

# 2011 University of Nevada Research Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/27/2012

## I. Report Overview

### 1. Executive Summary

Nevada Agricultural Experiment Station (NAES) 2011 annual report will focus on select program impacts which reflect unique benefits to a diversity of clientele and stakeholders in Nevada.

The mission of NAES is to build and support research capacity to advance understanding of biological, environmental, natural resource and social systems that enhance agriculture, community and economic vitality in compliance with State and Federal Legislation. While NAES faculty, students and staff labor to reach new milestones in these areas, the past two years has been more challenging fiscally than any other budget cycle over the last two decades. The economic and financial condition of the State of Nevada remains very weak, compounding the effects of previous years' reductions of state funding to the University of Nevada, Reno and its units. The fundamental issue is how NAES's mission is consistent with both the increasing share of cost borne by undergraduate students and the direction of a research driven university.

This past year, NAES priority grant program included Hatch, Multi-State, and McIntyre-Stennis funding opportunities, 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;
- Animals and Their Systems.

The research program and facilities of the NAES provide the foundation for graduate training activities and undergraduate research opportunities in Agricultural Science, Biochemistry and Molecular Biology, Biotechnology, Natural Resources and Environmental Sciences, Nutrition, Rangeland & Forestry Management, and Vet Science.

Through an outreach program involving town hall meetings, rural tours, impact reporting, news release, web based reporting of research progress, pamphlet, booklets 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:

- Developing biofuels and biomaterial unique to Nevada
- Economic development in rural Nevada & western beef industry
- Alternative crop and niche market crop development
- Rangeland restoration
- Breakthroughs in bark beetle control
- Improving food safety handling in Nevada

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.

Five 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 Field Laboratory, comprised of the NAES Greenhouse Complex, UNR's Equestrian Center, test vineyards, our avian facility, a fermentation lab and numerous test plots; Gund Ranch Rangeland Research Center playing host to numerous Great Basin rangeland project; and the Jay Dow Sr. Wetlands Research Laboratory.

**Total Actual Amount of professional FTEs/SYs for this State**

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	26.5	0.0
Actual	0.0	0.0	26.0	0.0

**II. Merit Review Process**

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

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

**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. NAES staff then arrange scientific peer reviews based upon departmental recommendations and and tabulate result. Individual contributing departments are responsible for ranking proposal based upon tabulated results. 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 findings to the Director of NAES and final decisions are made based on the rankings, 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
- 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, and direct mailings, to attend. We hold a "Field Lab Day" at our Valley Road Field Laboratory and the Gund Ranch Research Station's "Return of the Curlew" annually where there is an excellent dialog between stakeholders, University of Nevada Cooperative Extension and NAES faculty & administrators. Two advisory boards have been established to counsel NAES in matters of research and resident instruction. Both boards' qualifications cover a wide spectrum of interest, from local ranchers to federal agencies. New for this year, county focus groups were ask to contribute their viewpoints and ideas on the needs and deficiencies of their local region.

#### 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 External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Other (Informal discussions with key stakeholders)

#### Brief explanation.

We currently have a broadly based College of Agriculture, Biotechnology & Natural Resources / 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 schedule and coordinate town hall meetings throughout the state with the purpose of obtaining direct input to the NAES research portfolio. This year county focus groups were assembled to fine tune regional issue that were being missed by previous methods. Our partnership with Nevada Cooperative Extension provides assistance and access to stakeholders through joint efforts like the annual "Return of the Curlew" workshop. With the administration abiding by an "open door policy", informal discussions with key stakeholders provides important input into our research programs and resident instruction.

**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
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public
- Other (Conduct Field Lab Day for stakeholders and meet with Cooperative Extension to coordinate input)

**Brief explanation.**

In development and strategic planning of NAES research programs and priorities, input was collected primarily through meetings with stakeholder groups and individuals including concerned citizens, ranchers, agricultural organizations, natural resources professionals and managers, state and federal agency representatives, food industry representatives, and University of Nevada Cooperative Extension (UNCE) administrators and specialists. The directors and scientists also attended UNCE workshops and took advantage of these opportunities to participate in discussion with groups and individuals.

The College of Agriculture, Biotechnology and Natural Resources (CABNR) and NAES continue to upgrade both websites to make the Experiment Station and agriculture much more prominent, visible and accessible to those who explore or interact through that venue. The updated NAES website now allows electronic submission of questions, comments and suggestions, which are then routed to appropriate personnel for review. Other social media outlets were also developed to gain even greater exposure, all of which allow for public comments and suggestion.

NAES research project participants obtained direct and indirect stakeholder input through varied avenues. Projects with social science components frequently used questionnaires and surveys. Stakeholder input to some basic science and some applied projects occurred in the form of reviewer inputs to proposals, and from questions, comments and discussions at regional, national and international conferences. Stakeholder input for other projects was collected through comments and questions at workshops and topical meetings for end users.

**3. A statement of how the input will be considered**

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

**Brief explanation.**

Information collected from stakeholders was used to adjust issue areas that are influencing CABNR's future direction. These stakeholder priorities also directly influenced applied research activity through local decisions about research priorities, availability of funding from certain extramural funding sources including stakeholder groups such as industry associations, and hiring decisions for faculty. Stakeholder input not only informs planning, but also influences resource allocations.

Stakeholders are very concerned about closures and/or sales of experiment station field labs and loss of base faculty and staff position. They are increasingly willing to help support the mission through advocacy and fund raising as well as putting more time into prioritizing and participating in discussions about strategic directions. Stakeholder feedback also revealed where volunteers and donors would be interested in assisting with the program.

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

Over the past year, our stakeholders have been exceptional in providing direction to NAES's research program. After numerous discussions with a whole host of interest parties, we have distilled their request to six major categories.

1. Restoration, renovation and sustainability of rangelands to support multiple uses
2. More research focused on foods that are high desert appropriate that small local farms can produce.
3. In light of global warming, a number of stakeholders are wanting improvements in drought resistance feed crops, high desert adapted biofuels and range re-seeding cultivars.
4. The locally grown contingent is interested in nutrient values, flavor and safety of crops grown in Nevada's soils
5. The Sierra Nevada Mountain forests are under attack and stakeholders are concerned about bark beetle invasion and all the ramification that go along with a stressed forest ecosystem.
6. There is also a desire for further economic development in both agriculture and rural areas.
7. Our stakeholders would also like to see faculty position restored.

IV. Expenditure Summary

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
0	0	1529149	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
<b>Extension</b>			<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	0	0	1477915	0
<b>Actual Matching</b>	0	0	1695037	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	0	0	3172952	0

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

## V. Planned Program Table of Content

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

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

**Program # 1**

**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			17%	
103	Management of Saline and Sodic Soils and Salinity			3%	
111	Conservation and Efficient Use of Water			5%	
112	Watershed Protection and Management			10%	
121	Management of Range Resources			20%	
122	Management and Control of Forest and Range Fires			3%	
123	Management and Sustainability of Forest Resources			5%	
125	Agroforestry			6%	
132	Weather and Climate			1%	
133	Pollution Prevention and Mitigation			14%	
135	Aquatic and Terrestrial Wildlife			1%	
136	Conservation of Biological Diversity			2%	
211	Insects, Mites, and Other Arthropods Affecting Plants			12%	
216	Integrated Pest Management Systems			1%	
	<b>Total</b>			100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	7.5	0.0
Actual Paid Professional	0.0	0.0	7.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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



Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	422765	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	430428	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 these critical issues, NAES research will be conducted on evaluating long term vegetation changes in the Great Basin, measuring heavy metal contamination in Nevada's waterways, pheromone protection of forests, evaluating livestock grazing for noxious weed management, compatibility of wildlife and livestock grazing, evaluating post wildland fire restoration and grazing systems, evaluating forest wildfires and ecosystems recovery, studying soil transport properties using NAES field labs to conserve water and improve water quality and evaluating sage grouse and pygmy rabbit habitats and developing a conservation plan compatible with Nevada agriculture.

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

The target audiences for research and educational programming are livestock producers, veterinarians, environmentalists, local governments, native american groups and agency personnel.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	1845	11260	125	0

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

**Patent Applications Submitted**

Year: 2011

Actual: 1

**Patents listed**

CDNA, Encoded Enzyme, And Product Produced Therefrom, Including Use For Pheromone Production

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
Actual	0	54	54

**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.

Year	Actual
2011	127

**Output #2**

**Output Measure**

- Field Days Conducted

Year	Actual
2011	1

**Output #3**

**Output Measure**

- Newsletters Produced

Year	Actual
2011	2

**Output #4**

**Output Measure**

- Research Projects Conducted

Year	Actual
2011	16

**Output #5**

**Output Measure**

- Web Sites Created or Updated

<b>Year</b>	<b>Actual</b>
2011	2

**Output #6**

**Output Measure**

- Digital Media Created or Updated

<b>Year</b>	<b>Actual</b>
2011	5

**Output #7**

**Output Measure**

- Manuals and Other Printed Instructional Materials Produced

<b>Year</b>	<b>Actual</b>
2011	1

**Output #8**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	51

**Output #9**

**Output Measure**

- Number of Undergraduate Students Involved in Research

<b>Year</b>	<b>Actual</b>
2011	69

**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	Natural Resources and Environmental Science - Post Fire Seeding
3	Natural Resources and Environmental Science - Precipitation and Guzzlers
4	Forestry Pest Management

**Outcome #1**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

Natural Resources and Environmental Science - Post Fire Seeding

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

After wildfires, plant communities are in danger of transitioning from perennial, fire resistant vegetation into communities dominated by flammable, annual species, such as cheatgrass. In an effort to stop this transition, seeding of native and desirable perennial vegetation is conducted by the Bureau of Land Management in at-risk areas on public lands. This in turn has led to increased demand for plant material that can restore altered landscapes back to complex, diverse native systems. Our goal is to improve the success of rehabilitation efforts in Nevada through a better understanding of the factors that promote successful post-fire reseeding.

**What has been done**

Over the past four years, our scientists have use a combination of field surveys and common garden experiments to infer how much establishment success is influenced by seed characteristics (seed size, number seeds produced) vs. environmental variation (seeding method, timing, etc.).

**Results**

The results from this research have been translated into recommendations to land managers and

seed producers regarding the most efficient use of resources in future reseeding efforts (i.e. developing better seeds or more effective cultural practices). This project was instrumental in providing rangeland research experience for a botanist who now works for the USFW service. These findings are also now being used in instructional material at a number of Universities.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources
122	Management and Control of Forest and Range Fires

#### Outcome #3

##### 1. Outcome Measures

Natural Resources and Environmental Science - Precipitation and Guzzlers

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2011	0

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

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

State and federal agencies using hydrologic models to estimate the contribution of surface water runoff to groundwater recharge require data on precipitation. However, models estimating precipitation in Nevada are based on an extremely limited number of data points.

Wildlife water developments, or guzzlers, are man-made catchments designed to capture and store precipitation, making the water available to wildlife throughout the year. Guzzlers are typically installed in remote areas where precipitation data are lacking. This study investigated the feasibility of instrumenting guzzlers to collect hydro-meteorological data in a cost-effective manner.

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

Instruments considered for deployment were tested under conditions simulating temperature extremes in remote Nevada. Recommendations for deployment are made based on those results. Two field sites were instrumented in early 2009 and data was collected through 2010.

**Results**

Guzzlers present a unique opportunity to improve data in remote Nevada catchments in a cost-effective manner. Precipitation, air temperature, water storage and runoff data can be collected at guzzler sites for less than \$5,000, much less than a standard weather station (\$10,000 - \$20,000). Based on results from instrument tests and field data, installing hydro-climatic instrumentation at guzzlers can improve data availability in remote Nevada catchments.

Equipment recommendations, such as data loggers, rain gauges and pressure transducers, have been provided to Nevada Dept. of Wildlife, NRCS and USFWS.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
132	Weather and Climate
136	Conservation of Biological Diversity

**Outcome #4**

**1. Outcome Measures**

Forestry Pest Management

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

The mountain pine beetle, *Dendroctonus ponderosae*, causes the annual loss of billions of board feet of lumber. It is the most devastating insect pest of North American coniferous forests. Despite the economic importance of this beetle, very little is known about its biochemistry or molecular biology. This project will investigate biochemical and molecular mechanisms this bark beetle uses to communicate and deal with the tree it lives in. Genes involved in these processes may become targets for future directed control strategies. That is, use them to identify genes involved in pheromone biosynthesis, endocrine signaling, and tree bark detoxification.

### What has been done

Sequence and microarray clustering analyses (finds groups of genes that are similar) were combined to identify putative pheromone biosynthetic genes. The sequence data have been deposited into NIH's genetic sequence database "GenBank" and the microarray data has been submitted to National Center for Biotechnology Information's Gene Expression Omnibus web site. A website serving as a gateway to bark beetle genomic data at UNR was completed. The research team has complete experiments to determine the biological origin of a class of terpene found in conifer trees, identify potential enzymes involved in p-cymene (hydrocarbon) metabolism, and adapted RNAi techniques to knock-down selected genes in living organisms.

### Results

One particularly exciting outcomes is the discovery that the midgut may not be the pheromone-biosynthetic tissue in bark beetles, or that different pheromone components may be synthesized in different tissues. This discovery modifies the paradigm regarding the site of pheromone biosynthesis that had been strongly supported for over a decade. These finding have invigorated the insect scientific community. Other major Universities working on bark beetle control are now using our data to further understand forestry pest management.

Overall, these studies uncovered the strategy bark beetles use to produce different ratios in their pheromone blends. This project is also the first molecular and biochemical characterizations of bark beetles' formidable ability to detoxify tree resin. Both the International Society for Chemical Ecology and the Entomological Society of America have found these finding important in the advancement of pest management.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
125	Agroforestry
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

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

### External factors which affected outcomes

- Economy
- Appropriations changes
- Other (Budgetary Restraints)

### Brief Explanation

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).



Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

### **Evaluation Results**

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a 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 in the NAES research portfolio. Each presentation was videotaped and posted to the web for general review for one year.

NAES administration also evaluates the program based upon leverage funds, publications in refereed journals, new collaboration with NGO's, state and federal agencies, invited review articles, extension publications, invitations to talk at national and international meetings and community feedback.

### **Key Items of Evaluation**

Faculty participating in the Natural Resource Management and Environmental Sciences program have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. The group as a whole has leveraged over \$1,627,721, produced 74 publications, and now are working with 14 different groups (BLM, USFS, USFW, USGS, ARS, NRCS, Nevada Dept. of Wildlife, Nature Conservancy, National Wildlife Service, Nevada Wilderness Society, Eastern Nevada Landscape Coalition, Tahoe Regional Planning Agency, the Paiute Pyramid Lake Tribe, and Lahonton Water Quality Board).

**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			30%	
213	Weeds Affecting Plants			13%	
601	Economics of Agricultural Production and Farm Management			7%	
608	Community Resource Planning and Development			33%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			17%	
	<b>Total</b>			100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	2.0	0.0
Actual Paid Professional	0.0	0.0	2.2	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	106039	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	128942	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**

Nevada scientists will continue to conduct economic analysis of various rural labor and public policy issues, research improving childcare and diverse needs of custodial grandparents in Nevada. Research will continue in economic development through the economic development center and analysis and development of rural healthcare.

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

Educators, community leaders, decision-makers, parents, native american organizations and health care organizations.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	940	14055	240	1000

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

**Patent Applications Submitted**

Year: 2011

Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
<b>Actual</b>	12	3	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.

<b>Year</b>	<b>Actual</b>
2011	31

**Output #2**

**Output Measure**

- Field Days Conducted

<b>Year</b>	<b>Actual</b>
2011	1

**Output #3**

**Output Measure**

- Newsletters Produced

<b>Year</b>	<b>Actual</b>
2011	2

**Output #4**

**Output Measure**

- Web Sites Created or Updated

<b>Year</b>	<b>Actual</b>
2011	3

**Output #5**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	6

**Output #6**

**Output Measure**

- Number of Undergraduate Students Involved in Research

<b>Year</b>	<b>Actual</b>
2011	9

**Output #7**

**Output Measure**

- Research Projects Conducted

<b>Year</b>	<b>Actual</b>
2011	9

**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	Western Rural Development - Beef Industry
3	Western Rural Development - Community Business Matching

**Outcome #1**

**1. Outcome Measures**

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,

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

Western Rural Development - Beef Industry

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

The general objective is to make the West, with its differing land and climate conditions and its involvement in specialty crops production, processing and marketing, more a part of the analytical systems of the Food and Agricultural Policy Institute (FAPRI) that are used to guide U.S. agricultural and trade policy.

**What has been done**

The University of Nevada, Reno has provided information on the cattle and sheep industries, and specialty crops. The range portion of the cattle and sheep industries is undergoing significant change as a result of policies to address increasing environmental concerns, public lands grazing fees, and the evolution of technology in the cattle and sheep industries.

UNR has developed cattle and sheep industry models that separate the regional industry from the rest of the U.S. and world, and now has integrated these new more specific models into the FAPRI system, as well as utilized the models for solving regional issues that are important to the management of the public lands and grazing industry.

**Results**

The Western livestock model was successfully developed and showed the differential impacts in beef prices in the Western United States to the country as a whole. Results of this model show that different regions of the nation may have differential price impacts from alternative federal farm bill legislation. The model now supports the U.S. and World Agricultural Outlook or Baseline, which is being used as definitive information by the U.S. Congress, the USDA, and the private sector for agricultural analysis and projections of policy and trade impacts.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development

**Outcome #3**

**1. Outcome Measures**

Western Rural Development - Community Business Matching

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

Western rural places were originally settled by people whose livelihoods depended upon natural resource extraction (mining, timber harvest, fisheries, etc.). In an increasingly integrated global economy, farm employment has declined by 70%, and other resource industries have declined by 50% since 1900s.

Entrepreneurism offers a solution to rural economic challenges. Communities play a role in fostering the emergence of entrepreneurial activity. If community networks are diverse and dense, and if there is a sense of shared risk, entrepreneurs are more likely to take risks that may result in success.

**What has been done**



Researchers at the University of Nevada have completed the Community Business Matching model and a commercial sector development analysis for Lander County, Nevada.

#### **Results**

This project provides a platform for focused community development leading to strengthened economy in Lander County, Nevada. The Lander County Economic Development Authority has used the results to target economic development on mine sites that have or are going to cease operations.

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

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development

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

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

- Economy
- Appropriations changes
- Competing Programmatic Challenges

##### **Brief Explanation**

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).

Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

##### **Evaluation Results**

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a 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 in the NAES research portfolio. Each presentation was videotaped and posted to the web for general review for one year.

NAES administration also evaluates the program based upon leverage funds, publications in refereed journals, new collaboration with NGO's, state and federal agencies, invited review articles, extension publications, invitations to talk at national and

international meetings and community feedback.

### **Key Items of Evaluation**

Faculty participating in the Economic Development with Emphasis in Rural Areas program have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. The group as a whole has leveraged over \$489,760, produced 15 publications, and now are working with three different groups (ARS, Food and Agricultural Policy Research Institute, and USFS).

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

**Program # 3**

**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
134	Outdoor Recreation			13%	
609	Economic Theory and Methods			10%	
702	Requirements and Function of Nutrients and Other Food Components			33%	
703	Nutrition Education and Behavior			24%	
721	Insects and Other Pests Affecting Humans			8%	
722	Zoonotic Diseases and Parasites Affecting Humans			12%	
	<b>Total</b>			100%	

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

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

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	3.0	0.0
Actual Paid Professional	0.0	0.0	1.5	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	115408	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	67280	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**

Our POW goal is to conduct research to better understand healthy life style habits, and educational programs that focuses on healthy life style habits.

NAES research is focusing on nutritional intervention in the treatment of cancer, nutritional protection from side stream cigarette smoke, evaluating the beneficial effect of functional foods, studying school education programs on children's nutrition, and studying parameters that prevent obesity in high risk families.

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

The target audience for educational programming is consumers, health care personnel, agency personnel, local school boards, and nutrition support groups.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	41754	300	35	100

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

**Patent Applications Submitted**

Year: 2011

Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
<b>Actual</b>	0	4	4

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

**Output Target**

**Output #1**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2011	7

**Output #2**

**Output Measure**

- Newsletters Produced

<b>Year</b>	<b>Actual</b>
2011	2

**Output #3**

**Output Measure**

- Research Projects Conducted

<b>Year</b>	<b>Actual</b>
2011	5

**Output #4**

**Output Measure**

- Web Sites Created or Updated

<b>Year</b>	<b>Actual</b>
2011	3

**Output #5**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	9

**Output #6**

**Output Measure**

- Number of Undergraduate Students Involved in Research

<b>Year</b>	<b>Actual</b>
2011	16

**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 meetings, nutrition and health, school board, local governmental and Federal and State agency meetings.
2	Human Health - Relapsing Fever

**Outcome #1**

**1. Outcome Measures**

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

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

Human Health - Relapsing Fever

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

Chipmunks are commonly found in close association with humans in campgrounds and around rural cabins. Our research indicates that in the Sierra Nevada ecosystem, chipmunks are commonly infected by relapsing fever spirochetes and that chipmunks serve as an important link in disease transmission to humans. The human disease, relapsing fever, has affected citizens of Nevada and California alike and is transmitted to individuals through the bite of an infected tick. Wild rodents, especially chipmunks serve both to maintain tick populations and as reservoirs for the bacteria which causes relapsing fever in humans.

Woodpiles, trash cans and homes uninhabited during the winter may serve to benefit wild rodents resulting in higher rodent survival and reproduction.

In order to understand how rodent survival, reproduction and recruitment can affect the prevalence of disease around human habitations, scientists from the University of Nevada, Reno are using chipmunks as model organisms to understand the transmission dynamics that occur to maintain relapsing fever in nature.



**What has been done**

The team has collect over 1,000 wild rodents. To date, 35 samples have been sequenced for genetic analysis.

Our research indicates that chipmunks serve as a reservoir for relapsing fever and appear to be in higher densities around rural/summer cabins than in areas without human habitation. The high rodent densities serve to amplify the potential for disease transmission to humans.

**Results**

A significant impact our research has had on the public health community includes a greater understanding of the distribution and potential risks to humans in the eastern Sierra Nevada Mountains due to infection with tick-borne relapsing fever. The research team has identified the pathogen in disparate regions of the state. In addition, the California Dept. of Public Health and the Washoe County Public Health department have recently begun using UNR's analysis in their laboratory to diagnose infection of tick-borne relapsing fever.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
721	Insects and Other Pests Affecting Humans
722	Zoonotic Diseases and Parasites Affecting Humans

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

**External factors which affected outcomes**

- Economy
- Appropriations changes
- Competing Programmatic Challenges

**Brief Explanation**

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).

Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

**Evaluation Results**

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a 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 in the NAES research portfolio. Each presentation was videotaped and posted to the web for general review for one year.

NAES administration also evaluates the program based upon leverage funds, publications in refereed journals, new collaboration with NGO's, state and federal agencies, invited review articles, extension publications, invitations to talk at national and international meetings and community feedback.

### **Key Items of Evaluation**

Faculty participating in the Nutrition and Health program have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. The group as a whole has leveraged over \$150,000, produced 5 publications, and now are working with two different groups (USFS and Washoe County School District).

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

**Program # 4**

**1. Name of the Planned Program**

Global Food Security and Hunger

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms			9%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			24%	
301	Reproductive Performance of Animals			19%	
303	Genetic Improvement of Animals			5%	
304	Animal Genome			2%	
307	Animal Management Systems			5%	
308	Improved Animal Products (Before Harvest)			3%	
311	Animal Diseases			8%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals			11%	
601	Economics of Agricultural Production and Farm Management			3%	
602	Business Management, Finance, and Taxation			11%	
	<b>Total</b>			100%	

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

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

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	7.5	0.0
Actual Paid Professional	0.0	0.0	5.4	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	297971	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	626341	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

We are working to improve fruit and vegetable production through research, education, and outreach utilizing hoop houses, greenhouses and hydroponics. Through genetic modification in important subsistence crop species such as rice and wheat we are increasing thiamin (vitamin B1) levels in the seeds. We are investigating the potential for plants that prefer to grow in salty soils or waters (i.e., halophytes) to produce food for human or livestock consumption. By studying the effect of price, location and timing, we are looking for ways to implement K-12 school breakfast in the most cost-effective. NAES scientists are developing region specific wine grapes that withstand early freeze, drought tolerance and high salinity through the uses of genetic modification and selective breeding programs. The University is also working on a rangeland bull culling program that uses DNA fingerprinting to identify sub optimal animals, in addition to documenting bull behavioral patterns that influence paternity.

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

The target audience for research and educational programming is agriculture and livestock producers, veterinarians, agency personnel and local government organizations as well as students taking classes or participating in research activities.

The general public and small commercial farmers in northern Nevadans are very interested prolonged production options. 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. We see the thiamin project potentially serving the global community. Both livestock projects are targeted for ranchers located in the Great Basin and surrounding Sierra Nevada Mountains.

#### 3. How was eXtension used?

eXtension was not used in this program

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

#### 1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2645	7060	90	0

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

Year: 2011  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
Actual	0	11	11

**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

Year	Actual
2011	18

**Output #2**

**Output Measure**

- Demonstrations and Field Days Conducted

Year	Actual
2011	1

**Output #3**

**Output Measure**

- Newsletters Produced

<b>Year</b>	<b>Actual</b>
2011	2

**Output #4**

**Output Measure**

- Research Projects Conducted

<b>Year</b>	<b>Actual</b>
2011	18

**Output #5**

**Output Measure**

- Web Sites Created or Updated

<b>Year</b>	<b>Actual</b>
2011	4

**Output #6**

**Output Measure**

- Digital Media Created or Updated

<b>Year</b>	<b>Actual</b>
2011	12

**Output #7**

**Output Measure**

- Manuals and Other Printed Instructional Materials Produced  
Not reporting on this Output for this Annual Report

**Output #8**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	13

**Output #9**

**Output Measure**

- Number of Undergraduate Students Involved in Research

<b>Year</b>	<b>Actual</b>
2011	94



**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, presentations at stakeholder, Native American and agency meetings.
2	Alternative crops (wine grapes) for a semi-arid region
3	Cattle Management - Nutrient Cycling



**Outcome #1**

**1. Outcome Measures**

Peer reviewed journal articles, presentations at scientific meetings, presentations at stakeholder, Native American and agency meetings.

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

Alternative crops (wine grapes) for a semi-arid region

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2011	0

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

**Issue (Who cares and Why)**

The wine industry is well established California, Oregon, and Washington. And it is common knowledge that vines that are stressed produce high quality grapes than non-stressed. With a growing movement for locally produced, a number of northern Nevadans are exploring their options in planting vineyards. Nevada, on paper, is well situated to capitalize on a number of environmental factors that should promote a healthy wine industry. Plenty of sun, low rain fall, minimal pest and respectable temperature ranges. However, very few are willing to jump into an industry without any guidelines. This is where the University of Nevada, Reno comes into play

**What has been done**

Experiments were run this past summer to develop the methods for measuring water use efficiency in wine grapes. Dehydration experiments were run on approximately 50 genotypes. Steps were made in identify mechanisms regulating bud dormancy. This year seven new varieties were planted to determine their suitability in the northern Nevada climate. Workshops were conducted throughout the year, both in the classroom and field, which helps attendees understand the grape varieties, microclimates, pest management and post-harvest processing.

**Results**

Through the work of Dr. Grant Cramer's program, the University is now recommending a number of wine grape varieties that work best in Nevada's growing conditions. This has resulted in a budding wine industry in northern Nevada that is now making sound choices in grape varieties, pest management strategies and vineyard management. To date, there are now 12 private vineyards and 2 commercial vineyards that attribute much of their success to the work done at the University of Nevada, Reno.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

#### Outcome #3

##### 1. Outcome Measures

Cattle Management - Nutrient Cycling

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2011	0

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

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

Nutrient cycling is an important part of sustainable agricultural systems. Bio-solids are the by-product of waste water treatment plants, and are normally disposed of via surface disposal routes. Recycling of nutrients in municipal bio-solids to agricultural fields improves sustainable US agriculture and food systems. However, consumers may express concern about the inclusion of municipal waste in the food production process. The long-term goal of this study is a multi-disciplinary investigation into the use of bio-solid fertilizer in a sustainable agro-ecosystem management setting.

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

The research team over a period of one year measured a suite of parameters relating to forage production of triticale per acre, meat quality, meat safety, and ecological affect to the environment. The experiment was designed to test Class B municipal bio-solid against commercially available fertilizer and control plots.

### Results

Results from this project have been shown to a range of cattle producers. Letting them know that regardless of fertilizer source, total forage yields were equal. However, carcass weights and weight gain were lower for cattle finished on bio-solid treated forage. The nutritional values were shown to be lower in total digestible nutrients and digestibility. Though levels of arsenic, lead and mercury were higher in bio-solid treated soils, no concentrations were detected in forage or meat samples tested during the study.

Results from this project have been disseminated to cattle producers through educational programs such as the annual California and Nevada Cattleman's Update and the University of Nevada Cooperative Extension Cattleman's Update is an extension program comprised of a rural tour to disseminate new findings to the ranching communities. NAES faculty partner to connect with the rural stakeholders and determine current research priorities.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

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

##### External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Programmatic Challenges

##### Brief Explanation

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).

Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

##### Evaluation Results

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

advances from each NAES research project 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 in the NAES research portfolio. Each presentation was videotaped and posted to the web for general review for one year.

NAES administration also evaluates the program based upon leverage funds, publications in refereed journals, new collaboration with NGO's, state and federal agencies, invited review articles, extension publications, invitations to talk at national and international meetings and community feedback.

### **Key Items of Evaluation**

Faculty participating in the Global Food Security and Hunger program have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. The group as a whole has leveraged over \$450,000, produced 14 publications, and now are working with seven different groups (BLM, USFS, NRCS, ARS, Nevada Veterinary Medical Association, NV Cattlemen Association, and the Nevada Woolgrowers Association)

**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

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

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

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	4.0	0.0
Actual Paid Professional	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{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**

Scientists are investigating: avian and forest vulnerability, the effects of elevated nitrogen on forest, the effects of nutrients and carbon fluctuations across aquatic and desert ecosystems, the effects on soils at the rain-snow transition zone, and creating educational programs that stimulates transformative research, education and outreach on effects of regional climate change on ecosystem resources.

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

Scientific community, resource managers, Nevada System of Higher Education faculty, students,

constituents and policy makers.

**3. How was eXtension used?**

{No Data Entered}

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

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	0	0

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

**Patent Applications Submitted**

Year: 2011

Actual: {No Data}

**Patents listed**

{No Data Entered}

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
<b>Actual</b>	0	40	0

**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.

Year	Actual
2011	0

**Output #2**

**Output Measure**

- Research Projects Conducted

<b>Year</b>	<b>Actual</b>
2011	0

**Output #3**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	0

**Output #4**

**Output Measure**

- Number of Undergraduate Students Involved in Research

<b>Year</b>	<b>Actual</b>
2011	0

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

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

O. No.	OUTCOME NAME
1	Peer reviewed journal articles, publications in commodity group publications, presentations at scientific meetings, presentations at stakeholder, Native American and agency meetings.



## **Outcome #1**

### **1. Outcome Measures**

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 Outcome Measure

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

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

- Economy
- Appropriations changes
- Competing Programmatic Challenges

#### **Brief Explanation**

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).

Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

#### **Evaluation Results**

{No Data Entered}

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

{No Data Entered}

**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
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			25%	
204	Plant Product Quality and Utility (Preharvest)			25%	
206	Basic Plant Biology			25%	
511	New and Improved Non-Food Products and Processes			25%	
	<b>Total</b>			100%	

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

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

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.5	0.0
Actual Paid Professional	0.0	0.0	4.4	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	285040	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	213751	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**

Scientists are currently determining best algal species (survival and growth rates, fat and starch content) for production of oils that will then be processed into biofuels. Investigation into Nevada's highly prolific rabbit brush as a good candidate for production of industrial (i.e., rubber, plastics, coatings, lubricants and adhesives) and energy feedstocks (i.e. biodiesel and cellulosic-based liquid fuels. Camelina is being evaluated as an alternative crop for biofuel and other plant derived products.

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

Those most effected by this research include the general public, energy and chemical industry, and potential producers.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	61	4375	90	0

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

**Patent Applications Submitted**

Year: 2011

Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
<b>Actual</b>	0	5	5

**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.

<b>Year</b>	<b>Actual</b>
2011	27

**Output #2**

**Output Measure**

- Demonstrations and Field Days Conducted

<b>Year</b>	<b>Actual</b>
2011	6

**Output #3**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	11

**Output #4**

**Output Measure**

- Number of Undergraduate Students Involved in Research

<b>Year</b>	<b>Actual</b>
2011	14

**Output #5**

**Output Measure**

- Research Projects Conducted

<b>Year</b>	<b>Actual</b>
2011	6

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

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

O. No.	OUTCOME NAME
1	Peer reviewed journal articles, publications in commodity group publications, presentations at scientific meetings, presentations at stakeholder, Native American and agency meetings.
2	Bio-Renewable - Rabbit Brush

## **Outcome #1**

### **1. Outcome Measures**

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 Outcome Measure

## **Outcome #2**

### **1. Outcome Measures**

Bio-Renewable - Rabbit Brush

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

- 1862 Research

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

Change in Action Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2011	0

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

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

Rabbit brush (*Chrysothamnus nauseosus*) 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 advance the fundamental knowledge regarding structure/property relationships in natural rubber, especially the role of naturally-occurring, non-rubber constituents in creating and controlling the nanostructured features that are believed to be responsible for the unique properties of natural rubber derived from Pará rubber trees.

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

Over the past year scientist at the University of Nevada, Reno have optimized the production of the small rubber particle protein (SRPP) and rubber elongation factor (REF) using an *E. coli* protein expression system. However the maximum obtainable yield using this system was approximately 2 mg/liter culture. The team has also switched to using a Baculovirus system which

has much higher yield, producing SRPP and REF in hundreds of milligrams instead of tens.

### Results

The ability to generate large amounts of SRPP and REF has allowed us to reconstruct a natural rubber equivalent using synthetic rubber as a precursor. This could lead to the development of a better synthetic rubber that can be used in high performance rubber products and decrease our dependence on the current sole commercial source of high quality rubber.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
511	New and Improved Non-Food Products and Processes

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

### External factors which affected outcomes

- Economy
- Appropriations changes

### Brief Explanation

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).

Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

### Evaluation Results

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a mini-symposium to learn of the research advances from each of the 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 in the NAES research portfolio. Each presentation was videotaped and posted to the web for general review for one year.

NAES administration also evaluates the program based upon leverage funds, publications in refereed journals, new collaboration with NGO's, state and federal agencies,

invited review articles, extension publications, invitations to talk at national and international meetings and community feedback.

**Key Items of Evaluation**

Faculty participating in the Sustainable Energy program have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. The group as a whole has leveraged over \$545,249, produced 3 publications, 19 presentations, and now are working with the Nevada Dept. of Energy and the Nevada Renewable Energy Consortium.



**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			10%	
901	Program and Project Design, and Statistics			30%	
	<b>Total</b>			100%	

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

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

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	2.0	0.0
Actual Paid Professional	0.0	0.0	0.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	4530	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	5324	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**

Scientists are developing a community weight control model for use in Nevada's city clinics. Investigation has begun into the effects of distance to parks, trails, food outlets, etc. in relation to amount of vegetables consumed and obesity. The Washoe County School District has implemented a Student Wellness Policy; researchers are identifying best practices at the school and classroom level, and reporting on its execution and effectiveness.

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

Educators, health professionals, general public and policy-makers.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	500	0

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

**Patent Applications Submitted**

Year: 2011

Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
Actual	0	0	0

**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.

<b>Year</b>	<b>Actual</b>
2011	2

**Output #2**

**Output Measure**

- Newsletters Procuded

<b>Year</b>	<b>Actual</b>
2011	1

**Output #3**

**Output Measure**

- Research Projects Conducted

<b>Year</b>	<b>Actual</b>
2011	1

**Output #4**

**Output Measure**

- Web Sites Created or Updated

<b>Year</b>	<b>Actual</b>
2011	0

**Output #5**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	2

**Output #6**

**Output Measure**

- Number of Undergraduate Students Involved in Research

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



**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	School Breakfast: Economic Cost and Nutritional Outcomes

**Outcome #1**

**1. Outcome Measures**

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.

Not Reporting on this Outcome Measure

**Outcome #2**

**1. Outcome Measures**

School Breakfast: Economic Cost and Nutritional Outcomes

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

In recent years, some elementary schools in Nevada have implemented a "free-to-all" school meal program (Provision 2) to ease the administrative burdens of identifying children in need each school year. Naturally, operating under Provision 2 requires additional financial resources from a participating school.

There is emerging evidence that the added costs of covering more student meals far exceed the envisioned administrative benefits under Provision 2 for most institutions.

A national study does indeed indicate that there is a significant increase in breakfast participation when it is free to all students. However, many participating schools in that study had also changed the location of breakfast to the classroom and the timing to later in the morning.

In this study we focus on the separate impact of "price", "location", and "timing" of school breakfast on participation and nutritional intake in elementary schools in Nevada using state-of-the-art data collection methods.

### **What has been done**

The study plan captured the extraordinary opportunity to conduct a cohort study design. Several of the same students were available to collect school breakfast intake by 1) traditional means (in cafeteria, before school, 3-payment levels), 2) in cafeteria, 10 minutes during school time, 3-payment levels, and 3) in classroom, during school time, free-to-all. Data collection resources were reallocated toward conducting the new cohort study rather than obtaining prevalence data from Clark County School District. To date, three schools have completed the surveys.

### **Results**

Our results are aiding Nevada School officials to implement school breakfast in the most cost-effective way. This in turn benefits the wider educational community and all Nevada taxpayers. State policymakers are now interested in the study's findings to determine need and impact of a statewide breakfast subsidy bill (e.g. Nevada 2011 Assembly Bill 137).

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

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

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

- Economy
- Appropriations changes
- Competing Programmatic Challenges

### **Brief Explanation**

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).

Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

### **Evaluation Results**

Faculty participating in the Childhood Obesity program have unfortunately been slated for layoff on July 1<sup>st</sup>, 2012. This program will require realignment of remaining faculty research initiatives to compensate for these losses or close the program.

**Key Items of Evaluation**



**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
112	Watershed Protection and Management			25%	
133	Pollution Prevention and Mitigation			25%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			20%	
723	Hazards to Human Health and Safety			15%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			15%	
	<b>Total</b>			100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.5	0.0
Actual Paid Professional	0.0	0.0	2.9	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	134447	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	113776	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**

Provide agricultural producers in Nevada with information about the risks associated with food safety in terms of direct marketing, including legal, financial, and marketing risks. In-depth cattle handling workshop are being performed that targets the Spanish speaking workers to increased production and improved animal health through decreased stress.

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

This program is targeting Nevada's agricultural producers with emphasis on Spanish speakers.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	15	200	0	0

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

**Patent Applications Submitted**

Year: 2011  
Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
<b>Actual</b>	0	9	0

**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.

<b>Year</b>	<b>Actual</b>
2011	21

**Output #2**

**Output Measure**

- Research Projects

<b>Year</b>	<b>Actual</b>
2011	2

**Output #3**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	4

**Output #4**

**Output Measure**

- Number of Undergraduate Students Involved in Research

<b>Year</b>	<b>Actual</b>
2011	7

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

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

O. No.	OUTCOME NAME
1	Peer reviewed journal articles, publications in commodity group publications, presentations at scientific meetings, presentations at stakeholder, Native American and agency meetings.
2	Food Safety - Caregiver Training

**Outcome #1**

**1. Outcome Measures**

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 Outcome Measure

**Outcome #2**

**1. Outcome Measures**

Food Safety - Caregiver Training

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

Nevada has been one of the fastest growing states in the US for the past two decades and such growth is associated with increases in population that faces relatively large food safety hazards (elderly, young children, those with immune compromised problems). In many situations, the caregiver for young and elderly are their first line of defense in preventing food-borne illnesses.

Based on two major surveys conducted in Nevada, there is a strong need for the University to be proactive for providing extensive food safety education to caregivers. Furthermore, educational modules need to provide caregivers food safety information so that they can be in compliance with the Nevada "food code" (NAC 446). Our objective is to develop an online food safety education program for child and elderly care givers.

**What has been done**

A teaching module has been developed for caregivers that will permit students self-paced access 7/24. The teaching module was developed using Soft Chalk, which provides a unique interface and is a leading tool for educational software. The modules are interactive incorporating discussions, short instructional videos, questions and answer segments with self-assessment (quiz). Subsequent to student completion of the course module, we provide caregivers

certification for safe food handling.

### **Results**

With the advent of food safety web site, participants are now able to access this fully narrated and animated curriculum whenever they choose, rather than at a specific time and location. The team has also been providing onsite food safety workshops for those caregivers and caregiver facilities that do not have easy access to the internet.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

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

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

- Economy
- Appropriations changes

### **Brief Explanation**

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).

Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

### **Evaluation Results**

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a 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 in the NAES research portfolio. Each presentation was videotaped and posted to the web for general review for one year.

NAES administration also evaluates the program based upon leverage funds,

publications in refereed journals, new collaboration with NGO's, state and federal agencies, invited review articles, extension publications, invitations to talk at national and international meetings and community feedback.

**Key Items of Evaluation**

Faculty participating in the Food Safety program have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. The group as a whole has leveraged over \$716,462, produced 9 publications, 12 presentations, and now are working with the Washoe County District Health and the Nevada State Health Division.

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

**Program # 9**

**1. Name of the Planned Program**

Animals and their systems

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources			17%	
135	Aquatic and Terrestrial Wildlife			25%	
136	Conservation of Biological Diversity			17%	
301	Reproductive Performance of Animals			13%	
302	Nutrient Utilization in Animals			8%	
304	Animal Genome			2%	
305	Animal Physiological Processes			5%	
311	Animal Diseases			13%	
	<b>Total</b>			100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Actual Paid Professional	0.0	0.0	2.5	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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



Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	111715	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	109195	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 activities included investigation into the decline of mule deer in Nevada; identifying the incidence of mycoplasma, mannheimia, and lungworm across the genetic landscape of Nevada's bighorn sheep; characterizing mountain lion distribution, abundance, and prey selection in Nevada; the impact of contraceptive treatment on fertility and behavior of feral horses; impact of agrochemical and environmental contaminants on avian species.

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

Target audiences include Nevada Department of Transportation, NV Dept. of Wildlife, sport hunters, livestock owners, local residents, numerous wildlife oriented NGOs, land-use planning agencies, and the scientific community in general.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	415	5300	200	550

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

**Patent Applications Submitted**

Year: 2011

Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
Actual	0	5	0

**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.

Year	Actual
2011	17

**Output #2**

**Output Measure**

- Field Days Conducted

Year	Actual
2011	1

**Output #3**

**Output Measure**

- Research Projects Conducted

Year	Actual
2011	6

**Output #4**

**Output Measure**

- Web Sites Created or Updated

Year	Actual
2011	3

**Output #5**

**Output Measure**

- Number of Graduate Students or Post-Doctorates Trained

<b>Year</b>	<b>Actual</b>
2011	11

**Output #6**

**Output Measure**

- Number of Undergraduate Students Involved in Research

<b>Year</b>	<b>Actual</b>
2011	41

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

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

O. No.	OUTCOME NAME
1	Wildlife Crossings
2	Wild Horse Management

**Outcome #1**

**1. Outcome Measures**

Wildlife Crossings

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

In general, the most conspicuous consequence of roads on animal populations is direct mortalities that result from collision with vehicles. An estimated 1 million animals are killed on American roads each day often with substantial cost. Damages to vehicles that result from collisions with deer alone can exceed \$1 billion and result in more than 200 human fatalities each year.

Data on animal-vehicle collisions collected by Nevada Department of Transportation (NDOT) and Nevada Department of Wildlife (NDOW) along a 20-mile stretch of US Hwy 93 between Wells and Contact has documented 150 known deer killed annually with an estimated total of approximately 300 deer killed per year (NDOT 2006).

The data indicates that this portion of US Hwy 93 is a 'hotspot' for deer-vehicle collisions particularly during spring and autumn migration, when deer are forced to cross US Hwy 93 to reach seasonal ranges.

This project will document the use of overpasses and underpasses by wildlife, evaluate the effectiveness, and determine the cost-benefit ratio of construction, property damage, and human and wildlife loss of life.

**What has been done**

Construction of a wildlife overpass for mule deer and other species on US Hwy 93 was implemented to reduce deer-vehicle collisions in an area that appears to be a 'hotspot' for animal-vehicle collisions. The team of scientists from UNR has monitored underpasses and overpasses along US highway 93 using both GPS tracking and motion sensitive photograph. The team documented > 12,000 deer having used the crossing structures since this project began. More than 116,000 photos of animals have been collected since September 12th, 2011. These photos

have been organized and documentation of use by species has continued. Evaluation of the effectiveness of the overpass is being determined from benefit-cost analysis from reducing fatalities and injuries to motorists, and reducing costs associated with damaged property and from the perspective of mule deer population dynamics and reduced fatalities of mule deer.

**Results**

Results from this project are showing that mule deer and other species of wildlife that use the crossing structures have been successfully moved off the highway and allowed to cross without danger to wildlife or humans resulting from mule deer being forced to navigate highways with high volumes of traffic. We have begun to disseminate recommendations for inclusion in development of future crossing through meetings with personnel from Nevada Department of Wildlife, Nevada Department of Transportation, and the US Department of Transportation.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
121	Management of Range Resources
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

**Outcome #2**

**1. Outcome Measures**

Wild Horse Management

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2011	0

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

**Issue (Who cares and Why)**

Feral horses in the American West pose a complex and expensive management problem. Their populations continue to grow at a rate of 15-20% a year while their range continues to shrink. There is a need to control populations without adversely affecting the genetic diversity of the herd. Current management strategies of removal and adoption are expensive and logistically challenging. An efficacious, long duration, reversible contraception method would provide managers with a tool to economically manage the Northern Nevada horse populations. This

project evaluates the behavioral effects of the contraceptive treatments; SpayVac, and GonaCon on mares in the wild setting.

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

Over a two day period in the hills surrounding Reno, Nevada, 77 feral mares were rounded up and injected with either SpayVac or GonaCon, aged and then released in June of 2005. Injected mares were then observed weekly from February to December for the next seven years to determine the efficacy of each treatment and the reversibility of the contraceptives long-term effects.

#### **Results**

Reduction of free-ranging horses by limiting fertility holds the greatest promise for economic, humane and effective population control. Contraception in feral horses should be safe and potentially reversible, cost effective, efficacious for several years with minimal handling required, and should not affect normal reproductive and harem maintenance behavior. We have found that both of the contraceptive formulations significantly reduced fertility as claimed by manufactures, suggesting that one injection was effective for up to five years.

Our results also showed minimal behavioral changes in treated females as it relates to mare-stallion relationships. We saw no adverse side-effects from either contraceptive treatment as treated and control females had similar social behavior.

Some concerns were originally voiced by numerous horse advocacy groups about the reversibility of the drugs. The results after two years post protection interval have shown that statistically all mares have begun reproducing offspring.

This study has added significantly to the understanding of the behavior effects and duration of two different long-term contraceptive products. Either product will potentially add an economical tool for range management of wild and feral horse populations when compared to round-ups and adoptions.

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

<b>KA Code</b>	<b>Knowledge Area</b>
121	Management of Range Resources
301	Reproductive Performance of Animals
305	Animal Physiological Processes

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

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

- Economy
- Appropriations changes
- Competing Programmatic Challenges

##### **Brief Explanation**

The State of Nevada has been one of the slowest states in recovering from the past recession and because of this NAES's state appropriations have fallen for the third year in a row from \$9.69M to \$4.61M. As a result of this cut to NAES's budget, fewer research projects will be supported, faculty FTE were lost, and recruiting graduate students will be

difficult. The funding shortfall has also affected the collaborations between NAES and the University of Nevada Cooperative Extension through the loss of most joint appointments (State Extension Specialists).

Due to curricular review in 2010, there is a public perception that the College of Agriculture/NAES is not functioning due to department/program closures. The experiment station has also faced threats from the potential rezoning and sale of field station properties to assist University budget issues. This supports public perception that the College of Agriculture/NAES no longer supports the agricultural community.

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

### **Evaluation Results**

Faculty programs are evaluated annually and annual reviews of performance are prepared for each calendar year. We held a 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 in the NAES research portfolio. Each presentation was videotaped and posted to the web for general review for one year.

NAES administration also evaluates the program based upon leverage funds, publications in refereed journals, new collaboration with NGO's, state and federal agencies, invited review articles, extension publications, invitations to talk at national and international meetings and community feedback.

### **Key Items of Evaluation**

Faculty participating in the Animals and their Systems program have been productive and continued to carry out cutting edge research and in addressing agricultural production in Nevada. The group as a whole has leveraged over \$230,210, produced 5 publications, 12 presentations, and now are working with 7 different groups (BLM, Nevada Division of Wildlife, Nevada Division of State Lands, Nature Conservancy, Wildlife Conservation Society, National Wildlife Service, and Nevada Bighorns Unlimited)