutrition using MyPlate, how to identify appropriate serving sizes, influences media and marketing have on decision making about food purchases, the amount of sugar, fat and sodium found in processed foods, how to read nutrition labeling effectively, and ways to increase physical activity each day.

Programs taught by Cent$ible Nutrition Educators reached 5,351 youth of whom 92.5% improved in one or more of the nutritional core areas. 85% of youth improved knowledge or skills necessary to choose foods consistent with Federal Dietary Guidelines, and 37% of youth improved physical activity practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Improved eating behavior practices, food choices, and lifestyle habits. Targets are the number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	3539

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the State of Obesity: Better Policies for a Healthier America, Wyoming has the 27th highest adult obesity rate in the nation, currently at 29.5 % up from 16.6% in 2000. In a recent report published by the CDC, statistics on youth indicate that 13% of adolescents were overweight and 11 % were obese. Many adolescents also reported being inactive: 76% did not attend daily physic led classes on all 5 days of school; 72% were not physically active at least 60 minutes per day; and 22% of adolescents watched television 3 or more hours on an average school day.

With hectic lifestyles, convenience foods and eating out has increasingly become more common

along with a decrease in physical activity. As a result obesity related health issues, such as diabetes, coronary heart disease, stroke and some cancers, have continued to increase.

What has been done
UW Extension Nutrition and Food Safety Educators teamed up with local diabetes educators and/or dietitians, to conduct Dining with Diabetes in Wyoming. This five-session program, conducted 3 times, combined education on diabetes self-care with recipe demonstrations, food tasting, nutrition information, and low-impact physical activity for people of all fitness levels. A collaboration was also formed between the Downtown Clinic (Laramie WY), UW WWAMI Medical Students, UW Extension, UW Health Sciences, and UW Family & Consumer Sciences to provide diabetes education to a population that is uninsured in Laramie. Teaching people with Diabetes basic lifestyle measurers to help control blood glucose has the potential to not only maintain but improve their quality of life.

Results
By the end of Dining with Diabetes program, 100% of the participants showed an increase in understanding of which vegetables are examples of "starchy" vegetables; increased understanding of which foods provide carbohydrates; and an increased understanding of which foods contain trans fats. One participant shared "I learned how important it is to monitor my intake of carbohydrates as well as sugars and to reduce the amount of starchy vegetables that I eat".

Twenty-eight uninsured Downtown Clinic patients with prediabetes or Type 2 DM, received education and guidance on setting goals and follow up on progress with their goals by the medical students. Participants reported being "very satisfied" with the education and showed a mean knowledge score increase from 4.3 before the training to 7.4 after the training. Of the participants who completed a pre and post questionnaire, they improved their confidence in being able to: identify what they could do to lower their risk to heart disease; they could identify foods that raise their blood sugar; they could set an exercise schedule; they could use a blood glucose monitor; they could identify the carbohydrate in their diet.

Teaching people with Diabetes basic lifestyle measures to help control blood glucose has the potential to not only maintain but improve their quality of life.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

Individuals gain awareness, knowledge and skills related to: improved attitude about healthy eating; increased knowledge of healthy food choices; improved skills in selection of healthy foods; improved body image. Target is number of participants reporting outcome.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Youth incorporate skills and change behaviors related to: increased physical activity; increased knowledge of healthy food choices; improved selection of healthy foods; understanding of serving sizes; improved body image.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1982

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the State of Obesity: Better Policies for a Healthier America, Wyoming has the 27th highest adult obesity rate in the nation, currently at 29.5 % up from 16.6% in 2000. In a recent report published by the CDC, statistics on youth indicate that 13% of adolescents were overweight and 11 % were obese. Many adolescents also reported being inactive: 76% did not attend daily physic led classes on all 5 days of school; 72% were not physically active at least 60 minutes per day; and 22% of adolescents watched television 3 or more hours on an average school day.

With hectic lifestyles, convenience foods and eating out has increasingly become more common along with a decrease in physical activity. As a result obesity related health issues, such as diabetes, coronary heart disease, stroke and some cancers, have continued to increase.

What has been done
UW Extension Educators taught 6 programs focused on sports nutrition. 411 youth and adults were reached through the sports nutrition programs.

Outreach to the general included newsletter articles, newspaper columns, radio spots and educational displays at farmers markets and health expos.

Results
Participants learned about the importance of proper nutrition, healthy pre-and post exercise snacks, hydration, and sleep in regards to performance.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #5

1. Outcome Measures

Youth and families experience: improved nutritional health; reduced medical costs; health improved through community opportunities; healthier weight; decreased risk factors for nutrition-health related problems. Target is number of participants reporting outcome.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Create awareness of research on obesity, nutrition, and health. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wyoming is experiencing a demographic shift toward an older population. Projections indicate that by 2030, Wyoming will be among states with the highest concentration of individuals over age 85.

What has been done
This project will develop a set of asset maps that can be used by community stakeholders to identify and visualize connections and partnerships, as well as resource density, in relation to the dispersion of the state?s older population.

Results
Given the vast topography of Wyoming and the wide dispersion of its population, it is imperative that policymakers and service providers have accurate information about where older adults reside relative to programs and services available to serve them.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

External factors which affected the Nutrition and Food Safety Initiative team's programming included high staff turn over for Area Extension Educators and Cent$ible Nutrition Educators. Competing programs for time and financial resources also affect participation numbers in programs as well as the ability to collaborate with state and federal partners, and schools.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

UW Extension Educators reported reaching 2,332 youth in nutrition programs. Youth learned about healthy nutrition using MyPlate, how to identify appropriate serving sizes, influences media and marketing have on decision making about food purchases, the amount of sugar, fat and sodium found in processed foods, how to read nutrition labeling effectively, and ways to increase physical activity each day.

Programs taught by Cent$ible Nutrition Educators reached 5,351 youth of whom 92.5% improved in one or more of the nutritional core areas. 85% of youth improved knowledge or skills necessary to choose foods consistent with Federal Dietary Guidelines, and 37% of youth improved physical activity practices.

Twenty-three families (N=49) participated in the Body Works pilot. Post evaluations determined participants' satisfaction with the course, change in knowledge, and potential practice changes. On a scale of 1 to 4 (4=very satisfied), the participants rated the relevance of information to their needs as 3.8. Adults reported the greatest change of knowledge in the following areas: planning a healthy meal; MyPlate; and cooking. 100% of the participants indicated they gained knowledge in Planning a healthy meal and MyPlate. Youth reported increased learning in planning a healthy meal, the benefits of eating with your family, and cooking. 80% of the adult participants indicated the following changes in their behavior as the course progressed: exercise more with my child/children; eat more meals together; and help prepare more meals at home. 50% of the youth indicated they intend to eat more healthy foods.

Diabetes education continued to be a programing area for UW Extension programs. 100% of the Dining with Diabetes participants showed an increase in understanding of which vegetables are examples of "starchy" vegetables; increased understanding of which foods provide carbohydrates; and an increased understanding of which foods contain trans fats. One participant shared "I learned how important it is to monitor my intake of carbohydrates as well as sugars and to reduce the amount of starchy vegetables that I eat." Twenty-eight uninsured Downtown Clinic patients with prediabetes or Type 2 DM, received education and guidance on setting goals and follow up on progress with their goals by the medical students. Participants reported being "very satisfied" with the education and showed a mean knowledge score increase from 4.3 before the training to 7.4 after the training. Of the participants who completed a pre and post questionnaire, they improved their confidence in being able to: identify what they could do to lower their risk to heart disease; they could identify foods that raise their blood sugar; they could set an exercise schedule; they could use a blood glucose monitor; they could identify the carbohydrate in their diet.

Key Items of Evaluation

Participants in nutrition programs learned about healthy nutrition using MyPlate, how to identify appropriate serving sizes, influences media and marketing have on decision making about food purchases, the amount of sugar, fat and sodium found in processed foods, how to read nutrition labeling effectively, and ways to increase physical activity each day.
Teaching people with Diabetes basic lifestyle measurers to help control blood glucose has the potential to not only maintain but improve their quality of life.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Food Safety

☑ 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
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	90%		90%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	2.0	0.0
Actual Paid	3.0	0.0	1.7	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**
48170	0	66114	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
48170	0	66114	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Wyoming Food Safety Coalition is a partnership between the University of Wyoming Extension, the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies. Educational programs through the Wyoming Food Safety Coalition target food industry employees, day care providers, and the general public.
ServSafe is one of the programs coordinated and taught through the Wyoming Food Safety Coalition. This 8 hour, face to face training provided food service employees the opportunity to certify nationally and to obtain the ServSafe Food Protection Certification. ServSafe and ServSafe Starter classes in Spanish were also conducted throughout Wyoming.
Educational programs on handwashing and food safety practices were delivered to youth through the school system.
Educational programs on food preservation used multiple methods to ensure safety of the end product. Food preservation programs for adults and youth included pressure and water-bath canning, freezing, and drying foods.
Research continued to focus on more rapid methods of detection of food-borne pathogens such as E.coli and Listeria. Ultimately delineate genes that promote survival in the environment and result in disease contamination of food. Research also continues on toxoplasma gondii infection from undercooked meats which may alter the course of brain aging-related diseases.
Outreach efforts included newsletters, radio, articles in newspapers, social media, and educational displays at community events.

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 all programs regardless of their race, national origin, gender, age, religion, or disability. Specific target audience groups for the CNP (EFNEP) program: Low-income adults, and youth in Title I schools. All other food safety efforts targeted audiences include: general public, both adults and youth, and policy makers.

3. How was eXtension used?

eXtension is utilized as a resource for educators and clientele. The link to eXtension is prominently displayed on the UW Extension Web site home page. Additionally all extension employees are made aware of professional development opportunities available through eXtension. UW Extension participates in "Ask an Expert"; food safety questions submitted by clientele receive responses from Nutrition and Food Safety Educators or State Specialists.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5161	100000	1056	3000

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

Patent Applications Submitted

Year:	2015
Actual:	1

Patents listed
Use of Listerial Exopolysaccharide Degrading Proteins.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	10	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research on the ability to detect, analyze, and prevent the presence of food-borne pathogens and harmful chemicals in food products. Target is the number of research publications, bulletins, reports, and presentations.

Year	Actual
2015	20

Output #2

Output Measure

- Number of food safety programs which promote safe handling practices in the public and food service industry.

Year	Actual
2015	104

Output #3

Output Measure

- Number of partcipants in educational programs offered by the Wyoming Food Safety Coalition.

Year	Actual
2015	3174

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improve personal hygiene such as hand washing. Avoidance of cross-contamination resulting in keeping foods safe. Target is the number of participants reporting outcome.
2	Increased awareness and knowledge of food safety practices. Target is the number of participants reporting outcome.
3	Transfer of knowledge on research evaluating the ability to detect, analyze, and prevent the presence of food-borne pathogens and harmful chemicals in food products. Target is the number of projects reporting this outcome.
4	Food service industry personnel pass ServSafe certification test. Target is the number of participants who complete course and pass test of the National Restaurant Association.

Outcome #1

1. Outcome Measures

Improve personal hygiene such as hand washing. Avoidance of cross-contamination resulting in keeping foods safe. Target is the number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	4663

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Microbial contamination of food is a serious public health problem: Each year in the U.S., food-borne diseases cause approximately 48 million illnesses, 128,000 hospitalizations, and 3,000 deaths. It is estimated that the average cost per foodborne illness is $1,850. Adults and youth in the general public are important groups to reach with food safety education because their behaviors greatly affect the safety of food that they serve to others and/or eat themselves.

With approximately 60 percent of food-borne illness outbreaks nationwide attributable to food-service establishments, food-service personnel are key to reducing the risk of food-borne illness.

What has been done
The Wyoming Food Safety Coalition is a partnership between the University of Wyoming Extension, the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies. Educational programs through the Wyoming Food Safety Coalition target food industry employees, day care providers, and the general public.

UW Extension Educators delivered programs on personal hygiene (spreading germs and hand washing) and basic food safety practices for youth through the school formal school system.

Outreach efforts included newsletters, radio, articles in newspapers, social media, and educational displays at community events.

Results
Based on data from an evaluation project conducted by UW Extension for the WFSC, this year 97 percent of participants made at least one change related to cleanliness, for example, washed their hands more often. Another 78 percent made at least one change related to food preparation,

for example, prevented cross-contamination by keeping raw meats, cooked foods, and fresh produce separated.

Elementary students who participated in the school programs learned how quickly germs multiply and about proper hand washing before handling food. They were engaged in a demonstration highlighting why warm water and soap are more effective than using hand sanitizing wipes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Increased awareness and knowledge of food safety practices. Target is the number of participants reporting outcome.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	6217

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Microbial contamination of food is a serious public health problem. It is estimated that the average cost per foodborne illness is $1,850. Over 44,000 households across Wyoming practice home preservation of food. Unfortunately, a large percentage of home canners are using unsafe practices that put them at high risk for food spoilage and foodborne illness. These risks can be prevented through the use of research-based canning methods.

What has been done
The Wyoming Food Safety Coalition is a partnership between the University of Wyoming Extension, the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies. Educational programs through the Wyoming Food Safety Coalition target food industry employees, day care providers, and the general public.

Safe and Nutritious Home Food Preservation programs for adults and youth included hands-on experience and classroom instruction on research-based home food preservation methods. Workshop topics included water-bath and pressure canning as well as freezing, dehydrating, and vegetable fermentation.

Outreach efforts included newsletters, radio, articles in newspapers, social media, and educational displays at community events.

Results

386 individuals participated in the Safe and Nutritious Home Food Preservation programs and standard evaluations were collected from 119 of these participants. On a four-point scale, participants rated the relevance of the information at 3.8. One participant shared 'I appreciate the hands-on opportunity. Bringing something home furthers education for other family members". 93% of participants indicated an increase in knowledge of food safety topics. A large percentage of participants indicated intentions to adopt important food safety practices as a result of these programs. These behavior changes included properly venting when pressure canning, correctly adjusting recipes for altitude, and following tested recipes. Additionally, 72% of participants indicated intentions to preserve more fruits and vegetables at home as a result of this program.

Based on data from an evaluation project conducted by UW Extension for the WFSC, this year 80% of the participants made at least one change related to cooling food, for example, putting food into a shallow container or cutting meat into smaller pieces before putting it in the refrigerator.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

Transfer of knowledge on research evaluating the ability to detect, analyze, and prevent the presence of food-borne pathogens and harmful chemicals in food products. Target is the number of projects reporting this outcome.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2015	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Toxoplasma gondii infection often results from ingestion of undercooked meats. Toxoplasmosis results in clinically silent infection in humans that involves brain and skeletal muscle.

What has been done
Studies with mice have demonstrated there is an interaction between T. gondii and Huntington's disease.

Results
Prevalent Toxoplasma gondii infection may alter the course of brain-aging-related diseases, such as Huntington's disease.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #4

1. Outcome Measures

Food service industry personnel pass ServSafe certification test. Target is the number of participants who complete course and pass test of the National Restaurant Association.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	503

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Microbial contamination of food is a serious public health problem: Each year in the U.S., food-borne diseases cause approximately 48 million illnesses, 128,000 hospitalizations, and 3,000 deaths. It is estimated that the average cost per foodborne illness is $1,850.

With approximately 60 percent of food-borne illness outbreaks nationwide attributable to food-service establishments, food-service personnel are key to reducing the risk of food-borne illness.

What has been done
The Wyoming Food Safety Coalition is a partnership between the University of Wyoming Extension, the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies. Educational programs through the Wyoming Food Safety Coalition target food industry employees, day care providers, and the general public.

Coalition team members trained 1,474 food handlers in the following workshops: Wyoming Food Safety Fundamentals, ServSafe, and other programs for temporary food permits, sanitation training and ?Food Safety Works? programs. ServSafe and ServSafe Starter classes in Spanish were also conducted throughout Wyoming.

Outreach efforts included newsletters, radio, articles in newspapers, social media, and educational displays at community events.

Results
503 individuals participated in the ServSafe programs and 81% of those participants passed the exam and received a five-year certification, valid throughout the U.S.

Of the 432 participant's in WFSC's ServeSafe and ServSafe Starters workshops: 94% passed the certification exam. Participants also reported the following behavior changes regarding food safety:

80% made at least one change in regard to cooling food (using shallow containers for cooked foods before refrigeration).
78% made at least one change related to food preparation (prevented cross-contamination by separating raw meats, cooked foods, and fresh produce).
75% made at least one change such as monitored critical control points more closely.
70% made at least one change related to cooking food (use a stove or microwave to reheat food, rather than reheating on a steam table).

Improved food handling behaviors such as those listed above increase the likelihood that food served in Wyoming is safe, and therefore, that lives have been saved, illnesses avoided, health care costs controlled, fewer work days missed, and local businesses and institutions made stronger.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

External factors which affected the Nutrition and Food Safety Initiative team's programming included high staff turn over for Area Extension Educators. Competing programs for time and financial resources also affect participation numbers in programs as well as the ability to collaborate with state and federal partners, and schools. Changing demographics within the state, specifically an increase in the number of Hispanic employees in the food service industry, require changes in program delivery.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Based on data from an evaluation project conducted by UW Extension for the WFSC, this year 97 percent of participants made at least one change related to cleanliness, for example, washed their hands more often. Another 78 percent made at least one change related to food preparation, for example, prevented cross-contamination by keeping raw meats, cooked foods, and fresh produce separated.

Elementary students who participated in the school programs learned how quickly germs multiply and about proper hand washing before handling food. They were engaged in a demonstration highlighting why warm water and soap are more effective than using hand sanitizing wipes.

386 individuals participated in the Safe and Nutritious Home Food Preservation programs and standard evaluations were collected from 119 of these participants. On a four-point scale, participants rated the relevance of the information at 3.8. 93% of participants indicated an increase in knowledge of food safety topics. A large percentage of participants indicated intentions to adopt important food safety practices as a result of these programs. These behavior changes included properly venting when pressure canning, correctly adjusting recipes for altitude, and following tested recipes. Additionally, 72% of participants indicated intentions to preserve more fruits and vegetables at home as a result of this program.

503 individuals participated in the ServSafe programs and 81% of those participants passed the exam and received a five-year certification, valid throughout the U.S. Participants in the ServSafe classes reported making the following behavior changes: cooling food properly; separating raw meats, cooked foods, and fresh produce to prevent cross-contamination; monitor critical control points more closely; and properly reheating foods.

Research: Toxoplasma gondii infection often results from ingestion of undercooked meats. Studies have demonstrated prevalent Toxoplasma gondii infection may alter the course of brain-aging-related diseases, such as Huntington's disease.

Key Items of Evaluation

Improved food handling behaviors increase the likelihood that food served in Wyoming is safe, and therefore, that lives have been saved, illnesses avoided, health care costs controlled, fewer work days missed, and local businesses and institutions made stronger.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
1982	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
2	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
3936	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
1	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
1	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.