

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

**Program # 2**

**1. Name of the Planned Program**

Animals and Their Systems

Reporting on this Program

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

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources			14%	
135	Aquatic and Terrestrial Wildlife			21%	
136	Conservation of Biological Diversity			14%	
301	Reproductive Performance of Animals			26%	
302	Nutrient Utilization in Animals			7%	
303	Genetic Improvement of Animals			3%	
304	Animal Genome			2%	
307	Animal Management Systems			3%	
311	Animal Diseases			10%	
	<b>Total</b>			100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890

Actual Paid Professional	0.0	0.0	2.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	170726	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	264242	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; wildlife guzzler's effects on survival and recruitment, 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**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	472	0	1100	0

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

<b>2012</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	0	10	0

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

**Output Target**

**Output #1**

**Output Measure**

- Non-peer reviewed publications

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

**Output #2**

**Output Measure**

- Presentations

<b>Year</b>	<b>Actual</b>
2012	34

**Output #3**

**Output Measure**

- Demonstrations and workshops conducted

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

**Output #4**

**Output Measure**

- Leveraged research funds

<b>Year</b>	<b>Actual</b>
2012	859892

**Output #5**

**Output Measure**

- Web sites created or improved

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

**Output #6**

**Output Measure**

- Number of graduate students and post-doctorates trained

<b>Year</b>	<b>Actual</b>
2012	3

**Output #7**

**Output Measure**

- Number of undergraduate students involved in research program

<b>Year</b>	<b>Actual</b>
2012	34

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

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

O. No.	OUTCOME NAME
1	Does Vegetation Structure Effect Greater Sage Grouse Survival?
2	Impact of Environmental Contaminants on Avian Species

## **Outcome #1**

### **1. Outcome Measures**

Does Vegetation Structure Effect Greater Sage Grouse Survival?

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

- 1862 Research

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

Change in Knowledge Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Sage grouse were proposed for listing > 10 times between 2000 and 2012, based on declining populations over the past 50 years throughout their range. Petitions were at least in part politically motivated, with a publicly stated goal of removing grazing from public lands in the west. A key rationale underlying listing petitions was that grazing impacted vegetation, which in turn affected Sage Grouse reproductive success.

The linkage between vegetation characteristics and Sage Grouse reproduction is based on a small number of studies, primarily in northern Nevada and southern Idaho. These studies form the basis for habitat management guidelines for Sage Grouse published in the Wildlife Society Bulletin in 2000. Concern has been raised by stakeholders in Nevada about the applicability of habitat guidelines based on studies in ecosystems that differ from those in much of Nevada.

These concerns are based on uncertainty about: (1) generality of relationships between vegetation and nest success; and (2) uncertainty about the relationship between grazing management and vegetation structure.

These concerns have important management, public policy, and societal implications because guidelines for management of Sage Grouse habitat will undoubtedly influence management of grazing on public lands.

The goal of this project was to establish the relationship between nest site selection and success of Greater Sage Grouse, and key vegetation parameters along the Falcon-Gondor transmission line in central Nevada.

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

The UNR team monitored over 1,100 greater sage-grouse associated with 13 breeding leks to characterize demographic processes in a ~6500 km<sup>2</sup> area in central Nevada. They used mark-recapture, lek observations, nest and brood monitoring, vegetation sampling, and radio telemetry to estimate key demographic parameters. Investigators used four analyses to examine the influence of distance from the Falcon-Gondor transmission line on various demographic rates (nest survival, female survival, and pre-fledging chick survival).

### **Results**

This project has provided the first rigorous assessment of the effects of transmission lines on sage grouse. The stakeholders interested in the results generated were Nevada Department of Wildlife, Bureau of Land Management, U. S. Fish and Wildlife Service, and NV Energy. Based partially upon finding reported to the Bureau of Land Management by the University, the BLM's original 2001 Resource Management Plan has been amended to reflect potential impacts upon Greater Sage Grouse.

This project also represents an intense field effort, based out of a remote camp in central Nevada. Students and technicians were in the field continuously from late February -May each year of the project. Such experiences provided substantial training in managing a field study, supervising personnel and learning both practical and natural history aspects of field biology.

### **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
301	Reproductive Performance of Animals

### **Outcome #2**

#### **1. Outcome Measures**

Impact of Environmental Contaminants on Avian Species

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

- 1862 Research

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

Change in Action Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Birds, and in particular migratory birds, may be exposed to environmental contaminants repeatedly when traveling. Migratory birds are protected during migration by an international treaty, The Migratory Bird Treaty Act. Nevada is part of an important western flyway with over 170 migratory bird species visiting. This is a particularly important issue for Nevada especially in light of the current and historic gold and silver mining conducted in the state.

The UNR team has developed a model which we believe is useful in testing whether low-dose exposure to environmental and agrochemical contaminants has an adverse effect on migratory birds. We use the homing pigeon as our avian model to determine the impact of various environmental and agrochemical exposures to migratory birds.

Previous results showed that low-dose exposure to arsenic and cyanide compounds resulted in a decreased ability to fly back to the roost, which would imply a decreased ability for migration. Many of these compounds have also shown effects on these birds ability to successfully reproduce.

For the purposes of this study we want to test this model with other neurotoxic compounds which are persistent in the environment such as mercury and lead compounds. Mercury contamination is particularly of interest in Nevada, because of the mining conducted in the 1800's which resulted in widespread mercury contamination in the rivers in and around Virginia City, Nevada. We wish to test whether these compounds will have debilitating effects on traveling. We also wish to expand upon our understanding of the longer term effect of these exposures by testing the offspring of these birds for both learning (to home) and reproductive abilities.

### **What has been done**

Experiments were initially conducted to determine relevant mercury exposure dosages through drinking water which would impact the bird's flight ability. As part of these studies, food and water consumption were monitored throughout the study in order to not only accurately determine dosage but to evaluate water and food consumption during periods of different activities such as migration.

Subsequent studies were conducted on the offspring of parents either exposed or not exposed to mercury. These studies revealed that the offspring of parents exposed to mercury initially had more difficulty in learning how to "home" back to their loft. Once the exposed offspring birds learned how to "home" to the loft from a given release site, they then were able to do so in subsequent releases very similar to non-exposed offspring.

### **Results**

The Avian Model developed here at the University of Nevada, as well as the information collected on environmental contaminants effects on birds has now been incorporated into the US Department of Interior's Natural Resource Damage Assessment and Restoration Programs as it relates to migratory birds. The US Fish and Wildlife Service has also included our avian model into their assessments of avian toxicology related to the Deepwater Horizon oil spill.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
135	Aquatic and Terrestrial Wildlife
301	Reproductive Performance of Animals

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

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

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

#### **Brief Explanation**

Climate: Nevada annual average precipitation continues to decline, with past two winters scoring some of the driest on record. Without adequate water supplies the competition between livestock and wildlife for resources could prove to be deadly.

Diminished resources: Maintaining required program diversity and complexity in the face of a 38% reduction in financial support has stretched faculty resources extremely thin and programs have become increasingly vulnerable to the loss of key faculty.

Decline in Federal and State Funding: The continuing decline in federal and state appropriated funds available to support teaching and research programs places additional pressure on the need to secure external funding to adequately address priority research and education programs.

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

#### **Evaluation Results**

The program is expanding the avian model to include other known environmental toxins. A large majority of this expansion is due to leveraged funds in excess of \$850,000.

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

The US Department of Interior's Natural Resource Damage Assessment and Restoration Program has incorporated our avian model into their Deepwater Horizon Oil Spill plans.