NEVADA
PREDATOR MANAGEMENT PLAN
FY 2006

PREPARED BY: RUSSELL WOOLSTENHULME
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NEVADA DEPARTMENT OF WILDLIFE

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Nevada Predator Management Plan
Fiscal Year 2006
July 1, 2005 - June 30, 2006

Summary

Six predator management projects were approved by the Board of Wildlife Commissioners on August 3, 2004. An overview of accomplishments of each is contained herein. Project 6a was a continuing effort begun in Fiscal Year (FY) 2001. Projects 14 through 16 were continuing efforts begun in FY 2004. Projects 17 and 18 were new projects beginning in FY 2005. The total project budget was $318,135.

The Board of Wildlife Commissioners considered project proposals for FY 2006 and took action on August 5, 2005 to continue with five of the existing projects. Projects 6a, 14, 15, 17 and 18 will be continued during FY 2006. Field work for project 16 was completed during FY 2005 and a final report will follow.

Three new projects were approved by the Board of Wildlife Commissioners for FY 2006 pending funding from alternate sources. The pending project include: Pending Project A: Predator Control to Protect Turkey Augmentations on Mason Valley Wildlife Management Area, Pending Project 6B: Protection of Desert Sheep: East Walker River and Pending Project C: Protection of Desert Bighorn Sheep: Excelsior Range. .

PROGRESS REPORTS FOR ONGOING PROJECTS

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

Project Description:

The Nevada Department of Wildlife (NDOW) 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 removed. 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 2001	FY 2002*	FY2003*	FY 2004*	FY 2005*	FY 2006*
Requested	$17,000	$840	$6,528	$6,528	$9,104	$9,104
Expended	$17,523	$840	$6,488	$5,486	$9,104	

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

Summary of Control Activities:

An adult male lion was removed from the project area on April 8, 2005. In FY 2002 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.

Species	2001	2002	2003	2004	2005	Total
Mountain Lion	0	1	0	0	1	2

Summary of Project Progress:

During Fiscal year 2005 the project area was expanded to include the Meadow Valley Mountains, North and South Pahroc Mountains, and the Hiko Mountains. This change was implemented to help facilitate the protection of bighorn sheep as they move from mountain range to mountain range. A survey conducted during September of 2004 classified a total of 65 bighorn sheep in the project area (Hiko, Pahroc and Delamar Ranges). The herd breakdown consisted of 15 rams, 32 ewes and 18 lambs. Twenty-six of the 65 observed bighorn sheep were in the Delamar Range.

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 indicates coyote predation on mule deer fawns can account for 50 - 77 percent of the total fawn mortality. 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 are 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 mandible of coyotes removed from the project area, and submits 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	$10,560		
Expended	$9,774	$12,186			

***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	$500	$500		
Expended	$214	$0			

Summary of Project Progress:

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 cannot 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 spring fawn/doe ratios
2005 population estimate 2200	2005 fawn/doe ratio 43/100
2004 population estimate 2100	2004 fawn/doe ratio 54/100
1999-2003 average 2100	1999-2003 average 46/100
1995-2004 average 2300	1995-2004 average 45/100
1985-1994 average 3000	1985-1994 average 48/100

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 0.61 pups/adult female. Coyote teeth for Fiscal Year 2005 are currently at the lab and will be available for next years report.

Deer composition surveys conducted during the spring of 2005 resulted in the classification of 884 deer. A total of 658 adults and 226 fawns were classified resulting in a ratio of 43 fawns/100 does.

Wildlife Damage Management activities on this project area are ongoing and the area is being provided with full-time mule deer protection efforts. WS conducted aerial and ground control activities in the unit. A total of 148 coyotes were removed by various methods from the entire Wilson Creek project.

Species	FY 04	FY 05	FY 06	FY 07	FY 08	Total
Coyote	138	148				

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 are 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	$8,640		
Expended	$6,282	$7,398			

***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	$500	$500		
Expended	$213	$0			

Summary of Project Progress:

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 cannot 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
2005 population estimate 4000	2005 fawn/doe ratio 35/100
2004 population estimate 4000	2004 fawn/doe ratio 45/100
1999-2003 average 4000	1999-2003 average 48/100
1995-2004 average 4600	1995-2004 average 43/100
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. Coyote teeth for Fiscal Year 2005 are currently at the lab and will be available for next years report.

Deer composition surveys conducted during the spring of 2005 resulted in the classification of 2002 deer. A total of 1,571 adults and 431 fawns were classified resulting in a ratio of 35 fawns/100 does.

WDM activities began in January 2005, when a full-time Wildlife Specialist was located on the unit in a camp trailer. WS conducted aerial and ground control activities on the project area. A total of 84 coyotes were removed from the Schell Creek Range with an emphasis on known mule deer fawning areas

Species	FY 04	FY 05	FY 06	FY 07	FY 08	Total
Coyote	71	84				

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 US Fish and Wildlife Service have 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 are 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*	$12,030

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	192	234

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 raven surveys during 2004 resulted in ravens/ 10 miles² as follows; March 8.0, April 2.5, May 6.0, June 1.0, and July 0.05. Surveys for ravens during 2005 resulted in the following: ravens/ 10 miles² March NA, April 7, May 4.3, and June 1.7.

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 Progress:

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 effect on nesting Sage grouse and other ground nesting upland game birds.

Table 1. 2004 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.

This five year project has been completed. The PhD student has completed protection efforts and has submitted research papers to peer reviewed scientific journals for publication. This project has had some real positive results for both sage grouse and sharp-tail grouse and in the next several months, there will be papers documenting the effects of raven removal aimed to protect sage grouse.

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.

Project 17: Elko County Deer and Elk Project

Project Description:

This projects primary goal is to provide protection to big game in the eastern half of Game Management Unit 101 to encourage greater production and recruitment and to affect 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 comparisons 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 a 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 are 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	$61,136			
Expended	$44,923				

Summary of Control Activities

The project was initiated in December 2004 with aerial hunting activities. In February 2005 a seasonal employee was hired to work the project on the ground providing ground crew for the aerial hunting operations, scouting for lions and implementing coyote control equipment.

The project removed a total of 416 coyotes and three mountain lions. Funding for the project was exhausted in July, however mountain lion work has continued to present. Two of the lions were removed form the Spruce Mountain area (GMU 105). No new lion sign has been seen on the mountain since warm-up, lion hunting in the East Humboldt's (GMU 101) has also been slow through the summer months. Lion work will continue throughout the summer. The use of a lion "call-box" has been implemented by the lion hunters to assist in locating and capturing lions.

Summary of Project Progress:

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 cannot 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. 2005 estimates are considered baseline, even though predator control work was conducted during the winter of 04-05. Effects of control work during the past winter will not begin to be realized until spring of 2006.

<u>101 group mule deer survey sample size</u>
2005 population estimate not available
2000-2004 average 1222
1995-2004 average 1620
1989-1994 average 2195

<u>101 group fawn/adult Ratios</u>
2005 fawn/adult ratio 43/100
1999-2004 average 33/100
1995-2004 average 33/100
1989-1994 average 31/100

<u>Area 10 elk population estimates</u>
2004 160
2003 170
2002 180
2001 180

<u>Area 10 calf/cow ratios</u>
2004 12/100
2003 26/100
2002 31/100
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 affect 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 comparisons 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, incidences of accidental trapping, and harvest have all 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, and 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 biologists 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.

Climatologically 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 depend 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	$33,859			
Expended	$20,511				

NDOW Budget Summary:

	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Requested	$50,000	$19,000	$0	$0	$0
Expended	$33,340		$0	$0	$0

Summary of Control Activities:

Wildlife Damage Management activities began in September 2004, when a full-time Wildlife Specialist initiated wildlife damage management work on the Washoe County Mule Deer Project from September 2004 until January 2005. The Wildlife Specialist then transferred work efforts to mule deer project 15. A seasonal Wildlife Specialist was hired in February to continue protection work around the spring mule deer fawning grounds. WS conducted aerial and ground control activities in the project area. Severe weather (fog) cancelled several scheduled aerial hunting flights this spring, but hopefully next year WS will have more favorable weather conditions. A total of 145 coyotes were removed by various methods from the entire Washoe County Mule Deer Project. Additionally two mountain lions were removed from the project area.

Summary of Project Progress:

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 cannot 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.

Mule deer surveys were flown in Game Management Unit (GMU) 014 and in surrounding GMUs 011, 012 and 013 during both late fall of 2004 and spring of 2005. Results of those surveys indicate that the spring 2005 fawn/doe ratio in area GMU 014 was 59/100, while the fawn/doe ratio for GMUs 011, 012 and 013 were 65/100.

Area 014 mule deer population estimates	Area 01 Fawn/doe Ratios
2005 population estimate 900	2005 014 fawn/doe ratio 59/100
2004 population estimate 850	2004 fawn/does ratio 59/100
2000-2004 average 925	1999-2004 average 40/100
1995-2004 average 900	1995-2004 average 42/100
1985-1994 average 1603	1985-1994 average 22/100

A mule deer capture was made in Game Management Unit 014 on December 14, 15 and 16, 2004. During this capture operation a total of 24 mule deer were radio tagged. The capture consisted of ten adult females, five adult males, four juvenile females and 4 juvenile males. Follow-up aerial surveys to determine status and location of radio-tagged deer were conducted on February 12, April 25 and July 8, 2005. Additionally ground surveys were conducted on March 11, March 29 and July1, 2005. As of the Last date of follow-up all radio-tagged deer had been accounted for and were alive. Movement and location data that has been collected will be used to better understand mule deer seasonal use and migration patterns. This information will help Wildlife Services personnel to better perform their work in the area as well as provide valuable information to the area game biologist. .

PROJECTS PENDING FUNDING

Pending Project A: Predator Control to Protect Turkey Augmentations on Mason Valley Wildlife Management Area

Project Description:

This project will provide protection to wild turkeys currently residing on Mason Valley Wildlife Management Area, and will serve as a pre-treatment to planned turkey augmentations to the area. The project will be conducted exclusively on the Mason Valley Wildlife Management Area.

Reason for Conducting the Project:

The wild turkey population in Mason Valley is experiencing a recent decline. An augmentation to the wild turkey population is scheduled for winter 2005-2006 to enhance the current population.

Services Provided by Wildlife Services:

Wildlife Services will design and implement the control project. WS will evaluate predator densities and determine where effective population management can be implemented.

Timing of Service:

December - January
This is a one year Project.

Geographic Area of Project:

Mason Valley Wildlife Management Area of Lyon County

Project Analysis:

The success of the control project will be evaluated by NDOW personnel through the analysis of annual brood counts. Success will be indicated by an increase in the production of wild turkey on Mason Valley Wildlife Management Area.

Wildlife Services Budget Summary:

	FY 2006
Requested	$16,223
Expended	

Pending Project 6B: Protection of Desert Sheep: East Walker River

Project Description:

The Nevada Department of Wildlife reintroduced 21 desert bighorn sheep into the East Walker River Canyon of the Pine Grove Range on October 28, 1993. A single ram was moved into the East Walker River area on October 27, 1994 to replace a radio-collared sheep that was mortality. An augmentation of 21 additional desert bighorn from the River Mountains was released in the East Walker River area on October 28, 1995. The herd maintained stability for a period of three to four years following the releases. Herd monitoring revealed some production. Survey data, incidental observations and other information indicate the herd began to fail around the period of 1997 to 1998. During the spring of 1996 a local Mason Valley rancher reported the sighting of six animals in the Wilson Canyon area. Ear tags on these animals were the same as those that were originally released along the East Walker, a distance of 26 miles to the south. Further reports indicate these animals took up residence in the Wilson Canyon area above the west fork of the Walker River.

As a result of several deaths and a declining population, a decision was made to attempt another augmentation and to provide predator control to assist the population in sustaining itself at a level where routine losses would not be detrimental to the herd.

An estimated 12 to 15 animals still existed in Unit 204 prior to the augmentation consisting of 22 desert bighorn sheep that occurred on October 30, 2001. These animals were captured in the Gabbs Valley Range on the 29th of October, 2001. This release complement contained 16 adult females, two yearling females, one female lamb and three yearling rams.

This control project is designed to help protect existing sheep from predation by mountain lions. Mountain lions are known predators of bighorn sheep. Two bighorn sheep losses have been documented since the last augmentation. The first was an adult ewe that turned out to be a lion kill within a week of release. It is possible this animal was weakened as a result of capture and transport. The second mortality was a radio-collared ewe. This mortality occurred around the first week of May, 2002.

Reason for Conducting the Project:

Two previous attempts to establish a population of desert bighorn have been unsuccessful as some sheep have emigrated outside of the release area and several sheep mortalities documented as lion kills have been observed at the site of previous sheep releases. Mountain lions are thought to be at least partially responsible for the poor success of the previous reintroduction attempts.

Services Provided by Wildlife Services:

Wildlife Services will control resident lions when they came in conflict with bighorn sheep. WS will periodically monitor the area during the winter months to evaluate if migratory lions have moved into the area. Lions that are found in proximity to bighorns will be controlled. Wildlife Services will provide dates, location and method of removal to NDOW for each lion removed.

Timing of Service:

September – August (5 months of work)
This project is scheduled for two years.

Geographic Area of Project:

East Walker River area of Lyon and Mineral Counties.

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:

East Walker	FY 2002	FY 2003*	FY 2004	FY 2005	FY 2006	FY 2007
Requested	$17,000	$840	Discontinued	No Action	$5,760	
Expended	$16,227	$840				

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

Summary of Control Activities:

A Wildlife Services employee began conducting lion control on October 18, 2001, in the Pine Grove/East Walker bighorn area. During the pre-treatment period the lion hunter was successful in the removal of two resident lions in the release/predator treatment area. A large male lion was harvested along the river between Raccoon Beach and Grant Hot Springs on October 18, 2001. On the 25th of October, 2001, an adult female lion was removed from an area to the south and west of Zanis' cabin.

Two more lions were removed after the augmentation of October 30, 2001. Wildlife Services snared a large male lion on December 17, 2001. A fourth lion was removed on May 6, 2002. This was a 10 year-old male lion. Wildlife Services Personnel felt that this is was same lion that had been in and out of the control area of the East Walker predator control project.

No lion activity was reported within the unit for some time until Wildlife Services personnel located a yearling ram that was an apparent lion kill during November of 2002.

In February 2003, two adult mountain lions, a male and a female, were removed from this unit. These lions were in the 3-4 year age-class. In June 2003, an adult 3 year old male mountain lion was removed from the protection unit.

Species	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	Total
Mountain Lion	4	3	No Action	No Action			7

Summary of Project Outcome:

On July 1, 2002, a telemetry flight was conducted in an attempt to find collared bighorn sheep in the East Walker and Pine Grove area. Five ewes with five lambs were sighted on the north facing slope of a large hill between Raccoon Beach and Grant's Hot Spring. The sheep were found in three groups. The first was a single ewe and lamb. A second group consisted of three ewes and three lambs. The last pair spotted was a single ewe and lamb, and surveyors could not tell if this ewe had ear tags.

A sheep survey was conducted in this area in August 2003. Additionally, several incidental sightings were made during the year by both NDOW and Wildlife Services employees. Survey efforts resulted in the sighting of 17 bighorn sheep being sighted several times within the project area including 11 ewes, 3 lambs, 2 young rams and an older ram; this helps document the fact that the sheep are reproducing within the area.

An aerial survey was conducted in this area in September 2004. A total of 24 bighorn sheep were classified, including 6 rams, 11 ewes and 7 lambs. This population is below carrying capacity and still below viable population numbers.

Project 6B was not funded for Fiscal Years 2004 and 2005. Biologists feel that a two year follow-up project would help protect increasing herds in this area.

Pending Project C: Protection of Desert Bighorn Sheep: Excelsior Range

Project Description:

The Nevada Division of Wildlife re-introduced desert bighorn sheep into the Excelsior Range with a release of 14 animals in 1986. The bighorn population had experienced moderate growth until about 2001; the population has been declining since that time. Water availability within the Excelsior Range is very limited. A water development constructed in open terrain within the Excelsior Range has become dysfunctional, leaving only natural springs located in steep willow choked canyons for the bighorns to use. During the fall of 2003, 10 mature rams were found dead in and around Mofo and Sponge Springs. It was determined from the remains that the sheep were killed by a lion. The limited water in the Excelsior Mountain Range has enabled the lions a great opportunity to take desert bighorn sheep easily.

Aerial surveys were conducted in September 2004, resulting in the classification of 40 bighorn sheep. That classification included 14 rams, 17 ewes and 9 lambs. The population trend in this are is static. Production has been at or below maintenance levels for the past five years. The herd is below carrying capacity and older age class rams are seemingly absent from the population. This project is designed to protect the existing population of desert sheep in the Excelsior Range.

Reason for Conducting the Project:

Mountain lions are known predators of bighorn sheep. The Excelsior Range has a history of lion predation on bighorn sheep. During the fall of 2003, 10 mature rams were found dead in and around Mofo and Sponge Springs. It was determined from the remains that the sheep were killed by a lion.

Services Provided by Wildlife Services:

Wildlife Services will attempt to control resident lions if they are in conflict with bighorn sheep. Wildlife Services will provide dates, location and method of removal to NDOW for each lion removed.

Timing of Service:

September-March
This project is scheduled for two years.

Geographic Area of Project:

Excelsior Range in Mineral County. Specific areas of control include Mofo and Sponge springs and Silver Dyke canyon.

Project Analysis:

Analysis of the effects of mountain lion control on the density of desert bighorn sheep will be through monitoring 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 2006	FY 2007
Requested	$5,280	
Expended		

FINALIZED PROJECT REPORTS

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 affect on sage grouse recruitment. This project ended with the 2004 breeding season.

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 ∃ 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 designed and implemented the raven control project. Wildlife Services placed baits in the field and monitored baits during the project duration. Wildlife Services provided Nevada Department of Wildlife (NDOW) with Global Positioning System (GPS) coordinates for the locations of the treated areas. Wildlife Services provided licensed applicators. Raven densities were monitored during the project duration using standard survey methods. Wildlife Services conducted post-treatment analysis of the effectiveness of the control project. Reports of all surveys conducted were provided by Wildlife Services to NDOW.

Timing of Service:

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 04 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	323	1,326
Totals	452	258	194	214	323	1,436

During the 2004 season Wildlife Services conducted raven surveys within the project area during the months of March through June. 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 4.6, April 3.6, May 4.3, and June 5.6. 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 were 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.

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 were 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 were 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.

A special hunt was conducted during the fall of 2004 on the project area. An insufficient sample size was collected during this hunt. With no adequate sample size the no data on nesting success or chick/hen ratios could be tabulated.

Results and discussion:

The results of this study indicate that ravens may 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 during the years when data was or could be collected. However, of the five years this project was operational, only two years of usable data were available.

During the first year of the project a communication error resulted in several key sage grouse predators being removed rather than just ravens. This was problematic due to the fact that with several species being removed from the project area there was no way to isolate which if any had an effect on sage grouse nesting success. The second year of the project no nest success data was collected, rendering that years results non-existent. The third and fourth years resulted in the data presented above and show significant increases in the nesting success of sage grouse under a raven control program on this unit. The final year resulted in an inadequate sample size so that collected data was unusable.

The recruitment of new grouse into the population was not a factor of this study. No action was taken to have any effect on sage grouse survival beyond hatching. The intent was to determine if ravens affected 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 were tracked to help aid in determining recruitment rates. The data from this project neither confirms nor refutes the possibility that raven control can effect recruitment into the population.

This project should serve as one piece of a very large and complex puzzle on the perpetuation of sage grouse in the west. This project demonstrated that nest success can be increased but without the addition of other management efforts (e.g., habitat restoration, predator control after hatch) sage grouse population are unlikely to respond with significant increases.

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 newborn 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 designed and implemented the control project. WS evaluated 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	93	92	410
Mountain Lion	0	0	0	1	0	1
Totals	35	101	89	93	92	411

During the 2004 season, scent-post station surveys were conducted by Wildlife Services during the months of March through June. 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 0.08, April 0.06, May 0.05, and June 0.03. These results indicate that coyote densities within the unit were suppressed during the critical fawning period.

Summary of Project Outcome:

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	2004	20 yr Average	Long-Term Average	Short-term Average
011	Treatment	20	23	54	36	60	63	30.4	107.2%	5%
033	Control	25	37	73	36	41	48	29.4	63.5%	17.1%

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.

During the analysis of this project it was feared by area biologists managing the North Washoe County area that precipitation could be a confounding issue in this study. Based from that fear the precipitation was added as a factor of consideration in determining effect of predator removal on Game Management Unit (GMU) 011. Further, biologists felt that because of differing precipitation patterns in northern Washoe County, GMU 033 (Sheldon NWR) may not be the best area to use as a control area.

To help alleviate any potential biological noise, additional north Washoe County GMUs were added to the analysis of this project. The results of this project will therefore compare fawn production on GMU 011 which received a treatment of predator removal and GMUs 013, 014 and 033. All of which will be viewed as control areas which did not receive a treatment. All three control areas are adjacent to and are similar to, in habitat and topographic features, GMU 011.

A one-way analysis of variance (ANOVA), a statistical method for making simultaneous comparisons between two or more means, was conducted comparing each of the areas with precipitation as a covariate. This test helped determine if precipitation differed between the four GMUs during the time period of the predator control. Results indicate that precipitation did not differ between areas either before or during the project years (2000-2004). ($F=0.37$, $Pr>F=0.8248$).

A mixed model ANOVA was used to analyze fawn production numbers comparing fawn production prior to and during the treatment period (2000-2004). The analysis indicates that control of predators increased the fawn to doe ratio on the control area ($F=12.13$, $Pr>F=0.001$). This analysis used precipitation as a covariate to help eliminate the possibility that annual precipitation could be responsible for any differences. The test ruled out precipitation as a significant factor.

Project Budget Detail

WILDLIFE SERVICES

Infrastructure Needs							
Personnel	Salary & Benefits	Per diem	Vehicle	D/T Hire	Supplies	Administration	Total
GS-11 (6 mos.)	$44,740	$800	$6,000	$0	$400	$10,388	$32,328
AD-6 (12 mos.)	$42,371	$3,000	$10,346	$0	$500	$11,243	$67,460
AD-6 (12 mos.)	$40,653	$4,400	$10,346	$0	$500	$11,180	$67,079
Total	$127,764	$8,200	$26,692	$0	$1,400	$32,811	$196,867

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 6a: Protection of Desert Bighorn Sheep: Lincoln County					
BUDGET ITEM	FY02	FY03	FY04	FY05	FY06
	Actual	Actual	Actual	Actual	Projected
Mountain Lion Specialist - AD-6	NA	NA	$0	$0	$0
GSA Vehicle (3 months)	NA	NA	$1,599	$1,987	$1,987
Camp Trailer ($100/ month)	NA	NA	$0	$0	$0
Horse and Dog Hire (3 months)	NA	NA	$2,972	$1,860	$1,860
Equipment and Snares	NA	NA	$0	$2,180	$2,180
Camp Rate (3 months)	NA	NA	$0	$1,560	$1,560
Administration	NA	NA	$915	$1,517	$1,517
TOTAL	$17,523	$840	$5,486	$9,104	$9,104

WILDLIFE SERVICES

Project 14: Wilson Creek - White Rock, Coyote Control to Enhance Mule Deer Fawn Production					
BUDGET ITEM	FY04	FY05	FY06	FY07	FY08
	Actual	Actual	Projected	Projected	Projected
Wildlife Technician	$0				
APHIS Vehicle	$0				
Aerial Hunting	$8,145				
Equipment (traps, Snares)	$0				
Supplies	$0				
Administration	$1,629				
TOTAL	$9,774	$12,186	$10,560		

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	Actual	Projected	Projected	Projected
Coyote ageing	$214	$500	$500		
TOTAL	$214	$0			

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	Actual	Projected	Projected	Projected
Wildlife Technician	$0				
APHIS Vehicle	$0				
Aerial Hunting	$5,235				
Equipment (traps, Snares)	$0				
Supplies	$0				
Administration	$1,047				
TOTAL	$6,282	$7,398	$8,640		

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	$500		
TOTAL	$213	$0			

WILDLIFE SERVICES

Project 16: Elko County Sage Grouse Project		
BUDGET ITEM	FY04	FY05
	Actual	Actual
Wildlife Technician	$8,756	
Aphis Vehicle	$2,132	
Supplies	$211	
Administration	$2,220	
TOTAL	$13,319*	$12,030

*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
	Actual	Projected	Projected	Projected	Projected
Wildlife Technicians 1 AD-5 (7 mos) 1 AD-5 (5 mos) Lion Specialist					
GSA/ APHIS vehicle					
Aerial Hunting					
Dog/Horse Hire					
Equipment					
Supplies					
Administration					
TOTAL	$44,923	$61,136			

WILDLIFE SERVICES

Project 18: Washoe County Deer Project					
BUDGET ITEM	FY05	FY06	FY07	FY08	FY09
	Actual	Projected	Projected	Projected	Projected
Wildlife Technician					
Aphis Vehicle					
Camp & ATV Hire					
Aerial Hunting					
Equipment					
Supplies					
Administration					
TOTAL	$20,511	$33,859			

NEVADA DEPARTMENT OF WILDLIFE

Project 18: Washoe County Deer Project		
BUDGET ITEM	FY05	FY06
	Actual	Projected
Deer Capture and handling (30 animals @ $600/animal) and associated costs.	$16,667	$0
Radio Tags (30 ear-tags @ $225.00/ collar)	$4,880	$0
Monitoring of animals (airplane, pilot, observer)	$11,793	$9000
Fall Survey	$	$10,000
TOTAL	$33,851	$19,000

WILDLIFE SERVICES

Pending Project A: Predator Control to Protect Turkey Augmentations on Mason Valley WMA		
BUDGET ITEM	FY06	FY07
	Projected	Projected
Wildlife Technician		
Aphis Vehicle		
Supplies		
Administration		
TOTAL	$14,201	

WILDLIFE SERVICES

Pending Project B: Protection of Desert Sheep: East Walker River		
BUDGET ITEM	FY06	FY07
	Projected	Projected
Wildlife Technician		
Aphis Vehicle		
Supplies		
Administration		
TOTAL	$5,760	

WILDLIFE SERVICES

Pending Project C: Protection of Desert Bighorn Sheep: Excelsior Range		
BUDGET ITEM	FY06	FY07
	Projected	Projected
Wildlife Technician		
Aphis Vehicle		
Supplies		
Administration		
TOTAL	$5,280	

APPENDIX

Predator Management Project Summary

Project Segment	Description	Species Protected	Control Species	Status	Wildlife Specialist	2004		2005		2006	
						Budget	Actual	Budget	Actual	Budget	Actual
	Infrastructure			Active		$180,794	$163,791	$182,077	$178,643	$196,897	
6a	Desert bighorn sheep Lincoln County	Desert sheep	Mt. lion	Active	Not incl.	$6,528	$5,486	$9,104	$9,104	$9,104	
14	Wilson Creek Range	Mule Deer	Coyote	Active	Not incl.	$18,060	$9,998	$13,640	$12,186	$11,060	
15	Horse/Cattle Camp Loop	Mule Deer	Coyote	Active	Not Incl.	$13,740	$6,495	$10,100	$7,398	$9,140	
16	Elko County Sage Grouse	Sage Grouse	Ravens	Complete		$12,616	$0	$13,038	$12,030		
17	Elko County Deer & Elk	Deer/Elk	Mt. lion/ coyote	Active	Included			$45,766	$44,923	$61,136	
18	Washoe County Deer	Mule Deer	Mt. lion/ coyote	Active	Included			$78,502	$53,851	$52,859	
Pending Projects											
Project A	Mason Valley Turkey	Turkey	Coyote	Proposed						$16,223	
Project 6B	Walker River Sheep	Bighorn sheep	Mt. Lion	Proposed						$5,760	
Project C	Excelsior Range Sheep	Bighorn sheep	Mt. Lion	Proposed						$5,280	
					Totals			$352,227	$318,135	$367,459	