# Draft Nevada Predator Management Plan
# Fiscal Year 2005
# July 1, 2004 - June 30, 2005


## Summary

Ten predator management projects were approved by the Board of Wildlife Commissioners on September 27, 2003. An overview of accomplishments of each is contained herein. Projects 1 and 4 were continuing efforts begun in FY 2000. Projects 5 and 6a were continuing efforts begun in Fiscal Year (FY) 2001. Project 8 was a continuing effort which began in FY 2002. Projects 11 through 16 were new starts in FY 2004. The total project budget was $225,995.

The Board of Wildlife Commissioners considered project proposals for FY 2005 and took action on August 5, 2004 to continue with four of the existing ten projects. Projects 6a, 14, 15 and 16 will be continued. Field work for Projects 1, 4, 8, 11, 12 and 13 were completed during FY 2004.

Two new projects were approved by the Board of Wildlife Management for implementation in FY 2005. Project 17: Elko County Deer and Elk Project and Project 18: Washoe County Deer Project.


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***Project 1:*** **Raven Control to Enhance Sage Grouse Nesting Success**

*Project Description:*

Raven populations were controlled during the 2000-2004 sage grouse breeding and nesting seasons. The project treatment was conducted in the Grassy/Hart Camp area of Washoe County with control areas on the Sheldon National Wildlife Refuge and the Lone Willow area of Humboldt County. Total size of the project area is approximately 250 square miles. During the first year of the study, the size of the study area was at least a third larger. However, with the establishment of the Black Rock National Conservation Area and its new wilderness area designation in the summer of 2001, a good portion of the contiguous sage grouse habitat to the east was lost in terms of our ability to control ravens and harvest grouse. Ravens were controlled through the use of lethal doses of corvicide-laced eggs and shooting. The corvicide is injected into eggs that are specifically placed to attract ravens. Continued monitoring will aid in determining if raven control has a positive
effect on sage grouse recruitment. This project ends with the 2004 breeding season, monitoring of sage grouse nest success will take place from harvested wings in the fall of 2004.

*Reason for Conducting the Project:*

Sage grouse populations have been decreasing for the past 20 years west-wide. Nevada populations have followed this trend. This decline has generated interest in petitioning the U.S. Fish and Wildlife Service to protect the species under the provisions of the Endangered Species Act.

The Department of Wildlife has determined that sage grouse nest success and chick survival within the Grassy/ Stevens Camp area are below levels needed for population growth or maintenance (chick/ hen ratio $\geq$ 1.75). The Department of Wildlife and University of Nevada, in cooperative studies, have also determined that a proximal cause of nest loss is raven predation.

*Services Provided by Wildlife Services:*

Wildlife Services will design and implement the raven control project. Wildlife Services will place baits in the field and monitor baits during the project duration. Wildlife Services will provide Nevada Department of Wildlife (NDOW) with Global Positioning System (GPS) coordinates for the locations of the treated areas. Wildlife Services will provide licensed applicators. Raven densities will be monitored during the project duration using standard survey methods. Wildlife Services will conduct a post-treatment analysis of the effectiveness of the control project. Reports of all surveys conducted will be provided by Wildlife Services to NDOW.

*Timing of Service:*

Control Period: Mid-March through May
Evaluation Period: April through October
Fiscal Years: FY 2000-2004

*Geographic Area of Project:*

Grassy/Hart Camp area of Washoe County is the treatment area and the Lone Willow area of Humboldt County and the Sheldon National Wildlife Refuge in Washoe and Humboldt Counties are the control areas.

*Project Analysis:*

Sage Grouse chick production and survival will be measured by NDOW through the analysis of wings collected during the hunting season. Hen nesting success will also be assessed using hunter harvested Sage Grouse wings collected during the fall hunting season. These "success" parameters will be compared between the "treatment" and "control" areas and compared to historic breeding success.

*Wildlife Services Budget Summary:*

| | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 |
|---|---|---|---|---|---|
| Requested | $ 35,903 | $47,129 | $31,010 | $11,038 | $11,038 |
| Expended | $25,306 | $29,723 | $31,274 | $8,656 | $8,856 |

**This budget summary includes a WS personnel position**

*Summary of Control Activities:*

Predators removed during the FY 00 through FY 03 work period were reported by Wildlife Services as the following:

| Species | FY 00 | FY 01 | FY 02 | FY 03 | FY 04 | Total |
|---|---|---|---|---|---|---|
| Coyote | 92 | 6 | 0 | 0 | 0 | 98 |
| Badger | 8 | 1 | 0 | 0 | 0 | 9 |
| Bobcat | 3 | 0 | 0 | 0 | 0 | 3 |
| Raven | 349 | 251 | 194 | 214 | 318 | 1,326 |
| Totals | 452 | 258 | 194 | 214 | 318 | 1,436 |

During the 2003 season Wildlife Services conducted raven surveys within the project area during the months of March through July. Survey stations were at ½ mile intervals for 25 miles for a total of 50 stations. Surveys were conducted 3 times each month resulting in 150 stations per month. Results of ravens/ 10 miles² is as follows; March 8.3, April 5.3, May 4.0, June 5.0, and July 6.0. These results are similar to raven counts in the proceeding two years of the study but considerably less than the FY 2000 pretreatment raven survey that resulted in 23.1 ravens/ 10 miles², indicating ravens are being suppressed on sage grouse nesting areas within the project.

*Summary of Project Outcome*:

Sage Grouse wings provide biologists with a tool that is appropriate for measuring the species response to the predator removal. We depend upon hunters to provide the sample of wings during the hunting season. Harvested wings provide biologists information on sex, age, nest success of females, and days since hatch of chicks.

During the fall of 2000, NDOW attempted to collect wings from hunter harvested birds in the control area. The wing collection effort met with limited success. There were only a small number of hunters within the area and only nine wings were collected the first year. During the second year, 2001, a special hunt was held with 75 permits available by application only and a 3/6 limit. A total of 115 hunter-harvested wings was collected with a chick/hen ratio of 1.24. For the same year, chick/hen ratios were 1.35 in the rest of Washoe County, 1.83 on the Sheldon and 2.06 in unit 031.

Although chick/ hen ratios were calculated from wings collected during the 2001 season, hen nesting success was not. This is a valuable tool in helping biologists determine at what point recruitment may be failing. This data should be collected in the future.

During the fall of 2002, the special sage grouse hunt for this area was again conducted. Seventy-five permits available by application only and a 3/6 limit. A total of 61 hunter-harvested wings was collected with a chick/hen ratio of 1.04. Same year chick/hen ratios for the rest of Washoe County were 1.61, and 2.53 for the Sheldon National Wildlife Refuge (NWR).

Nest success data was collected from 2002 harvested grouse. Nest success data indicate that 62.5% of females (n=24) within the Grassy/ Hart study area nested successfully, compared with 39.1% nest success in the rest of Washoe County (n=64). No data was available on nest success within the Sheldon NWR. This project was designed to determine the effects of Ravens on nesting sage grouse.

A special hunt was also conducted during the fall of 2003. Seventy-five permits were issued to applicants, and a 3/6 limit was set. A total of 112 hunter-harvested wings

was collected with a chick/ hen ratio of 2.26. Same year chick/ hen ratios for the rest of Washoe County were 2.49, and 1.44 for the Sheldon NWR.

Nest Success Data was collected from 2003 harvested grouse. Nest success data indicate that 66.7% of females (n=27) within the Grassy/ Hart study area nested successfully, compared with 31.1% nest success in the rest of Washoe County (n=45). No data was available on nest success within the Sheldon NWR.

The results of this study thus far indicate that ravens can have an effect on nesting sage grouse, as nest success levels on the project area were higher ($Z_c = 2.69$, $0.0025 < P < 0.005$) than the rest of Washoe County.

Recruitment is not a factor of this study. The intent is determine if Ravens effect nest success. No part of this study has an effect on chick survival once they have left the nest. However, because sage grouse are a species of interest to the Department, chick/ hen ratios are tracked to help aid in determining recruitment rates.

Spring of 2004 was the final year of field work on this project. Wing data will be collected and analyzed again during the fall of 2004. A final report on this project will be included in the annual predator plan to be completed in the fall of 2005.

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### *Project 4:* Coyote Control to Enhance Pronghorn Fawn Production: Vya - Massacre Area of Northern Washoe County

*Project Description:*

This project is designed to provide protection to new-born pronghorn antelope fawns within Game Management Unit (GMU) 011. Management work is performed on fawning grounds during the critical period each spring when pronghorn antelope fawns are most vulnerable to predation. Coyote control on pronghorn fawning grounds within this unit has been underway since FY 2000.

*Reason for Conducting the Project:*

Pronghorn fawn production across northwestern Nevada has been lower than expected since the population decline of 1992-93. Production in GMU 011 has been one of the lowest in the State. Coyotes are a known predator of pronghorn fawns. Coyote populations that remain stable during a period of pronghorn population declines may exhibit predation rates that hold pronghorn numbers below desirable numbers. Research on the nearby Hart National Antelope Refuge in 1996- 1997 found that predation by coyotes accounted for 58% of all fawn mortalities (total documented fawn loss = 86 of 104 born).

*Services Provided by Wildlife Services:*

Wildlife Services will design and implement the control project. WS will evaluate coyote densities and determine where effective population management can be implemented. Wildlife Services will provide Nevada Department of Wildlife (NDOW) with Global Positioning System (GPS) coordinates for the locations of removal, and data on numbers and methods of take.

WS will conduct a pre and post-treatment analysis of coyote densities utilizing standard survey methodologies. Reports of all surveys conducted will be provided by Wildlife Services to NDOW.

*Timing of Service:*

Control Period: April - May through June
Evaluation Period: September through October
Fiscal Years: 2000 - 2004

*Geographic Area of Project:*

Game Management Unit (GMU) 011 in northern Washoe County. Wildlife Services refers to this pronghorn herd as the "Surprise Antelope Herd."

*Project Analysis:*

Pronghorn populations should respond to lower predation rates by exhibiting increased fawn survival as measured by the fall composition survey. Population estimates should show an upward trend. Once numbers reach a threshold where predation no longer limits the population, growth will continue until another limiting factor is reached.

*Wildlife Services Budget Summary:*

| | Fiscal Year 00 | Fiscal Year 01 | Fiscal Year 02 | Fiscal Year 03 | Fiscal Year 04 |
|---|---|---|---|---|---|
| Requested | $ 0 | $ 0 | $17,770 | $18,179 | $22,921 |
| Expended | $5,400 | $20,633 | $22,269 | $19,337 | $15,240 |

**This budget summary includes a WS position**

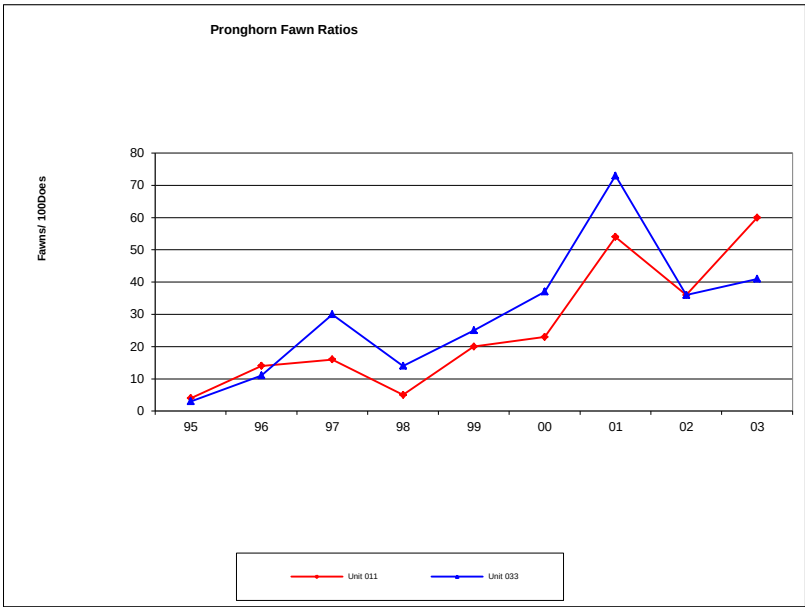
*Summary of Control Activities:*

| Species | FY 00 | FY 01 | FY 02 | FY 03 | FY 04 | Total |
|---|---|---|---|---|---|---|
| Coyote | 35 | 101 | 89 | 92 | 92 | 317 |
| Mountain Lion | 0 | 0 | 0 | 1 | 0 | 1 |
| Totals | 35 | 101 | 89 | 93 | 92 | 410 |

During the 2003 season, scent-post station surveys were conducted by Wildlife Services during the months of March through July. Scent-post stations were placed at ½ mile intervals for 25 miles for a total of 50 stations. Scent-post stations were monitored for 3 nights each month for a total of 150 station-nights per month. Coyotes per station for each month is as follows; March 0.09, April 0.03, May 0.03, June 0.03, and July 0.02. These results indicate that coyote densities within the unit were suppressed during the critical fawning period.

*Summary of Project Outcome:*

Pronghorn production has been monitored for several decades in northern Washoe and Humboldt Counties. The following graph shows production values by year:




The graph illustrates the recovery in production values starting in 1999 and continuing through 2003.

The following table demonstrates fawn production compared to both long-term and short-term averages:

Pronghorn Production Changes

| | | Fawns/ 100 does | | | | | | Percent Change From | |
|---|---|---|---|---|---|---|---|---|---|
| Unit | Action | 1999 | 2000 | 2001 | 2002 | 2003 | 20 yr Average | Long-Term Average | Short-term Average |
| 011 | Treatment | 20 | 23 | 54 | 36 | 60 | 29.5 | 103.3% | 66.7% |
| 033 | Control | 25 | 37 | 73 | 36 | 41 | 42.6 | - 3.8% | 13.9% |

The table shows that GMU 011's production rate increased 66% from the short term average (previous year) and is 103% higher than the 20 year average. The Sheldon NWR, GMU 033, which serves as a control unit without coyote control, showed production was unchanged between years and 15% below the long-term 20 year average.

Pronghorn populations in GMU 011 are increasing, field work on this project ended with the spring 2004 season. Pronghorn composition survey data will be conducted in the fall of 2004. A complete project summary will be included in the Fiscal Year 2006 annual predator plan.

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## ***Project 6A:*** **Protection of Desert Bighorn Sheep : Lincoln County**

*Project Description:*

The Nevada Department of Wildlife released 25 desert bighorn sheep into the Delamar range in October of 2003. Bringing the total number of desert bighorn released into the Delamar Mountains since 1997 to ninety-two. This project is designed to provide protection to that small herd which has suffered from repeated losses to predators. This project is undergoing an increase in scope and scale to try and cope with repeated losses despite trying to control lions over the last several years.

*Reason for Conducting the Project:*

Mountain lions are known predators of bighorn sheep. The Delamar Mountain Range has a history of lion predation on bighorn sheep. Each of the past bighorn sheep augmentation efforts into the Delamar Range has been met with losses to mountain lions. During the spring of 2001 a desert bighorn was found dead and determined to be a lion kill. Two desert bighorn from the 2002 augmentation were reported as lost to lion predation. Recently at least 2 radio-tagged sheep from the 2003 augmentation were reportedly killed by mountain lions.

*Services Provided by Wildlife Services:*

Wildlife Services will attempt to control resident lions if they are in conflict with bighorn sheep. WS will periodically monitor those areas consistent with desert bighorn sheep use including areas within Lincoln County, Nevada. WS will monitor lion activity during the winter months to evaluate the number of migratory lions that move into the area. Lions that are found in proximity to bighorns or that appear to be traveling from nearby ranges into known sheep use areas will be killed. Wildlife Services will utilize methods they deem most practical to accomplish the task of lion removal including but not limited to hounds, snares and call boxes. Wildlife Services will provide dates, location and method of removal to NDOW for each lion removed.

Nevada Department of Wildlife will provide WS personnel with maps of known sheep activity and known water sources used by desert bighorn sheep in Lincoln County to insure that WS personnel have the most accurate and informative data available. When practical NDOW will provide WS personnel, during or around the time of other air operations in Lincoln County, transport into water developments on the Delamar range to conduct lion sign surveys.

*Timing of Service:*

Mid-December through Mid-April

*Geographic Area of Project:*

Lincoln County - Centering protective efforts in the Delamar Mountains but extending out to those areas attended by desert bighorn sheep including but not limited to the Meadow Valley Mountains, North and South Pahroc Mountains, and the Hiko Mountains

*Project Analysis:*

Analysis of the effects of mountain lion control on the density of desert bighorn sheep will be through monitoring bighorn sheep population growth. NDOW biologists will use aerial and ground surveys and population models to make pre-treatment versus post-treatment population trend comparisons.

*Wildlife Services Budget Summary*:

| | FY 2002 | FY 2003* | FY2004* | FY 2005* |
|---|---|---|---|---|
| Requested | $17,000 | $840 | 4 months $6,528 | $9,104 |
| Expended | $17,523 | $840 | $6,488 | $5,486 |

***This budget summary does not include WS personnel, and indicates expenses related only to field work**

*Summary of Control Activities:*

Wildlife Services personnel conducted lion control work in the Delamar Range. In FY 2002 and FY 2003 one large adult mountain lion was removed from the vicinity of the relocated bighorn sheep population. Mountain lion survey work within the area has demonstrated that lion numbers are low. Due to the vulnerability of bighorn sheep to lion predation, any lion in the area is a threat. Follow-up surveys of the area after the removal of the large male indicate that a small lion, most likely a female, passed through the Delamar Range but did not take up residency.

| Species | 2001 | 2002 | 2003 | 2004 | Total |
|---|---|---|---|---|---|
| Mountain Lion | 0 | 1 | 0 | 0 | 1 |

*Summary of Project Outcome:*

A desert bighorn sheep survey of the Delamar Mountains was conducted in late September 2002. Twenty sheep were classified as two 5-year old rams and a 6-year old ram, 15 ewes and three lambs. A total of 8.3 hours of aerial survey time was spent on the Delamar Mountains and the Hiko, Pahroc ranges.

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***Project 8: Wilson Creek - White Rock, Mule Deer Predator/ Prey Relationship Project***

*Project Description:*

Mule deer populations in Game Management Area (GMU) 231, northeastern Lincoln County, have shown a gradual downward trend since the 1995 season. Predation could be a limiting factor. Studies indicate that predators can be a significant cause of mortality for mule deer. However, research also indicates that in order for predator control to be effective, the following conditions should exist: Deer populations below carrying capacity, predation identified as a limiting factor, and control efforts be designed to reduce predator populations enough to yield a response in deer populations, and control efforts be timed to be most effective.

In an effort to determine that these conditions exist within the proposed study area, thereby assuring that predator management actions are both warranted and effective, the Department proposes a one year evaluation period. After this evaluation the Department will use information collected to assess a need for protection of mule deer in GMU 231.

*Reason for conducting the project:*

Mule deer populations in Nevada have declined steadily since the late-1980s. GMU 231 has followed this same downward trend. Studies indicate that predators can be a significant cause of mortality for mule deer.

*Services provided by Wildlife Services:*

Wildlife Services will conduct an evaluation of the population status of predators within the proposed study area. They will, in cooperation with the Department of Wildlife, assess the effects of predators on mule deer survival. That assessment may include

delineation and audits of fawning grounds, migration corridors and summer and winter ranges to help determine if predation is a limiting factor at specific times of the year.

If predators are found to be a limiting factor, Wildlife Services, in cooperation with Department of Wildlife, will design a management strategy that will best utilize their resources for the protection of mule deer within the study area.

*Timing of Service:*

Evaluation Period: September - August
Length of Project: 1 - 5 years

*Geographic Location of Project:*

Treatment Area: Game Management Unit 231, Northeast Lincoln County Nevada.
Control Area: Area 22 (GMUs 221, 222, 223)

*Project Analysis:*

Studies indicate that predators can be a significant cause of mortality for mule deer fawns. However, research also shows that, in order for predator control to be effective, the following conditions should exist: Deer populations are below carrying capacity, predation was identified as a limiting factor, control efforts reduce predator populations enough to yield results, control efforts be timed to be most effective. In an effort to determine that these conditions exist within the proposed study area, thereby assuring that predator management actions are both warranted and effective, the Department proposes a one year evaluation period.

Evaluation: Monitoring of deer populations on the treatment and control areas will be conducted by NDOW during spring (April/ May) when conditions on the ground indicate to biologists that fawning has commenced and conditions are optimal to make accurate counts. Likewise, in the winter (December), composition surveys will be conducted on wintering deer when biologists feel migration is largely completed and conditions are optimal for accurate surveys. When possible, mule deer herd composition surveys will be replicated to ensure accurate counts and to minimize sampling bias.

Additionally, NDOW will re-evaluate deer population estimates for areas 22 and 23 for previous years to validate population data. Accuracy of population estimates depends largely on accurate assessment of mortality rates. In order to provide accurate mortality rates for the proposed treatment and control areas, 30 deer (15 for each area) will be captured and fitted with UHF-style radio transmitters, each equipped with an internal

mortality sensor. Radio-collared deer will be monitored on a weekly basis to provide biologists with mortality rates needed for population modeling.

*Wildlife Services Budget Summary:*

| | FY 2003 | FY 2004 |
|---|---|---|
| Requested | $0 | $0 |
| Expended | $0 | $0 |

*Nevada Department of Wildlife Budget Summary:*

Nevada Department of Wildlife will incur the following costs related to monitoring deer populations and predator/ prey interactions within the proposed treatment and control areas (NDOW will utilize funding from the predator management budget).

| | FY 2003 | FY 2004 |
|---|---|---|
| Requested | $44,400 | $18,000 |
| Expended | $30,294 | $3,551 |

*Summary of Activities:*

This project was an evaluation phase. NDOW and Wildlife Services conducted an analysis of feasibility on the area. Wildlife Services assessed the feasibility of conducting future work within the area (a wilderness study area), and both agencies analyzed data to determine best management practices for future control work.

During the week of December 2, 2002, NDOW employees conducted a capture and radio-tagged 30 mule deer (15 in Game Management Unit 231, and 15 in Management Area 22). During the week of February 17 aerial follow-up was conducted on the radio-tagged deer in the two areas. Twenty-nine transmitters were located with 25 of these animals alive and well. Four transmitters had dropped off the animals.

On April 21, 2003, the 13 remaining deer in Unit 231 were again located. All 13 animals were alive. Some of these deer remained on the winter habitat, while others had moved away from the winter habitat towards higher spring and summer use areas.

On April 22, 2003, NDOW employees commenced search for the 13 remaining deer in Area 22. Seven of those deer were located before severe winter snow storms shut down search operations. On the Morning of April 23, NDOW employees attempted again to make searches for the remaining deer, but heavy fog banks prevented helicopter

flight in most of Area 22. The deer that were located were found to be alive. As with Unit 231,
some deer remained on winter habitat while others had moved towards spring and summer use areas.

On June 12 and 13, the remaining 13 deer in Unit 231 were again located. All 13 deer were alive and most likely on their fawning and summer ranges. On June 12 and 13, the remaining deer from Area 22 were also located. Of the 13 remaining deer, ten of the animals were located and found to be alive. Included in these 10 that were located were five of six deer that were not located due to inclement weather during April flights. Three additional deer that were originally radio-tagged in Area 22 could not be located. Despite covering a very large area within Lincoln and White Pine Counties, no radio signal could be found for the three missing deer.

On August 14 and 15, during telemetry surveys, 11 of the 13 deer in area 231 were located and found to be alive. No signal was found for two other deer in this area. Surveys
were also conducted to locate the remaining 13 deer in Area 22. Of those 13, ten were located and alive. No signal was found for three other deer in this area.

*Summary of Project Outcome:*

Radio-telemetry data collected provided information on movement, migration corridors, and season use patterns by mule deer in Management Areas 22 and 23. Survival data was calculated for radio-tagged deer within these areas. The data collected was used to create maps to improve the ability for biologists to manage deer herds, provided Wildlife Services excellent information on seasonal deer use patterns increasing there ability to perform wildlife damage management activities, and finally survival data [$\hat{S}(t) = \Pi(1-d_j/r_j)$]was used to improve managers abilities to predict mule deer populations. Data and information from this project were used to design mule deer protection projects in Management Units 22 and 23.

| **Deer telemetry study Survival rates Dec 2002 - Dec 2003** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *t* | | *r* | *d* | | S(*t*) | | | |
| Period | Month | # at risk | # deaths | # censored | Survival | 95% C.I. High | 95% C.I. Low | VarS(*t*) |
| 1 | Dec | 30 | 0 | 0 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| 2 | Jan | 30 | 0 | 5 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| 3 | Feb | 25 | 0 | 0 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| 4 | Mar | 25 | 0 | 0 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| 5 | April | 25 | 0 | 0 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| 6 | May | 25 | 0 | 0 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| 7 | June | 25 | 1 | 1 | 0.9600 | 0.9745 | 0.9455 | 0.0074 |
| 8 | July | 23 | 0 | 0 | 0.9600 | 0.9751 | 0.9449 | 0.0077 |
| 9 | Aug | 23 | 0 | 0 | 0.9600 | 0.9751 | 0.9449 | 0.0077 |
| 10 | Sept | 23 | 0 | 0 | 0.9600 | 0.9751 | 0.9449 | 0.0077 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11 | Oct | 23 | 2 | 3 | 0.8765 | 0.9153 | 0.8378 | 0.0198 |
| 12 | Nov | 18 | 0 | 0 | 0.8765 | 0.9203 | 0.8327 | 0.0224 |
| 13 | Dec | 18 | 0 | 0 | 0.8765 | 0.9203 | 0.8327 | 0.0224 |

## Project 11: East Range: Bighorn Sheep Pre-Augmentation Treatment/ Mule Deer Protection Project

*Project Description:*

The Nevada Department of Wildlife's Bighorn Sheep Management Plan recommends that prior to a bighorn sheep augmentation, an evaluation of possible predation problems will be made on the release area. If it is determined that predation is a limiting factor, predator management will be instituted. This control project is designed to help protect existing and newly transplanted sheep within the East Range from predation by mountain lions. Additionally, predator management for the protection of bighorn sheep will also benefit mule deer within the same geographic area.

*Reason for Conducting the Project:*

One of the management goals established by the Nevada Department of Wildlife's Bighorn Sheep Management Plan is to restore and maintain bighorn herds at optimal levels. This requires the Department to make frequent augmentations of bighorn sheep to areas with a low population density. These augmentations are designed to elevate the density of a specific herd to a sustainable population level. Population studies of bighorn
sheep indicate that ecological limiting factors can be overcome if sheep densities are sufficient to rebound after a stochastic event.

The Bighorn Sheep Management Plan lists criteria for developing and initiating predator control programs for enhancing bighorn sheep habitat. Those criteria include possible predation on newly released sheep populations, low recruitment or population trends, confirmed predator-caused bighorn sheep mortalities, and environmental conditions (i.e., reduction in alternate prey or water sources) that may cause added vulnerability of sheep to predators.

*Services Provided by Wildlife Services:*

Wildlife Services will attempt to control resident lions prior to the release of bighorn sheep into the East Range. WS will periodically monitor the area during the winter months to evaluate if any migratory lions move into the area. Lions that are found in proximity to bighorn sheep and mule deer, or that are in apparent conflict with bighorn

sheep and mule deer, will be controlled. Wildlife Services will provide dates, location and method of removal to NDOW for each lion removed.

*Timing of Service:*

FY 2004
October - May
This project is scheduled for 4 months under funding from the Predator Management program, it is scheduled to continue for an additional 2 months using funding from private donations.

*Geographic Area of Project:*

Southern end of East Range and the northern end of the Stillwater Range, Pershing County, Nevada. Area of concentration to be desert bighorn habitat north and south of McKinney pass including known habitat on Granite Mountain and in the Root Springs area.

*Project Analysis:*

Analysis of the effects of mountain lion control on the density of desert bighorn sheep will be through monitoring bighorn sheep populations. NDOW biologists will use aerial and ground surveys to monitor sheep for losses due to predation.

*Wildlife Services Budget Summary:*

| East Range | Fiscal Year 2004* |
|---|---|
| Requested | 4 months $12,500**<br>6 months $18,000** |
| Expended | $1,162 |

***This budget summary includes a WS personnel position**
****This project is priced in conjunction with Project 12, Tobin Range bighorn sheep augmentation treatment. This project is being funded for 4 months, up to $12,500 from the Predator Management budget, the remaining 2 months of the project equaling $5,500 will be secured through private contribution to the project.**

*Summary of Project Outcome:*

| Species | 2004 | Total |
|---|---|---|
| | | |

| | | |
|---|---|---|
| Mountain Lion | 3 | 3 |

**Project 12: Tobin Range Bighorn Sheep Pre-Augmentation Treatment/ Mule Deer Protection Project**

*Project Description:*

The Nevada Department of Wildlife's Bighorn Sheep Management Plan recommends that prior to a bighorn sheep augmentation, an evaluation of possible predation problems will be made on the release area. If it is determined that predation is a limiting factor, predator management will be instituted. This control project is designed to help protect existing and newly transplanted sheep within the Tobin Range from predation by mountain lions. Additionally, predator management for the protection of bighorn sheep will also benefit mule deer within the same geographic area.

*Reason for Conducting the Project:*

One of the management goals established by the Nevada Department of Wildlife's Bighorn Sheep Management Plan is to restore and maintain bighorn herds at optimal levels. This requires the Department to make frequent augmentations of bighorn sheep to areas with a low population density. These augmentations are designed to elevate the density of a specific herd to a sustainable population level. Population studies of bighorn sheep indicate that ecological limiting factors can be overcome if sheep densities are sufficient to rebound after a stochastic event.

The Bighorn Sheep Management Plan lists criteria for developing and initiating predator control programs for enhancing bighorn sheep habitat. Those criteria include possible predation on newly released sheep populations, low recruitment or population trends, confirmed predator-caused bighorn sheep mortalities, and environmental conditions (i.e., reduction in alternate prey or water sources) that may cause added vulnerability of sheep to predators.

*Services Provided by Wildlife Services:*

Wildlife Services will attempt to control resident lions prior to the release of bighorn sheep into the East Range. WS will periodically monitor the area during the winter months to determine if any migratory lions move into the area. Lions that are found in proximity to bighorn sheep and mule deer, or that are in apparent conflict with bighorn sheep and mule deer, will be controlled. Wildlife Services will provide dates, location and method of removal to NDOW for each lion removed.

*Timing of Service:*

FY 2004
October - May
This project will be funded for 4 months from the Predator Management program, and for an additional 2 months using funding from private donations.

*Geographic Area of Project:*

Southern end of Tobin Range, Pershing County, Nevada.

*Project Analysis:*

Analysis of the effects of mountain lion control on the density of desert bighorn sheep will be through monitoring bighorn sheep populations. NDOW biologists will use aerial and ground surveys to monitor sheep for losses due to predation.

*Wildlife Services Budget Summary:*

| East Range | Fiscal Year 2004* |
|---|---|
| Requested | Priced jointly with project 11 |
| Expended | $11,446 |

***This budget summary includes a WS personnel position**

*Summary of Project Outcome:*

| Species | 2004 | Total |
|---|---|---|
| Mountain Lion | 1 | 1 |

## Project 13: Santa Rosa Range Bighorn Sheep Pre-Augmentation Treatment/ Mule Deer Protection Project

*Project Description:*

The Nevada Department of Wildlife's Bighorn Sheep Management Plan recommends that prior to a bighorn sheep augmentation, an evaluation of possible predation problems will be made on the release area. If it is determined that predation is a limiting factor, predator management will be instituted. This control project is designed

to help protect existing and newly transplanted sheep within the Santa Rosa Range from predation by mountain lions. Additionally, predator management for the protection of bighorn sheep will also benefit mule deer within the same geographic area.

*Reason for Conducting the Project:*

One of the management goals established by the Nevada Department of Wildlife's Bighorn Sheep Management Plan is to restore and maintain bighorn herds at optimal levels. This requires the Department to make frequent augmentations of bighorn sheep to areas with a low population density. These augmentations are designed to elevate the density of a specific herd to a sustainable population level. Population studies of bighorn sheep indicate that ecological limiting factors can be overcome if sheep densities are sufficient to rebound after a stochastic event.

The Bighorn Sheep Management Plan lists criteria for developing and initiating predator control programs for enhancing bighorn sheep habitat. Those criteria include possible predation on newly released sheep populations, low recruitment or population trends, confirmed predator-caused bighorn sheep mortalities, environmental conditions (i.e., reduction in alternate prey or water sources) that may cause added vulnerability of sheep to predators.

*Services Provided by Wildlife Services:*

Wildlife Services will attempt to control resident lions prior to the release of bighorn sheep into the Martin Creek Drainage. WS will periodically monitor the area during the winter months to determine if any migratory lions move into the area. Lions that are found in proximity to bighorn sheep and mule deer, or that are in apparent conflict with bighorn sheep and mule deer, will be controlled. Wildlife Services will provide dates, location and method of removal to NDOW for each lion removed.

*Timing of Service*:

FY 2004
November - May
This project is scheduled to run from 4 to 6 months contingent on securing private donations to fund predator control work.

*Geographic Area of Project:*

Martin Creek Drainage of the Santa Rosa Range, Humboldt County, Nevada.

*Project Analysis:*

Analysis of the effects of mountain lion control on the density of desert bighorn sheep will be through monitoring bighorn sheep populations. NDOW biologists will use aerial and ground surveys to monitor sheep for losses due to predation.

*Wildlife Services Budget Summary:*

| Martin Creek Drainage | Fiscal Year 2004* |
|---|---|
| Requested | 4 months $20,494**<br>6 months $30,744** |
| Expended | Not Conducted |

***This budget summary includes a WS personnel position**

*Summary of Project Outcome:*

No bighorn sheep augmentation took place in the Santa Rosa Range, therefore no protection measures under the direction of this program took place in Fiscal Year 2004.

**Project 14: Wilson Creek - White Rock, Coyote Control to Enhance Mule Deer Fawn Production**

*Project Description:*

This project is designed to protect mule deer fawns in Game Management Unit 231 where population levels over the past decade have steadily declined. Coyotes will be the focus of management activities, with protection focused on use areas where studies have shown most fawn loss occurs (e.g., fawning grounds and wintering areas). Mule deer population and fawn production levels from before, during and after the project will be compared to help assess the effectiveness of the project. An age structure analysis will be conducted on coyotes during the course of the project to help determine coyote population dynamics. A full time wildlife specialist will be assigned to this project.

*Reason for Conducting the Project:*

Mule deer populations in Game Management Area (GMU) 231, northeastern Lincoln County, have shown a gradual downward trend since the late 1980's. During this time fawn production has also declined. Studies indicate that predators can be a significant cause of mortality for mule deer. Research in other western states indicate coyote predation on mule deer fawns can account for 50 - 77 percent of the total fawn mortality. However, research also indicates that in order for predator control to be effective, the following conditions should exist: Deer populations below carrying capacity, predation identified as a limiting factor, and control efforts be designed to

reduce predator populations enough to yield a response in deer populations, and control efforts be timed to be most effective.

*Services Provided by Wildlife Services:*

Wildlife Services will design and implement the control project. The control work will consist of the removal of coyotes in Game Management Unit 231 for the protection of mule deer. Coyotes are the only animal targeted for removal. WS will evaluate coyote densities and determine where effective population management can be implemented. Wildlife Services will provide Nevada Department of Wildlife (NDOW) with Global Positioning System (GPS) coordinates for the locations of removal, and data on numbers and methods of take. Wildlife Services will also collect a canine tooth from the lower mandibles of coyotes removed from the project area, and submit collected teeth to NDOW for age structure analysis.

WS will use a full time wildlife specialist utilizing best control methods for the removal of coyotes, including the use of aircraft. WS will conduct a pre and post-treatment
analysis of coyote densities utilizing standard survey methodologies. Reports of all surveys conducted will be provided by Wildlife Services to NDOW.

*Timing of Service:*

Control Period: Throughout Fiscal Year 2004
Fiscal Years: 2004 - 2008 (5 year project)

*Geographic Area of Project:*

Game Management Unit 231. Wildlife damage management activities to protect mule deer fawns will be concentrated around higher elevation fawning grounds as determined by Nevada Department of Wildlife and Wildlife Service personnel and through use of telemetry data previously collected. Fawning ground activities will take place during the months of March through August.

Wildlife damage management activities to protect mule deer fawns will continue on summer grounds and onto lower elevation winter grounds. Summer and winter ground activities will take place approximately during the months August through February.

*Project Analysis:*

Mule deer populations should respond to lower predation rates by exhibiting increased fawn survival as measured by the fall composition survey. Population estimates should show an upward trend. Once numbers reach a threshold where predation no longer severely limits the population, growth will continue until another limiting factor is reached.

A comparison of population estimates and fawn production will be compared from GMU 231 from years prior to work beginning and will be compared to population levels and fawn production both during and after treatment.

An analysis of coyote age structure will be conducted each year of this project. Wildlife Service personnel will collect lower mandibles from as many of the removed coyotes as possible. These canine teeth will be sent to a laboratory for cementum aging. This process will help determine if a change in coyote age structure occurs during this project. Older age coyotes are believed to be more efficient at preying on larger ungulates and their offspring, while younger age class coyotes must rely more on alternate food sources (e.g., rodents).

*Wildlife Services Budget Summary*:

| | Fiscal Year 04* | Fiscal Year 05 | Fiscal Year 06 | Fiscal Year 07 | Fiscal Year 08 |
|---|---|---|---|---|---|
| Requested | $ 16,560 | $13,140 | | | |
| Expended | $10,128 | $9,774 | | | |

***This budget summary does not include WS personnel, and indicates expenses related only to field work**

*Nevada Department of Wildlife Services Budget Summary*:

| | Fiscal Year 04 | Fiscal Year 05 | Fiscal Year 06 | Fiscal Year 07 | Fiscal Year 08 |
|---|---|---|---|---|---|
| Requested | $1,500 | $1,000 | | | |
| Expended | $0 | $214 | | | |

*Summary of Project Outcome:*

Historic mule deer populations and fawn ratios within GMU 231 will be compared to results of surveys during the life of this project. Complete analysis of results can not be accurately made until the completion of the five year project. However in the interim, a yearly comparison will be reported to provide a perfunctory look at the status of the project.

| GMU 231 mule deer population estimates | GMU 231 Fawn/doe/ Ratios |
|---|---|
| 1999-2004 average 2100 | 1999-2004 average 45/100 |

| | |
|---|---|
| 1995-2004 average 2300 | 1995-2004 average 45/100 |
| 1985-1994 average 3000 | 1985-1994 average 50/100 |

Coyote teeth (n=60) were collected from GMU 231 during Fiscal Year 2004 on the project area. Those teeth were aged using cementum age analysis and it was determined that the average age of coyotes taken in this unit was 2.9 years of age. A total of 30 females were taken with 23 of those being greater than one year of age. Thirty males were taken with 24 of those being greater than one year of age. Results indicate a ratio of 0.94 pups/ adult female. Deer composition survey data will be conducted during the Spring of 2005.

| Species | FY 04 | FY 05 | FY 06 | FY 07 | FY 08 | Total |
|---|---|---|---|---|---|---|
| Coyote | 138 | | | | | |

**Project 15: Horse and Cattle Camp Loop, Schell Creek Range. Coyote Control to Enhance Mule Deer Fawn Production**

*Project Description:*

This project is designed to protect mule deer fawns in Game Management Unit 222 where population levels over the past decade have steadily declined. Coyotes will be the focus of management activities, with control work being conducted on fawning grounds which primarily occur in the northern half of Unit 222. Mule deer population and fawn production levels from before, during and after the project will be compared to help assess the effectiveness of the project. An age structure analysis will be conducted on coyotes during the course of the project to help determine coyote population dynamics. A wildlife specialist will be assigned to this project during appropriate times of the year.

*Reason for Conducting the Project:*

Mule deer populations in Game Management Area (GMU) 222, White Pine County, have shown a gradual downward trend since the late 1980's. During this time fawn production has also declined. Studies indicate that predators can be a significant cause of mortality on mule deer. Research in other western states indicates coyote predation on mule deer fawns can account for 50 - 77 percent of the total fawn mortality. However, research also indicates that, in order for predator control to be effective, the following conditions should exist: Deer populations below carrying capacity, predation identified as a limiting factor, and control efforts be designed to reduce predator populations enough to yield a response in deer populations, and control efforts be timed to be most effective.

*Services Provided by Wildlife Services:*

Wildlife Services will design and implement the control project. The control work will consist of the removal of coyotes in the northern portions of Game Management Unit 222 for the protection of mule deer. Coyotes are the only animal targeted for removal. WS will evaluate coyote densities and determine where effective population management can be implemented. Wildlife Services will provide Nevada Department of Wildlife (NDOW) with Global Positioning System (GPS) coordinates for the locations of removal, and data on numbers and methods of take. Wildlife Services will also collect a canine tooth from the lower mandibles of coyotes removed from the project area and submit teeth to NDOW for age structure analysis.

WS will use a wildlife specialist utilizing best methods for the removal of coyotes, including the use of aircraft. WS will conduct a pre and post-treatment analysis of coyote densities utilizing standard survey methodologies. Reports of all surveys conducted will be provided by Wildlife Services to NDOW.

*Timing of Service:*

Control Period: January/February - August, Fiscal Year 2004
Fiscal Years: 2004 - 2008 (5 year project)

*Geographic Area of Project:*

Northern half of Game Management Unit 222. Work will be focused on that area North of Patterson Pass to the North end of Unit 222. Work may occur within area 222 as deemed necessary by Wildlife Services to work effectively. Wildlife damage management activities to protect mule deer fawns will be concentrated around higher elevation fawning grounds as determined by Nevada Department of Wildlife and Wildlife Service personnel using mule deer distribution telemetry data previously collected. Control around fawning grounds will take place during the months of February through August.

*Project Analysis:*

Mule deer populations should respond to lower predation rates by exhibiting increased fawn survival as measured by the fall composition survey. Population estimates should show an upward trend. Once numbers reach a threshold where predation no longer severely limits the population, growth will continue until another limiting factor is reached.

Population estimates and fawn production will be compared from GMU 222 from years prior to work beginning and will be compared to population levels and fawn production both during and after the project.

An analysis of coyote age structure will be conducted each year of this project. Wildlife Service personnel will collect a canine tooth from the lower mandibles of as many of the removed coyotes as possible. These teeth will be sent to a laboratory for cementum aging. This process will help determine if a change in coyote age structure occurs during this project. Older age coyotes are believed to be more efficient at preying

on larger ungulates and their offspring, while younger age class coyotes must rely more on alternate food sources (e.g., rodents).

*Wildlife Services Budget Summary*:

| | Fiscal Year 04* | Fiscal Year 05 | Fiscal Year 06 | Fiscal Year 07 | Fiscal Year 08 |
|---|---|---|---|---|---|
| Requested | $ 12,240 | $9,600 | | | |
| Expended | $6,086 | $6,282 | | | |

***This budget summary does not include WS personnel, and indicates expenses related only to field work**

*Nevada Department of Wildlife Services Budget Summary*:

| | Fiscal Year 04 | Fiscal Year 05 | Fiscal Year 06 | Fiscal Year 07 | Fiscal Year 08 |
|---|---|---|---|---|---|
| Requested | $1,500 | $1,000 | | | |
| Expended | $0 | $213 | | | |

*Summary of Project Outcome:*

Historic mule deer populations and fawn ratios within Management Area 22 will be compared to results of surveys during the life of this project. Complete analysis of results can not be accurately made until the completion of the five year project. However in the interim, a yearly comparison will be reported to provide a perfunctory look at the status of the project.

| Area 22 mule deer population estimates | Area 22 Fawn/doe/ Ratios |
|---|---|
| 1999-2004 average 4000 | 1999-2004 average 45/100 |
| 1995-2004 average 4600 | 1995-2004 average 45/100 |
| 1985-1994 average 8900 | 1985-1994 average 45/100 |

Coyote teeth (n=39) were collected from GMU 222 during Fiscal Year 2004 on the project area. Those teeth were aged using cementum age analysis and it was determined that the average age of coyotes taken in this unit was 2.5 years of age. A total of 21 females were taken with 9 of those being greater than one year of age. Eighteen males were taken with 14 of those being greater than one year of age. Results indicate a ratio of 1.78 pups/ adult female. Deer composition survey data will be conducted during the Spring of 2005.

| Species | FY 04 | FY 05 | FY 06 | FY 07 | FY 08 | Total |
|---|---|---|---|---|---|---|
| | | | | | | |

### *Project 16:* Elko County Sage Grouse Project

*Project Description:*

The effects of common raven removal on the nest success of the greater sage grouse are being measured by this project. Common raven populations were controlled during the sage grouse breeding and nesting season. The project was conducted in the Snake Range of Elko County in the immediate vicinity of sharp-tailed grouse translocation sites. Ravens were controlled through the use of an avicide and other ground control activities.

*Reason for Conducting the Project:*

The common raven is a common nest predator that is increasing in abundance throughout the intermountain west. The increase is strongly associated to anthropogenic resource subsidies, including power lines, roads, and landfills. Ravens are accomplished predators of bird nests and fledglings, and increased raven abundance in areas of human subsidies is thought to have "spillover predation" effects. Increased raven numbers are thought to have cascading ecological effects, including increased sage grouse nest failure due to egg depredation by ravens. An important constraint on sage grouse population growth is poor nest success. The USDA Fish and Wildlife Service has been petitioned to list the greater sage grouse under the Endangered Species Act. Wildlife damage management may have an important role to play in future sage grouse conservation plans. It is important that wildlife managers understand sage grouse responses to management actions to design effective wildlife damage management activities.

*Services Provided by Wildlife Services:*

Wildlife Services will design and implement the control project. WS will evaluate raven and coyote densities and determine where effective population management can be implemented. WS will provide licensed applicators to apply avicide. Wildlife Services will provide Nevada Department of Wildlife (NDOW) with Global Positioning System (GPS) coordinates for the locations of the treated areas.

WS will conduct a pre and post-treatment analysis of raven and coyote densities utilizing standard survey methodologies. Reports of all surveys conducted will be provided by Wildlife Services to NDOW.

*Timing of Service:*

Control Period: Early March through June
Evaluation Period: March through June 2005

*Geographic Area of Project:*

The Snake Range, Elko County, Nevada. The approximate size of the treatment area is 175 square miles.

*Project Analysis:*

Sage grouse will be captured from known leks and fitted with a necklace style radio-transmitter. Radio-tagged grouse are relocated 2 times per week until nesting behavior is identified. Nests are located and monitored to determine fate if each nests. Nests are considered successful if one or more egg hatches from a clutch. Unsuccessful nests are categorized as abandoned or predated. Miniaturized cameras and video equipment is set up in the field to monitor sage grouse nests and to document nest predation activities and species. Cameras film nests 24 hours a day (night filming by use of infrared non visible light) using time lapse photography.

*Wildlife Services Budget Summary:*

| | FY 2004 | FY 2005 |
|---|---|---|
| Requested | $12,616 | $13,038 |
| Expended | $13,319* | |

**This budget summary includes a WS personnel position**
**this project was funded by outside sources for 2004, No costs were billed to NDOW.*

*Summary of Control Activities:*

Predators removed during the Fiscal Year were reported by Wildlife Services as the following:

| Species | Fiscal Year 04 | Fiscal Year 05 |
|---|---|---|
| Raven | 318 | |

During the 2003 season, Wildlife Services conducted raven surveys within the project area during the months March through July. Survey stations were at ½ mile intervals for 25 miles for a total of 50 stations. Surveys were conducted 3 times each

month resulting in 150 stations per month. Results of ravens/ 10 miles² is as follows; March 8.0, April 2.5, May 6.0, June 1.0, and July 0.05. These results are similar to raven counts in the proceeding three years of the study but considerably less than the FY 2000 pretreatment raven survey that resulted in 36.7 raven/ 10 miles² indicating ravens are being suppressed on sharp-tailed grouse nesting areas.

*Summary of Project Outcome:*

The Wildlife Services report documents a significant decrease in avian nest predators (ravens) within the 175 square mile study area. Ravens are the predators that would be expected to have the most serious deleterious affect on nesting Sage grouse and other ground nesting upland game birds.

Table 1. Nesting Status of Sage Grouse within Project Area

| | Total Nests | Nest Predation | Hatched | Abandoned | Predation % | Nesting Success |
|---|---|---|---|---|---|---|
| **Total** | 24 | 3 | 19 | 2 | 12.5% | 73.6% |

We have no direct knowledge of sage grouse nest success prior to raven removal because this project was initiated 2 years following the onset of raven removal. However, a translocated population of Columbian sharp-tailed grouse was monitored prior to the onset of substantial efforts to remove ravens during 1999-2000. The average nest success of sharp-tailed grouse prior to raven removal was 42%. During the systematic raven removal activities nest success of sharp-tailed grouse was 75%. Raven removal possibly increased nest success of sharp-tailed grouse. Therefore, it is possible that nest success was greater than the expected value of greater sage grouse in this study due to raven removal activities and may be consistent with a study in Oregon that described increase nest success due to predator removal (Batterson and Morse 1948). Furthermore, ravens are considered primary predators but we did not identify any raven encounters at video recorded sage grouse nests. It is possible that raven removal decreased the occurrence of raven depredations.

Further investigation at this site, such as measuring nest success at various distances from the raven removal route, is needed to truly understand the relationship between raven removal and nest success. Our findings are preliminary and during 2004-2005 we will measure nest success at various distances from the raven removal route to further identify any correlation.

Ground squirrels have been documented as effective sage grouse nest predators. However, we observed the Wyoming and Paiute ground squirrels encounter nests and not depredate any eggs. On one occasion, a Wyoming ground squirrel appeared to bite 3 eggs but did not penetrate the eggshells. Least chipmunk and Northern pocket mouse were observed eating and crushing eggshells following a hatch. Therefore, subsequent

scavenges by rodents may result in misidentifying sage grouse nest predators based on egg and nest remains.

Video recording is useful for evaluating the effectiveness of management activities on estimating raven "take." We observed a Wyoming ground squirrel depredate 2 egg baits but not sage grouse eggs. If ground dwelling animals prove to be substantial egg bait predators, then elevated egg platforms may be important to target only corvids. Further egg bait recordings may provide an identification of these predators and an empirical basis for estimating raven "take."

Videography appears to be an effective tool for identifying sage grouse nest predators. Remains of eggshells and nests alone may not be reliable due to biases that we observed associated with identifying predators from egg and nest remains, such as subsequent eggshell scavenging and inter-specific predation patterns.

In conclusion, it is probable that direct raven removal increased sage grouse nest success in NE Nevada. This is consistent with experimental research of raven removal impacts on sage grouse nest success in Oregon. The majority of management plans recommend restoring habitat as a means of minimizing the predator-prey interactions. Due to the time lag between the beginning and completion of restoring sagebrush steppe communities and the rapidly declining rate of sage grouse abundance, it may be important to incorporate raven damage management activities for endangered populations until habitat quality is sufficient at concealing nests from predators.

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## *Project 17:* Elko County Deer and Elk Project

*Project Description:*

This projects primary goal is to provide protection to big game in east half of Game Management Unit 101 to encourage greater production and recruitment and to effect an increase in the population. This goal will be pursued by the protection of these species from coyote and mountain lion predation during key times of the year and on key fawning/ calving grounds and wintering grounds. Work will be conducted on Game management Units (GMU's) 101, 105 and 107. Effects of the project will be determined from both comparison of historic herd composition ratios and herd size as well as by comparison (for deer only) between the East Humboldt deer to deer herds from the Ruby Mountains.

*Reason for Conducting the Project:*

Population growth within the East Humboldt Range deer herd (GMU 101, 105, 107) has been less than expected, despite good spring fawn ratios in that area. Additionally, The elk herd in GMU 105 has an herd objective of 340 head of elk. That

herd is currently at less than 200 head with poor calf production recently. Even though production is believed to be adequate, recruitment (calves surviving first year) is poor and elk numbers are not increasing to the desired objective. Elk that have been radio-tagged within GMU 105 have seen a 50% loss rate indicating mortality is higher than expected.

Studies indicate that predators can be a significant cause of mortality on mule deer and elk. Research in other western states indicates coyote predation on mule deer fawns can account for 50 - 77 percent of the total fawn mortality. However, research also indicates that, in order for predator control to be effective, the following conditions should exist: Deer populations below carrying capacity, predation identified as a limiting factor, and control efforts be designed to reduce predator populations enough to yield a response in deer populations, and control efforts be timed to be most effective.

*Services Provided by Wildlife Services:*

Wildlife Services will design and implement the control project. The control work will consist of the removal of coyotes and mountain lions to the extent possible to protect deer and elk in the following Game Management Units, during the following times:

| GMU | Season | Protecting | Removing |
|---|---|---|---|
| 101 | spring, summer | mule deer | coyotes, mountain lions |
| 105 | spring, summer | elk | coyotes, mountain lions |
| 105/107 | fall, winter | mule deer | coyotes, mountain lions |

WS will evaluate coyote and mountain lion densities and determine where effective population management can be implemented. Wildlife Services will provide Nevada Department of Wildlife (NDOW) with Global Positioning System (GPS) coordinates for the locations of removal, and data on numbers and methods of take.

WS will use a wildlife specialist utilizing best methods for the removal of mountain lions and coyotes, including the use of aircraft. WS will conduct a pre and post-treatment analysis of coyote densities utilizing standard survey methodologies. Reports of all surveys conducted will be provided by Wildlife Services to NDOW.

*Timing of Service:*

Control Period: Throughout Fiscal Year 2005
Fiscal Years: 2005 - 2009 (5 year project)

*Geographic Area of Project:*

Game management Units 101 which provides fawning and summer range for a Northern Ruby Mountain Deer Herd, and Game Management Unit 105 and 107 Which provides Winter habitat for the same herd. GMU 105 is spring and summer habitat for a small elk herd.

*Project Analysis:*

Mule deer populations should respond to lower predation rates by exhibiting increased fawn survival as measured by composition surveys. Population estimates should show an upward trend. Once numbers reach a threshold where predation no longer severely limits the population, growth will continue until another limiting factor is reached.

Population estimates and fawn production will be compared to historic trends within the same units. Comparisons will also be made between the project area and with deer from the Ruby Mountains that fawn and summer in GMUs 102 and winter in 103, 104 and 108. The Ruby Mountains herd is considered to be essentially the same range as the East Humboldt Range with nearly identical geology, soils, and vegetation separated by only a low pass known as Secret Pass. Therefore, it will provide an excellent comparison to the East Humboldt Range herd with fewer ecological factors having a potential confounding effect on the analysis of outcome.

Elk populations should respond to lower predation rates by exhibiting increased calf survival as measured by composition surveys. Population estimates should show an upward trend. Population estimates and calf production will be compared to historic trends within the same units.

*Wildlife Services Budget Summary:*

| | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|---|---|
| Requested | $45,766 | | | | |
| Expended | | | | | |

*Summary of Project Outcome:*

Historic mule deer populations and fawn ratios within deer group 101 (101,105,106,107) will be compared to results of surveys during the life of this project. Complete analysis of results can not be accurately made until the completion of the five year project. However in the interim, a yearly comparison will be reported to provide a perfunctory look at the status of the project.

<u>101 group mule deer survey sample size</u> <u>101 group fawn/doe Ratios</u>

| | |
|---|---|
| 2000-2004 average 1222 | 1999-2004 average 33/100 |
| 1995-2004 average 1620 | 1995-2004 average 33/100 |
| 1989-1994 average 2195 | 1989-1994 average 31/100 |

| Area 10 elk population estimates | | Area 10 calf/cow ratios | |
|---|---|---|---|
| 2004 | 160 | 2004 | 12/100 |
| 2003 | 170 | 2003 | 26/100 |
| 2002 | 180 | 2002 | 31/100 |
| 2001 | 180 | 2001 | 57/100 |

### *Project 18:* Washoe County Deer Project

*Project Description:*

This project's primary goal is to provide protection to deer in Washoe County so as to encourage greater fawn recruitment and to effect an increase in the population of mule deer. This goal will be pursued by the protection of mule deer from coyote and mountain lion predation during key times of the year and on key fawning grounds and wintering grounds. Work will be conducted on Game management Unit (GMU) 014. Effects of the project will be determined from both comparison of historic herd composition ratios and herd size as well as by annual comparison between GMU 014 deer to deer in the rest of Area 01.

*Reason for Conducting the Project*:

Mule deer numbers are reportedly declining throughout their western U.S. range. Similarly, Nevada populations have also experienced declining mule deer populations. North Washoe County local area biologists have noted a decrease in the number of deer classified during annual spring and fall surveys, which has resulted in lower population estimates for North Washoe deer herds. Many local residents and sportsmen have also noticed diminished herd sizes and have responded by seeking possible solutions to reverse the current trend.

Many of Nevada's deer ranges have suffered from habitat loss to recent wildfires. GMU 014 has suffered some historic wildfires, but they have not been to the same magnitude of other Nevada locations. Thus causing biologists to look for other possible explanations for limiting factors for mule deer. Predator populations are seemingly on the rise in North Washoe County. Mountain lion observations, incidence of accidental trapping, and harvest have all dramatically increased over the last decade. Prolonged drought conditions in this area may lead to further predation incidents as deer become more congested around available water and forage sources or as they become weakened nutritionally.

*Services Provided by Wildlife Services:*

Wildlife Services will design and implement the control work. The control work will consist of the removal of coyotes and mountain lions in Game Management Unit 014 for the protection of mule deer. WS will evaluate predator densities and determine where effective population management can be implemented. Wildlife Services will provide Nevada Department of Wildlife (NDOW) with Global Positioning System (GPS) coordinates for the locations of removal, and data on numbers and methods of take.

WS will use a wildlife specialist utilizing best methods for the removal of mountain lions and coyotes, including the use of aircraft. WS will conduct a pre and post-treatment analysis of coyote densities utilizing standard survey methodologies. Reports of all surveys conducted will be provided by Wildlife Services to NDOW.

*Activities conducted by NDOW:*

*Radio-Telemetry*: 30 mule deer (adult bucks, adult does, fawns) will be captured and radio-tagged, with these totals to be split between opposing slopes of the Granite Range. Follow up on these deer would be conducted monthly for a period of 1 year and twice monthly in months of deer migration to help biologist delineate seasonal use patterns, migration timing and corridors, mortality rates, and when possible cause of death.

*Survey and inventory:* In addition to annual spring composition surveys, NDOW personnel will conduct a fall composition survey in Management Area 01 to help assess mule deer herd size and fawn recruitment.

*Climatological Assessment:* NDOW personnel will monitor the climatic conditions and annual precipitation of North Washoe County to help eliminate “biological noise” in assessing project effectiveness.

Timing of Service:

Control Period: Throughout Fiscal Year 2005
Fiscal Years: 2005 - 2009 (5 year project)

*Geographic Area of Project:*
GMU 014 in Northern Washoe County.

*Project Analysis:*

Mule deer populations should respond to lower predation rates by exhibiting increased fawn survival as measured by composition surveys. Population estimates

should show an upward trend. Once numbers reach a threshold where predation no longer severely limits the population, growth will continue until another limiting factor is reached.

Population estimates and fawn production will be compared with deer from the rest of Management area 01, and with historic fawn numbers within GMU 014. The other GMUs within area 01 have similar habitat and climatic conditions so they will provide a good comparison to the GMU 014 deer herd.

Studies indicate that predators can be a significant cause of mortality for mule deer fawns. However, research also shows that, in order for predator control to be effective, the following conditions should exist: Deer populations are below carrying capacity, predation was identified as a limiting factor, control efforts reduce predator populations enough to yield results, control efforts be timed to be most effective.

*Evaluation*: Monitoring of deer populations on the treatment and control areas will be conducted by NDOW during spring (April/ May) when conditions on the ground indicate to biologists that fawning has commenced and conditions are optimal to make accurate counts. Likewise, in the fall, composition surveys will be conducted when conditions allow for accurate surveys.

Additionally, NDOW will re-evaluate deer population estimates for GMU 014 and surrounding area 01 Units for previous years to validate population data. Accuracy of population estimates depends largely on accurate assessment of mortality rates. In order to provide accurate mortality rates for the proposed treatment and control areas, Radio telemetry data will be used to calculate mortality.

*Wildlife Services Budget Summary:*

| | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|---|---|
| Requested | $28,502 | | | | |
| Expended | | | | | |

*NDOW Budget Summary:*

| | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
|---|---|---|---|---|---|
| Requested | $53,750 | $0 | $0 | $0 | $0 |
| Expended | | $0 | $0 | $0 | $0 |

*Summary of Project Outcome:*

Historic mule deer populations and fawn ratios within Management Area 01 will be compared to results of surveys during the life of this project. Complete analysis of results can not be accurately made until the completion of the five year project. However in the interim, a yearly comparison will be reported to provide a perfunctory look at the status of the project.

| Area 014 mule deer population estimates | Area 01 Fawn/doe/ Ratios |
|---|---|
| 1999-2004 average 1350 | 1999-2004 average 40/100 |
| 1995-2004 average 4600 | 1995-2004 average 42/100 |
| 1985-1994 average 8900 | 1985-1994 average 22/100 |

## Project Budget Detail

**WILDLIFE SERVICES**

**Infrastructure Needs**

| Personnel | Salary & Benefits | Per diem | Vehicle | D/T Hire | Supplies | Administration | Total |
|---|---|---|---|---|---|---|---|
| GS-11 (6 mos.) | $34,960 | $1,800 | $5,600 | $0 | $400 | $8,552 | $51,312 |
| AD-6 (12 mos.) | $40,376 | $2,900 | $9,946 | $0 | $500 | $10,744 | $64,446 |
| AD-6 (12 mos.) | $38,903 | $4,400 | $9,946 | $1,500 | $500 | $11,050 | $66,299 |
| Total | $114,239 | $9,100 | $25,492 | $1,500 | $1,400 | $30,346 | $182,077 |

Infrastructure needs, while shown in the above table as a separate cost, are more correctly seen as a facet of each project.

**WILDLIFE SERVICES**

Project 1: Sage Grouse Project Budget

| BUDGET ITEM | FY00 | FY01 | FY02 | FY03 | FY04 |
|---|---|---|---|---|---|
| | Actual | Actual | Actual | Actual | Actual |
| 1 Wildlife Technician - AD-4 (salary/ben.) | $7,114 | $7,561 | NA | NA | $5,648 |
| APHIS Vehicles (1,800 miles/month @ .325) | $3,117 | $3,086 | NA | NA | $1,133 |
| Camp Trailer ($100/month for 4 months) | $400 | $450 | NA | NA | $200 |
| Aerial Hunting (@ $150/hr) | $5,835* | $660 | NA | NA | $0 |
| Equipment (GPS, suppressed .22 rifle, binocs) | $1,703 | $0 | NA | NA | $0 |
| Supplies (DRC-1339, Eggs, .22 bullets, etc) | $358 | $936 | NA | NA | $674 |
| Administration | $6,779 | $17,030 | NA | NA | $1,201 |
| TOTAL | $25,306 | $29,723 | $31,274 | $8,656 | $8,856 |

* Included Vya antelope aerial hunting hours only for FY00.

**WILDLIFE SERVICES**

| Project 4: North Washoe Pronghorn Antelope Project Budget | | | | | |
|---|---|---|---|---|---|
| BUDGET ITEM | FY00 | FY01 | FY02 | FY03 | FY04 |
| | Actual | Actual | Actual | Actual | Actual |
| 1 Wildlife Technician - AD-4 (salary/ben.) | | | NA | NA | $4,167 |
| Aerial Hunting | $2,387 | $9,780 | NA | NA | $7,185 |
| APHIS Vehicles (1,800 miles/month @ .325) | NA | NA | NA | NA | $1,013 |
| Camp Trailer ($100/month for 4 months) | NA | NA | NA | NA | $150 |
| Supplies | NA | NA | NA | NA | $185 |
| Administration | $3,013 | $10,853 | NA | NA | $2,540 |
| TOTAL | $5,400 | $20,633 | $22,269 | $19,337 | $15,240 |

**WILDLIFE SERVICES**

| Project 6a: Protection of Desert Bighorn Sheep: Lincoln County | | | | |
|---|---|---|---|---|
| BUDGET ITEM | FY02 | FY03 | FY04 | FY05 |
| | Actual | Actual | Actual | Projected |
| Mountain Lion Specialist - AD-6 | NA | NA | $0 | $0 |
| GSA Vehicle (3 months) | NA | NA | $1,599 | $1,987 |
| Camp Trailer ($100/ month) | NA | NA | $0 | $0 |
| Horse and Dog Hire (3 months) | NA | NA | $2,972 | $1,860 |
| Equipment and Snares | NA | NA | $0 | $2,180 |
| Camp Rate (3 months) | NA | NA | $0 | $1,560 |
| Administration | NA | NA | $915 | $1,517 |
| TOTAL | $17,523 | $840 | $5,486 | $9,104 |

**WILDLIFE SERVICES**

| Project 8: Wilson Creek - White Rock, Mule Deer Predator/ Prey Project | | |
|---|---|---|
| BUDGET ITEM | FY03 | FY04 |
| | Actual | Actual |
| Administration | $0 | $0 |
| TOTAL | $0 | $0 |

**NEVADA DEPARTMENT OF WILDLIFE**

| Project 8: Wilson Creek - White Rock, Mule Deer Predator/ Prey Project | | |
|---|---|---|
| BUDGET ITEM | FY03 | FY04 |
| | Actual | Actual |
| Deer Capture and handling (30 animals @ $500/animal) | $15,000 | $0 |
| Radio Collars (30 collars @ $196.50/ collar) | $5,894 | $0 |
| Monitoring of animals (airplane, pilot, observer 6 hours/ month @ $300/hr for 6 months) | $9,400 | $3,551 |
| TOTAL | $30,294 | $3,551 |

**WILDLIFE SERVICES**

| Project 11: East Range Bighorn Sheep Pre-Augmentation Treatment/ Mule deer protection project | |
|---|---|
| BUDGET ITEM | FY04 |
| | Actual |
| Supplies | $149 |
| GSA Vehicle | $397 |
| | |

| Project 11: East Range Bighorn Sheep Pre-Augmentation Treatment/ Mule deer protection project | |
|---|---|
| Horse and Dog Hire | $423 |
| Administration | $193 |
| TOTAL | $1,162 |

**WILDLIFE SERVICES**

| Project 12: Tobin Range Bighorn Sheep Pre-Augmentation Treatment/ Mule deer protection project | |
|---|---|
| BUDGET ITEM | FY04 |
| | Actual |
| Supplies | $5,137 |
| GSA Vehicle | $1,192 |
| Horse and Dog Hire, Travel | $3,210 |
| Administration | $1,907 |
| TOTAL | $11,446 |

**WILDLIFE SERVICES**

| Project 13: Santa Rosa Range Bighorn Sheep Pre-Augmentation Treatment/ Mule deer protection project | |
|---|---|
| BUDGET ITEM | FY03 |
| | Projected |
| Supplies | $0 |
| Administration | $0 |
| | |

| Project 13: Santa Rosa Range Bighorn Sheep Pre-Augmentation Treatment/ Mule deer protection project | |
|---|---|
| TOTAL | NOT CONDUCTED |

**WILDLIFE SERVICES**

| Project 14: Wilson Creek - White Rock, Coyote Control to Enhance Mule Deer Fawn Production | | | | | |
|---|---|---|---|---|---|
| BUDGET ITEM | FY04 | FY05 | FY06 | FY07 | FY08 |
| | Actual | Projected | Projected | Projected | Projected |
| Wildlife Technician | $0 | $0 | | | |
| APHIS Vehicle | $0 | $0 | | | |
| Aerial Hunting | $8,145 | $10,500 | | | |
| Equipment (traps, Snares) | $0 | $450 | | | |
| Supplies | $0 | $0 | | | |
| Administration | $1,629 | $2,190 | | | |
| TOTAL | $9,774 | $13,140 | | | |

**NEVADA DEPARTMENT OF WILDLIFE**

| Project 14: Wilson Creek - White Rock, Coyote Control to Enhance Mule Deer Fawn Production | | | | | |
|---|---|---|---|---|---|
| BUDGET ITEM | FY04 | FY05 | FY06 | FY07 | FY08 |
| | Actual | Projected | Projected | Projected | Projected |
| Coyote ageing | $214 | $500 | | | |
| TOTAL | $214 | $500 | | | |

**WILDLIFE SERVICES**

| Project 15: Horse and Cattle Camp Loop, Schell Creek Range. Coyote Control to Enhance Mule Deer Fawn Production | | | | | |
|---|---|---|---|---|---|
| BUDGET ITEM | FY04 | FY05 | FY06 | FY07 | FY08 |
| | Actual | Projected | Projected | Projected | Projected |
| Wildlife Technician | $0 | $0 | | | |
| APHIS Vehicle | $0 | $0 | | | |
| Aerial Hunting | $5,235 | $7,500 | | | |
| Equipment (traps, Snares) | $0 | $500 | | | |
| Supplies | $0 | $0 | | | |
| Administration | $1,047 | $1,600 | | | |
| TOTAL | $6,282 | $9,600 | | | |

**NEVADA DEPARTMENT OF WILDLIFE**

| Project 15: Horse and Cattle Camp Loop, Schell Creek Range. Coyote Control to Enhance Mule Deer Fawn Production | | | | | |
|---|---|---|---|---|---|
| BUDGET ITEM | FY04 | FY05 | FY06 | FY07 | FY08 |
| | Projected | Projected | Projected | Projected | Projected |
| Coyote Ageing | $213 | $500 | | | |
| TOTAL | $213 | $500 | | | |

**WILDLIFE SERVICES**

| Project 16: Elko County Sage Grouse Project | | |
|---|---|---|
| BUDGET ITEM | FY04 | FY05 |
| | Actual | Projected |
| Wildlife Technician | $8,756 | $7,485 |
| Aphis Vehicle | $2,132 | $2,700 |
| Supplies | $211 | $680 |
| Administration | $2,220 | $2,173 |
| TOTAL | $13,319* | $13,038 |

*During FY 2004 this project was funded through outside sources as part of research for a P.hD. Research Project, with no cost to NDOW.

**WILDLIFE SERVICES**

| Project 17: Elko County Deer and Elk Project | | | | | |
|---|---|---|---|---|---|
| BUDGET ITEM | FY05 | FY06 | FY07 | FY08 | FY09 |
| | Projected | Projected | Projected | Projected | Projected |
| Wildlife Technicians<br>1 AD-5 (7 mos)<br>1 AD-5 (5 mos)<br>Lion Specialist | <br>$10,320<br>$7,224<br>$0 | | | | |
| GSA/ APHIS vehicle | $5,049 | | | | |
| Aerial Hunting | $12,000 | | | | |
| Dog/Horse Hire | $700 | | | | |
| Equipment | $1,200 | | | | |
| Supplies | $300 | | | | |
| Administration | $8,284 | | | | |
| TOTAL | $45,077 | | | | |

**WILDLIFE SERVICES**

| Project 18: Washoe County Deer Project | | | | | |
|---|---|---|---|---|---|

| Project 18: Washoe County Deer Project | | | | | |
|---|---|---|---|---|---|
| BUDGET ITEM | FY05 | FY06 | FY07 | FY08 | FY09 |
| | Projected | Projected | Projected | Projected | Projected |
| Wildlife Technician | $8,522 | | | | |
| Aphis Vehicle | $3,000 | | | | |
| Camp & ATV Hire | $900 | | | | |
| Aerial Hunting | $10,500 | | | | |
| Equipment | $800 | | | | |
| Supplies | $0 | | | | |
| Administration | $4,750 | | | | |
| TOTAL | $28,502 | | | | |

**NEVADA DEPARTMENT OF WILDLIFE**

| Proposal B: Washoe County Deer Project | |
|---|---|
| BUDGET ITEM | FY05 |
| | Projected |
| Deer Capture and handling (30 animals @ $600/animal) and associated costs. | $19,000 |
| Radio Tags (30 ear-tags @ $225.00/ collar) | $5,000 |
| Monitoring of animals (airplane, pilot, observer 6 hours/ flight @ $250/hr for 12 flights) | $16,000 |
| Fall Survey | $10,000 |
| TOTAL | $50,000 |

APPENDIX

# Predator Management Project Summary

| Project Segment | Description | Species Protected | Control Species | Status | Wildlife Specialist | 2003 | | 2004 | | 2005 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **Budget** | **Actual** | **Budget** | **Actual** | **Budget** | **Actual** |
| | Infrastructure | | | Active | | $190,325 | $187,044 | $180,794 | $163,761 | $182,077 | |
| 1 | Grassy Sage Grouse | Sage Grouse | Ravens | Completed | | $11,038 | $8,656 | $11,038 | $8,856 | | |
| 4 | Vya Pronghorn Production | Pronghorn | Coyotes, Bobcats | Completed | | $18,179 | $19,337 | $22,921 | $15,240 | | |
| 6a | Desert Bighorn Sheep Lincoln County | Desert Sheep | Mt. Lions | Active | Not Incl. | $840 | $840 | $6,528 | $5,486 | $9,104 | |
| 8 | Wilson Creek Range | Mule Deer | No Control | Completed | None | $44,400 | $30,294 | $18,000 | $3,551 | | |
| 11 | East Range Bighorn | Bighorn/ Deer | Mt. Lion | Completed | Included | | | $12,500 | $1,162 | | |
| 12 | Tobin Range Bighorn | Bighorn/ Deer | Mt. Lion | Completed | Included | | | | $11,446 | | |
| 13 | Santa Rosa Range | Bighorn/ Deer | Mt. Lion | Abandon | Included | | | $20,494 | $0 | | |
| 14 | Wilson Creek Range | Mule Deer | Coyote | Active | Not Incl. | | | $18,060 | $9,998 | $13,640 | |
| 15 | Horse/ Cattle Camp loop | Mule Deer | Coyote | Active | Not Incl. | | | $13,740 | $6,495 | $10,100 | |
| 16 | Elko County Sage Grouse | Sage Grouse | Ravens | Active | Included | | | $12,616 | $0 | $13,038 | |
| A | Elko County Deer & Elk | Mule Deer/ Elk | Mt. Lion, Coyote | New | Included | | | | | $45,766 | |
| B | Washoe County Deer | Mule Deer | Mt. Lion, Coyote | New | Included | | | | | $78,502 | |
| | | | | **Totals** | | $301,88 | $276,305 | | $316,691 | $225,995555 | $306,4 |