

2010 University of Nevada Research Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

This Annual Report for the Nevada Agricultural Experiment Station (NAES) for 2010 reports on select program impacts which reflect unique benefits to a diversity of clientele and stakeholders in Nevada. No attempt was made to include all programs or all program impacts since they are too extensive.

The mission of NAES is to build and support research capacity to advance understanding of biological, environmental, natural resource and social systems to enhance agriculture, community and economic vitality in compliance with State and Federal Legislation. Research is conducted in the laboratories of the Max C. Fleischmann College of Agriculture, Knudsen Resource Center, Howard Medical Sciences, Bureau of Mines building, and the Sarah Fleischmann College of Human and Community Sciences.

Six field laboratory sites are also utilized for research, including: Main Station Field Laboratory, which houses the large animal surgical facility and laboratory and the meats laboratory; Valley Road Plant Sciences Field Laboratory, which houses the experimental winery and vineyard and the brand new state of the art NAES Greenhouse Complex; Newlands Research and Extension Center; Gund Ranch Rangeland Research Center; and the Jay Dow Sr. Wetlands Research Laboratory.

The NAES Priority grants program involves Hatch and Multi-State Research Programming which is driven by peer and stakeholder review and embraces the Federal State partnership directed by the Hatch Act and subsequent Farm Bill provisions. The overarching goals of the NAES include:

- Global Food Security and Hunger - Agricultural Production in a Semi-Arid Environment;
- Economic Development with Emphasis in Rural Areas;
- Natural Resource Management & Environmental Sciences in the Great Basin & Sierran Ecosystems;
- Nutrition and Health;
- Childhood Obesity Prevention;
- Climate Change;
- Food Safety;
- Sustainable Bioenergy.

The research program and facilities of the NAES provide the foundation for graduate training activities and undergraduate research opportunities for undergraduate students in Animal Science, Biochemistry and Molecular Biology, Biotechnology, Natural Resources and Environmental Sciences, Resource Economics and Nutrition. Through an extensive outreach program involving town hall meetings, rural tours, impact reporting, news release, web based reporting of research progress, pamphlet and annual reports and a directed advisory committee, the progress of the NAES research program is communicated with stakeholders on a regular basis and feedback is obtained to provide direction to future research projects.

Some of this year's highlights include:

- reviving retired farmland with alternative crops;
- testing new methods for improving wool harvesting;
- evaluating illegal dumping and state budget cuts impacts on rural development;
- improving fish hatchery's fry survival upon release;

- reducing fuel loads with seasonal grazing;
- finding low cost methods for determining annual snowpack;
- developing biofuels and biomaterial unique to Nevada;
- finding ways to improve weight management in the underserved;
- improving beef quality assurance in by training Nevada's youth.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	26.0	0.0
Actual	0.0	0.0	24.9	0.0

II. Merit Review Process

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

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

2. Brief Explanation

Scientific peer review drives the initial selection of research projects that comprise the NAES research portfolio. NAES solicits applications from CABNR/NAES scientists in a general call for proposals that identifies the priority areas. Faculty submit the proposals through an NAES web-based application process and the individual contributing departments are responsible for obtaining scientific peer review.

In addition to departmental peer review process, the CABNR/NAES's Advisory Board and the newly formed Range Advisory Board reviewed, evaluated and ranked proposals based upon their constituents' inputs.

All three groups submit their ranked research proposals to NAES and the Director, in consultation with the Associate Director, approve the research projects based on the departmental recommendations, peer review and Advisory Board rankings and comments and stakeholder input.

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
- Other (Conduct Field Lab Days at our Field Stations)

Brief explanation.

We have and will continue to conduct tours throughout the state for the purpose of obtaining stakeholder input. During these tours we invite participants to town hall meetings through general press coverage in the local newspapers, and we invite stakeholder groups and individuals through personal contact, i.e., email, telephone, etc., to attend. We hold "Field Lab Day" at our Main Station Field Laboratory and the Gund Range Research Station where there is an excellent dialog between stakeholders and NAES faculty and administrators. Two advisory boards have also been formed, whose qualifications cover a wide spectrum of interest, from local ranchers to federal agencies.

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
- Other (Informal discussions with key stakeholders)

Brief explanation.

We currently have a broadly based CABNR/NAES Advisory Board committee and a second more focused Range Advisory Board that meet and provides advice 1-3 times per year, respectively. In addition, we have faculty members that schedules and coordinates town hall meetings throughout the state with the purpose of obtaining direct input to the NAES research portfolio. Our partnership with Nevada Cooperative Extension provides assistance and access to stakeholders. Informal discussions with key stakeholders provide important input into our programs.

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
- Other (Conduct Field Lab Day for stakeholders)

Brief explanation.

Stakeholders include all federal, state and county non-governmental organizations that are involved in agricultural production and environmental stewardship. Individual stakeholders are identified through personal contact with producers, town hall meetings, attendees at field lab days, and connections with extension and college outreach personnel. Input is received verbally or written.

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
- Other (Devising new ag curricula)

Brief explanation.

The stakeholder input is relied upon to establish the research portfolio for NAES, and that includes identification of priority areas, identifying important new issues and the actual approval and funding of new and continuing projects. Two new majors are now in development based upon stakeholders' request.

Brief Explanation of what you learned from your Stakeholders

The overwhelming message is that stakeholders want more help in research and its applications. Nevadans desire information necessary to make decisions related to rangeland resources and rural development. Bio-renewable energies and water quality have risen to the

forefront as areas of particular importance for our Nevadan stakeholders. This in turn, is leading to development of research programs in those particular areas.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	1382430	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	0	0	995480	0
Actual Matching	0	0	1051891	0
Actual All Other	0	0	0	0
Total Actual Expended	0	0	2047371	0

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

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger - Agricultural Production in a Semi-Arid Environment
2	Economic Development with Emphasis in Rural Areas
3	Natural Resource Management and Environmental Sciences in the Great Basin and Sierran
4	Nutrition and Health
5	Climate Change
6	Sustainable Energy
7	Childhood Obesity
8	Food Safety
9	Agricultural Production in a Semi-Arid Environment

Add previously unplanned program

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger - Agricultural Production in a Semi-Arid Environment

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			51%	
301	Reproductive Performance of Animals			16%	
303	Genetic Improvement of Animals			7%	
307	Animal Management Systems			7%	
308	Improved Animal Products (Before Harvest)			5%	
311	Animal Diseases			7%	
601	Economics of Agricultural Production and Farm Management			7%	
	Total			100%	

Add knowledge area

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	2.9	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
0	0	302319	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	274440	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

NAES scientists are developing region specific wine grapes that with stand early freeze, drought tolerance and high salinity through the uses of genetic modification and selective breeding programs. Merino sheep are being genetically crossbred with US breeds to develop high yielding, extra fine wool while maintaining quality of meat produced in lambs. The University is also working on a range bull culling program that uses DNA fingerprinting to identify sub optimal animals. Finally, outreach efforts are being conducted to provide cattle producers the opportunity to improve management of risk in a variety of areas, including: elimination of drug tissue residues, suitable cull animals selection, manage risk in animal disease through a sound biosecurity program, and improving carcass quality through low stress handling techniques.

2. Brief description of the target audience

Our wine research is directed towards those who want to create a boutique wine industry in Northern Nevada as well as the scientific community associated with grape genomics. Both livestock projects are targeted for ranchers located in the Great Basin and surrounding Sierra Nevada Mountains.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
Actual	8525	191600	1965	2100

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

Patent Applications Submitted

Year: 2010
 Plan:
 Actual: 1

Patents listed

Experimental vaccine for Epizootic Bovine Abortion (Foothill Abortion)

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	17	17

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer reviewed journal articles, publications in commodity group publications, presentations at scientific meetings, presentations at stakeholder, Native American and agency meetings.

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	45

Output #2

Output Measure

- Demonstrations and field days conducted

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	16

Output #3

Output Measure

- Leveraged Research Projects

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	25

Output #4

Output Measure

- Websites created or updated

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	8

Output #5

Output Measure

- Digital media created or updated
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	3

Output #6

Output Measure

- Manuals and other printed instructional materials produced
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

Output #7

Output Measure

- Number of undergraduate students involved in research
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	92

Output #8

Output Measure

- Number of graduate students or post-doctorates trained
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	30

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	An Alternative Wool Harvesting System For the US Sheep Industry
2	Effects of Alternate Agriculture in Nevada

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

Not Reporting on this Outcome Measure

An Alternative Wool Harvesting System For the US Sheep Industry

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wool is a dominant product of sheep enterprises in Nevada and other western states. Most of 7 million sheep inventory in the US, are Merino derived wool producing flocks, and are required to be shorn mechanically, which costs \$4-5 per ewe and \$8-15 per ram constituting a substantial expense to wool growers. Shearing is a labor intensive process, and accident and injury prone occupation that requires personal skill and experience that are always in high demand, due to the short and seasonal work. Therefore, a biological wool harvesting procedure may offer a more humane, less stressful, less contaminating, and more environmentally friendly wool harvesting solution.

There are several biological fleece harvesting reagents and procedures in wool sheep and cashmere goats. However, none of these have been approved for use in the United States. The objective of this investigation was to evaluate the efficacy of a biological wool harvesting system BioClip® as an alternative to mechanical shearing of the wool sheep flocks in the US.

What has been done

Following recommendation provided by reagent manufacturer, a research team from the University of Nevada, Reno, selected a small flock of one year old ewes from the University's main merino flock located in central Nevada. Animals were given one injection of BioClip® and fitted with fleece retention netting. For the next four weeks animals were feed normal diets while being kept in holding pens to facilitate monitoring of overall health. Afterwards, fleece was removed using retention netting. Animals were then compared to control groups to evaluated wool re-growth nine weeks after injection.

Results

Bioclip reagent was developed for biological wool harvesting in Merino breed in Australia. The early trials of BioClip® wool harvesting system (WHS) in Australia have shown improved fleece quality, animal welfare, labor and textile processing efficiency.

University of Nevada, Reno's team of scientists have found that BioClip® is effective to induce a simultaneous and complete fleece shedding in Merino along with sheep derived from US merino sheep. These findings are now being used as support evidence in the approval process to allow BioClip® usage in the US. If the BioClip® reagent can be licensed and made available in US, the system may serve as an alternative wool harvesting protocol to the traditional shearing for wool sheep enterprise.

4. Associated Knowledge Areas

- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 301 - Reproductive Performance of Animals
- 303 - Genetic Improvement of Animals
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 601 - Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

- Not Reporting on this Outcome Measure
Effects of Alternate Agriculture in Nevada

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alfalfa has played a crucial role in the development of western agriculture and was once the most widely produced forage in the Great Basin. It is a perennial forage crop typically produced in

regions characterized by hot dry summers and cold winters, and in arid regions such as northwestern Nevada, optimum production can only be achieved through irrigation.

Over 50 years of research effort has been devoted towards delineating alfalfa production water requirements in northern Nevada. However, the impending impact of water reallocation has stimulated renewed interest among the agricultural sector, not only in terms of alfalfa production but also with respect to alternative agriculture (e.g., biofuel crops and teff) and the restoration of abandoned agricultural lands. Of equal concern is the response of existing ecosystems to future changes in water availability, allocation, and management.

About 50,000 acres in Lyon County, Nevada are currently devoted to irrigated alfalfa production. Conversion to alternative agriculture could have a significant effect on water resources, the local economies, and ecosystem stability. The overall objective of this study was to determine likely responses by soils and vegetation to changes in water application and consumptive use, water table depth, and soil salinity in common landscapes found in Lyon County's Walker River Basin.

What has been done

Scientists from the University of Nevada, Reno have spent the last four years taking measurements of important soil characteristics and parameters, such as soil moisture depletion and evapotranspiration, susceptibility to wind erosion, salinization, nutrient fluxes, temperature, and organic matter content, as they relate to water treatment and vegetative cover.

Some of the findings include: that by decreasing irrigation to previously irrigated areas a new invasive species (tall whitetop aka pepper weed) could likely take over. A similar issue was found with tamarisk (aka salt cedar).

Salt accumulation due to prolonged irrigation of a given site was able to be washed almost completely clean of nitrates with heavy flushing of irrigated fields.

Following irrigation, the soil temperatures were much cooler, in spite of the fact that temperatures were taken in the middle of the day. Moisture was the most commonly important factor affecting the Carbon and Nitrogen fluxes for both laboratory and field studies. And, overall, the 25% water treatments were far more effective at reducing dust generation and increasing dust deposition than the 0% water treatments and, in some instances more so than even the controls.

Results

Long-term experiments sometimes yield unexpected results - and this is certainly the case for one component of the Alternative Agriculture and Vegetation Management project. "After two years the teff looked great, but now, in the third year, weeds are destroying our teff crop - and they are the same genus as the teff so we can't use a weed killer" explained Jay Davison (University of Nevada, Reno Cooperative Extension Office).

A group of about 20 Walker Basin ranchers and residents attended the Basin Project Alternative Agricultural Field Day and BBQ. Davison guided participants down the rows of alternative crops, pointing out the advantages and potential disadvantages of each and discussing yields and irrigation regimes. The group also learned about plant behavior in response to changes in temperature, precipitation/irrigation and humidity, with demonstrations of the measuring and monitoring equipment being used on site.

The group then visited plots where cool and warm season biomass production for nine species was being compared, and where weeds were again identified as the major production challenge. The third component of the Alternative Agriculture and Vegetation Management project is a

revegetation study, where seeding has resulted in very healthy four wing saltbush shrubs - which show good potential for reducing dust and loss of fine soil particles.

4. Associated Knowledge Areas

- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 301 - Reproductive Performance of Animals
- 303 - Genetic Improvement of Animals
- 307 - Animal Management Systems
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 601 - Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Faculty seeking job security elsewhere, department closures)

Brief Explanation

Current State budget shortfalls have narrowed the breadth of research programs in NAES. Fewer research projects will be supported and recruiting graduate students will be difficult. In addition, due to the Governor's hiring freeze, State budget shortfalls, and two department closures within the College of Agriculture, Biotechnology and Natural Resources, NAES is prevented from moving forward and determining the areas of research most important to the state, nation and internationally.

The closure of the departments of Animal Biotechnology and Resource Economics will most certainly affect how we determine the most important direction of the College/NAES to remain competitive with current research issues.

In addition, if \$17,000,000 is not secured by State Legislators this 2010 session, the College of Agriculture, Biotechnology and Natural Resources is proposed for closure and remaining departments will be moved to new homes. This action could significantly alter NAES's organizational structure and cohesiveness.

All of these issues will determine the future of our research.

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the research advances from each NAES research projects where each principle investigator or graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. Where appropriate future funding will continue where the results justify continued funding.

Key Items of Evaluation

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Economic Development with Emphasis in Rural Areas

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
122	Management and Control of Forest and Range Fires			43%	
213	Weeds Affecting Plants			28%	
601	Economics of Agricultural Production and Farm Management			14%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			15%	
	Total			100%	

Add knowledge area

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	6.0	0.0
Actual	0.0	0.0	1.2	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
0	0	55007	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	99050	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

This year's economic development focused primarily on rangeland wildfires and invasive weeds effects on ranchers, all the way up to regional level economics. Specifically, researchers addressed questions like: what strategies a best suited for positioning firefighting equipment across the Great Basin; at what point would private landowners invest to reduce risk and costs of rangeland fires; what impact does alternative grazing practices produce from ranch to regional levels; and creating models that coordinate ranchers and public agency decision-makers in their efforts to battle invasive weeds and wildfires in Nevada.

2. Brief description of the target audience

Private land owners and ranchers, government agencies (BLM, Forest Service, NRCS, ARS), and state and county agencies.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	1750	4000000	400	500000
Actual	1668	262472	130	0

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

Patent Applications Submitted

Year: 2010
 Plan: 0
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	0	26	
Actual	0	15	15

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer reviewed scientific journal articles, publications on economic development , presentations at scientific meetings, presentations at stakeholder, Native American, health care organizations, agency and local government meetings.
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	26	49

Output #2

Output Measure

- Newsletters produced
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

Output #3

Output Measure

- Leveraged Research Projects
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	15

Output #4

Output Measure

- Websites created or updated
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	5

Output #5

Output Measure

- Manuals and other printed instructional materials produced
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	2

Output #6

Output Measure

- Number of graduate students or post-doctorates trained

Not reporting on this Output for this Annual Report

Year

Target

Actual

2010

{No Data Entered}

10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Peer reviewed scientific journal articles, publications on economic development, presentations at scientific meetings, presentations at stakeholder, Native American, health care, agency and local government meetings,
2	Bringing the Economics of Nevada's Budget Cuts to the People
3	The Economics of Illegal Dumping Mitigation in Northern Nevada

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

- Not Reporting on this Outcome Measure

Peer reviewed scientific journal articles, publications on economic development, presentations at scientific meetings, presentations at stakeholder, Native American, health care, agency and local government meetings,

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	26	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

- 122 - Management and Control of Forest and Range Fires
- 213 - Weeds Affecting Plants
- 601 - Economics of Agricultural Production and Farm Management
- 803 - Sociological and Technological Change Affecting Individuals, Families, and

Outcome #2

1. Outcome Measures

- Not Reporting on this Outcome Measure

Bringing the Economics of Nevada's Budget Cuts to the People

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

During the 1990s and early 2000s, the state of Nevada has been the fastest growing state in the nation in annual percentage growth in population. This population has been fueled by rapid economic expansion and construction. However with the national recession and the state's housing construction collapse, the state and its counties have realized economic recession. In fact, the state of Nevada ranks highest in unemployment rate in 2010.

This economic collapse has caused concern by state economic development leaders and county commissioners as to economic activity and fiscal balances. The need to develop strategic economic development and industry targeting programs is a need in the state to more efficiently address economic growth and possible economic stagnation.

Also understanding of the state of Nevada fiscal system is needed. Employment and unemployment data from the Nevada Department of Employment, Training, and Rehabilitation gives information as to employment and unemployment trends in the state and Nevada counties. An understanding of this employment and unemployment data are needed for proper economic development targeting. Additional decision makers need to be aware of potential economic impacts of reductions in public service activities such as Nevada System for Higher Education and local extension offices.

What has been done

Develop a web based program to analyze U.S. Bureau of Economic Analysis data, State of Nevada Department of Employment, Training, and Rehabilitation data, and State of Nevada Taxation data. Also develop voice-over-power points and webinars for discussion of economic and fiscal trend tools and analysis.

Develop Cooperative Extension fact sheets and University Center for Economic Development publications on socio-economic and fiscal trends.

Additionally University Center publications and Cooperative Extension workshops are being used to deliver analysis of potential changes in natural resource allocations on Nevada counties and communities and associated fiscal impacts.

Develop extension fact sheets to detail impacts to the state and local economy from reductions in public services and infrastructure.

Results

Nevada legislation is looking at cutting over \$162 million in state support from the Nevada System of Higher Education (NSHE) for the fiscal years 2012/2013. This project has produced the definitive economic impact analysis of NSHE on the state's economy, along with the economic impacts of the county extension offices in Mineral and Lyon Counties on their host county economies.

This project has also helped Nevada decision makers successfully understand the factors causing changes in the socio-economic trends and fiscal balancing that are appropriate with the Nevada fiscal system. An in light of the state's budget crisis, provided Nevada county commissioners with a timely socio-economic and fiscal analyses of potential impacts of changes in public resource management and development of industrial targeting plans. A series of workshops, "Does Growth Pay for Itself", were also held to inform stakeholders and the general public of the economic consequences of certain decisions. Elliot Parker, a professor at UNR, said "that without projects like Dr. Harris, the ramifications of uncontrolled growth would likely not be discussed in Nevada's general populous."

With rural communities requesting assistance in the area of entrepreneurship development, this project now provides a mechanism for delivery of entrepreneurship education materials to county economic development officials and individuals throughout the nation via the internet.

4. Associated Knowledge Areas

- 122 - Management and Control of Forest and Range Fires
- 213 - Weeds Affecting Plants
- 601 - Economics of Agricultural Production and Farm Management
- 803 - Sociological and Technological Change Affecting Individuals, Families, and

Outcome #3

1. Outcome Measures

- Not Reporting on this Outcome Measure

The Economics of Illegal Dumping Mitigation in Northern Nevada

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Illegal dumping has been a persistent nuisance in the community. Illegal dumping has the potential to be very damaging to the environment and costly for tax-payers to clean-up. There are local non-profits that focus on combating this issue, but they usually operate with limited funding and resources. Washoe County Nevada's offers free dump days to residents through the year as stipulated in the garbage hauler franchise agreements which have been very popular. However, despite the resources available to residents and organized clean-up efforts, illegal dumping remains an issue throughout Washoe County.

In an effort to better understand the motivations behind illegal dumping, as well as to assess resident perceptions of illegal dumping, this study examined resident willingness to pay (WTP) and participate in illegal dumping cleanup, as well as improved enforcement of illegal dumping laws and/or prosecution of illegal dumping offenders.

What has been done

Data for this study were collected from an in-person survey of 452 residents in Reno and Sparks, Nevada in the fall of 2009. Logistic models were used to estimate survey respondent WTP for the three policy options discussed above, as well as to assess resident activities, demographics, and attitudes more likely to influence WTP.

Results

A large portion of survey respondents (68%) would be will to participate in illegal dumping cleanup and over 84% would be willing to report an act of illegal dumping. The study also showed that residents would generally be willing to pay a tax or fee for both illegal dump site cleanup (78%) and law enforcement/prosecution (71%) of illegal dumping offenders.

Results from this study are now being used as support to a potentially increase in either residential taxes or trash collection fees to expand cleanup and/or enforcement of illegal dumping offenses governed by Washoe County District Health Department.

Another outcome of this research is the "Public Education & Information Program for Solid Waste" put on by Washoe County District Health Department. Based upon survey results, this plan uses information and education as a means to facilitate positive changes in behaviors by providing solid evidence and behavior-based theory about how these changes will benefit this county, as well as the environment.

4. Associated Knowledge Areas

- 122 - Management and Control of Forest and Range Fires
- 213 - Weeds Affecting Plants
- 601 - Economics of Agricultural Production and Farm Management
- 803 - Sociological and Technological Change Affecting Individuals, Families, and

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
- Populations changes (immigration, new cultural groupings, etc.)
- Other (University's department of Resource Economics closure)

Brief Explanation

Current State budget shortfalls have narrowed the breadth of research programs in NAES. Fewer research projects will be supported and recruiting graduate students has basically ended for the department of Resource Economics. In addition, due to the Governor's hiring freeze and further State budget shortfalls, NAES is prevented from moving forward and determining the areas of research most important to the state, nation and internationally.

The closure of the department of Resource Economics will affect how we determine the most important direction of the College/NAES to remain competitive with current economic issues and rural development. All but three resource economists have been laid off and those three remaining faculty will be moved to a different College.

In addition, if \$17,000,000 is not secured by State Legislators this 2010 session, the College of Agriculture, Biotechnology and Natural Resources is proposed for closure and remaining departments will be moved to new homes. This action could significantly alter NAES's organizational structure and cohesiveness.

All of these issues will determine the future of our research.

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the research advances from each NAES research projects where each principle investigator or graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing economic development in Nevada. Where appropriate future funding will continue where the results justify continued funding.

Key Items of Evaluation

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Natural Resource Management and Environmental Sciences in the Great Basin and Sierran Ecosystems

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			6%	
103	Management of Saline and Sodic Soils and Salinity			12%	
112	Watershed Protection and Management			4%	
121	Management of Range Resources			2%	
133	Pollution Prevention and Mitigation			29%	
136	Conservation of Biological Diversity			3%	
302	Nutrient Utilization in Animals			14%	
304	Animal Genome			18%	
305	Animal Physiological Processes			10%	
311	Animal Diseases			2%	
	Total			100%	

Add knowledge area

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	7.0	0.0
Actual	0.0	0.0	3.9	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
0	0	285618	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	340535	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

To address issues in natural resource management and environmental sciences, NAES is conducting research on a multitude of issues.

Rangeland projects include: identifying barriers to successful establishment of post-fire seeding in the Great Basin; rehabilitation of a salt-desert shrub community by studying herbaceous plants response to shrub removal and establishment; reducing fuel load of key cheatgrass dominated range sites by the use of livestock; testing survival of seeds important to Great Basin rangeland rehabilitation that are digested by rumenal species.

Forestry projects include: studying the effects of broadcast and slash pile burning on soil, vegetation growth and water quality in sierras; developing adaptive management of sierra forest with understory controlled burns; controlling mountain pine beetle via hormone production.

Ecosystem projects include: investigating the of potential for methyl mercury production and inputs from irrigation drains in Nevada, expanding our understanding of the cross habitat energetic linkages in Sierran lakes, developing geographic distribution maps of genetic variation in Nevada bighorn sheep, and exploring health issues occurring in bighorn sheep.

2. Brief description of the target audience

Audiences include: livestock producers, veterinarians, environmentalists, local governments, native american groups and agency personnel.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	1750	4000000	400	500000
Actual	4433	9573	805	436119

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

Patent Applications Submitted

Year: 2010
 Plan: 1
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	0	28	
Actual	0	56	56

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer reviewed scientific publications, publications in natural resource and environmental organization publications, presentations at scientific meetings, presentations at stakeholder, Native American and agency meetings.

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	28	246

Output #2

Output Measure

- Demonstrations, Field Days, and Workshops Conducted

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	3

Output #3

Output Measure

- Leveraged Research Projects

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	66

Output #4

Output Measure

- Web Sites Created or Updated

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	14

Output #5

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

Output #6

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	66

Output #7

Output Measure

- Number of Undergraduate Students Involved in Research

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	144

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Peer reviewed journal articles, presentations at scientific meetings, articles in natural resource and environmental science magazines, presentations at stakeholder, Native American and agency meetings.
2	Estimates of Predation by Double-crested Cormorants on Rainbow Trout in Northern Nevada Lakes.
3	Seasonal Livestock Grazing: Reducing Cheatgrass Fuel Loads

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

- Not Reporting on this Outcome Measure

Peer reviewed journal articles, presentations at scientific meetings, articles in natural resource and environmental science magazines, presentations at stakeholder, Native American and agency meetings.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	28	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

- 102 - Soil, Plant, Water, Nutrient Relationships
- 103 - Management of Saline and Sodic Soils and Salinity
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 133 - Pollution Prevention and Mitigation
- 136 - Conservation of Biological Diversity
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 311 - Animal Diseases

Outcome #2

1. Outcome Measures

Not Reporting on this Outcome Measure

Estimates of Predation by Double-crested Cormorants on Rainbow Trout in Northern Nevada Lakes.

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Double-crested cormorants (*Phalacrocorax auritus*) may have a profound effect on stocked fish populations, especially in small, managed reservoirs. The birds are voracious predators, diving up to 70 feet to hunt fish, from minnows to 15-inch trout. Each one can consume a pound or more of fish a day. They brazenly dive under boats, swooping past anglers' lures. "They're an in-your-face kind of bird," explained Russell McCullough, a state fisheries biologist.

In recent years, increasing populations of cormorants nationwide have led to growing concern from the public and natural resource management professionals about potential impacts of cormorants on various fish resources, prompting the US Fish and Wildlife Service to perform an environmental impact assessment. This project looks at the effects of predation by cormorants on stocked populations of rainbow trout in northern Nevada.

What has been done

Scientists from the University of Nevada, Reno evaluated the effects of predation by double-crested cormorants on stocked populations of rainbow trout (*Onchorhynchus mykiss*) using tag-recovery models and temporal symmetry capture-mark-recapture techniques to estimate monthly survival probability and predation rate in an urban lake (Virginia Lake) in Reno, NV.

The team stocked the lake with 2,248 uniquely tagged rainbow trout on three separate occasions separated by approximately a month and sampled a double-crested cormorant nesting and breeding island in the lake weekly to recover tags.

Based on tag-recovery models, the team estimated that 19% of rainbow trout survived from the first to the second stocking event and 4% of rainbow trout survived from the second to the third

stocking event. Accounting for the probability that we found tags deposited on the nesting island if they were present, we estimated that 100% of rainbow trout stocked in spring were eaten by double-crested cormorants.

Results

Short-term efforts to reduce double-crested cormorant predation on trout involve non-lethal techniques such as hazing. Hazing strategies used by Nevada's Department of Wildlife (NDOW) include harassing the birds away from release points by watercraft, noisemakers and pyrotechnics. The problem lies in the fact that these strategies are short-term. When personnel depart from the scene, cormorants go to work.

Since cormorants were the predominant consumer of stocked rainbow trout and consumption increased as double-crested cormorants established a nesting and breeding colony, UNR scientists are suggesting that NDOW stocking success could be enhanced by scheduling stocking for fall months, after cormorants have migrated. This change in stocking regimes would allow rainbow trout to achieve a mass and size that potentially exceeds what double-crested cormorants can consume.

Because cormorants are also protected under the Migratory Bird Treaty Act of 1918, any management or control must be coordinated and approved through the federal government. By shifting stocking cycle to fall, a reduction in red-tape with the feds is achieved.

4. Associated Knowledge Areas

- 102 - Soil, Plant, Water, Nutrient Relationships
- 103 - Management of Saline and Sodic Soils and Salinity
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 133 - Pollution Prevention and Mitigation
- 136 - Conservation of Biological Diversity
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 311 - Animal Diseases

Outcome #3

1. Outcome Measures

- Not Reporting on this Outcome Measure
 - Seasonal Livestock Grazing: Reducing Cheatgrass Fuel Loads

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Several theories have prevailed through the years regarding grazing cheatgrass. But the predominate theory, according to BLM District Manager Jerry Smith, revolved around having to graze it in the spring when it was green. "Once cheatgrass dries out, it had no nutritional value to livestock and cattle would not eat dry cheatgrass."

Within the Intermountain region, grass biomass decomposes slowly and with little or no grazing activity, the cheatgrass in any given year may represent two or more production cycles. A review of current rangeland fire research suggests that two years of fuel accumulation is the optimal for grassland fires in the Intermountain West. With the increasingly higher cost of restoring or rehabilitation rangelands, finding solutions that benefit both the rancher and range is a high priority.

This project re-opens the debate on whether or not cheatgrass have any value, and if so, can a rancher afford putting livestock on it. The overall goal was to investigate the efficacy of fall grazing of cheatgrass by domestic livestock, as a large scale fuel reduction tool, without effecting livestock performance

What has been done

Over the last three years, the research team from the University of Nevada scored individual cows and sheep on body condition before and after feeding trials to determine the overall health of each animal. Trial pastures were also evaluated on total biomass available before animals were released into the pasture each fall and afterwards, approximately 60 days later.

After all data were collected, the results showed reductions in the amount of cheatgrass from 500 lbs. of cheatgrass biomass per acre to 90 lbs. of cheatgrass biomass per acre. With the reduction in wildfire potential, came improvement in perennial grass production. Over the course of the study, production of perennial grasses increased from 45 lbs. per acre to 577 lbs. per acre.

The research team also ruled out the notion that dry cheatgrass has no nutritional value. The protein content and energy of cheatgrass in the fall proved as good, if not better, than perennial grasses. And the results were consistent through the four-year study. Lab analyses revealed protein levels fluctuated between 3.5 and 6%. Energy levels also scored well, measuring 45% and above.

Results

To Jerry Smith, who has dedicated his 34-year career with the BLM to managing natural resources, the research shows great promise in the fight against cheatgrass.

Smith continues, "Cheatgrass presents a hazard from two perspectives." "It comes up earlier than most perennial grasses, stealing resources like water and nutrients needed by other grasses, which provide forage for wildlife. Secondly, once cheatgrass dries, it is highly flammable and becomes a fire hazard."

"According to our records, during the last four years nearly four million acres burned in Nevada," said Smith. "Cheatgrass was a contributing factor to large fire growth in 85 percent of these fires. Furthermore, cheatgrass invades burned areas. For example, a single stalk of cheatgrass can produce 1,000 seeds, and a single acre may contain hundreds of thousands of these plants." The BLM estimates that cheatgrass invades 4,000 acres a day.

Smith concludes, "without a doubt, the research that Dr. Perryman and Dr. Bruce conducted is proof there are other ways to win the fight against this invasive grass."

4. Associated Knowledge Areas

- 102 - Soil, Plant, Water, Nutrient Relationships
- 103 - Management of Saline and Sodic Soils and Salinity
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 133 - Pollution Prevention and Mitigation
- 136 - Conservation of Biological Diversity
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 311 - Animal Diseases

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
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Faculty seeking job security elsewhere)

Brief Explanation

Current State budget shortfalls will narrow the breadth of research programs in Nevada Agricultural Experiment Station (NAES). Fewer research projects will be supported and recruiting graduate students will be difficult. Plus, due to the Governor's hiring freeze, State budget shortfalls, and two department closures within the College of Agriculture, Biotechnology and Natural Resources, NAES is prevented from moving forward and determining the areas of research most important to the state, nation and internationally.

Current cutbacks to our programs will also affect how we determine the most important direction of the College/NAES to remain competitive with current research issues. Several of our senior faculty will be retiring and potential layoffs are looming, will cutbacks affect our ability to fill these positions or will we be forced to cutback our research efforts to concentrate on teaching our courses.

Additionally, if \$17,000,000 is not secured by State Legislators this 2010 session, the College of Agriculture, Biotechnology and Natural Resources is proposed for closure and remaining departments will be moved to new homes. This action could significantly alter the NAES's organizational structure and cohesiveness.

All of these issues will determine the future of our research.

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the research advances from each NAES research projects where each principle investigator or

graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing natural resource and environmental issues in Nevada. Where appropriate future funding will continue where the results justify continued funding.

Key Items of Evaluation

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Nutrition and Health

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
609	Economic Theory and Methods			30%	
703	Nutrition Education and Behavior			65%	
723	Hazards to Human Health and Safety			5%	
	Total			100%	

Add knowledge area

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	2.5	0.0
Actual	0.0	0.0	1.0	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
0	0	31452	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	17809	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

2010 29 43

Output #2

Output Measure

- Demonstrations and Workshops Conducted

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	2

Output #3

Output Measure

- Leveraged Research Projects

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	5

Output #4

Output Measure

- Web Sites Created or Updated

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

Output #5

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	2

Output #6

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	18

Output #7

Output Measure

- Number of Undergraduate Students Involved in Research

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	17

Output #8

Output Measure

- Unique Visitors to Websites

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	6565

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Peer reviewed scientific publications, publications in health and nutrition organization publications, presentations at scientific meetings, presentations at stakeholder, nutrition and health, school board, local governmental and Federal and State agency meetings.
2	Air Filtration Systems and Secondhand Smoke-Induced Health Effects

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

- Not Reporting on this Outcome Measure

Peer reviewed scientific publications, publications in health and nutrition organization publications, presentations at scientific meetings, presentations at stakeholder, nutrition and health, school board, local governmental and Federal and State agency meetings.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	29	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

- 609 - Economic Theory and Methods
- 703 - Nutrition Education and Behavior
- 723 - Hazards to Human Health and Safety

Outcome #2

1. Outcome Measures

- Not Reporting on this Outcome Measure

Air Filtration Systems and Secondhand Smoke-Induced Health Effects

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Secondhand smoke (SHS) is responsible for many respiratory diseases caused or aggravated by an inflammatory response including: asthma, bronchitis, pneumonia and middle ear infections. Asthma is a key public health problem in the U.S. and has been increasing since 1980. Asthma attacks can be caused by something that bothers the lungs. These asthma triggers can be one of two types, either allergens or irritants.

Irritants, such as secondhand smoke (SHS) trigger asthma attacks by stimulating irritant receptors in the respiratory track causing the muscles surrounding the airway to constrict and resulting in an asthma attack. Since Americans spend up to 90% of their time indoors, exposure to indoor irritants like SHS may play a significant role in triggering these attacks.

With only 22 states having comprehensive smoke-free workplace laws (bars and restaurants included) and many of these having exemptions for businesses, such as gaming, many Americans continue to be exposed to SHS. One rationale for not passing smoke-free laws and for granting exemptions is the claim by some that air filtration (ventilation) systems can minimize the harmful effects of exposure to SHS.

Despite these claims, air filtration systems used by businesses and in public buildings may not be efficient in removing the irritants of SHS responsible for triggering asthma episodes and other respiratory illnesses.

Does standard air filtration systems used by businesses (charcoal and or HEPA filters) reduce the health effects from environmental tobacco smoke (ETS) exposure?

What has been done

In this study University of Nevada, Reno scientists tested whether an air filtration system (activated charcoal filter and MERV filters rated up to 8 - general commercial) could significantly reduce ETS contaminants and provide adequate protection against ETS induced inflammatory response in the lungs.

Studies were conducted which looked at the effect of SHS exposure following exposure for 6 hours/day, 3 days a week for 6 weeks.

Mice were exposed to either full ETS, ETS passed through an activated charcoal filter or no ETS. The data showed that with even the most efficient air filters tested in these studies (MERV 8)

which represent the most efficient air filtration systems used commercially by businesses that at least 40% of the particulate matter is not filtered out. Carbon monoxide levels are not significantly reduced by these air filtration systems.

Following exposure, inflammatory responses were determined looking at Bronchial lavage fluid (BAL) and lung digests. Inflammatory response was looked at in terms of infiltration of BAL fluid and lung tissue by inflammatory cells as well as the production of cytokines by these cells. Carbon monoxide (CO) and total suspended particle (TSP) analyses showed that the filters reduced CO and TSP by 32% and 35% respectively.

Results

This study provided the first data which address whether standard air ventilation systems are capable of reducing the health effects associated with ETS exposure. Our results demonstrated that neither activated charcoal nor MERV 8 filters eliminate exposure to ETS chemical constituents. Suggesting that the peoples exposed to the filtered ETS may be at a different stage in their inflammatory response, but are not fully protected from the ETS induced inflammatory response.

These findings are now being passed on to legislators (as they weigh the health implications of smoking bans versus industry sponsored ventilation system alternatives), air quality regulators (EPA, OSHA) and businesses where smoking is currently permitted.

4. Associated Knowledge Areas

- 609 - Economic Theory and Methods
- 703 - Nutrition Education and Behavior
- 723 - Hazards to Human Health and Safety

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

Brief Explanation

Current State budget shortfalls have narrowed the breadth of research programs in NAES. With the possible 2013 closure of the Department of Nutrition (major contributor to the goals of nutrition and health, as well as childhood obesity), NAES is prevented from moving forward and determining the areas of research most important to the state, nation

and internationally. Current cutbacks and the looming layoff to our nutrition programs will also affect graduate student and post-doctoral recruitment.

Additionally, if \$17,000,000 is not secured by State Legislators this 2010 session, the College of Agriculture, Biotechnology and Natural Resources is proposed for closure and remaining departments will be moved to new homes. This action could significantly alter the NAES's organizational structure and cohesiveness.

All of these issues will determine the future of our research.

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the research advances from each NAES research projects where each principle investigator or graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing nutrition and health issues in Nevada. Where appropriate future funding will continue where the results justify continued funding.

Key Items of Evaluation

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management			1%	
201	Plant Genome, Genetics, and Genetic Mechanisms			78%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			20%	
402	Engineering Systems and Equipment			1%	
	Total			100%	

Add knowledge area

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.7	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
0	0	65464	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	54093	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

2010 {No Data Entered} 24

Output #2

Output Measure

- Leveraged Research Projects

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	8

Output #3

Output Measure

- Web Sites Created or Updated

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

Output #4

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	23

Output #5

Output Measure

- Number of Undergraduate Students Involved in Research

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Introducing a Low Cost Method for Determining Snowpack in the Mountain West

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

Not Reporting on this Outcome Measure

Introducing a Low Cost Method for Determining Snowpack in the Mountain West

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With 50-80 percent of the water supply in the West arriving in the form of snow, data on snow pack provide critical information to decision makers and water managers throughout the West. Snow depth (SD) and snow water equivalence (SWE) information from dedicated stations and field surveys is critical for assessing water availability. The SNOwpack TELEmetry network, established, operated and maintained by the Natural Resources Conservation Service (NRCS), consists of over 730 sites in 11 states. Each site is equipped with a range of instruments that measure SD and SWE.

However, SNOTEL sites are long-term installations, fixed in place, which can limit quantifying the highly variable temporal and spatial nature of SWE and SD due to factors including weather, vegetation cover, and topography. And based upon the range of instruments attached to SNOTEL site, can be reasonable expensive.

This project looks at supplementing the current SNOTEL permanent weather stations with a new wireless network of easily transportable, mobile SD and SWE sensing stations, deemed Snowcloud.

What has been done

University of Nevada, Reno scientists in collaboration with University of Vermont designed a low cost, easily transportable device used to collect real-time snow depth and snow water equivalence information. The system was designed to communicate via Wi-Fi frequencies to create a network of data collectors - Snowcloud.

A 6-node Snowcloud network was deployed at the University of California's Sagehen Creek field

station in the central Sierra Mountains. Snowcloud measurements are used with information from the meteorological station and spatial data analysis techniques to provide real estimates of snow depth and snow water equivalence. Snowcloud measurements were also supplemented with manual snow sampling techniques to develop and verify statistical models of the relationship between snow depth, snow water equivalence and other site characteristics.

The Sagehen deployment directly measures snow depth and air temperature and the network was then linked to a fixed location station that conforms to SNOTEL station design. Snow depths and extrapolated SWE data were interpreted using GIS.

To facilitate visualization and analysis, animations were created with a variable time scale for the total desired time interval. Snow water equivalence and snow depth variations are seen as color scale gradations on an aerial photo, while the observed data is represented as line graphs animated in time with the interpolated data.

Results

This project has proven to be extremely valuable in supplementing fixed-site SNOTEL data with measurement taken from less than ideal locations in surrounding areas. NRCS scientist are now using techniques developed through this project to extrapolating SD and SWE where topographic features and vegetation characteristics are not uniform or do not represent the area surrounding the SNOTEL site. These wireless sensing networks are now extending SNOTEL data to estimate areal distribution of SD and SWE on small- and intermediate-scales.

This project has shown that Snowcloud nodes are highly portable and easily deployed in remote locations, and able to withstand winter condition, while keep cost down substantially in comparison to permanent stations. The total materials cost per Snowcloud node was approximately \$500.

4. Associated Knowledge Areas

- 112 - Watershed Protection and Management
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 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
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Faculty seeking job security elsewhere)

Brief Explanation

Current State budget shortfalls will narrow the breadth of research programs in Nevada Agricultural Experiment Station (NAES). Fewer research projects will be supported and recruiting graduate students will be difficult. Plus, due to the Governor's hiring freeze, State budget shortfalls, and two department closures within the College of Agriculture, Biotechnology and Natural Resources, NAES is prevented from moving forward and determining the areas of research most important to the state, nation and internationally.

Current cutbacks to our programs will also affect how we determine the most important direction of the College/NAES to remain competitive with current research issues. Several of our senior faculty will be retiring and potential layoffs are looming, will cutbacks affect our ability to fill these positions or will we be forced to cutback our research efforts to concentrate on teaching our courses.

Additionally, if \$17,000,000 is not secured by State Legislators this 2010 session, the College of Agriculture, Biotechnology and Natural Resources is proposed for closure and remaining departments will be moved to new homes. This action could significantly alter the NAES's organizational structure and cohesiveness.

All of these issues will determine the future of our research.

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the

research advances from each NAES research projects where each principle investigator or graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing climated change issues in Nevada. Where appropriate future funding will continue where the results justify continued funding.

Key Items of Evaluation

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
204	Plant Product Quality and Utility (Preharvest)			23%	
206	Basic Plant Biology			44%	
511	New and Improved Non-Food Products and Processes			33%	
	Total			100%	

Add knowledge area

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	2.4	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
0	0	213278	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	209302	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

Research efforts relating to sustainable energy revolved around native species found in the Great Basin that would serve as biomaterials and biofuels. Specifically, rabbit brush is being used for it latex production as well as its cellulosic-based feedstock to produce biodiesel; gum weed and gopher weed are being examined for their use in creating hydrocarbon compounds that are highly suited for the production of liquid biofuels; horticultural experiment are underway to determine if camelina (a new biofuel feed crop) is suitable for northern Nevada; and further investigations are now underway to determine oil production potential of 20 varieties of salt-loving algae.

2. Brief description of the target audience

Renewable energy industry, scientific community, NGOs, and the general public

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
Actual	232	50	70	75

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

Patent Applications Submitted

Year: 2010
 Plan:
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	6	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer reviewed scientific publications, presentations at scientific meetings, presentations to stakeholder, workshops.

<input type="checkbox"/> Not reporting on this Output for this Annual Report		
Year	Target	Actual
2010	{No Data Entered}	6

Output #2

Output Measure

- Demonstrations and Workshops Conducted

<input type="checkbox"/> Not reporting on this Output for this Annual Report		
Year	Target	Actual
2010	{No Data Entered}	8

Output #3

Output Measure

- Leveraged Research Projects

<input type="checkbox"/> Not reporting on this Output for this Annual Report		
Year	Target	Actual
2010	{No Data Entered}	11

Output #4

Output Measure

- Web Sites Created or Updated

<input type="checkbox"/> Not reporting on this Output for this Annual Report		
Year	Target	Actual
2010	{No Data Entered}	3

Output #5

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

<input type="checkbox"/> Not reporting on this Output for this Annual Report		
Year	Target	Actual
2010	{No Data Entered}	15

Output #6

Output Measure

- Number of Undergraduate Students Involved in Research

<input type="checkbox"/> Not reporting on this Output for this Annual Report		
Year	Target	Actual
2010	{No Data Entered}	10

Output #7

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Biofuels from Salt Basin Algae: An Energy Crop for Nevada
2	Rabbit Brush As A Multi-Use Industrial Crop For Biomaterial And Bioenergy Applications

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

Not Reporting on this Outcome Measure

Biofuels from Salt Basin Algae: An Energy Crop for Nevada

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To fulfill the growing energy needs of Nevada, it is becoming increasingly clear that the state and country must invest in the development of alternative energy resources, such as biofuels, wind, solar and geothermal. The purpose of this study is to explore whether a salt-loving, pink algae, *Dunaliella salina*, can serve as a biofuels feedstock. Because this organism grows optimally in high saline environments, and is naturally occurring in various regions of the Great Basin, it appears to be well suited as a new alternative biofuels crop for Nevada.

What has been done

Analysis of growth rates, triacylglycerol, free fatty acid content, and insoluble starch content for nineteen strains of halophytic microalgae (*D. salina*) has been completed and analysis of results is being finalized for publication.

In addition, University of Nevada, Reno researchers have explored the use of centrate, the liquid fraction created when anaerobically digested wastewater sludge is dewatered for disposal purposes, as a low cost, nutrient source for growing algae.

The research team has also begun the sequencing of approximately 30 different freshwater green algae strains including *Chlorella*, *Neochloris*, and *Nannochloropsis* species.

The team is now in the process of selective breed *D. salina* through multiple generations looking for changes in lipid content. One discovery new to this field of science is that both buoyant density gradient centrifugation and flow cytometry followed by fluorescence activated cell sorting can be effectively used to select for significant increases in lipid and/or starch content algal cell populations without resorting to genetic engineering.

Other scientific advancements include the complete mitochondrial and plastid genome sequences have now been published. Short sub-sequence of a transcribed DNA libraries derived from various environmental stress conditions by Sanger and Roche 454 sequencing produced over 1.5 M cleansed reads and about 21,000 unigenes. Analysis of a small collection of expressed sequence tags from salt-shocked *D. salina* cells was also completed.

In order to identify genes that control oil production, an experiment using a custom microarray has been completed with the largest change in gene expression patterns occurring after three days of nutrient deprivation.

Results

Despite the potential global economic importance of the pink algae *Dunaliella salina*, relatively little research has been done to understand its unique physiology and exploit its tremendous potential. While the federal government is increasing their investment into biofuel research, most of the attention is being given to fresh water dependent crops that will need to be grown using existing agricultural land and water resources.

However, for Nevada, this is not a viable long-term strategy, as it will be politically and pragmatically un-reasonable to re-allocate significant amounts of its precious water and agricultural resources to feed the appetite of a new biofuels industry. Rather, it makes sense for Nevada to take the lead on developing an alternative biofuel feedstock that is more compatible with Nevada's need to manage the unique resources available in the Great Basin.

Traditional agricultural production systems require a high quality of fresh water. The alternative halophytic algal production system being investigated here utilizes low quality waste water with preferably high salt content unsuitable for any other use.

In addition to abundant sunlight, Nevada has significant geothermal resources that could be leveraged to improve the economic viability of the proposed halophytic alga production systems. One of the major drawbacks of algal production systems investigated by the DOE in the mid 1990's was the nighttime cooling of production ponds that limited algal growth rates. Effective and strategic exploitation of geothermal resources for heating of algal production ponds would overcome this drawback.

4. Associated Knowledge Areas

- 204 - Plant Product Quality and Utility (Preharvest)
- 206 - Basic Plant Biology
- 511 - New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

- Not Reporting on this Outcome Measure

Rabbit Brush As A Multi-Use Industrial Crop For Biomaterial And Bioenergy Applications

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Global warming and decreasing oil reserves have mandated the development of renewable and sustainable alternatives to petroleum-based products. Plants, which produce zero balance carbon emission energy feedstocks, represent a particularly attractive alternative to fossil fuels. Furthermore, due the high degree of chemical diversity present in plant kingdom, many plant species are being investigated as replacement for the production of petroleum-based industrial chemicals.

One such plant species is rabbit brush (*Chrysothamnus nauseosus*). Rabbit brush is a highly prolific perennial shrub that is endemic to Nevada and the Great Basin region of the United States. This plant species produces significant amounts natural rubber, soft resins and plant based ethanol. As such, while most plants are utilized for single applications, rabbit brush could be exploited for both the production of industrial materials (eg., rubber, plastics, coatings, lubricants and adhesives) and energy feedstocks (eg., biodiesel and cellulosic-based liquid fuels). The goal of this project is to examine the potential of Rabbit Brush As A Multi-Use Industrial Crop For Biomaterial And Bioenergy Applications.

What has been done

Over the past year scientist at the University of Nevada, Reno have developed a large scale methods of extracting rubber from rabbitbrush. This includes optimized solvent extraction methods (centrifugation and the use of creaming agents) to separate bulk rubber and resin from whole rabbitbrush plants. These methods have been able to consistently extract approximately 6% of total shrub dry weight as rubber and 5% as resin.

Molecular weight analysis of the extracted rubber reviewed that rabbitbrush rubber produces high quality rubber with an average molecular weight of 800,000 Daltons. Nuclear magnetic resonance analyses further showed that the solvent extracted rubber to be very pure with very little contaminating compounds.

Allergen analyses of rabbitbrush rubber shows that the proteins associated with rabbitbrush rubber particles have very low protein content. Although this finding bodes well for rabbit brush's potential as a hypoallergenic source of rubber, test are still necessary to determine if immunogenic proteins related to Type I latex allergies are present. Therefore we are in the process of performing analyses of rabbitbrush rubber particle proteins using antibodies to the major natural latex allergens Hev B1 and Hev B5.

Results

These accomplishments are important in that University of Nevada, Reno scientists have been able to generate materials that will allow the team to assess the biomaterial and bioenergy potential of materials extractor from rabbitbrush. Through these efforts the research team has validated the importance of rabbitbrush as one of the newest sources of locally grown rubber, resin and biomass materials in Nevada.

Thus far all results are indicating that Nevada's rabbit brush rubber is very comparable to another commercially grown plant from the US southwest, guayule. If more detailed analyses support these findings, it may be possible to utilize the currently established guayule industrial infrastructure to extract rubber, resin and biomass from rabbitbrush and thus establish a second commercial source of hypoallergenic rubber for the United States.

4. Associated Knowledge Areas

- 204 - Plant Product Quality and Utility (Preharvest)
- 206 - Basic Plant Biology
- 511 - New and Improved Non-Food Products and Processes

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
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Faculty seeking job security elsewhere)

Brief Explanation

Current State budget shortfalls will narrow the breadth of research programs in Nevada Agricultural Experiment Station (NAES). Fewer research projects will be supported and recruiting graduate students will be difficult. Plus, due to the Governor's hiring freeze, State budget shortfalls, and two department closures within the College of Agriculture, Biotechnology and Natural Resources, NAES is prevented from moving forward and determining the areas of research most important to the state, nation and internationally.

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All of these issues will determine the future of our research.

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the research advances from each NAES research projects where each principle investigator or graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing sustainable energy in Nevada. Where appropriate future funding will continue where the results justify continued funding.

Key Items of Evaluation

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
134	Outdoor Recreation			20%	
703	Nutrition Education and Behavior			20%	
724	Healthy Lifestyle			20%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			30%	
901	Program and Project Design, and Statistics			10%	
	Total			100%	

Add knowledge area

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.1	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
0	0	11645	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	39281	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

Researchers are examining the physical activity and food environment-obesity relationship across a large and diverse statewide population while including community social economic and demographic characteristics such as racial distribution, poverty rate, urban vs. rural distinction into the analysis.

2. Brief description of the target audience

State and local government policy makers, ultimately, all residents of the state of Nevada.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
Actual	20	2422	0	95

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

Patent Applications Submitted

Year: 2010
 Plan:
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	2	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer reviewed scientific journal articles, presentations at scientific meetings, presentations to stakeholder, Native American, health care organizations, agency and local government

meetings.

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	5

Output #2

Output Measure

- Demonstrations and Workshops Conducted

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	3

Output #3

Output Measure

- Leveraged Research Projects

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	3

Output #4

Output Measure

- Web Sites Created or Updated

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

Output #5

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	2

Output #6

Output Measure

- Number of Graduate Students or Post-Doctorates Trained

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	6

Output #7

Output Measure

- Number of Undergraduate Students Involved in Research

Not reporting on this Output for this Annual Report

Year

Target

Actual

2010

{No Data Entered}

12

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	A Model For A Primary Care Weight Management Program For Underserved Populations

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

Not Reporting on this Outcome Measure

A Model For A Primary Care Weight Management Program For Underserved Populations

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Affecting two thirds of the Nevada adult population, overweight and obesity constitute currently the state's most prevalent modifiable health risk factor. In spite of numerous calls to action targeting the health care system and the society, the data show no improvement in the obesity epidemic.

Physician support from dietitians is a challenge, especially in Nevada which ranks 50th in the Nation, with only 12.8 dietitians per 100K population (National average is 25.1 dietitians per 100K population).

Our goal is to improve the healthcare of the overweight or obese patient by developing and implementing a primary care based weight management intervention which will be efficient and cost-effective. This intervention is intended to shift the paradigm of treating obesity from third-party obesity centers to primary care offices.

The patient-primary care physician relationship is usually long-term, and thus offers the best path to address a chronic medical problem such as obesity. More so, because obesity is an important risk factor for many chronic medical conditions, this will facilitate an integrative approach to patient care.

What has been done

University of Nevada, Reno in collaboration with Nevada Health Centers, Inc. created a novel, cost-effective, primary healthcare based small group intervention program for the prevention and treatment of overweight and obesity in the underserved population.

This intervention took medical assistants, who are already part of the primary care team, and are more cost-effective than a dietitian or a behavior therapist, and gave them on job training as weight management coaches. The idea was to enable them to efficiently deliver a well-structured, cognitive-behavioral and nutrition education program developed by experts.

The team developed a cognitive behavior and nutrition therapy curriculum that guides dietician on how to train weight management coaches. Two manuals were also developed, one for the weight management coaches with specific directions for implementing the program and serving as the weight management coach group leader. The second manual for patients, provided easy to understand, step by step information about cognitive-behavior skills and nutrition knowledge. With materials in hand, dieticians from the University of Nevada, Reno, met with Nevada Health Center employees who then selected good candidates for the program.

Results

This primary care physician supervised intervention is intended to alleviate the lack of infrastructure and medical services needed to assist the overweight and obese patients. The patient-primary care physician relationship is usually of long-term, and thus offers the best path to address a chronic medical problem such as obesity. More so, because obesity is an important risk factor for many chronic medical conditions, this intervention facilitated an integrative approach to patient care.

For sustainability, the Sierra Family Health Centers, under the direction of Dr. Carl Heard, has continued the weight classes for their patients, led by one of their clinical staff. In addition, UNR was able to set up a formal agreement with the Dietetic Technician program at Truckee Meadows Community College and have their student's complete part of their "community nutrition" internship hours helping train primary care staff.

The administrative and professional staff of the Nevada Health Centers, Inc. continued to be willing to assist with the recruitment of this study. They realized as health professionals that their overweight or obese adult patients will greatly benefit by having this kind of care available to reduce their disease risk.

4. Associated Knowledge Areas

- 134 - Outdoor Recreation
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 803 - Sociological and Technological Change Affecting Individuals, Families, and
- 901 - Program and Project Design, and Statistics

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
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Possible 2013 closure of the Nutrition department)

Brief Explanation

Current State budget shortfalls have narrowed the breadth of research programs in NAES. With the possible 2013 closure of the Department of Nutrition (major contributor to the goals of nutrition and health, as well as childhood obesity), NAES is prevented from moving forward and determining the areas of research most important to the state, nation and internationally. Current cutbacks and the looming layoff to our nutrition programs will also affect graduate student and post-doctoral recruitment.

Additionally, if \$17,000,000 is not secured by State Legislators this 2010 session, the College of Agriculture, Biotechnology and Natural Resources is proposed for closure and remaining departments will be moved to new homes. This action could significantly alter the NAES's organizational structure and cohesiveness.

All of these issues will determine the future of our research.

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing

different levels of program intensity.

- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the research advances from each NAES research projects where each principle investigator or graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing childhood obesity in Nevada. Where appropriate future funding will continue where the results justify continued funding.

Key Items of Evaluation

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
308	Improved Animal Products (Before Harvest)			10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			30%	
723	Hazards to Human Health and Safety			30%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			30%	
	Total			100%	

Add knowledge area

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.3	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
0	0	30697	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	17381	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

Current work by NAES involves developing an online food safety education program for child and elderly care givers reaching participants through their worksites. Participants access this fully narrated and animated curriculum whenever they choose, rather than at a specific time and location. In addition, onsite food safety workshops are being conducted for those caregiver facilities who desire such and for those caregivers who do not have easy access to the internet.

2. Brief description of the target audience

Child and elderly care givers, State of Nevada Division of Health, Washoe District Health Department, the Nevada Food Safety Task Force, Nevada cattle producers

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
Actual	60	200	90	0

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

Patent Applications Submitted

Year: 2010
 Plan:
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	2	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer reviewed scientific journal articles, presentations at scientific meetings, presentations to stakeholder, health care organizations, agency and local government meetings.
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	6

Output #2

Output Measure

- Leveraged Research Projects
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	6

Output #3

Output Measure

- Web Sites Created or Updated
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	2

Output #4

Output Measure

- Digital Media Created or Updated
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

Output #5

Output Measure

- Number of Graduate Students or Post-Doctorates Trained
- Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	4

Output #6

Output Measure

- Number of Undergraduate Students Involved in Research

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	{No Data Entered}	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Improving Quality Assurance in Nevada's Dairy and Beef Industry

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

Not Reporting on this Outcome Measure

Improving Quality Assurance in Nevada's Dairy and Beef Industry

2. Associated Institution Types

1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Cattle can be many things to a producer at any given time but the fact is they're all the same in the end - steaks, hamburgers burgers, roasts and ribs. They end up on someone's plate thousands of miles away. Delivering a safe and quality product is the beef industry's best way to increase beef demand and meet consumer's satisfaction for quality and safety. Producers have to assure that the beef product meets the quality standards established.

The purpose of the Nevada Youth Livestock Quality Assurance Training Program is to increase food safety awareness by educating youth producers of their role in this process and the importance of raising their livestock in an appropriate manner. By following a quality assurance program, youth can improve their animal care and management practices in order for their animal to achieve its highest level of performance while providing a safe, wholesome product for consumers.

What has been done

BQA is an ongoing program that teaches cattle ranchers in all 50 states about animal genetics, cattle-handling, feed-purchasing, record-keeping, testing and other procedures to produce beef without residue of animal health products or pesticides. Participants work with veterinarians and scientists to learn how to keep their cattle healthy, increase product quality and enhance consumer confidence in their meat.

Over the past two years University of Nevada, Reno veterinarians have begun the "Youth Livestock Quality Assurance Training Program". This project developed instructive materials (both print and web based) that enhance the educational aspects of 4-H, FFA, and Nevada Junior Livestock Show participant.

Results

Often in our youth livestock programs, youth get so involved in competitive aspects of the project that they lose sight of the fact that the livestock they produce is eventually destined to the consumer. 4-H and FFA beef project leaders and parents can use these materials to teach their youth about Beef Quality Assurance and how they can produce a better beef product for the consumer. By the end of 2010 season, more than 400 youth have passed the QA program.

This program has produced more than 350 adults and 60 beef operations certified in BQA. Additionally, the Nevada BQA program is part of national effort, which has resulted in a 25 percent reduction in the amount of injection site lesions due to improper vaccination protocol on beef cattle.

4. Associated Knowledge Areas

- 308 - Improved Animal Products (Before Harvest)
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and
- 723 - Hazards to Human Health and Safety
- 803 - Sociological and Technological Change Affecting Individuals, Families, and

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

Brief Explanation

Current State budget shortfalls have narrowed the breadth of research programs in NAES. The two programs conducting the majority of research directly related to food safety have either been closed (Animal Biotechnology & Veterinary Science) or face the possibility of closure in 2013 (Nutrition). These losses prevent NAES from moving forward and determining the areas of research most important to the state and nation. Current cutbacks and the looming layoff to our nutrition faculty will only further hurt research efforts by reducing graduate student and post-doctoral recruitment.

Additionally, if \$17,000,000 is not secured by State Legislators this 2010 session, the College of Agriculture, Biotechnology and Natural Resources is proposed for closure and remaining departments will be moved to new homes. This action could significantly alter the NAES's organizational structure and cohesiveness.

All of these issues will determine the future of our research.

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a web based mini-symposium to learn of the research advances from each NAES research projects where each principle investigator or graduate student makes a power point presentation in a forum open to all faculty, staff, students and stakeholders as well as College and NAES leadership. Faculty are questioned and future goals are discussed for each research project t in the NAES research portfolio. The web cast has been saved and will be open for review for one year. Faculty have been productive and continued to carry out cutting edge research and in addressing food safety issues in Nevada. Where appropriate future funding will continue where the results justify continued funding.

Key Items of Evaluation

Publications in refereed journals, invited review articles, extension publications, invitations to talk at national and international meetings.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Agricultural Production in a Semi-Arid Environment

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	10.5	0.0
Actual	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

{No Data Entered}

2. Brief description of the target audience

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	1750	4000000	400	500000
Actual	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}

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

Patent Applications Submitted

Year: 2010

Plan: 0

Actual: {No Data}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	0	65	
Actual	{No Data Entered}	{No Data Entered}	{No Data Entered}

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer reviewed journal articles, publications in commodity group publications, presentations at scientific meetings, presentations at stakeholder, Native American and agency meetings.

Not reporting on this Output for this Annual Report

Year	Target	Actual
2010	65	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	peer reviewed journal articles, publications, in trade journals, presentations at scientific meetings, stakeholder, Native American and agency presentations

Add Cross-cutting Outcome/Impact Statement or Unintended or Previously Unknown Outcome Measure

Outcome #1

1. Outcome Measures

- Not Reporting on this Outcome Measure

peer reviewed journal articles, publications, in trade journals, presentations at scientific meetings, stakeholder, Native American and agency presentations

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

- Change in Knowledge Outcome Measure
- Change in Action Outcome Measure
- Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	65	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

(OPTIONAL SECTION)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
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- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other

Evaluation Results

Key Items of Evaluation