

# 2012 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. Agriculture, as well as land-grant institutions, is challenged to compete in a global economy while still responding to the needs of a diverse U.S. population. 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 and information needs of students, Wyoming citizens and communities, 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, Profitable and Sustainable Agriculture Systems, 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. UW Extension added the new program areas to its reporting system to capture time and effort beginning with FY2011. Fiscal year 2012, 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 Master Cattleman, the High Plains Ranch Practicum, Range 101 School, Dining with Diabetes, Wyoming Youth Leadership Education (WYLE) and Extension Volunteer Organization for Leadership, Vitality, and Enterprise (EVOLVE) institutes report strong impacts for citizens of the state. Additionally, Local Food Expos held in five locations across the state demonstrate strong interdisciplinary efforts between agriculture, horticulture, and nutrition education to advance whole foods and consumption of local products. 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; the incumbent for this position has completed three years. 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: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	104.0	0.0	55.2	0.0
Actual	100.0	0.0	42.4	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. 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. The joint research and extension needs assessment conducted in 2004 was used as a baseline for determining efforts for this POW. 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 2012 a guide was developed and training was conducted for area teams to prepare for implementation. 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 on reaching limited resource audiences in the Cent\$ible Nutrition Program which includes EFNEP. County 4-H educators conducted 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. In 2007 UW Extension had a CSREES program review of the total extension system. Both Research and Extension went through an academic planning process which was integrated into the College of Agriculture and Natural Resources plan. The College of Agriculture and Natural Resources Academic Plan was approved as part of the 2009 to 2013 University of Wyoming Academic 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 are gathering stakeholder input 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. The 2009 - 2013 Academic Plan recommended revision of structured advisory committees. Modified focus groups will 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 2012, 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. Advisory Committee and 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, 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. Beginning 2012 focus groups are 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 UW Extension initiative teams to identify emerging issues. Input gathered is used in program planning, evaluation of current programs, and redirection of programs when applicable. Stakeholder input from area advisory groups, county commissioners, and area teams assist in staffing priorities. Search committees comprised of local stakeholders

provide input on screening, interviewing and hiring decisions for UW Extension and AES. Input from all sources is used in development, implementation, and evaluation of Extension and Research programs. Stakeholder input is collected through a variety of methods to reach the broadest scope of individuals and groups in Wyoming. The AES utilizes annual advisory meetings to gain input on research activities. Surveys, both mail and on-line, are used to assess needs. Production agriculture research priorities are continuously updated based on stakeholder input. These priorities are posted on the AES website to help guide applied research efforts. 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.

### **Brief Explanation of what you learned from your Stakeholders**

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](http://www.uwyo.edu/uwexpstn/_files/docs/production-ag-research-priorities.pdf)

4-H and Youth Development - 1) increase volunteer training, 2) increase afterschool and summer programs for non-traditional 4-H 3) develop school mentorship programs and programs that address high risk behaviors 4) initiate workforce skill training for youth including college visits; 5) increase marketing efforts to reach underserved youth and retain older youth in the program.

Community Development Education - 1) continue financial management training efforts to include youth; 2) expand efforts in leadership development including leadership institutes in rural areas, 3) expand non-profit board training; 4) municipal employee training; 5) research on economic analysis of federal land management planning is essential to the state.

Childhood Obesity, Nutrition and Health- 1) obesity continues to be identified as a priority issue for adults and youth. 3) basic nutrition and cooking skills. 4) sustainable food and agriculture systems including growing, preserving, and preparation of foods; 5) childhood obesity.

Food Safety - 1) expand efforts in food safety at both food service and consumer level. 2) Research on the safety of food is essential to consumer confidence. 3) Safe food preservation techniques. 4) Increase outreach to Spanish speaking clientele.

Global Food Security and Hunger, Crop, Livestock, and Horticulture Systems - 1) specialty crops and alternative forages; 2) increased need for educational programming for small acreage owners, 3) mediation training is needed for agriculture producers due to increased land use for energy expansion and federal land agencies; 4) new methods to deliver information are needed such as newspaper inserts, current information on Web site, and utilize the Northern Ag Network radio stations to reach producers.

Sustainable Management of Rangeland Resources - 1) hands-on range monitoring workshops, 2) water management including quality, quantity and efficient use 3) drought and ranch sustainability ;4) small acreage workshops to educate new land owners; 5) water management, livestock/wildlife interface; 6) and coalbed methane water quality. 7) Address reclamation issues facing agriculture producers.

Sustainable Energy: 1) renewable energy - 2) energy development and reclamation; 3) energy including wind, oil, gas and the impact on agriculture.

Climate Change: 1) identify sustainable cropping systems and variety selection in the face of climate change 2) develop improved soil properties in light of rising CO2 levels.

IV. Expenditure Summary

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
1539533	0	1947236	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
<b>Extension</b>			<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	1539533	0	1947236	0
<b>Actual Matching</b>	1539533	0	1947236	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	3079066	0	3894472	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous</b>				
<b>Carryover</b>	0	0	0	0

## V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Community Development Education
2	4-H and Youth Development
3	Sustainable Management of Rangeland Resources (SMRR)
4	Global Food Security and Hunger, Crop, Livestock and Horticulture Systems
5	Climate Change
6	Sustainable Energy
7	Childhood Obesity, Nutrition, and Health
8	Food Safety



**V(A). Planned Program (Summary)**

**Program # 1**

**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%		5%	
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%		17%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		18%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	2.1	0.0
Actual Paid Professional	11.0	0.0	4.4	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
169349	0	202072	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
169349	0	202072	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 and research activities and efforts of the CDE program include:

Development of models to explain the potential impact policy changes have on the ability of communities to capture and retain dollars.

Family Resource Management programs will reach out to a broad spectrum of constituents throughout Wyoming using a variety of anticipated programs. Outputs include methods such as train-the-trainer workshops, home-study courses, and such approaches as the Internet ([www.uwyo.edu/CES/FRM/](http://www.uwyo.edu/CES/FRM/)), blogs, and Webinars. Also included are publications, meetings, news releases, and feature articles.

Community-based leadership training institutes; (EVOLVE) Extension Volunteer Organization for Leadership Vitality and Education. Skill training workshops; i.e., board training. General public information and educational efforts; i.e., public media materials; information/educational meetings and workshops; books, booklets, bulletins, training materials; providing data. Facilitation of community processes.

Analyses of community data and economic impact. Assessments to identify individual strengths and areas to be strengthened to guide personal development and grow talent. Media resources to promote community capital development Extension education and increase awareness of Extension resources.

Outputs for entrepreneurship programs include publications and one-on-one consultations, and web sites.

Training institute for municipal clerks and treasurers to develop workforce and soft skills in developing capacity in their city/county roles. In 2012 The Wyoming Municipal Institute provided by UW Extension and the Wyoming Association of Clerks and Treasurers provided certification for attendees.

Research efforts will include 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 the educational

products for financial management programs will be all individuals (including youth and senior citizens), families (including low-income families), and in general people at risk of experiencing financial stress. The group of educators, specialists, and faculty responsible for leading and delivering the outputs in the program is the smallest of the University of Wyoming's Extension initiative teams. A priority for program development is to use methods of information and instruction that make it possible for the most constituents to be assisted while minimizing face-to-face work. Thus the team will emphasize train-the-trainer courses, newsletters, and electronic delivery of information and programming.

Targeted audiences for leadership development include: 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. Federal/state/local agency leaders/members.

Entrepreneurship programs target 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 Wyoming 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.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	3230	500	85	200

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

**Patent Applications Submitted**

Year: 2012

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	2	14	16

**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.

<b>Year</b>	<b>Actual</b>
2012	11

**Output #2**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	3315

**Output #3**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	167

**Output #4**

**Output Measure**

- Entrepreneurship output targets include: number of individuals assisted.

<b>Year</b>	<b>Actual</b>
2012	180

**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, and ability to make informed decisions on land management and community development.

<b>Year</b>	<b>Actual</b>
2012	80

**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: Transfer of knowledge regarding decisions on public land management and community development.
5	Research: Development of impact models that will contribute to community development as well as mitigate unwanted consequences. Target is number of impact models developed.

## **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 Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	778

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Many county-appointed and non-profit board members and elected officials want to complete their assigned duties yet lack the skills and training needed to perform to the best of their ability. County Commissioners and the Wyoming Association of Municipalities have identified the need to provide training to current and new board members so they might properly fulfill their duties and responsibilities. The UW Extension Community Development Education (CDE) initiative team developed materials to support training programs for county boards and Municipal treasurers.

#### **What has been done**

The CDE team developed curriculum and educational materials to support the program. Area educators used the materials to develop a four-hour educational program for county-appointed and non-profit boards in the state. The team has partnered the Wyoming Association of Municipal Clerks and Treasurers (WAMCAT). The team received approval from the International Institute of Municipal Clerks and the Association of Public Treasurers for meeting certification and continuing education requirements. In 2012 778 individuals participated in training including 76 in a comprehensive Wyoming Municipal Institute.

#### **Results**

Over the past five years board training has taken place. The NE Area CDE educator conducted a Web-based follow up survey administered at least 6 months following the course. Ninety four percent believe they are more effective board members, and 78 percent believe their confidence increased. Sixty eight percent increased meeting facilitation skills, and 53 percent increased skills in parliamentary law. Fifty eight percent believe they are better at fulfilling their board responsibilities while 45 percent improved in planning and organizing. Thirty-nine percent improved in handling conflict and 77 percent improved in their leadership skills.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Actual</b>
2012	259

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

In the last decade Wyoming has experienced significant economic growth stemming from its natural resources of gas,oil, and coal. Jobs in the energy sector pay well, most residents hold service sector positions that are typically low paying and are often seasonal. 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. The second critical issue is the spending habits of adolescents. Many adolescents earn income, of which they spend 98 percent, and do not have to pay for many living expenses such as housing. 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. Financial blogs were also implemented in 2011.

**What has been done**

Family resource management courses were taught using a variety of methods from multi-session classes meeting to blogs and webinars. One time 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. Youth were reached through camps and specific courses on money management. A stronger on-line approach is being developed to reach this audience. Youth were reached through a community camp focusing on financial literacy.

**Results**

End of session evaluations indicated over 90 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.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
2012	99

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Leadership development was identified as a need by the Wyoming Rural Development Council's Community Assessments. The Wyoming Business Council has shared their vision of community economic development using a building block model. At the base are three blocks; leadership development, workforce development, and community capacity building. The second level has two blocks, existing business development and entrepreneur development, and one block on the top for recruiting.

**What has been done**



In FY 2012, five EVOLVE leadership institutes were held. Each institute meets monthly for 8 sessions ranging from 6 - 8 hours in length. Topics covered include teambuilding, communication, conflict management, a fishbowl simulation of leadership assessment, community involvement, and overall leadership. Educators also conducted assessments for Wyoming LEAD, and marketing sessions for the institutes. Additionally educators have worked with three existing community leadership programs sharing the EVOLVE model.

**Results**

In 2012, 99 individuals graduated from EVOLVE community leadership institutes in Wyoming. Weekly session evaluations and a end of course written evaluation indicated 100 percent of participants reported their leadership behavior (communication, conflict management, meeting organization) improved. Over 90 percent reported their participation in community events increased as a result of participation in the program. This program which began in 1995 has become a model for the country. A sample of participant comments:

"I've always been a go-getter and have a habit of doing it "all" myself. The classes have given me tools to organize a team and share responsibilities in reaching a common goal." " The most significant thing I learned is that anyone can develop the skill set, talent and abilities to become a great leader."

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

**Outcome #4**

**1. Outcome Measures**

Research: Transfer of knowledge regarding decisions on public land management and community development.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	10

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The audiences for the outcomes consist of policy makers, landowners, land use planners, land trusts, federal and state agency personnel, other researchers, elected officials and concerned

citizens. Research offers insights as to maximizing benefits and minimizing damages and costs from land use decisions. This includes fiscal impacts of development and the ecosystem services implications of land use changes.

**What has been done**

Analysis of emerging conservation easement markets is becoming an important public/private tool in addition to standard land use controls. Stated choice analysis using a random utility model and mixed logit estimation techniques indicated difference between Colorado and Wyoming landowner preferences for conservation easement programs. It also indicates that land trusts have different missions that influence the types of Conservation Easements they would pursue. The research is designed to improve the decision making environment for program providers and participants. These results are being shared with the academic community, extension educators, land trusts and producer groups.

**Results**

The research relates to open space preservation/conservation issues across a variety of natural resource considerations, particularly land and water resources. Exurban sprawl and landscape fragmentation continue to be critical issues with respect to resource management, local governance, and rural community development. There are implications for the costs of infrastructure development and public service provision as per the arrangement of people on the landscape and the conversion of extensive agricultural lands into large lot exurban parcels.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

**Outcome #5**

**1. Outcome Measures**

Research: Development of impact models that will contribute to community development as well as mitigate unwanted consequences. Target is number of impact models developed.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
-------------	---------------

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The research offers insights as to how land use decisions may affect the provision of public services in a rural community. This ultimately affects community budgets and development decisions. The audiences for the outcomes consist of landowners, land use planners, land trusts, federal and state agency personnel, other researchers, elected official, taxpayers, and concerned citizens.

**What has been done**

GIS technology and economic models have provided insights as to why dispersed residential development brings greater cost per unit tax revenue when law enforcement resources are used to achieve public safety. These results are being shared with county planning groups.

**Results**

The research relates to cost conserving and efficient rural development. Public service provision can be shown to be dependent in part on the patterns of rural development. Exurban sprawl and landscape fragmentation continue to be critical issues with respect to resource management, local governance, and rural community development.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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 will 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. Many communities are under pressure to deal with multiple changes/issues. A significant portion of community members often resist such change or choose to ignore it. Resources will continue to be scarce and may diminish. The CDE team is only one of five UW Extension SIT teams. Consequently, UW Extension resources brought to bear on this objective will be limited. In the past year there has been one area educator position vacant due to failed searches for a successful candidate. 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**

The CDE team utilizes a variety of evaluation methods to collect outcome data from programs. Board training is a major thrust of the team. A follow up survey was conducted, using a Website developed by the University of Wyoming Survey Tool. Participants of board training were invited to participate in the survey at least 6 months after attendance. Included were participants from 2008 to 2012.

Participants indicated that they have used the training on effective meeting facilitation, parliamentary procedure, roles and responsibilities, open meetings law, and legal responsibilities the most.

In the area of skill enhancement, 91% of respondents felt they were more effective as board members while 78% felt their confidence had increased. In addition, 68% increased their skills in meeting facilitation, and 53% in parliamentary law. Fifty eight percent feel they are better at fulfilling their board responsibilities, while 45% improved in planning and organizing, 39% in handling conflict, and 77% increased their leadership roles. In summary, the involvement of 70% of respondents was strengthened.

Process skills are key to building community capacity. Conflict management classes taught statewide provided the following results. Fifty participants provided feedback on knowledge and skills gained.

The results from the evaluation show that the majority of participants acquired the necessary knowledge and skills to positively manage conflict.

- 86 percent agreed that at the end of the workshop they could list up to three conflict resolution strategies.
- 94 percent agreed that they could successfully compare/contrast interests and positions.
- 88 percent agreed that they had learned how to use strategies to prevent conflict.
- 88 percent agreed that their participation in the workshop would help them to be more effective in their work/personal life.
- 90 percent of the attendees found that the workshop was a valuable or very valuable experience.

End of session evaluations on all programs showed knowledge gained and skills improved. Over half of respondents indicated they planned to make positive changes as a result of classes.

## **Key Items of Evaluation**

Capacity for serving on governmental or non-profit boards increased as a result of educational programming by UW Extension. Over 91 percent report more confidence and skills working on boards.

Extension Volunteer Organization for Leadership, Vitality, & Enterprise (EVOLVE) the curriculum utilized for community leadership programs has become a model for the Western States. In place for over 15 years, the program has success in developing capacity of community members to serve in leadership roles.

**V(A). Planned Program (Summary)**

**Program # 2**

**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%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	31.0	0.0	0.0	0.0
Actual Paid Professional	33.0	0.0	0.0	0.0
Actual Volunteer	12.0	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
508046	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
508046	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 include volunteer training on the following topics: Ages and stages of youth; Risk Management; Youth Development Concepts; Non-profit Management/Coordination; Financial Management/IRS Issues; Project Training; Learning Styles; Club Maintenance; Recruitment and Retention.

Traditional 4-H will focus on project or leadership activities; teach and/or facilitate educational programs; recruitment of new members, training, camps, clinics, contests, media, and assessment.

Non-traditional 4-H activities will include: Cloverbuds (pre 4-H); After School Programs; School Enrichment; Youth Leadership; Marketing; and Camps.

**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 Extension programs regardless of their race, national origin, gender, age, religion, or disability. 4-H Volunteers will be recruited from the following groups: Adults in the community, other agencies, civic groups, youth groups, and the general public.

Traditional 4-H youth audiences will target:

- Youth
- Volunteers
- Families
- Community.

The target audience for non-traditional 4-H will include: 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.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	4683	10000	25242	20000

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

**Patent Applications Submitted**

Year: 2012

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	0	0	0

**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
2012	8932

**Output #2**

**Output Measure**

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

Year	Actual
2012	786

**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
2012	2946

**Output #4**

**Output Measure**

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

Year	Actual
2012	3261



**Output #5**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	524

**Output #6**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	9628

**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**

<b>Year</b>	<b>Actual</b>
2012	16496

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

In Wyoming there are an estimated 75,000 youth between the ages of 8 and 18 according to the U.S. Census Bureau. According to the Search Institute, 'youth who have ten or fewer of the 40 external and internal assets are at high risk of developing at-risk behaviors'. All of the 40 external and internal assets are likely to be developed by youth involved in the 4-H program. Youth in the traditional 4-H program have the opportunity to expand their knowledge base, increase their life skills and develop leadership abilities in order to become responsible, contributing citizens.

#### **What has been done**

4-H youth educators conducted 786 educational activities including 4-H camps, Junior Leader programs, leadership retreats and special interest sessions, judging programs, training on public speaking and presentations and implemented Character Counts training statewide. In 2011 the issue of bullying was also addressed in two counties via in-school programs. Additionally UW Extension, with an over \$200,000 State Department grant led a group of 30 youth and five adults to Mongolia for a month to begin implementation of 4-H in that country.

#### **Results**

100 percent of youth participating in 4-H judging programs reported increased confidence and skills in decision making and communication. Junior leaders (youth age 13 - 18) reported through formal and informal evaluations increased awareness and skills in teamwork, decision making, self-discipline, leadership, communication, and responsibility. Youth participating in educational programs, camps, and other activities demonstrate increased knowledge and skills. Youth participating in the Mongolian 4-H implementation gained leadership skills and understanding of diverse cultures.

### **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**

<b>Year</b>	<b>Actual</b>
2012	5908

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

In Wyoming there are an estimated 75,000 youth between the ages of 8 and 18 according to the U.S. Census Bureau. According to the Search Institute 'youth who have ten or fewer of the 40 external and internal assets are at high risk of developing at-risk behaviors'. All of the 40 external and internal assets are likely to be developed by youth involved in the 4-H program. Youth in the traditional 4-H program have the opportunity to expand their knowledge base, increase their life skills and develop leadership abilities in order to become responsible, contributing citizens.

**What has been done**

4-H educators work with youth ages 13 - 18 in junior leader programs which target development of assets. A variety of methods are used including training, camps, workshops, leadership retreats, and on-going monthly junior leader meetings. WYLE(Wyoming Youth Leadership Education program)curriculum,funded through the Daniels Fund, was held in all areas in the state with 2 to 3 day retreats for junior leader age youth. Focusing on developing assets in youth is an objective of all educational activities. Bullying has been addressed through programs in schools including peer mentoring. Military partnership programs have also been implemented providing leadership opportunities for youth. Mentoring programs have been implemented.

**Results**

Junior leader age youth (13 - 18) report through formal and informal evaluation increased skills, knowledge, and assets such as self esteem, communication, responsibility, and decision making. Wyoming Youth Leadership Education retreats had the following impact: daily evaluations as well

as a final overall evaluation were used to evaluate the overall impact of the program. The evaluations showed that 78 percent of youth said that their knowledge was improved or greatly improved by the True Colors assessment, 74 percent for learning styles, 89 percent for body language, and 94 percent for extreme leadership, 40 percent for youth in governance, 58 percent for business etiquette, 90 percent for senior sensitivity, 65 percent for Character Counts, and 90 percent for communication. Bullying program evaluation results indicated: 78 percent reported an increase in student awareness of what bullying is; 65 percent of students have an increased understanding of how to handle bullying situations. Mentor programs reported on average mentors and mentees spend between 4 - 12 hours per month together. 100 percent of parents express the postiveness of the mentor/mentee matches. All youth have shown an increase in self confidence since enrolled in the program. All youths outlook on life have improved and all have shown more postive changes and /or positive choices since enrolled in the program.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Actual</b>
2012	2781

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

In Wyoming there are an estimated 75,000 youth between the ages of 8 and 18 according to the U.S. Census Bureau. According to the Search Institute 'youth who have ten or fewer of the 40 external and internal assets are at high risk of developing at-risk behaviors'. All of the 40 external and internal assets are likely to be developed by youth involved in the 4-H program. Youth in the traditional 4-H program have the opportunity to expand their knowledge base, increase their life skills and develop leadership abilities in order to become responsible,

contributing citizens.

### **What has been done**

4-H educators work with youth ages 13 - 18 in traditional and non-traditional junior leader programs which target development of assets. A variety of methods are used including training, camps, workshops, leadership retreats, and on-going monthly junior leader meetings. Non-traditional efforts include: mentoring programs through a partnership between National 4-H Council and the Office of Juvenile Justice Delinquency Prevention were implemented in addition to mentoring programs as part of anti-bullying initiatives which are structured to develop trusting relationships which offer guidance, support, and encouragement aimed at developing the competence and character of youth. Programs focusing on developing assets in youth is an objective of all educational activities. Bullying has been addressed through programs in schools including peer mentoring.

### **Results**

- On Average mentors and mentees spend between 4 - 12 hours per month together.
  - 100 percent of parents express the positiveness and success of the mentor/mentee matches.
  - 100 percent of the parents report their children love doing activities with their mentor.
  - Family participation nights continue to thrive.
- Using a Likert scale both parent and mentor evaluations show: /
- all youth have shown an increase in self confidence since enrolled in the program.
  - all youth's outlook on life has improved since enrolled in the program.
  - all youth have shown more positive changes and or positive choices since enrolled in the program.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Actual</b>
2012	2928

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Adult volunteers are the mainstay of the 4-H program. The success of the program depends on the knowledge and skills volunteer leaders have and can then pass on to the youth and parents in their clubs. Leaders can directly accomplish goals of the program for positive youth development of all participants. In the 2011-2012 program year in Wyoming there were 2928 leaders at all stages of experience and expertise. Area advisory meetings, 4-H councils, program assessments compiled over three years revealed the need for leadership training beyond the basics of 4-H.

**What has been done**

4-H educators and the State 4-H volunteer development specialist teamed to design and implement the Master 4-H Volunteer Training in 2012. Resources included curriculum and activities developed to provide hands-on, experiential learning opportunities for volunteers. The program consisted of 11 hours of intensive training. Wyoming leaders hosted and organized the Western 4-H Leaders Forum reaching over 200 volunteers. In addition, county youth educators conducted over 193 training sessions for volunteers, reaching over 3261 (includes duplicates) including parents of youth.

**Results**

100 percent of participants increased knowledge to increase capacity when working with youth as a result of training sessions.

Using a 5-point post retro pre evaluation - volunteer leads showed increased knowledge in the following areas:

23 percent increase in understanding of the 8-essential elements.

15 percent increase in the understanding of how contributions impact 4-H

15 percent increase in understanding how to help others succeed.

20 percent of the 4-H mentoring program

14 percent increase in understanding how Extension can support volunteers.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Actual</b>
2012	2928

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Adult volunteers are the mainstay of the 4-H program. The success of the program depends on the knowledge and skills volunteer leaders have and can then pass on to the youth and parents in their clubs. Leaders can directly accomplish goals of the program for positive youth development of all participants. In the 2011-2012 program year in Wyoming there were 2432 leaders at all stages of experience and expertise. Area advisory meetings, 4-H councils, program assessments compiled over three years revealed the need for leadership training beyond the basics of 4-H.

**What has been done**

4-H youth educators conducted 193 training activities including State 4-H Leaders Conference, project and general leader training. Objectives and goals of 4-H youth development principles are incorporated into all training sessions.

**Results**

Volunteers stated increased understanding of youth development principles which foster youth to become productive adults. Testimonials from 4-H leaders and youth indicate the positive influence adult volunteers have on the life of 4-H members.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

High staff turnover in the 4-H program also impacts continuity of youth development programs. Additionally funding support from county partners impacts the 4-H program.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

Over one-third of youth development programs and volunteer training are evaluated through formal evaluations including end of session surveys, pre and post test, follow up, and observation. Testimonials from participants, teachers, and parents.

Youth age 13 - 18 participate in on-going year round junior leader programs. The following quotes are from informal evaluations:

"Junior leaders has helped me become more involved with my community and prepare me for future leadership roles." -18-year-old 4-H'er

"I now have better social skills, public speaking and increased my group interaction abilities from being a part of junior leaders." -17-year-old 4-H'er

"I have learned so many public speaking skills and enjoy 4-H so much I would like to become a 4-H educator." -14-year-old 4-H'er

"My son has more confidence in himself and able to make decisions after his first year involved in junior leaders." - Parent

"The youth involved in junior leaders for sure have more leadership and public speaking abilities." - FFA adviser

In 2012 the issue of bullying was addressed through peer mentor and teacher education training.

- 78 percent reported an increase in student awareness of what bullying is
- 65 percent of students have an increased understanding of how to handle bullying situations
- 100 percent of teachers indicated the mentor relationship was beneficial to students
- 27 percent indicated they would make changes in the classroom as a result of the program

Volunteers contribute significant volunteer time adding approximately \$1 million dollars to youth outreach efforts.

### **Key Items of Evaluation**

Volunteers contribute significant volunteer time adding approximately \$1 million dollars to youth outreach efforts.

In 2012 the issue of bullying was addressed through peer mentor and teacher education training.

- 78 percent reported an increase in student awareness of what bullying is
- 65 percent of students have an increased understanding of how to handle bullying situations
- 100 percent of teachers indicated the mentor relationship was beneficial to students
- 27 percent indicated they would make changes in the classroom as a result of the program

**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**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
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%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)****1. Actual amount of FTE/SYs expended this Program**

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	14.0	0.0	10.0	0.0
Actual Paid Professional	14.0	0.0	5.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
215535	0	234219	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
215535	0	234219	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Natural resource programs will reach out to a broad spectrum of constituents throughout Wyoming using a variety of sources. Workshops on sustainable rangeland and animal management principles will be offered within each Extension area within the state. Provide professional development opportunities for rangeland professionals. Develop written educational materials on rangeland and animal management practices and principles (fact sheets, bulletins, media, presentations, Web). Conduct technical consultation on rangeland and animal management, and monitoring of rangelands. Develop media on rangeland management principles (radio, TV, press). Conduct research and demonstrations on sustainable natural resource management principles. Work with individual rangeland managers on developing, implementing, and evaluating sustainable management practices.

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

**2. Brief description of the target audience**

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

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

**3. How was eXtension used?**

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

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	2810	100000	1946	2500

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	3	17	20

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

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

Year	Actual
2012	180

**Output #2**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	75

**Output #3**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	4756

**Output #4**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	2810

**Output #5**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	30

**Output #6**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	1946

**Output #7**

**Output Measure**

- Research: Transfer knowledge and increase appreciation of sustainable rangeland production.

<b>Year</b>	<b>Actual</b>
2012	42

**Output #8**

**Output Measure**

- Research - Number of research publications, bulletins, reports, and presentations on watershed management. Target is number of outputs reported.

<b>Year</b>	<b>Actual</b>
2012	13

**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 management as necessary to meet objectives. Target is number of participants reporting outcome.
4	Research: Transfer knowledge and increase appreciation of sustainable rangeland production. Target is number of projects reporting outcome.
5	Research: Transfer knowledge and increase appreciation of watershed management. Target is number of projects reporting 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**

<b>Year</b>	<b>Actual</b>
2012	30000

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

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

#### **What has been done**

The Sustainable Management of Rangeland Resources initiative team has produced over 267 seventy second TV spots which air twice weekly on commercial TV station in Casper. The segment titled 'Exploring the Natural Wonders of Wyoming' (ENOW) covers natural resource topics to provide education to the general public. The ENOW spots have also been placed on You-Tube to reach a national audience. Articles on natural resource issues appear in Barnyards & Backyards, rural living in Wyoming Magazine quarterly and statewide newspaper inserts.

#### **Results**

In the seventh year of airing these spots, the team receives regular feedback from Wyoming citizens and now national viewers on the positive aspects of the spots. The videos have been transferred to

DVD's for public distribution and also distributed to schools though the state. The spots posted on You-Tube with viewership growth from 2,400 in 2007 to 186,000 views in 2012. It is difficult to measure impact, though the audience response has generated enough impact that the the energy industry now provides partial funding for the segments aired twice weekly. Barnyards and Backyards magazine has over 3000 paid subscribers.

#### 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
2012	1946

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

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

###### **What has been done**

Educators conducted 31 educational programs including an ag expo, GPS training, plant anatomy, native plants and noxious weeds, and nature awareness. Alternative energy, windmill science and wind workshops were also conducted. Over half the counties in Wyoming conduct summer camping programs which include natural resource education.

**Results**

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

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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 management 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**

<b>Year</b>	<b>Actual</b>
2012	1068

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

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

compatible as both are important for the sustainability of the State's rangeland resources and its economy.

**What has been done**

Extension educators in the SMRR initiative conducted 46 educational programs, tours, or workshops on range monitoring. Most classes were targeted toward permittees reaching 1068 individuals. Reclamation 101 School has been implemented to assist producers and industry in mitigating energy impacts.

**Results**

100 percent of participants in educational programs reported increased awareness, knowledge, and skills of range monitoring. Over one third of individuals reported implementing or adjusting management plans as a result of the workshops. Participants reported a 16% increase in knowledge and 89% reported their expectations in the course were met. In Rangeland Management Schools over 79% of participants reported gaining some new knowledge, with 7% reporting significant knowledge gained.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land

**Outcome #4**

**1. Outcome Measures**

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

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	9

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Rangelands comprise approximately 80% of Wyoming and 40% of the U.S. and are split between private and public ownership. Communities throughout the West are dependent on rangelands for ecosystem goods and services and rangelands are impacted by how society chooses to use them. Understanding how rangelands can be monitored for assessing sustainability can inform decision-makers, rangeland managers, and the public about the social, economic, and ecological aspects of these issues.

#### **What has been done**

The Sustainable Rangelands Roundtable (SRR) was created in 2001 to develop social, economic, and ecological criteria and indicators of rangeland sustainability. The mission is to have these criteria and indicators become part of the dialogue on sustainability and to encourage the federal agencies to develop a national report on rangeland sustainability. SRR has held many meetings with stakeholders and federal agency leaders, promoted our mission at numerous meetings, and published papers. Small teams have been put together to develop peer reviewed papers on using the indicators and the SRR developed framework to assess the impacts of climate change, food security, and nontraditional energy development on rangeland sustainability.

#### **Results**

Sustainability of rangelands has become part of the dialogue when the impacts of rangeland management and policy decisions are being made. Understanding what needs to be monitored and collecting that data over time, has informed decision-makers, land managers, and the public about rangeland sustainability. As the program moves forward, we expect that there will be changes in public discourse about the balance among social, economic, and ecological sustainability. A Washington, DC Capitol Hill briefing was conducted for Congressional staff on the importance of rangelands for different uses and how we can monitor those activities.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
111	Conservation and Efficient Use of Water
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
136	Conservation of Biological Diversity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
605	Natural Resource and Environmental Economics

## **Outcome #5**

### **1. Outcome Measures**

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

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	4

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Pathogens are the number one cause of impairments in assessed rivers and streams in the nation and in Wyoming. In Wyoming, E. coli is used as the primary indicator of water quality impairment due to pathogens, and indicates potential risk to human health. When indicator bacteria levels exceed the standards set forth by the U.S. Environmental Protection Agency (EPA) or state regulatory agency the waterbody is considered impaired for the intended use. Two important questions in water quality monitoring programs for E. coli impairments are 1) what is the relationship between the hydrologic dynamics of the watershed system and measured E. coli levels and 2) how effective are the BMPs (Best Management Practices) that have been implemented at addressing the water quality impairment.

#### **What has been done**

In collaboration with local conservation districts, we conducted two watershed scale studies in rangeland watersheds in WY that are listed as impaired for E. coli. In the Greybull Watershed, in the Big Horn Basin, Northwest Wyoming, we conducted a three-year study to assess E. coli levels in response to stream flow dynamics and sediment movement within the Greybull River. In the Crow Creek Watershed in Southeast Wyoming, we assessed the effectiveness of implemented BMP's on addressing water quality due to E. coli. The Greybull study showed that E. coli were surviving over the winter in the streambed sediment and were being transported within the stream system with the sediment during high flows due to snow melt. The Crow Creek study quantified the effectiveness and limitations of implemented BMPs and documented the need to adjust water quality monitoring methods to directly assess the effectiveness of BMPs at addressing water quality issues.

#### **Results**

Results of these watershed studies are being used to improve the implementation of Total Maximum Daily Loads (TMDLs) to address water quality impairments due to E. coli in Wyoming.

More specifically, the results are being used to determine future BMP implementations in these watersheds and are being used to improve water quality monitoring programs across the state.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
605	Natural Resource and Environmental Economics

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

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

##### Brief Explanation

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

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

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

One multi-day extensive grazing school held in Southeast Wyoming gathered evaluation data at the conclusion of the program. Thirty-one participants responded.

Participants listed changes they would make. A sample of comments included:

- Intensify my winter grazing management in hope of better animal performance.
- Will continue to improve our program, especially will start doing cost analyses and recording forage amounts available.
- Convert everything to year-round grazing by matching stock to resources. Improve forage quality and pasture capability. My planned goal is to improve the land and its resources by grazing it with intensive management.
- Try to graze winter with wind row hay; understand importance of good quality water availability importance; manage water better; graze better to stage 2 not stage 1.

Participants were also asked to evaluate the expected impact on the profitability of their operations. Those raising livestock estimated profitability improved \$43.54 per head. When extrapolated by number of head managed by each participant, the total estimated improvement as a result of attending the school is \$527,600.

### **Key Items of Evaluation**

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

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

Participants were asked to evaluate the expected impact on the profitability of their operations. Those raising livestock estimated profitability improved \$43.54 per head. When extrapolated by number of head managed by each participant, the total estimated improvement as a result of attending the school is \$527,600.



**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%		10%	
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%		5%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890

Plan	26.0	0.0	30.0	0.0
Actual Paid Professional	21.0	0.0	18.9	0.0
Actual Volunteer	2.0	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
323302	0	867990	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
323302	0	867990	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**

Any or all channels of the media will be 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 by county offices, area teams, and the University of Wyoming will reach producers locally, regionally, and statewide. Public educational programs by extension specialists and educators presenting research-based information will be held in response to local, state, and national crop and livestock production, horticultural and nutrition issues. Demonstrations of technology and skills training will be included in education curriculum to enhance educational effectiveness. Field tours will be organized to provide producers with the opportunity to observe improved sustainable agricultural practices.

Areas of focus in livestock systems emphasis will be placed on the four main areas: herd management, herd development, cropping systems and livestock development, risk and operation management techniques and alternatives to enhance the stability of Wyoming livestock producers. Fostering development of local food systems, which includes promoting use of local foods, can improve energy efficiency of the food system while yielding many other benefits. UW Extension plans to enhance efficiency within local food systems by improving relationships among local food producers and consumers in Wyoming.

- development and pilot-testing of *Wyoming Local Food Expos* in at least two communities; development and distribution of the *Wyoming Local Foods Guide* (print and electronic versions) which will include 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.

- development and implementation of a training module to provide UW Extension educators statewide with the knowledge and skills to successfully promote local foods.

EFNEP adult curriculum taught in a series of lessons; adult one-time lessons; youth curricula taught in a series of lessons and day camps; displays and demonstrations; state and community partnerships with agencies serving the low-income; training for educators; evaluation of program; ongoing-updating of curricula and materials.

Other nutrition efforts will focus on educational programs; media outreach; health fairs; training; assessment and data collection; and research in human health and disease .

**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 for the CNP (EFNEP) program: low-income adults, youth in Title I schools.

**3. How was eXtension used?**

eXtension is used as a resource in Wyoming. The link to eXtension is prominently displayed on the UW Extension Web site home page. In addition, professional development opportunities through eXtension are publicized to Extension employees.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	7808	90000	2128	5000

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 1

**Patents listed**

21USP1: Method for Reducing Protein Misfolding in Cells, 3/30/12

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	3	56	59

**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.

<b>Year</b>	<b>Actual</b>
2012	481

**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

<b>Year</b>	<b>Actual</b>
2012	9936

**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.

<b>Year</b>	<b>Actual</b>
2012	50

**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.

<b>Year</b>	<b>Actual</b>
2012	4500

**Output #5**

**Output Measure**

- Research: Number of research publications, bulletins, reports, and presentations on crop, livestock, and horticulture systems. Target is number of outputs reported.

<b>Year</b>	<b>Actual</b>
2012	224

**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	Research: Transfer knowledge and increase awareness of research on crop, livestock, and horticulture systems. Target is number of projects reporting 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**

<b>Year</b>	<b>Actual</b>
2012	9936

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The value of agriculture to Wyoming's economy approaches \$1 billion each year, and agriculture's contribution to open spaces, wildlife, and recreation is even greater. Livestock and crop producers throughout the state of Wyoming face an ever changing industry with issues such as; increasing cost of production, increasing pressure focused on land conversion, changing requirements for marketing knowledge. All of the issues are coupled with the need for producers to be able to raise agricultural products in a sustainable operation with limited resources.

#### **What has been done**

Extension Educators in Profitable and Sustainable Agriculture Systems conducted 481 educational programs including field days, workshops, classes, multi-session courses, and volunteer training. In addition media is utilized to reach citizens through television, newspaper inserts, magazines, news columns and special articles, and radio. Educators also write educational newsletters distributed by mail and on line. Five local food expos were implemented in 2012 and training conducted for educators to expand expos statewide.

#### **Results**

Formal and informal evaluations were used to determine outcome. 100 percent of agriculture producers participating in educational activities reported increased awareness on Global Food Security, Hunger, Crop, Livestock, and Horticulture Systems.

Written evaluations of the Ranch Practicum School Profitability and Sustainability following the comprehensive eight day course reported:

Nineteen participants indicated knowledge gained would influence 76 people, management for 10,800 beef cattle and 404,000 acres of land. Producers who attended the class reported the class resulted in \$160,535 improvement in net income to their operations in total.

94% would be likely or very likely to use cow body condition as a management tool.

88% would be likely or very likely to use decision making skills gained to help them make management decisions.

94% reported that they would be likely or very likely to improve range management or natural resource management.

96% indicated they gained moderate to significant knowledge in 25 specific area related to ranch production and management.

#### 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
- 1862 Research

#### 3a. Outcome Type:

Change in Action Outcome Measure

#### 3b. Quantitative Outcome

Year	Actual
2012	4500

#### 3c. Qualitative Outcome or Impact Statement

##### **Issue (Who cares and Why)**

The value of agriculture to Wyoming's economy approaches \$1 billion each year, and agriculture's contribution to open spaces, wildlife, and recreation is even greater. The largest component of Wyoming agriculture is the beef cattle industry, accounting for approximately 70 percent of all cash receipts and 86.5 percent of all livestock production. Sheep, lamb, and wool receipts in 1998 were \$29 million. Forage sustains the Wyoming livestock industry. Hay is the leading crop in Wyoming with 1998 production valued at \$185 million, mostly marketed through livestock. Crop producers across Wyoming are challenged with increasing production costs, global market competition, environmental pressure, and decreased labor availability. Alternative markets, improved management practices, and cost efficiency is critical to ensure profitability and sustainability for Wyoming producers. Irrigation is a key factor identified by UW Extension area advisory committees and AES advisory groups.

### What has been done

UW Extension educators conducted 481 classes, workshops, tours on crop, livestock, and horticulture systems targeting Wyoming producers and landowners. In addition, educators published articles in local newspapers, newsletters, special newspaper inserts and discussed the topic on radio programs. Topics included pasture management, introduction to irrigation, and the Wyoming Water Conference, and Wyoming Water Association tour. The Master Cattleman Class, which met weekly for eight weeks, provided 24 hours of classroom instruction. Over a three year period classes have been held in all five areas of the state. Horticulture programs are conducted throughout the state with Master Gardener programs implemented in 15 of the 23 counties.

### Results

Participants indicated through formal and informal evaluations that they increased confidence in decision making skills necessary to make needed management decisions. Producers reported increased knowledge and awareness of pasture conditions. 4500 participants in educational activities reported gaining knowledge and awareness of resources and methods of irrigation and cost related to each method. End of 2012 program evaluations reported:

85 percent gained knowledge of production strategies

90 percent gained knowledge of enterprise analysis and risk management

100 percent plan to implement one or more ideas

While participants are hesitant to provide a specific dollar value to impact of their ranches.

Reasons for this hesitancy ranged from "it depends on the market" and "it's too early to tell". Eight producers indicated specific dollar values ranging from \$1000 to \$30,000 for a total of \$101,000 with the average being \$12,625. Sixteen of the ranchers indicated that they now utilize partial budgeting to help in the decision making process.

## 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
- 1862 Research

### 3a. Outcome Type:

Change in Knowledge Outcome Measure



**3b. Quantitative Outcome**

Year	Actual
2012	9936

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The value of agriculture to Wyoming's economy approaches \$1 billion each year, and agriculture's contribution to open spaces, wildlife, and recreation is even greater. The largest component of Wyoming agriculture is the beef cattle industry, accounting for approximately 70 percent of all cash receipts and 86.5 percent of all livestock production. Sheep, lamb, and wool receipts in 1998 were \$29 million. Forage sustains the Wyoming livestock industry. Hay is the leading crop in Wyoming with 1998 production valued at \$185 million, mostly marketed through livestock. Crop producers across Wyoming are challenged with increasing production costs, global market competition, environmental pressure, and decreased labor availability. Alternative markets, improved management practices, and cost efficiency is critical to ensure profitability and sustainability for Wyoming producers. Irrigation is a key factor identified by UW Extension area advisory committees and AES advisory groups.

**What has been done**

UW Extension educators conducted 481 classes, workshops, tours on crop, livestock, and horticulture systems targeting Wyoming producers and landowners. In addition, educators published articles in local newspapers, newsletters, special newspaper inserts and discussed the topic on radio programs. Topics included pasture management, introduction to irrigation, and the Wyoming Water Conference, and Wyoming Water Association tour. The Master Cattleman Class, which met weekly for eight weeks, provided 24 hours of classroom instruction. Over a four year period classes have been held in all five areas of the state. Horticulture programs are conducted throughout the state with Master Gardener programs implemented in 15 of the 23 counties. In addition each of the four Agricultural Experiment Stations held field days to disseminate research information to Wyoming producers.

**Results**

Formal and informal evaluations were used to determine outcome. 100 percent of agriculture producers participating in educational activities reported increased awareness on Global Food Security, Hunger, Crop, Livestock, and Horticulture Systems.

**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
2012	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The value of agriculture to Wyoming's economy approaches \$1 billion each year, and agriculture's contribution to open spaces, wildlife, and recreation is even greater. Livestock and crop producers throughout the state of Wyoming face an ever changing industry with issues such as; increasing cost of production, increasing pressure focused on land conversion, changing requirements for marketing knowledge. All of the issues are coupled with the need for producers to be able to raise agricultural products in a sustainable operation with limited resources.

**What has been done**

Extension Educators in Profitable and Sustainable Agriculture Systems conducted 481 educational programs including field days, workshops, classes, multi-session courses, and volunteer training. In addition media is utilized to reach citizens through television, newspaper inserts, magazines, news columns and special articles, and radio.

Educators also write educational newsletters distributed by mail and on line. Five local food expos were conducted in each area of the state and training conducted for educators to expand expos statewide.

**Results**

Formal and informal evaluations were used to determine outcome. Written evaluations of the Ranch Practicum School Profitability and Sustainability following the comprehensive eight day course reported:

Nineteen participants indicated knowledge gained would influence 76 people, management for 10,800 beef cattle and 404,000 acres of land. Producers who attended the class reported the class resulted in \$160,535 improvement in net income to their operations in total.

Master Cattleman, a comprehensive five week course reported, 100 percent plan to implement one or more ideas learned in the class.

While participants are hesitant to provide a specific dollar value to impact of their ranches.

Reasons for this hesitancy ranged from "it depends on the market" and "it's too early to tell". Eight producers indicated specific dollar values ranging from \$1000 to \$30,000 for a total of \$101,000 with the average being \$12,625. Sixteen of the ranchers indicated that they now utilize partial budgeting to help in the decision making process.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Research: Transfer knowledge and increase awareness of research on crop, livestock, and horticulture systems. Target is number of projects reporting outcome.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	27

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

The United States has historically been the largest investor in the world in public agricultural research and development, and the leading country in terms of intellectual outputs such as publications and patents related to the agricultural sciences; however, this once dominant position has eroded substantially because of a variety of factors, most prominently a reduction in the rate of growth of research funding in the United States in recent decades. This reduction has coincided with a slowdown in the productivity of U.S. agriculture. The primary focus of this research involves an examination of how investments in agricultural research increase agricultural productivity and generate economic returns. A clear understanding of the relationship between agricultural research and the benefits that result is critical to insuring an adequate food supply, especially for poor and disadvantaged communities.

#### What has been done

Development of comprehensive data resources required to measure agricultural productivity and the economic return to research in agriculture. These include data on agricultural production and productivity, as well as data on public and private investments in agricultural research and development. The data were used to estimate the economic return to research, which helps to justify these critically important investments.

#### Results

The impact has been an acknowledgement by the scientific community that U.S. agricultural productivity has been slowing in recent decades because of a reduction in the growth of public spending on agricultural R&D. This research has also resulted in a rescaling of the estimated rate of return to public investments in R&D from approximately 50 percent per year to 10 percent per year. A 10 percent real rate of return represents a solid investment opportunity that policymakers can use to help justify these critical investments.

### 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

#### **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, the following:

- Food choices made available and advertised to consumers by producers
- Access to timely and accurate information
- Coordination and cooperation of federal agencies and state partners
- Existence of local collaboration
- Level of funding at federal, state and local level
- 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 or horticulture issues. Funding is vital to this program; changes in appropriations could impact funding. Additionally, global market changes impact both research and extension programs in profitable and sustainable agriculture.

#### **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. Each focus has developed a logic model which includes specific evaluation plans and methods. 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.

Multiple methods were used. Sampling was utilized to gather evaluative data from media education efforts. Surveys, by mail, telephone, or on-site were used with program participants. Observation and unstructured interviews were used to determine medium to long term outcomes. Tests including pre- and post- were utilized to measure knowledge gained.

100% of participants indicated increasing knowledge, awareness and skills. Over half of respondents of evaluation surveys indicated aspirations to implement practices that

would would be an improvement.

Over 90% of individuals enrolling in the master gardener program complete the course and pass the certification test.

**Key Items of Evaluation**

100% of participants indicated increasing knowledge, awareness and skills. Over half of respondents of evaluation surveys indicated aspirations to implement practices that would would be an improvement.

Over 90% of individuals enrolling in the master gardener program complete the course and pass the certification test.

**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%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	4.0	0.0
Actual Paid Professional	3.0	0.0	2.8	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
46185	0	128591	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
46185	0	128591	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 will focus on best species and variety selection as well as effectiveness of production practices as aspects of climate changes. Invasive species, and drought will be 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 will be addressed. Plant species and variety adaption to the changing ecosystem will be critical to maintaining the agricultural productivity for the state. Educational programs will help 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.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**



2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1600	5000	400	1000

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

Year: 2012  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	0	7	7

**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
2012	112

**Output #2**

**Output Measure**

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

Year	Actual
2012	42

**Output #3**

**Output Measure**

- Research: Evaluation of production practices in the face of climate changes. Target is number of research projects.

<b>Year</b>	<b>Actual</b>
2012	4

**Output #4**

**Output Measure**

- Research: Determine the relationship between climate change and competition among native and invasive plant species. Target is number of research projects.

<b>Year</b>	<b>Actual</b>
2012	5

**Output #5**

**Output Measure**

- Research: Evaluate strategies to mitigate release of greenhouse gases into the atmosphere. Target is number of research projects.

<b>Year</b>	<b>Actual</b>
2012	6

**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: Create awareness of production practices, invasive plant species, and potential to mitigate greenhouse gas emissions in the face of climate change. Target is 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
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	117

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Wyoming is a rangelands state where small changes in temperature and growing season and amount and timing of precipitation can have a dramatic effect on the success of plant communities in the ecosystem. Best species and variety selection as well as effectiveness of production practices will change as aspects of climate changes. 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. Periodic and sustained drought is another critical factor in the success of agriculture in Wyoming. Some evidence suggests that drought and other climate variability may be more of a factor as the climate warms. In addition, strategies to control global warming will likely create opportunities for Wyoming agriculture to both profit and contribute to mitigation of forces driving change in climate.

#### **What has been done**

UW research and extension activities focus 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 are addressed. Educational programs presented help producers and land managers understand the implications of drought for grasslands and cropping ecosystem management.

#### **Results**

Participants in the 11 educational programs conducted by UW Extension reaching 117 youth and adults reported gaining awareness and knowledge on the subject.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
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
- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

<b>Year</b>	<b>Actual</b>
2012	780

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Wyoming is a semi arid climate state where small changes in temperature and growing season and amount and timing of precipitation 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. Best species and variety selection as well as effectiveness of production practices will change as aspects of climate changes. 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. Periodic and sustained

drought is another critical factor in the success of agriculture including horticulture in Wyoming. Some evidence suggests that drought and other climate variability may be more of a factor as the climate warms. In addition, strategies to control global warming will likely create opportunities for Wyoming agriculture to both profit and contribute to mitigation of forces driving change in climate.

#### **What has been done**

UW Extension educators in crop and livestock systems, and horticulture address climate change in numerous production programs presented throughout the state. The energy extension coordinator provides programming specific to climate change mitigation. Newspaper inserts, magazines, and newsletters also assist in information dissemination. Landowners with 50 acres or less are targeted in small acreage management programs which is a foci in the state. A new program last year 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.

#### **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**

<b>KA Code</b>	<b>Knowledge Area</b>
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
2012	880

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Wyoming is a rangelands state where small changes in temperature and growing season and amount and timing of precipitation 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 Extension agriculture efforts. Best species and variety selection as well as effectiveness of production practices will change as aspects of climate changes. 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. Periodic and sustained drought is another critical factor in the success of agriculture including horticulture in Wyoming. Some evidence suggests that drought and other climate variability may be more of a factor as the climate warms. In addition, strategies to control global warming will likely create opportunities for Wyoming agriculture to both profit and contribute to mitigation of forces driving change in climate.

**What has been done**

UW Extension educators in crop and livestock systems, and horticulture address climate change in numerous production programs presented throughout the state. The energy extension coordinator provides programming specific to climate change mitigation. Newspaper inserts, magazines, and newsletters also assist in information dissemination.

**Results**

100 percent of participants indicated they had gained awareness and knowledge as a result of educational programs. As a new program, significant impact data is not available.

**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: Create awareness of production practices, invasive plant species, and potential to mitigate greenhouse gas emissions in the face of climate change. 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**

<b>Year</b>	<b>Actual</b>
2012	11

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Water availability is a critical in the semi-arid western US. Snowmelt from forested mountainous regions provides water for irrigated agriculture, urban centers, and industry. The timing and amount of precipitation in rangelands determines plant biomass production for cattle and wildlife grazing. Automated measurement networks and computer simulation models can be used to better understand water storage and flux in forest and rangeland ecosystems, and to assess the impact of management decisions and natural disturbances.

#### **What has been done**

A combined measurement and modeling approach is used to quantify water, heat, and carbon storage & flux in the soil-plant-atmosphere system. Measurements include precipitation, snow depth, snow temperature, soil water content, and soil temperature in both forest and rangeland ecosystems. The modeling includes surface energy balance calculations and the numerical solution of one-dimensional vertical soil water flow, heat transport, and CO<sub>2</sub> production and transport equations. Current efforts focus primarily on the Snowy Range Mountains, the North-Platte River Basin, the Powder River Basin, and the Bighorn Basin, all in Wyoming

#### **Results**

The development and testing of soil-plant-atmosphere models is critical in understanding current water, heat, and carbon fluxes as part of agronomic, hydrological, and climate studies. The availability of physics-based computer simulation models also provides a tool for quantifying the impact of management decisions and natural disturbances on the functioning of the forest and rangeland ecosystems.

### **4. Associated Knowledge Areas**



<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management
132	Weather and Climate
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
605	Natural Resource and Environmental Economics

#### **V(H). Planned Program (External Factors)**

##### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- 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**

End of session evaluations were used to determine outcomes of educational efforts. In addition, small acreage (land conversion) has implemented three land demonstration projects in central and SE Wyoming mitigating soil erosion, and climate change issues. Drought has been an issue for agriculture producers for almost a decade, follow up on risk management is conducted informally.

100% of program participants report gaining awareness and knowledge of the topics covered in educational programs.

Over 50% report that they plan to make positive changes as a result of classes.

Energy audits are being implemented resulting in changes which contribute to money saved and increased efficiency of energy use.

##### **Key Items of Evaluation**

100% of program participants report gaining awareness and knowledge of the topics covered in educational programs.

Over 50% report that they plan to make positive changes as a result of classes.

Energy audits are being implemented resulting in changes which contribute to money saved and increased efficiency of energy use.

As a program in its second full year of implementation, outcomes are minimal.

**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%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	3.0	0.0
Actual Paid Professional	4.0	0.0	3.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
61581	0	142369	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
61581	0	142369	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

Media will be 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 will inform 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 will reach general public and agriculture producers locally, regionally, and statewide. Public educational programs with invited speakers and extension specialists and educators presenting research-based information will continue to be held in response to local, state, and national energy sustainability. Demonstrations of technology and skills training will be included in education curriculum to enhance educational effectiveness. Field tours will be 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 will provide a resource base for integrating agriculture production and renewable energy based programs.

Educational programs will emphasize sustainable energy practices such as bio-fuels and wind energy, reclamation and restoration of disturbed lands, and energy conservation practices. Other methods will include individual interaction with landowners educating them on resources available to assist them with sustainable energy practices. UW Extension will provide coordination with other colleges on the UW campus such as Engineering and the School of Energy Resources, state and federal agencies to provide education on this topic, and funding for this effort. UW Extension will also provide educational opportunities for professionals involved with reclamation and restoration of disturbed lands.

The UW Energy Extension Coordinator conducted five energy audits for businesses to identify potential energy and cost savings.

The University of Wyoming's College of Agriculture and Natural Resources will conduct research and direct extension programming efforts to help ensure prudent use of the state's precious resources.

### 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. Participants will include policy makers for county, state, and federal government agencies, crop

producers, livestock producers, energy companies, general public, and the scientific community. An existing secondary audience will be the media, general public, and interest groups not directly involved in production agriculture (i.e., environmental groups). Energy conservation methods will be targeted at both agriculture and general public audiences.

**3. How was eXtension used?**

The UW Extension energy extension coordinator serves on the eXtension energy community of practice. eXtension is used as a resource for educators and the public. the Web site link is prominently displayed on the UW Extension home page. UW Extension educators are aware of professional development opportunities available through eXtension.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	1200	10000	342	1000

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	11	16	27

**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
2012	1200

**Output #2**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	39

**Output #3**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	6

**Output #4**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	56

**Output #5**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	25

**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	Research: Create awareness of ecosystem services affected by energy development and reclamation efforts. Target is number of projects reporting this outcome.
5	Research: Create awareness on the potential to produce bioenergy. Target is 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
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	1200

### **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 vibrant 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 precious 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 as solar photovoltaics 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. Conservation and preservation of our natural resources, both land and water is an ongoing effort for both extension and research.

#### **What has been done**

The University of Wyoming College of Agriculture and Natural Resources research and extension 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 fall 2009, UW Extension partnered with the School of Energy Resources at UW to fund an energy extension coordinator who provides leadership and coordination for extension energy programs in the college. Initial training for field extension educators was conducted; a Western SARE grant (\$110,000) was obtained by Montana State University in collaboration with the UW Extension energy extension coordinator to implement a Western Region training on energy issues (release of funds has delayed this until Fall 2011). 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. 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 Research Center, USDA Rural Development, Natural Resource Conservation Service, and the Wyoming Business Council. 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**

In 2011, UW Extension initiated an issue team focusing on sustainable energy issues. 100 percent of participants in the 56 programs held reported gaining awareness of the topic and gaining knowledge. Early partnership efforts have resulted in increasing effectiveness of programs through multiple collaborators.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Actual</b>
2012	25

**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 vibrant energy industry, the College of Agriculture and Natural Resources strives to conduct research and direct extension programming efforts to help ensure prudent use of the state's precious 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 as solar photovoltaics 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. As an energy rich state, conservation and preservation of our natural resources, both land and water is an ongoing effort for both extension and research.

#### **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. Partnerships have leveraged funding to support an innovative energy internal grant program for UW Extension. Integrated program efforts are in progress.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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.

##### **2. Associated Institution Types**

- 1862 Extension

##### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

Year	Actual
2012	1

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Over 137 million people in more than 70 countries are affected by arsenic poisoning through drinking water supplies. Studies have shown that long-term human exposure to drinking water containing arsenic in excess of 50 µg/L causes increased risk of skin, lung, bladder, and kidney cancer and increased risk of premature death. U.S. Environmental Protection Agency (EPA) proposed a new limit of 10 µg/L for arsenic for human drinking water, effective January 26, 2006.

#### What has been done

A flow-through filtration system for field applications was designed, developed, and tested to remove arsenic from groundwater. Several groundwater samples were pumped through the flow-through reactor consisting of CuO nanoparticles.

#### Results

Cupric oxide nanoparticles effectively removed arsenic from groundwater samples across a wide range of pHs and concentrations of competing ions including, phosphate, silica, and sulfate. Removal of arsenic with CuO nanoparticles did not affect the chemistry of groundwater samples and most of the water quality parameters remained within the US EPA human drinking water limits.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment

### Outcome #4

#### 1. Outcome Measures

Research: Create awareness of ecosystem services affected by energy development and reclamation efforts. 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
2012	12

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Wyoming is currently one of the leading onshore producers of natural gas in the US. Most of the gas fields in the state are located on sagebrush steppe rangelands with short growing seasons, weakly developed soils, and very limited precipitation. Because of these extreme environmental conditions and problems with weedy species, restoration of these sites to their pre-disturbance vegetation and land uses has proven to be difficult. Of exceptional importance is restoration of wildlife habitat, particularly sage grouse habitat because this bird is a threatened species. If operators are not capable of restoring lands impacted by drilling to pre-disturbance land uses including wildlife habitat, especially sage grouse habitat, they will not be able to obtain permits for further drilling.

**What has been done**

The Wyoming Reclamation and Restoration Center in collaboration with BP and Conservation Seeding and Restoration, Inc. has constructed a database framework with the purpose of creating a restoration decision management tool by compiling oil and gas pad reclamation data to identify successful restoration practices. Data were collected from three large Wyoming production fields. The framework includes tables for measurements of reclamation practices (e.g. soil handling methods and amendments, seeding mix and timing, and weed management), geographical and climate data (e.g. precipitation, slope, aspect, elevation and temperature) and monitoring data (e.g. vegetation composition and structure along with soil analysis and grazing). Microsoft Access and ESRI ArcGIS were employed to build the reclamation database for consistent and reliable data storage, manipulation and retrieval.

**Results**

The long-term goals of the project are threefold: to deliver an operational framework to analyze and isolate trends leading to reclamation success and failure; to provide a strong decision management tool for limiting uncertainty and estimating associated risk under variable environmental conditions; and to offer a flexible and sharable database that allows for additional data input from diverse sources. Use of this tool will facilitate successful reclamation and reestablishment of pre-disturbance land uses including suitable wildlife habitat and maintenance of economic health in Wyoming.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
131	Alternative Uses of Land

402        Engineering Systems and Equipment  
608        Community Resource Planning and Development

**Outcome #5**

**1. Outcome Measures**

Research: Create awareness on the potential to produce bioenergy. 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
2012	6

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Farmers and ranchers in Wyoming operate under harsh climatological and economic constraints. New agricultural technologies that relieve these constraints and integrate with existing production are vital to healthy economic development in rural parts of the state. Aquaculture of oil-producing microalgae at large scales has been identified as an appropriate method of biodiesel production in arid regions of the Western US. It can be accomplished on non-agricultural land with relatively little water consumption and will not compete with existing agriculture. Moreover, microalgae can be used to feed animals and amend soils after oil and other useful chemicals have been extracted from them. In recent years, tens of billions of public and private dollars have been invested to realize the potential of large-scale microalgal aquaculture. But this technology is in its infancy and many biological and technological challenges have been encountered. Our research addresses some of these challenges in a series of overlapping field and laboratory studies.

**What has been done**

We have made progress on several projects intended to domesticate algae for large-scale culture in Wyoming. Most importantly, we have begun genetically modifying the single-celled green alga *Chlamydomonas* so that the individual cells can be induced to form multicellular clumps after accumulating oil. If successful, our technology will cause oil-laden algal cells to form large clumps and settle to the bottom of their culture vessel. Water can then be removed for recycling and the remaining algal sludge scooped out for processing. If successful, our strategy will dramatically reduce harvest costs for large-scale cultures of algae. So far, we have successfully expressed a cell adhesion molecule from the multicellular green alga *Volvox* in *Chlamydomonas*, causing it to form clumps. We have also begun developing algacide-resistant strains of *Chlamydomonas* that tolerate high levels of hydrogen peroxide-based algacides, which can be used as general

purpose biocides in algal culture systems.

### Results

A graduate student working on the project won the Wyoming 30K Entrepreneurship Competition that was held in March 2012 and has started a small business that provides research services for algal aquaculture businesses now starting up all over the world. Most of these lack biological expertise specific to algae. The project employs two or more graduate or undergraduate students continuously, on average. These students are part of a growing technical workforce needed by the nascent algal biofuel industry and other sectors of the agricultural economy.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment

## 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. Weather extremes are a factor in agriculture production outcomes regarding crops for alternative fuels. As a new planned program, the first year heavily involved training and awareness for extension educators. The community development partnership in Wamsutter to assist with infrastructure development ended in June 2011.

## V(I). Planned Program (Evaluation Studies)

### Evaluation Results

End of session written evaluations were utilized to collect outcome data. In addition personal follow-up with the local educator or UW Energy Extension Coordinator was conducted. 100% of program participants indicated they increased awareness and knowledge as a result of educational 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.

Program participants reported that in some instances, alternative energy options are not cost effective therefore contributed to decision making which is a positive outcome.

**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.

**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%		40%	
703	Nutrition Education and Behavior	10%		20%	
704	Nutrition and Hunger in the Population	80%		20%	
724	Healthy Lifestyle	10%		20%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	4.0	0.0
Actual Paid Professional	10.0	0.0	6.7	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
153954	0	307700	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
153954	0	307700	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**

Nutrition efforts will focus on educational programs which increase knowledge and skills in nutrition needs of children and incorporate physical activity into lifestyle; media outreach; health fairs; training; assessment/data collection. Programs which teach body size acceptance will also be targeted to youth.

EFNEP adult curriculum taught in a series of lessons; adult one-time lessons; youth curricula taught in a series of lessons and day camps; displays and demonstrations; state and community partnerships with agencies serving the low-income; training for educators; evaluation of program; Ongoing- Updating of curricula and materials.

Since skeletal muscle is the main site for utilization of glucose and fatty acids in the body and insulin resistance in skeletal muscle is the key step in the incidence of type 2 diabetes, we hypothesize that impaired fetal skeletal muscle growth due to nutrient deficiency plays an important role. Our goal is to understand how the development of fetal skeletal muscle affects the properties of skeletal muscle of adulthood, and to develop effective strategies to mitigate or avoid incidence of diabetes and obesity caused by impaired skeletal muscle development due to fetal nutrient deficiency.

UW AES researchers intend to investigate the role of maternal nutrition in programming of pre- and postnatal body composition.

**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, Youth in Title I schools.

All other nutrition efforts targeted audience includes: general public, both adults and youth and policy makers.

**3. How was eXtension used?**

eXtension is utilized with all extension initiatives as a resource. eXtension is prominatly highlighted on the UW Extension Web site home page. Additionally, extension personnel are made aware of professional development opportunities offered through eXtension.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	5183	15000	6735	10000

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

**Patent Applications Submitted**

Year: 2012

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	0	43	43

**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
2012	166

**Output #2**

**Output Measure**

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

Year	Actual
2012	6735

**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
2012	30

**Output #4**

**Output Measure**

- Research: Conduct research and present results on obesity, nutrition, and health. Target is number of publications, reports, bulletins, and presentations.

Year	Actual
2012	75

**Output #5**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	11918

**Output #6**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	7000

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Improved knowledge of food guide pyramid, 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	Research: Create awareness of relationships between obesity, nutrition, and health. Target is number of projects reporting this outcome.

## **Outcome #1**

### **1. Outcome Measures**

Improved knowledge of food guide pyramid, 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**

<b>Year</b>	<b>Actual</b>
2012	7000

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Wyoming youth and adults are at risk as reflected by various health-related data: For example, over 20 percent of Wyoming adults report no leisure time physical activity, 47 percent of Wyoming high school students report not being enrolled in a physical education class, and 78 percent of both Wyoming adults and high school students do not eat recommended amounts of fruits and vegetables. Additionally, research in Wyoming, Montana, and Idaho documented body dissatisfaction as a significant predictor of self-consciousness keeping respondents from participating in physical activity.

#### **What has been done**

A variety of classes (many multi-session) on Steps to a New You, Healthy Eating, Weight Management and basic nutrition were conducted by nutrition educators. Articles were published in newsletters, newspaper columns and educational displays were developed. Youth were reached through series of classes conducted in schools by 4-H, Nutrition and Food Safety and Cent\$ibile Nutrition educators.

#### **Results**

56 percent of adults and 59 percent of youth reported increased familiarity with MyPlate. 36 percent reported being physically active for at least 30 minutes per day, on four or more days per week, more often.

38 percent reported getting a 'super-sized' portion less often. (A 'super-sized' portion of food or beverage is one that is much bigger but costs only a little more money).

90 percent showed improvement in one or more nutrition practices.

25 percent reported weight loss as a result of changes in eating, meal planning, and increasing physical activity.

#### 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
2012	3500

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Wyoming youth and adults are at risk as reflected by various health-related data: For example, over 20 percent of Wyoming adults report no leisure time physical activity, 47 percent of Wyoming high school students report not being enrolled in a physical education class, and 78 percent of both Wyoming adults and high school students do not eat recommended amounts of fruits and vegetables. Additionally, research in Wyoming, Montana, and Idaho documented body dissatisfaction as a significant predictor of self-consciousness keeping respondents from participating in physical activity.

###### **What has been done**

A variety of classes (many multi-session) on Steps to a New You, Healthy Eating, Weight Management and basic nutrition were conducted by nutrition educators. Youth participated in day camps, and in-school curriculum including Grazing with Marty Moose, Munching through Wyoming History, Passports to Food Adventures, and WIN Kids. Articles were published in newsletters, newspaper columns and educational displays were developed.

###### **Results**

End of session and follow up evaluations indicated:  
36 percent reported being physically active for at least 30 minutes per day, on four or more days per week, more often.  
90 percent showed improvement in one or more nutrition practices.

97.5 percent had a positive change in any food group.  
50 percent serve more than one kind of fruit and 48 percent serve more than one kind of vegetable each day.  
48 percent of youth could correctly identify the physical activity recommendation for children.  
25 percent reported weight loss as a result of changes in eating, meal planning, and increasing physical activity.

#### 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.

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2012	7000

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Wyoming residents are at risk as reflected by various health-related data: For example, over 20 percent of Wyoming adults report no leisure time physical activity, 47 percent of Wyoming high school students report not being enrolled in a physical education class, and 78 percent of both Wyoming adults and high school students do not eat recommended amounts of fruits and vegetables.

###### **What has been done**

UW Extension educators conducted over 300 classes which emphasized a holistic approach including proper nutrition, increasing physical activity and healthy food choices. Strong Bones - Strong People, basic nutrition, and Steps to a New You were all programs focused on objectives. Youth curriculum developed by the UW Cent\$ible Nutrition program was also implemented in

schools across the state.

**Results**

7000 individuals participated in 300 classes of which 10 were multi-session with four to eight sessions in length. Over 50 percent, or 3500 participants reported improved eating behavior practices, food choices, and lifestyle habits through end of session evaluations.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior

**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
2012	4000

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Approximately 13,000 of 57,000 Wyoming children ages 10 to 17 years (22.9%) are considered overweight or obese according to BMI for age standards. Wyoming ranks third among the 50 states and D.C. in overall prevalence.

\* Only one in six (16.3%) Wyoming children in higher income families are overweight or obese. The state ranks third in prevalence among higher income children.

\* One in five (20.2%) Wyoming children with private health insurance are overweight or obese.

\* Wyoming children are more likely than their counterparts nationwide to be physically active for at least 4 days per week, and less likely to spend 2 hours or more in front of a television or computer screen.



**What has been done**

UW Extension utilized EFNEP youth curricula taught in a series of lessons and day camps; displays and demonstrations; Other nutrition efforts focused on educational programs which increase knowledge and skills in nutrition needs of children and adults and also incorporate physical activity into lifestyle; educators use media outreach (newspapers, newsletters, radio); health fairs; Programs which teach body size acceptance also are targeted to youth. A variety of classes (many multi-session) on Steps to a New You, Healthy Eating, Weight Management and basic nutrition were conducted by nutrition educators. In addition 4-H educators partner with Cent\$ible Nutrition to implement special interest classes in the school system.

**Results**

Results of the educational programs (several were series of 5 - 8 weeks) reaching 4000 youth included:

- 90 percent showed improvement in one or more nutrition practices.
- 50 % increased their knowledge about carbohydrates as a source of energy.
- 38% reported eating a variety of foods;
- Over 59% increased their knowledge of MyPlate food groups;
- 22% could identify missing food groups in meals;
- 20.5% could identify physical activity recommendations for their age;
- 36% are physically active for at least 30 minutes per day during four or more days per week.
- 33% increased their knowledge of body size diversity.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
-------------	---------------

2012

4000

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Approximately 13,000 of 57,000 Wyoming children ages 10 to 17 years (22.9%) are considered overweight or obese according to BMI for age standards. Wyoming ranks third among the 50 states and D.C. in overall prevalence.

\* Only one in six (16.3%) Wyoming children in higher income families are overweight or obese. The state ranks third in prevalence among higher income children.

\* One in five (20.2%) Wyoming children with private health insurance are overweight or obese.

\* Wyoming children are more likely than their counterparts nationwide to be physically active for at least 4 days per week, and less likely to spend 2 hours or more in front of a television or computer screen.

#### What has been done

UW Extension utilized EFNEP youth curricula taught in a series of lessons and day camps; displays and demonstrations; Other nutrition efforts focused on educational programs which increase knowledge and skills in nutrition needs of children and adults and also incorporate physical activity into lifestyle; educators use media outreach (newspapers, newsletters, radio); health fairs; Programs which teach body size acceptance also are targeted to youth.

A variety of classes (many multi-session) on Steps to a New You, Healthy Eating, Weight Management, Dining with Diabetes, and basic nutrition were conducted by nutrition educators.

#### Results

Results of the 300 educational programs (several were series of 5 - 8 weeks) reaching over 2088 youth and 3013 adults included:

90 % showed improvement in one or more nutrition practices.

97.5% had a positive change in any food group.

27% reported eating a variety of foods;

Over 50% increased their knowledge of MyPlate food groups;

24% could identify missing food groups in meals;

45% could identify physical activity recommendations for their age;

36% are physically active 30 minutes per day, four or more days a week.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

## **Outcome #6**

### **1. Outcome Measures**

Research: Create awareness of relationships between obesity, nutrition, and health. 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**

<b>Year</b>	<b>Actual</b>
2012	13

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The prevalence of childhood obesity in the United States, including Wyoming, is a major concern. Epidemiological studies have found that breastfeeding reduces risk of obesity in childhood and beyond but the mechanism is not yet understood. Our work has focused on evaluating the presence and dynamics of specific appetite hormones in breast milk which may be involved in early metabolic programming.

#### **What has been done**

Thus far we have measured the anorexogenic peptides glucagon-like peptide-1 (GLP-1), polypeptide YY (PYY), and leptin to determine whether these hormones change across a single feeding and are different in breast milk at the start of feeding (foremilk) compared to the end of feeding (hindmilk). Additionally, we have also evaluated the relationship of these hormones to maternal and infant anthropometrics.

#### **Results**

Data thus far indicate that the presence of appetite hormones in breast milk may be important in infant appetite and growth regulation. Results of our work support the obesity-protective effects of breastfeeding directly from the breast and may impact infant feeding practices and recommendations.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
305	Animal Physiological Processes
703	Nutrition Education and Behavior
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**

Many conditions and situations that exist in Wyoming are similar to those in other parts of the country, for example, the following:

Food choices made available and advertised to consumers by producers; Access to timely and accurate information; Coordination and cooperation of federal agencies and state partners, schools and other youth agencies; Existence of local collaboration; Level of funding at federal, state and local level; and Willingness of community organizations, to collaborate with The University of Wyoming Extension.

If EFNEP funding is decreased, appropriations will impact program delivery. Population changes impact limited resource audiences eligible for program.

Availability of funding for research in childhood obesity.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

Steps to a New You is curricula which uses a holistic approach to nutrition and health. All participants completed a pre- and post-questionnaire, enabling to measure new attitudes gained such as, living a life focused on health, honoring hunger, and enjoy physical activity every day. The following are significant impacts reported by them.

50% Participants increased physical activity purposely.

90% of participants now stop eating when they start to feel full.

Research data have provided conclusive evidence that changes in individual lifestyles and behaviors can lead to improved health status (Centers for Disease Control and Prevention, 1997; Canadian Nurses Association, 1992).

Adults who participate in programs complete end of session evaluations. Those in series of lessons complete a pre- and post-survey and/or follow up evaluations. 3000 adults completing lessons reported the following.

### **Nutrition Practices and Food Intake**

- 90 percent improved in one or more nutrition practices.
- 97.5 percent had a positive change in any food group.
- 61 percent use the Nutrition Facts labels to make food choices more often.
- 50 percent serve more than one kind of fruit, and 48 percent serve more than one kind of vegetable to their families each day more often.

### **Physical Activity Practices**

- 36 percent are physically active for at least 30 minutes per day during four or more days per week

2202 youth participating in Grazing with Marty Moose, Munching Through Wyoming History, Passports to Food Adventures, and WIN Kids curricula reported the following through pre- and post-assessments to capture behavior changes.

Specific questions for each curriculum showed the following after the lessons.

- 59 percent improved their knowledge of MyPlate food groups.
- 31.5 percent more correctly identify the number of food groups in a meal and 22.2 percent more correctly identified missing food groups in a meal.
- 44.9 percent tried new fruits and 37.4 percent tried new vegetables more often.
- 48 percent could correctly identify the physical activity recommendation for children.
- 50 percent increased their knowledge about carbohydrates as a source of energy.

### **Key Items of Evaluation**

Research data have provided conclusive evidence that changes in individual lifestyles and behaviors can lead to improved health status (Centers for Disease Control and Prevention, 1997; Canadian Nurses Association, 1992).

100 percent of participants gained knowledge and raised awareness of the role nutrition and physical activity play in health.

**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%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	2.0	0.0
Actual Paid Professional	4.0	0.0	1.4	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
61581	0	64295	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
61581	0	64295	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**

University of Wyoming Extension collaborates with the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies in partnership as the Wyoming Food Safety Coalition. Educational efforts include a series of workshops or classes targeting food industry personal. In addition, utilizing ServSafe, the certification course of the National Restaurant Association in depth classes which include end of session certification testing are conducted. Classes, workshops, displays, and demonstrations are used to reach a general consumer audience. Youth are reached through school programs on handwashing and avoidance of cross contamination.

Educational programs on food preservation including pressure and water-bath canning, freezing, and drying foods will be delivered using multiple methods to ensure safety of the end product.

Research will 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.

**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, 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 both to educators and clientele. The University of Wyoming Extension Web site prominently displays eXtension on its' home page. eXtension professional development opportunities are publicized to all extension personnel.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2027	10000	500	5000

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

**Patent Applications Submitted**

Year: 2012

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	0	2	2

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Research; Evaluate the ability to detect and analyze for the presence of food-borne pathogens. Target is number of publications, reports, bulletins, and presentations.

Year	Actual
2012	3

**Output #2**

**Output Measure**

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

Year	Actual
2012	115

**Output #3**

**Output Measure**

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

Year	Actual
2012	2429



**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	Research: Transfer of knowledge on the ability to detect and analyze for the presence of food-borne pathogens. Target is the number of projects reporting this outcome.
4	Research: Research will result in easier, 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. Target is the number of projects with results that demonstrate outcome.
5	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**

<b>Year</b>	<b>Actual</b>
2012	2028

### **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. Additionally, home food preparers and consumers 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

#### **What has been done**

UW Extension collaborates with the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies in partnership as the Wyoming Food Safety Coalition (WFSC). Educational efforts include a series of workshops or classes targeting food industry personal. In addition, utilizing ServSafe, the certification course of the National Restaurant Association in depth classes which include end of session certification testing are conducted. Classes, workshops, displays, and demonstrations are used to reach a general consumer audience. Youth are reached through school programs on handwashing and avoidance of cross contamination.

#### **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. Eighty percent made at least one change related to cooling foods. 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. Seventy-five percent made at least one change such as monitored critical control points more closely. Improved food handling behaviors increase the likelihood that food served in Wyoming is

safe and, therefore, that lives have been saved, illnesses avoided, healthcare cost 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

#### 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
2012	2500

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

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% of food-borne illness outbreaks nationwide attributable to food-service establishments, food-service personnel are key to reducing the risk of food-borne illness. Additionally, home food preparers and consumers 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.

###### **What has been done**

115 classes ranging from ServSafe certification courses, ServeSafe Starters, Going for the Gold food safety classes for food service handlers, consumer food safety classes and school workshops on proper handwashing methods were conducted. Additionally classes on safe food preservation were taught statewide. In 2012 numerous courses were also taught in Spanish in Western Wyoming.

###### **Results**

100 percent of participants reported through both formal and informal evaluations increased

awareness and knowledge of food safety practices.  
97% made at least one change in regard to cleanliness.  
80% made at least one change in regard to cooling food.  
78% made at least one change related to food preparation.  
75% made at least one change such as monitored critical control points more closely.  
70% made at least one change related to cooking food.  
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

#### Outcome #3

##### 1. Outcome Measures

Research: Transfer of knowledge on the ability to detect and analyze for the presence of food-borne pathogens. 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
2012	1

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Contamination of food through microorganisms, toxins, or physical and chemical contaminants results in a hazard for consumers. Food borne diseases cause illnesses, hospitalizations and death. In order to keep food safe, a methodical process known as Hazard Analysis Critical Control Point (HACCP) is used in food processing and food services.

###### **What has been done**

The manual for HACCP training of small, rural, non-meat food processors was revised and in its second printing, B1200r. This is a step-by-step guide to developing an individualized HACCP program. Also written and in its first printing was the facilitator's guide, B-1200.1. This guide is

used by the trainers from the Wyoming Food Safety Coalition (WFSC). Trainings have been conducted throughout the year in different parts of the state.

**Results**

The increase in the safety of the food produced and manufactured in the state increases the safety of the consumer. The WFSC is a multi-agency, multidisciplinary partnership that has become the primary source of food safety education throughout the state. The heart of WFSC is a core of trained teams which are located in communities across the state. They include environmental health specialists, the state Department of Agriculture/Consumer Health specialists, extension educators, and college faculty. "The Wyoming Department of Agriculture's Consumer Health Services depends on Coalition team members to deliver food safety education throughout the state. WFSC is an invaluable partner in helping keep food safe in Wyoming" says the manager of Wyoming's Department of Agriculture's Consumer Health Services.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #4**

**1. Outcome Measures**

Research: Research will result in easier, 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. Target is the number of projects with results that demonstrate outcome.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	2

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Listeria monocytogenes is a pervasive foodborne pathogen that causes hundreds of cases of the severe disease, listeriosis, in the US every year. Although other foodborne bacteria such as Salmonella and E. coli cause more illnesses, L. monocytogenes is the deadliest of the common

foodborne bacteria, having a mortality rate of approximately 20%. One source of infections is the consumption of fresh produce that is contaminated with the bacterium. Currently, little is known about the cellular components that allow *L. monocytogenes* to adhere to the surfaces of fruits and vegetables.

#### **What has been done**

We recently identified genes responsible for the synthesis of a surface exopolysaccharide in *L. monocytogenes*. Exopolysaccharide commonly is used by bacteria to attach to plant surfaces and resist environmental insults such as desiccation. In future research, we will examine the role of the listerial exopolysaccharide in the attachment of cells to produce and the resistance of the bacterium to environmental stressors.

#### **Results**

This research will lead to a better understanding of the factors underlying the adherence and persistence of *L. monocytogenes* on produce and will guide efforts to prevent colonization and inhibit the growth of the bacterium on produce.

### **4. Associated Knowledge Areas**

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

### **Outcome #5**

#### **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**

<b>Year</b>	<b>Actual</b>
2012	359

#### **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. 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**

UW Extension collaborates with the Wyoming Department of Agriculture, Consumer Health Division and Wyoming Environmental Health Association, and local health agencies in partnership as the Wyoming Food Safety Coalition (WFSC). Educational efforts include a series of workshops or classes targeting food industry personal. In addition, utilizing ServSafe, the certification course of the National Restaurant Association in depth classes which include end of session certification testing are conducted. Classes are also being taught in Spanish in Western Wyoming.

#### **Results**

Of the 359 participant's in WFSC's ServeSafe and ServSafe Starters workshops : 92% passed the certification exam.

97% made at least one change in regard to cleanliness.

80% made at least one change in regard to cooling food.

78% made at least one change related to food preparation.

75% made at least one change such as monitored critical control points more closely.

70% made at least one change related to cooking food.

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**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Turnover of personnel offers challenges in Wyoming; Food Preservation as part of food safety also requires specialized training to provide competency in that subject area.

Populations changes (immigration, new cultural groupings, etc.)

Economy

Appropriation changes

Government Regulations

Competing Programmatic Challenges

Public Policy changes

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

End of session questionnaires, follow up surveys were used to document outcomes.

100 percent of participants reported through both formal and informal evaluations increased awareness and knowledge of food safety practices.

97% made at least one change in regard to cleanliness.

80% made at least one change in regard to cooling food.

78% made at least one change related to food preparation.

75% made at least one change such as monitored critical control points more closely.

70% made at least one change related to cooking food.

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.

#### **Key Items of Evaluation**

UW Extension is a key leader with the Wyoming Food Safety Coalition (WFSC) started in 1995. WFSC is a multi-agency, multi-disciplinary partnership that has become the primary source of food-safety education throughout the state. The heart of WFSC is a core of local trained teams, most of which include area UW Extension Nutrition and Food Safety educator and a health inspector from either the Wyoming Department of Agriculture or a local city/county health department of both. These teams plan and conduct a wide variety of educational programs. The addition of bi-lingual educators has increased UW Extension's capacity to provide educational programs to Spanish speaking clientele.

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.