FINAL

ENVIRONMENTAL ASSESSMENT

PREDATOR DAMAGE MANAGEMENT IN NEVADA

Prepared by:

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES

In Cooperation With:

NEVADA DEPARTMENT OF AGRICULTURE
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ACRONYMS USED

ACEC	Areas of Critical Environmental Concern
ADC	Animal Damage Control
APHIS	Animal and Plant Health Inspection Service
AWP	Annual Work Plan
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Codes of Federal Regulations
CY	Calendar Year
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
FY	Fiscal Year
HSUS	The Humane Society of the United States
HY	Harvest Year
IWDM	Integrated Wildlife Damage Management
LPC	Livestock Protection Collar
LRMP	Land and Resource Management Plan
MIS	Management Information System
MOU	Memorandum of Understanding
NAC	Nevada Administrative Codes
NASS	National Agriculture Statistics Service
NDOA	Nevada Department of Agriculture
NDOW	Nevada Department of Wildlife
NDRP	Nevada Division of Resource Protection
NEPA	National Environmental Policy Act
NF	National Forest
NHPA	National Historical Preservation Act
NRS	Nevada Revised Statutes
NWSP	Nevada Wildlife Services Program
PDM	Predator Damage Management
RMP	Resource Management Plan
SDA	Specially Designated Area
SMA	Special Management Area
SOP	Standard Operating Procedures
T&E	Threatened and Endangered
USC	U.S. Codes
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WA	Wilderness Area
WS	Wildlife Services
WSA	Wilderness Study Area

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

Across the United States, wildlife habitat has substantially changed as human populations have expanded and land has been transformed to meet varying human needs. These changes often compete with or attract wildlife and have inherently increased the potential for conflicts between wildlife and people. Some species of wildlife, in particular, have adapted to and thrive in the presence of humans and the changes that have been made. These somewhat symbiotic species are often responsible for the majority of conflicting activities between humans and wildlife. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Animal Damage Control (ADC) Final Environmental Impact Statement (FEIS) summarized the relationship in American culture of wildlife values and wildlife damage in this way (USDA 1997, revised):

> *"Wildlife has either positive or negative values, depending on varying human perspectives and circumstances. Wildlife generally is regarded as providing economic, recreational and aesthetic benefits and the mere knowledge that wildlife exists is a positive benefit to many people. However, the activities of some wildlife may result in economic losses to agriculture and damage to property. Sensitivity to varying perspectives and values is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural, and economic considerations as well."*

USDA is authorized to protect American agriculture and other resources from damage associated with wildlife. This function is carried out by the USDA, APHIS, Wildlife Services (WS) program. WS is authorized and directed to resolve conflicts involving animals preying on, or harassing, livestock and wildlife, damaging property or threatening human health and safety. The primary statutory authority for the APHIS-WS program is the Act of March 2, 1931, as amended (7 U.S.C. 426-426c). WS activities are conducted in cooperation with other federal, State, and local agencies, as well as private organizations and individuals. WS supervises the Nevada Division of Resource Protection (NDRP), which is a division of the Nevada Department of Agriculture (NDOA). The two entities form the Nevada Wildlife Services Program (NWSP).

This Environmental Assessment (EA) evaluates a portion of NWSP's responsibility to protect resources. Specifically, this EA addresses predator damage management (PDM) to resolve conflicts with predators throughout Nevada. Predators in Nevada include a range of species that prey on livestock and wildlife, damage property and other resources, and threaten human health and safety. Those that create the majority of conflicts are coyotes (*Canis latrans*), common ravens (*Corvus corax*), mountain lions (*Felis concolor*), striped skunks (*Mephitis mephitis)*, feral/free roaming dogs (*C. familiaris*), bobcats (*Lynx rufus*), raccoons (*Procyon lotor*), and badgers (*Taxidea taxus*). Most other predators in Nevada have historically caused only localized damage on an occasional basis and include black bears (*Ursus americanus*), feral/free roaming cats (*F. domesticus*), minks (*Mustela vison*), long-tailed weasels (*M. frenata*), short-tailed weasels (*M. rixosa*), spotted skunks (*Spilogale putorius*), gray fox *(Urocyon cinereoargentus*), red fox (*Vulpes vulpes*), kit fox (*V. macrotis*), and ringtails (*Bassariscus astutus*).

With the exception of feral dogs, feral cats, and common ravens, the above species are managed by the Nevada Department of Wildlife (NDOW). Under a Memorandum of Understanding (MOU) with NDOW, NWSP has primary responsibility to respond to complaints involving coyotes, mountain lions, bobcats, skunks, weasels, badgers, raccoons, and ringtails and NDOW has primary responsibility for responding to complaints involving foxes, minks, and black bears. NDOW can request assistance from NWSP for any species under their primary responsibility, but they are the lead agency at all times. NDOW often requests assistance from NWSP for responding to black bear depredation complaints. Feral dogs and cats are managed under the authority of county and municipal laws and NWSP responds to complaints involving feral dogs or cats only at the request of the County Sheriff or Health Department. Common ravens, as with all migratory birds, are managed by the U.S. Fish and Wildlife Service (USFWS). Under an MOU with USFWS, WS has the responsibility of responding to migratory bird depredation complaints and provides USFWS with reports on activities involving ravens.

NWSP refers all complaints received for river otters (*Lutra canadensis*) and marten (*Martes caurina*), the only other mammalian predators in Nevada, to NDOW. NWSP also responds to requests involving predatory birds such as raptors, but mostly through technical assistance. These species will be considered in other NEPA documentation pursuant to this EA, should the need arise.

The Nevada Wildlife Services Program

WS PDM is conducted in cooperation with other federal, State, and local agencies, as well as private organizations and individuals. WS cooperates with livestock associations and supervises NDRP, a division of NDOA. These two entities, WS and NDRP form the NWSP. NWSP has been conducting PDM in Nevada for over eighty years, and has changed PDM activities and methods to reflect societal values and minimize impacts on people, wildlife, and the environment.

WS' mission, developed through a strategic planning process, is to provide federal leadership in wildlife damage management for the protection of America's agricultural, industrial and natural resources, and to safeguard public health and safety. This is accomplished through:

A) training of wildlife damage management professionals;
B) development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
C) collection, evaluation, and dissemination of management information;
D) cooperative wildlife damage management programs;
E) informing and educating the public on how to reduce wildlife damage; and
F) providing technical advice and a source for limited-use management materials and equipment such as pesticides, cage traps, and pyrotechnics.

WS' Policy Manual[1] reflects the mission and provides guidance for engaging in wildlife damage control activities. NWSP personnel abide by the WS mission and policies. Before wildlife damage management is conducted, an *Agreement for Control* must be signed by NWSP and the land owner or manager, or a *WS Annual Work Plan* (*AWP*) must be presented to the land management administrator or agency representative for their review. NWSP cooperates with land and wildlife management agencies; when appropriate and as requested, to combine efforts to effectively and efficiently resolve wildlife damage

1 WS Policy Manual Provides guidance for NWSP personnel to conduct wildlife damage management activities through Directives. WS Directives referenced in this EA can be found online at http://www.aphis.usda.gov/wildlife_damage/ws_directives.shtml.

problems in compliance with all applicable federal, State, and local laws and MOUs between NWSP and other agencies. At the State level, NWSP has current MOUs with NDOW and NDOA that specify roles and functions. The MOU with NDOW specifically addresses which agency is responsible for the different species causing damage. National level MOUs were signed between WS and BLM in 1995, and between WS and USFS in 2004. These MOUs transferred the responsibilities for wildlife damage management and related compliance with NEPA from BLM and USFS to WS.

Purpose

This EA analyzes PDM for the protection of livestock, crops, property, human health and safety, and natural resources in Nevada. Normally, according to the APHIS procedures for implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions are categorically excluded (7 CFR 372.5(c). However, an EA was prepared in this case to facilitate planning, interagency coordination, and the streamlining of program management, and to clearly communicate with the public the analysis of cumulative impacts.

Nevada encompasses 110,540 square miles and is comprised of 17 counties: Carson City, Churchill, Clark, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Pershing, Storey, Washoe, and White Pine. NWSP personnel receive requests to conduct PDM throughout the various counties on private, federal, State, tribal, county, and municipal lands. As of September 30, 2009 cooperative agreements (active and inactive) were in place on approximately 22.5 million acres, about 32% of the State's total acreage (USDA 2010a). NWSP typically does not conduct management activities on every property under agreement each year nor does the program work continuously throughout the year on most of the properties under agreement. For example, NWSP conducted PDM on properties totaling approximately 21.5 million acres in FY 09 (federal fiscal year 2009 = Oct. 1, 2008 Sept. 30, 2009) where target predators were taken representing only 30% of the lands in Nevada (USDA 2010a). NWSP typically spends only a few hours or days on any specific property during the year resolving damage problems. NWSP usually conducts PDM on an average of less than 6.8 million acres per month (USDA 2010a) which is only about 10% of the land area in Nevada. The majority of property under agreement for PDM is under grazing lease from the Bureau of Land Management (BLM) or privately owned. As of September 30, 2009, NWSP had agreements for conducting PDM on over 19.6 million acres of BLM lands, 2.2 million acres of private lands, .6 million acres of USFS lands, and .1 million acres of other public lands.

1.1 NEED FOR ACTION

1.1.1 Summary of Proposed Action

The proposed action is a continuation of the current NWSP PDM activities in Nevada for the protection of livestock, crops, property, human health and safety, and natural resources, with a greater emphasis on protection of game species including sage-grouse (*Centrocercus urophasianus*), Rocky mountain bighorn sheep (*Ovis canadensis canadensis*), California bighorn sheep (*O. canadensis*), Desert bighorn sheep (*O. canadensis nelsoni*) pronghorn antelope (*Antilocapra Americana)*, Rocky mountain elk (*Cervus elaphus nelsoni*) and mule deer (*Odocoileus hemionus*).

The objective of PDM as conducted in the proposed action is to minimize loss or the risk of loss to the above resource categories from predation by responding to all public requests with technical assistance (advice or demonstrations) or direct control. NWSP employees will provide technical assistance to resource owners covering a variety of methods that can be used to resolve problems and where it is appropriate for the resource owners to resolve the problem themselves. NWSP will

also assist resource owners through educational programs on damage identification, prevention, and control, and by providing information on sources of supply for PDM activities such as pyrotechnics and propane cannons or by temporarily loaning some supplies such as cage traps.

Direct control support will mostly be provided for situations that require the use of methods and techniques that are difficult or dangerous for the public to implement, especially those that involve lethal control measures. Direct control efforts often require costly expenditures for supplies and staff hours and, therefore, are most often provided where cooperative funding is available. Resource owners that are afforded direct control assistance will be encouraged to use additional management strategies and sound husbandry practices, when and where appropriate, to further reduce conflict situations.

Under the proposed action, Integrated Wildlife Damage Management (IWDM) will be implemented which encourages the use of all available legal techniques and methods, used singly or in combination, to meet the needs of the requestors for resolving conflicts with predation. Most wildlife damage situations require professional expertise, an organized control effort, and the use of up to several of the available control methods to sufficiently resolve them. Using IWDM effectively is the task of NWSP personnel who are trained professionals and equipped to handle damage situations. The resource, species, location, type of damage, and the available biologically sound, cost-efficient and legal methods will be analyzed by NWSP personnel to determine the action taken to correct a conflict with predation.

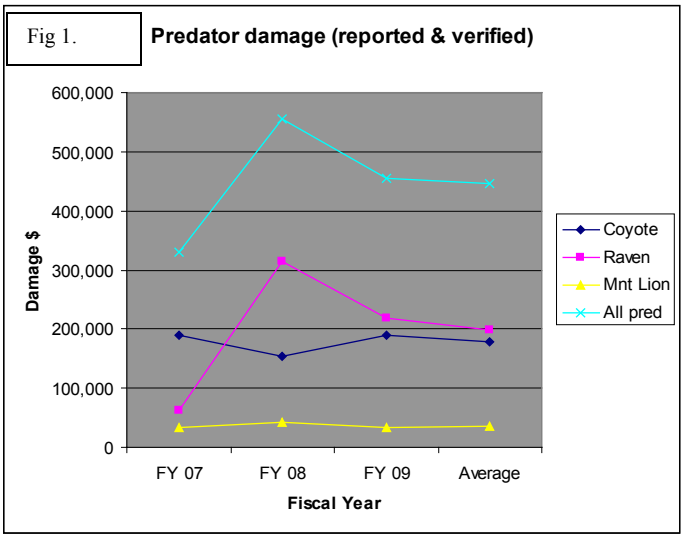
The proposed action will allow the use of all legal methods. A wide range of methods are available for resource owners and NWSP personnel. These fall into different categories including: cultural practices (ie. shed lambing and guard animals); habitat and behavior modification (ie. exclusion, chemical repellents, and hazing with pyrotechnics); and direct control (ie. traps, shooting, and toxicants). Direct control methods used by NWSP personnel may include shooting, calling and shooting, aerial hunting, trapping, snaring, M-44s, denning, gas cartridges, and decoy and tracking dogs. The direct control techniques are primarily used lethally.

PDM will be allowed in Nevada under the proposed action when and where requested on private and nonprivate lands where signed *Agreements for Control* or the appropriate *AWPs* are in place. All PDM will comply with applicable federal, State, and local laws and current MOUs between NWSP and the various management agencies. NWSP personnel will communicate with other agency personnel as appropriate and necessary.

Requests for the protection of game species would come from NDOW. NDOW bases its decisions for when and where predation management should occur on management plans for mule deer (NDOW 2004a), bighorn sheep (NDOW 2001), elk (NDOW 1997), sage-grouse (NDOW 2004b), and pronghorn antelope (NDOW 1983) accordingly. NDOW also considers new information including information regarding predation (NDOW 2010d), game species population status (NDOW 2009 and 2010b), and disease factors (NDOW 2010d) before requesting assistance with predation damage management.

The Nevada Wildlife Services Program provides technical assistance in the form of advice, education, and information on how to alleviate damage to: agriculture, property (including pets), human health and safety, and natural resources caused by a variety of predators. Calls numbered 855 in FY 06, 855 in FY 07, 1,127 in FY 08 and 1,101 in FY 09. Damages involved a variety of predators including coyotes, raccoons, mountain lions and striped skunks, particularly in the urban environs (USDA 2010a).

The magnitude of predator damage problems is also reflected in the value of losses reported to or verified by WS. However, in some instances one damage complaint can represent substantial losses such as the loss of high-value breeding stock. Figure 1 gives the value of reported/verified damage for coyotes, ravens, and mountain lions, and the combined value of reported/verified damage for all predators in Nevada from FY07 to FY09. Damage for coyotes has remained fairly stable from FY07 to FY09. Damage from ravens has increased from FY07 to FY09, with a fairly substantial peak in FY08. Confirmed and reported mountain lion damage has remained fairly consistent from FY07 to FY09. The WS data tracking system (MIS) primarily reflects agriculture related losses and has not been well suited to accurately reflect monetary losses for human health and safety or natural resource loss incidents. However, improvements are being made which should be reflected in future reports. Requests for assistance involving mountain lion depredation on horses, pets and wildlife, and threats to human health and safety have increased. Predation on pets and wildlife and threats to human health and safety are reported without estimates for economic cost. These types of incidents often have associated costs which can be substantial. For example, one way to estimate the value the public places on wildlife is to consider what individuals are willing to pay for auctioned hunting permits (Sielecki 2000). A permit for bighorn sheep hunting in Oregon that is available at an annual auction has sold for as high as $110,000 (Associated Press 2004). A permit for a desert bighorn sheep in Nevada has sold at auction for as high as $135,000 (NDOW 2010e). Auctions for desert bighorn sheep permits in Utah start at 30,000 (Utah Administrative Code Rule R657-47). Funds from the auctioned permits go to aid in bighorn sheep management and restoration efforts. For FY07-FY09 combined total value for damage caused by all predators mostly reflects coyote and raven damage as they were responsible for an average of 84% of the damage caused by all predators combined.



1.1.2 Need for Predator Damage Management for Protection of Livestock

Contribution of Livestock to the Nevada Economy. In 2007, agriculture generated over $513 million in annual sales from farm and ranch commodities in Nevada (NASS 2008). Of this, livestock production, primarily cattle, sheep, hogs, and poultry, accounted for about 57% of total farm commodity cash receipts and is, therefore, considered a primary agricultural industry sector in the State. In 2007, the total cash value from sales of all livestock products was about $294 million in Nevada (NASS 2008). Cattle and sheep production contributes substantially to local economies as range livestock production is the leading agriculture industry in Nevada. Production values for Nevada in 2008 were $156,294,000 for cattle and calves providing $187,950,000 gross income and $2,156,000 for sheep and lambs providing $3,877,000 gross income (NDOA 2009). However, the declining number of AUMs (animal unit months) allotted on BLM and USFS lands has had a negative impact on livestock production in Nevada and is equated to a 12.3 million dollar negative economic effect annually (Pearce et al. 1999). In 2008, Nevada livestock inventories included 450,000 cattle and calves, 70,000 sheep and lambs, and 3,500 swine (NDOA 2009). In addition, poultry, rabbits, goats, ratites, and exotic livestock are produced in Nevada, but at lower levels.

Predation of Livestock. Predators are responsible for the depredation of a wide variety of livestock including cattle, goats, sheep, swine, exotic pen-raised game, other hoofed-stock, and poultry. Depredation is defined as the killing, harassment, or injury of livestock resulting in monetary losses to the owner. Cattle and calves are vulnerable to predation, especially at calving (NASS 1992, 1996). Sheep, goats, and poultry are highly susceptible to year-round predation (Henne 1975, Nass 1977, 1980, NASS 1991, Tigner and Larson 1977, O'Gara et al. 1983). Livestock losses cause economic hardships to their owners and without effective PDM to protect them, predation losses and, hence, economic impacts are higher (Nass 1977, 1980, Howard and Shaw 1978, Howard and Booth 1981, O'Gara et al. 1983). Not all producers suffer losses to predators, but for those who do, those losses can be devastating (Baker et al. 2008).

Of the predators that affect livestock, coyotes inflict highest predation rates. In a study of sheep predation on rangelands in Utah, coyotes accounted for 67% of depredated lambs, followed by cougar predation at 31% and black bear predation at 2 percent (Palmer et al. 2010). Palmer et al. (2010) replicated a study from the 1970's to determine how predation rates on sheep may have changed over time. Overall, fewer lambs were lost to all causes than during the 1970's (5.8% compared with 9.5%, respectively), but the proportion of losses to predators did not change substantially. Predators were responsible for 87 % of the current total lamb losses compared with 83% in the 1970s. Coyotes accounted for 93% of all predator-killed lambs and ewes on nine sheep bands in shed lambing operations in southern Idaho and 25% of these kills were not fed upon (Nass 1977). Coyotes were also the predominant predator on sheep throughout a Wyoming study and essentially the only predator in winter (Tigner and Larson 1977).

Connolly (1992) determined that only a fraction of the total predation attributable to coyotes is reported to or confirmed by WS. He also stated that based on scientific studies and recent livestock loss surveys from the National Agriculture Statistics Service (NASS), WS only confirms about 19% of the total adult sheep and 23% of the lambs actually killed by predators. NWSP Specialists do not attempt to locate every livestock kill reported by ranchers, but rather make attempts to verify sufficient losses to determine if a predation problem exists that requires PDM actions. Therefore, NWSP's loss reports do not actually reflect the total number of livestock lost.

Although it is impossible to accurately determine the amount of livestock PDM saves from predation, it can be estimated. Scientific studies have revealed that in areas without some level of PDM, losses of adult sheep and lambs to predators can be as high as 8.4% and 29.3% of the total number of head (Henne 1975, Munoz 1977, O'Gara et al. 1983). Conversely, other studies have indicated that sheep and lamb losses are significantly lower where PDM is applied (Nass 1977, Tigner and Larson 1977, Howard and Shaw 1978, Howard and Booth 1981).

Livestock producers have learned that limiting their lambing/calving period to a short period of time and congregating the birthing animals into a relatively small area reduces the extent of damage that predators such as coyotes, wolves, bobcats and mountain lions will cause as compared to extended birthing periods spread over a wide area. Grouping the vulnerable animals together, both in time and space, reduces the degree of exposure of each individual. Unfortunately, while this practice protects the calves from predators such as coyotes, it increases the attractiveness of the site to predators such as ravens. Ravens will attack young lambs, calves, and goats, and even adult ewes, nannies, and cattle in certain situations, by pecking the eyes and other vulnerable spots such as the anal area, nose and navel (Larsen and Dietrich 1970, Wade and Bowns 1982). They can kill young animals by pecking out the eyes or umbilical cord which results in the animal going into shock and dying. Unfortunately, the strategy which helps to protect the young livestock from canid predation makes them vulnerable to corvid predation.

Scope of Statewide Livestock Losses. Nationally, 190,000 cattle/calves were lost to predation in 2005, representing a loss of $92.7 million to farmers and ranchers despite spending 199.1 million dollars on nonlethal approaches (e.g. guard animals 38.0%; exclusion fencing 34.0%; frequent checking 21.8%; and culling 19.6%) (NASS 2006). Of this national total, Nevada cattle and calf losses to predation were 200 and 1,100 head respectively, with respective total value losses of $206,000 and $452,000 (NASS 2006). Coyotes accounted for 50% of cattle losses and 90.9% of calf loss; while mountain lions accounted for 9.1% of calf loss (NASS 2006).

Nationally, 224,000 sheep/lambs were lost to predation in 2004, representing a loss of $18.3 million to farmers and ranchers despite spending 9.8 million dollars on nonlethal approaches (e.g. fencing 52%; night penning 32.9%; guard dogs 31.8%; lamb sheds 30.8%) (NASS 2005). ~~Of this national total, Nevada sheep and lamb losses to predation were 3,400 and 9,000 head respectively, with respective total value losses of $439,000 and $531,000 (NASS 2005). Coyotes accounted for 67.6% of sheep losses and 82.2% of lamb loss, while mountain lions accounted for 26.5% of sheep losses and 13.3% of lamb losses (NASS 2005).~~Nationally, 247,200 sheep/lambs were lost to predation in 2009, representing a loss of $20.5 million to ranchers and farmers (NASS 2010). Of this national total, 10,100 lambs and 2900 adult sheep were lost to predators in Nevada, valued at $397,000 and $646,000 respectively (NASS 2010).

NWSP personnel respond to reports from resource owners of losses to predation which may or may not be verified. Verified losses are defined as those losses examined by a NWSP specialist during a site visit and identified to have been caused by a specific predator. Confirmation of the species that caused the loss is a vital step toward establishing the need for control and the PDM necessary to resolve the problem. A NWSP specialist not only confirms the predator responsible, but also records the extent of the damage when possible. Losses that are reported, but not confirmed, are defined as those losses reported by the resource owner to NWSP and not confirmed during a site visit. Livestock losses reported to NWSP by cooperators are recorded as confirmed losses only if NWSP personnel are able to visit the site and make a determination of the causative species. Losses are considered unconfirmed if confirmation of the causative species is not made. Losses caused by predators before the NWSP specialist is contacted for assistance and not verified are considered reported losses. Other reported losses might involve situations where the identity of the predator species could not be determined by the NWSP specialist. In Nevada, during FY 07, 08 and 09, NWSP personnel responded to complaints where reported and verified losses from predators of all classes of livestock, including poultry and commercially raised game, averaged about 1,563 livestock animals or $208,887 per year (Table 1). Of these losses, lamb losses per year averaged $93,626, while sheep losses averaged $47,603 per year, approximately. Of these losses, coyotes accounted for approximately 76%, mountain lions 16%, and common ravens 4% of the depredations. All the other predators covered by this EA, gray, red and kit foxes, mink, badgers, spotted skunks, and ringtails, have been known to kill or injure livestock, primarily poultry.

Table 1. Livestock lost to predators in Nevada reported to/verified by NWSP during FY 07, 08 and 09 (USDA 2010a). The reported losses are determined from cooperator reports, while verified losses are reported by NWSP specialists. The coyote is the species responsible for the majority of livestock losses to predators, followed by mountain lions and ravens. Lambs, sheep, and calves were most impacted by these predators, reflecting their availability throughout Nevada and their vulnerability to predators.

Livestock Losses to Predators for FY 07, 08 and 09 (Reported and Verified)																				
Year	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	Avg	Avg
Livestock	Coyote			Mtn. Lion			Raven			Bobcat			Black Bear			Feral Dogs			Loss	Value
Cattle	1								3										1.33	$1,150.00
Calves	68	76	104	4		1	22	12	22										103	$37.883.33
Sheep	267	311	284	37	44	49							12	1	3	2	5		338.33	$47,603.33
Lambs	440	555	624	163	140	182	14	17	111	9	4	5	25	3		3		10	768.33	$93,626
Goats		3	1		1														1.67	$270
Kid Goats	186	48	330			2					15	2							194.33	$19,321
Horses				2	5	2													3	$5,966.67
Poultry	26	213	46	140						3	17	10					1		158	$2,900.33
Piglets		1							2										1	$166.67
Average	1,194.67			257.33			67.67			21.67			14.67			7				$208,887.33
Average Number of Livestock Lost per Year to Predators																			1,562.99	
Average Value of Livestock Lost per Year to Predators																				$208,887.33

Public lands in Nevada are used extensively for grazing sheep, lambs, cows, and calves, and, therefore livestock losses are highest on those land classes as shown in Tables 2a and 2b. All BLM Districts, except Carson City and Suprise, and USFS lands showed substantial losses of sheep and lambs to coyote predation. Most BLM Districts showed losses of calves, though the USFS NFs did not. Losses of all livestock classes caused by predators were valued on average at $107,919 per year on BLM lands and at $10,416.68 per year on USFS lands during FY 07, 08 and 09.

Private lands are used much more as lambing and calving grounds and raising other types of livestock. Losses on private lands within and outside the BLM Lands reflect this and a wider variety of livestock losses (Table 2c and 2d). Total losses of all livestock classes caused by predators on private lands within Nevada BLM lands averaged 411.32 animals/year valued at $77,619.34/year, during FY 07, 08 and 09 (Table 2c). Total losses of all livestock classes caused by predators on all private lands in Nevada averaged 532.67 animals/year valued at $96,544.30/year, during FY 07, 08 and 09 (Table 2d).

Private lands account for about 12% of the lands in Nevada, but 44% of the total losses. Conversely, nonprivate lands account for approximately 88% of the lands in Nevada and 56% of losses. Losses for public and private lands are compared in Table 2d. Production on private lands is higher per acre

than on public lands primarily because private lands are generally of better quality for agricultural uses and have better access to water (ie. along river bottoms). Additionally, the available AUMs on BLM and USFS allotments were reduced by 342,600 (about 20%) from 1980-1998 (Pearce et al. 1999) which has reduced the percentage of non-private lands needing PDM. Therefore, the percentage of losses is expected to be higher on private than nonprivate lands. Indeed, losses averaged 6 times higher per acre under agreement on private lands than on nonprivate during FY 07, 08 and 09 (USDA 2010a). Consequently, NWSP concentrates more effort per acre on private lands than on nonprivate lands.

Table 2a. Livestock lost to predators in Nevada on BLM public lands reported to or verified by NWSP during FY 07, 08 and 09 (USDA 2010a).

Livestock Losses to Predators on Public Lands-BLM Districts (Reported and Verified)																						
Fiscal Year		07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09
Livestock	Predator	Battle Mtn.			Carson City			Eagle Lake			Elko			Ely			Suprise			Winnemucca		
Sheep	Coyote	82	77	80	1		1	6			6	27	29	61	94	127				76	43	15
	Mtn. Lion	3						13			3		15	4	17	17				1	19	
	Black Bear				1																	
	Total	85	77	80	2		1	19			9	27	44	65	111	144				76	62	15
	Value ($)	10,750	10,275	8,050	200		250	1,700			1,500	5,000	6,520	8,670	16,110	23,010				7,840	7,935	2,100
Lambs	Coyote	137	89	80	1	1	2	10	4	14	45	66	97	93	100	164	2		7	57	37	45
	Mtn. Lion	22	5	18		2		40	10	10	8	66	104	41	16	30	3			22	26	3
	Raven							4						1	4	29				9	5	4
	Bobcat							5						2	4	3				2		
	Total	159	94	98	1	3	2	59	14	24	53	124	201	137	124	226	5		7	90	68	52
	Value ($)	16,215	10,035	9,805	100	289	180	4,575	1,400	2,400	5,300	14,725	18,430	13,805	14,370	24,755	500		700	8,475	7,000	5,225
Cattle	Coyote				1																	
	Value ($)				750																	
Calves	Coyote	9	6	2	1	7						5	38	1	4					3	2	4
	Raven	5									1				1	4						
	Mtn. Lion						1							1								
	Total	14	6	2	1	7	1				1	5	38	2	5	4				3	2	4
	Value ($)	5,900	2,900	800	200	2,850	500				400	2,500	18,800	1,000	2,500	2,000				1,300	750	1,700
Goats, Kid	Coyote										29	42	30								21	2
	Value ($)										2,668	3,360	3,000								1,485	200
Total Number Livestock Lost		258	177	180	5	10	4	78	14	24	92	198	313	204	240	374	5	0	7	169	153	73
Average Number																						

Livestock Losses to Predators on Public Lands-BLM Districts (Reported and Verified)																							
Fiscal Year		07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09
Livestock	Predator	Battle Mtn.			Carson City			Eagle Lake			Elko			Ely			Suprise			Winnemucca		
Livestock Lost/Year		205			6.33			38.66			201			272.67			4			131.67		
Total Value of Livestock Lost ($)		32,865	23,210	18,655	1,250	3,139	930	6,275	1,400	2,400	9,868	25,585	46,750	23,475	32,980	49,765	500	0	700	17,615	17,170	9,225
Average Value of Livestock Lost/Year ($)		24,910			1,773			3,358.33			27,401			35,406.67			400			14,670		

Table 2b. Livestock lost to predators in Nevada on public lands-National Forest ranger districts, reported to or verified by NWSP during FY 07, 08 and 09 (USDA 2010a).

Livestock Losses to Predators on Public Lands-National Forest Ranger Districts (Reported and Verified)																
Year		07	08	09	07	08	09	07	08	09	07	08	09	07	08	09
Livestock	Predator	Austin			Bridgeport			Ely			Mountain City			Ruby Mountains		
Sheep	Coyote							6	2	1	1	10	3			
	Mtn. Lion									4			1		2	3
	Total							6	2	5	1	10	4		2	3
	Value							$950	$300	$650	$120	$900	$400		$200	$360
Lambs	Coyote	8				1		41	29	15	26	26	27	33	2	13
	Mtn. Lion									4		5	3	15		4
	Total	8				1		41	29	19	26	31	30	48	2	17
	Value	$800				$89		$4,400	$3,540	$2,190	$2,920	$3,335	$3,250	$4,800	$200	$1,840
Total Number Livestock Lost		8				1		47	31	24	27	41	34	48	4	20
Average Number Livestock Lost/Year		2.67			.33			34			34			24		
Total Value of Livestock Lost		$800				$89		$5,350	$3,840	$2,840	$3,040	$4,235	$3,650	$4,800	$400	$2,200
Average Value of Livestock Lost/Year		$266.67			$29.67			$4,010			$3,641.67			$2,466.67		

Table 2c. Livestock lost to predators on private lands within BLM lands in Nevada reported to or verified by NWSP during FY 07, 08 and 09 (USDA 2010a).

Livestock Losses to Predators on Private Lands Within BLM Districts (Reported and Verified)																						
Fiscal Year		07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09
Livestock	Predator	Battle Mtn.			Carson City			Eagle Lake			Elko			Ely			Suprise			Winnemucca		
Sheep	Coyote	17	23	4	1	2	14			1		3				21				2	10	
	Mtn. Lion				11	1	9							2		5						
	Black Bear				12	1	3															
	Total	17	23	4	24	4	26			1		3		2		26				2	10	
	Value ($)	2,550	3,375	450	5,320	780	4,160			200		420		250		3,295				300	1,300	
Lambs	Coyote	35	78	30	36	40	46			7		24	25	7	27	13				40	8	13
	Mtn. Lion				6	5	4			1				2		16						
	Raven		2	42			2									21						34
	Black Bear				14	3																
	Bobcat																					
	Total	35	80	72	56	48	52			8		24	25	9	27	50				40	8	47
	Value ($)	3,835	8,725	6,800	12,735	5,881	7,014			600		2,525	2,420	900	3,030	5,920				6,000	800	5,000
Cattle	Coyote				1																	
	Raven															3						
	Total				1											3						
	Value ($)				750											2,700						
Calves	Coyote	8		1	6	9	2				5	25	16	4	11	6		2	6	28	7	22
	Raven	3	1	1								7	7	1	1	9				5	2	2
	Mtn. Lion						1													3		
	Total	11	1	2	6	9	3				5	32	23	5	12	15		2	6	36	9	24
	Value ($)	4,350	500	950	2,800	4,250	1,550				2,000	15,000	11,400	2,100	5,800	4,500		1,000	2,700	17,000	4,450	10,300
Goats, All	Coyote										32	42	30		2					154	21	2
	Bobcat											15										

Livestock Losses to Predators on Private Lands Within BLM Districts (Reported and Verified)																							
Fiscal Year		07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09
Livestock	Predator	Battle Mtn.			Carson City			Eagle Lake			Elko			Ely			Suprise			Winnemucca		
	Mtn. Lion																				1	
	Total										32	57	30		2					154	22	2
	Value ($)										2,968	4,360	3,000		310					15,350	1,585	200
Horse, All	Mtn. Lion		4														2				1	
	Value ($)		15,100														500				800	
Total Number Livestock Lost		63	108	78	87	61	81	0	0	9	37	116	78	16	41	94	2	2	6	232	50	73
Average Number Livestock Lost/Year		83			76.33			3			77			50.33			3.33			118.33		
Total Value of Livestock Lost ($)		10,735	27,700	8,200	21,605	10,911	12,724	0	0	800	4,968	22,305	16,820	3,250	9,140	16,415	500	1,000	2,700	38,650	8,935	15,500
Average Value of Livestock Lost/Year ($)		15,545			15,080			266.67			14,697.67			9,601.67			1,400			21,028.33		

Table 2d. A comparison of livestock losses to predators on Nonprivate and Private lands reported to or verified by NWSP (USDA 2010a).

Comparison of Losses on Public and Private Lands (Reported and Verified)																
Fiscal Year		07	08	09	07	8	09	07	08	09	07	08	09	07	08	09
Livestock	Predation	BLM Public Land			Forest Service Land			State Lands			Non Private Land Total			Private Land Total		
Sheep	Total	256	277	284	7	14	12	6	15	-	269	306	296	45	40	57
	Value	$30,660	$39,320	$39,930	$1,070	$1,400	$1,410	$750	$3,000	-	$32,480	$43,720	$41,340	$8,420	$5,875	$8,105
Lambs	Total	504	427	610	123	63	66	103	-	-	730	490	676	140	193	263
	Value	$48,970	$47,819	$61,495	$12,920	$7,164	$7,280	$15,400	-	-	$77,290	$54,983	$68,775	$23,470	$21,411	$28,979
Cattle	Total	1	-	-	-	-	-	-	-	-	1	-	-	1	-	3
	Value	$750	-	-	-	-	-	-	-	-	$750	-	-	$750	-	$2,700
Calves	Total	21	25	49	-	-	-	-	3	-	21	28	49	62	69	122
	Value	$8,800	$11,500	$23,800	-	-	-	-	$1,300	-	$8,800	$12,800	$23,800	$27,950	$33,000	$55,210
Goats, Kid	Total	29	63	32	-	-	-	-	-	-	29	63	32	186	78	332
	Value	$2,668	$4,845	$3,200	-	-	-	-	-	-	$2,688	$4,845	$3,200	$18,318	$5,845	$33,200
Horse, Foals and Adults	Total	-	-	-	-	-	-	-	-	-	-	-	-	2	5	-
	Value	-	-	-	-	-	-	-	-	-	-	-	-	$500	$15,900	-
Total Number Lost		811	792	975	130	77	78	109	18	-	1,050	887	1,053	436	385	777
Average Number Lost		859.33			95			42.33			996.67			532.67		
Total Loss Value		$91,848	$103,484	$128,425	$13,990	$8,564	$8,690	$16,150	$4,300	-	$122,008	$116,348	$137,115	$79,408	$82,031	$128,194
Average Loss Value		$107,919			$10,414.67			$6,816.67			$125,157			$96,544.33		

In addition to direct livestock losses to predators such as predation and injury, producers also lose livestock indirectly to predators. For example, a potential indirect loss to cattle producers is disease transmission from predators; cattle can become infected with rabies after being bitten by infected animals such as skunks and fox. Indirect losses are typically minor, but the potential losses can be devastating should a major outbreak occur.

1.1.3 Need for Predator Damage Management for Protection of Crops, Property, Human Health and Safety and Natural Resources

Predators impact a number of resources in Nevada other than livestock. Those resources include:

- **Crops** Field crops such as melons (watermelons and cantaloupes), sweet and field corn, and wheat have been damaged by predators such as coyotes, feral/free-roaming dogs, badgers, and raccoons. Fruit and nut crops have also been damaged by raccoons, ravens, and ring-tailed cats in Nevada. Another type of problem is improved or planted pasture damage caused by badgers burrowing because the uneven ground left by digging and the burrows can hamper the use of planting and mowing equipment which can result in damage to the equipment. Ravens and badgers were the only predators that accounted for crop damage during FY 07, 08 and 09, averaging $5,483.33 in damage to nut, grain, and alfalfa crops (USDA 2010a).

- **Other Agriculture** Several other commodities associated with agriculture can be damaged by predators such as beehives, haystacks, livestock feed, and eggs. Losses in FY 07 included $12,910 to bee hives by black bear (USDA 2010a).

- **Property** NWSP also responds to requests from permittees, landowners, and NDOW to alleviate property damage from predators such as: black bears breaking in and destroying the interiors of homes or other structures; coyotes, mountain lions, or raccoons killing pets; ravens damaging communication/electrical lines; coyotes causing damage to drip irrigation systems by biting holes in the pipe; raccoons and skunks burrowing into or under homes to den; and badgers, skunks, or raccoons causing damage to landscaping, gardens, or golf courses from feeding activities. Considering FY 07, 08 and 09, an average of 366.67 incidents per year of predator damage to property was reported to or verified by NWSP with an average loss per year of $203,456.33 (USDA 2010a). Raccoons accounted for 58% of the incidents, coyotes 17%, striped skunks 4% and ravens 1%. In addition, approximately 26 pets were predated or injured per year by coyotes (81%), lions (9%), raccoons (4%), red fox (3%), striped skunks (3%) and bobcats (1%), at an average value of $6,233 (USDA 2010a).

- **Human Health and Safety** NWSP conducts limited PDM actions in Nevada to reduce human health and safety concerns of the public. Human health and safety concerns include: human attacks from mountain lions, bears, and coyotes that result in injuries or death; disease threats from rabies and plague outbreaks where predators act as reservoirs; odor and noise nuisances from skunks and raccoons under houses; and airstrike hazards from ravens and coyotes crossing runways at airports or airbases. Baker and Timm (1998), after several human-coyote interactions in an area, concluded that the use of leghold traps to capture and euthanize a few coyotes would be the best method to resolve the problem and have the most lasting effects. After a child was killed by a coyote in Glendale, California, city and county officials trapped 55 coyotes in an 80-day period from within one-half mile of the home, an unusually high number for such a small area (Howell 1982). NWSP assists many residents in the Reno area concerned about coyote attacks on their pets

and their apparent loss of fear for humans. Predator attacks on humans fortunately occur very rarely, but could result in requests for assistance under the current program.

Recommendations are generally made to consider exclusion methods to reduce human health and safety concerns, but the animals present are often removed. Averaging FY 07, 08 and 09, raccoons (52%), coyotes (32%), bobcats (5%), striped skunks (5%), mountain lion (3%), raven (1%), feral cat (<1%), black bear (<1%), badger (<1%), feral dogs (<1%), gray fox (<1%), kit fox (<1%), red fox (<1%), spotted skunks (<1%), mink (<1%), and weasels (<1%) were responsible for 426 human health and safety requests per year (USDA 2010a).

Ravens have been a problem at landfills where they either obtain trash materials from uncovered garbage, or they have access to trash that has been uncovered by the activities of other species (e.g. dogs and coyotes digging up garbage). Corvids can carry trash materials out of the landfill, resulting in risks to human health and safety in the area surrounding the landfill and fines regarding vector control. During FY 2007, Nye county landfills reported $14,200 in losses to ravens (machinery, abatement and fines) (USDA 2010a). Congregation of ravens at landfills also results in accumulations of fecal matter which are a health and safety risk to landfill personnel. Landfill operators fence their landfills to keep out coyotes and free-roaming dogs and make a continual effort to keep the trash covered by dirt. Too little dirt and the trash is not sufficiently covered to keep the birds away, too much dirt and the life expectancy of the landfill is reduced. Finding replacement areas for landfills to move to are very difficult and no one wants a landfill to "fill up". Although landfill operators make an attempt to keep the garbage covered there is a continuation of new delivery and dumping of the garbage. Corvids tend to hang out at the landfill and mob the delivery truck at the dumping time. In the short period of time from when the truck starts to dump and when the truck clears the area and the landfill operator can push in cover dirt (and there may be other trucks lined up to dump) the ravens swarm over the dumped garbage. Harassing of the birds at this time can exacerbate health concerns because the ravens take garbage and fly to less hostile areas to feed. In Henderson, birds at the landfill are known to frequent the local high school's common area where students eat lunch. The ability of corvids to persist in obtaining garbage despite the best efforts of the landfills to address the issue is the reason why lethal methods may be applied to reduce corvid numbers and associated problems at landfills.

- **Natural Resources** Predators are sometimes responsible for requests for assistance involving natural resources such as game species protection. NWSP is responsive to agencies with management responsibilities for wildlife species that are impacted by predation. If a management agency requests assistance in protecting impacted wildlife species, NWSP works with the agency to identify and provide the level of protection needed.

NWSP has been contracted by NDOW to conduct predator damage management activities targeting specific predators for the protection of other wildlife species. NDOW has contracted the services of NWSP to conduct coyote damage management for the protection of mule deer (*Odocoileus hemionus*), antelope (*Antilocapra americana*), and sharp-tailed grouse (*Tympanuchus phasianellus*), raven damage management for the protection of sharp-tailed grouse, sage-grouse (*Centrocercus urophasianus*), and turkeys (*Meliagris gallopavo*), and mountain lion damage management for the protection of bighorn sheep (*Ovis* spp.), and mule deer. The addition of these contracted projects has increased NWSP's efforts focused on these three predator species.

In light of current policies in the State of Nevada, NWSP anticipates receiving continued requests to help reduce predation on sage grouse, mule deer, bighorn sheep, elk and antelope. State of Nevada Board of Wildlife Commissioners, Commission Policy Number 22, Procedure 7, states "To

give transplanted or translocated animals a better chance of establishment, predator control must be accomplished by Wildlife Services or another appropriate entity before and after any transplants or translocations can occur." NWSP recognizes the Board of Wildlife Commissioners policies due to authority granted to them under Nevada Revised Statutes (NRS). NRS: 501.105 states "The commission shall establish policies and adopt regulations necessary to the preservation, protection, management and restoration of wildlife and its habitat." In addition NDOW receives revenue that is by statute to be used as stated in NRS 501.3575, 1 (b), "The management and control of predatory wildlife in this State.", and NRS 502.253, item 1. (a), "Programs for the management and control of injurious predatory wildlife." In addition to these policies and statutes, NDOW also has a predator management plan. As stated in its predator management plan, "Coyotes, mountain lions, and ravens are common predators in Nevada. While predators are important to a balanced ecosystem, in some areas of the state, these predators endanger the establishment of new wildlife populations, or contribute to the decline of existing species. Wildlife damage management can be effective when well-defined predator problems are identified. Often times, when predator problems exist that endanger wildlife populations or threaten declining species; controls can be implemented to manage those problems." (NDOW 2010b).

Sage grouse and bighorn sheep populations in some sections of Nevada are sufficiently healthy that NDOW allows sport harvest of these species. However in other sections of the state, NDOW has not reached management goals for these populations and may request NWSP to conduct PDM activities in an effort to enhance local populations of these species.

While outside of the scope of authority and decision making for NWSP, it is important to note that there are other related and ongoing activities to enhance game species survival and success. Activities such as habitat restoration and improvements or disease management are implemented by the appropriate land management agencies (e.g. USFS or BLM), in coordination with NDOW.

Predator damage management is not used as a sole tool in enhancing the success of other wildlife species, but is used where the management authority, NDOW, has determined that predation is a limiting factor in the success of the wildlife species of concern, even while other factors are being addressed. Examples of this include sage-grouse habitat restoration and improvements which have been done/are in progress and include removing and controlling scotch thistle from sage-grouse brood rearing habitat (FY 08 and 09), removal of pinyon pine and juniper trees from brooding and breeding areas in FY 09 and FY 10, and creation of fire breaks in sage-grouse habitat (also in FYs 09 and 10). More information on sage-grouse management can be found in Nevada Sage-grouse Conservation Project (W-64-R-9); Nevada Department of Wildlife, Dec 2009.

NDOW has prepared a plan for addressing pneumonia in bighorn sheep in the East Humboldt Range and in the Ruby Mountains. NDOW biologists found 102 total dead bighorn sheep in East Humboldt (unit 101) and the Ruby Mountains (unit 102) earlier ~~this year~~in 2010, and note concerns that as many as 80% of each herd may die from pneumonia before the winter is over. Based partly on this disease concern, NDOW biologists and veterinarians have administered broad spectrum antibiotics to some of the animals and have developed a plan to monitor and study the sheep for the next few years. The plan includes forage quality, genetics, and nutritional studies. In addition to the study and treatment, NDOW has asked the public to avoid these herds to reduce unnecessary stressors (NDOW 2010c).

USDA's Natural Resource Conservation Service (NRCS) launched a new initiative in 2010 to protect sage-grouse habitat and restore rangelands. Public meetings were held across the State in cooperation with Senator Reid's office and the Nevada Cattlemen's Association to inform producers of the program and encourage their participation. Contracts were awarded on both private and public land, totaling almost $2 million, to remove invasive pinyon and juniper trees from 2,000 acres and rehabilitate over 7,000 acres. In addition 10 miles of fence will be removed (USDA 2010e). All of these improvements to sage-grouse habitat will benefit other native wildlife including game species such as mule deer and pronghorn antelope. Other improvements have included guzzler installations and repair for wildlife, in partnership with BLM (NDOW) 8/19/10).

Sage Grouse (*Centrocercus urophasianus*) NWSP anticipates receiving requests to provide predator damage management in sage-grouse nesting areas to protect nests and chicks during the vulnerable nesting and fledging periods. Nest predation and early brood (chick) mortality by predators has been well documented in the literature (Schroeder et al, 1999, Connelly et al. 2000b, - Schroeder and Baydack 2001, and Coates 2007). Studies conducted in Washoe and Elko Counties in Nevada showed that ravens have the potential to seriously impact sage-grouse production (Alstatt 1995). Another study conducted in NE Nevada showed that raven abundance was strongly associated with sage-grouse nest failure, with resultant negative effects on sage-grouse reproduction (Coates 2007).

Research has also shown that in areas of altered habitat there is potential for increased predation on all life stages of sage-grouse (Scroeder and Baydack 2001, Connelly et al. 2004, Coates 2007). Research in western Wyoming attributed increased sage-grouse nest depredation to high corvid abundances, which resulted from anthropogenic food and perching subsidies in areas of natural gas development (Holloran 2005). In the same Wyoming location (Bui 2009) also found common raven abundance increased in association with oil and gas development. In Nevada human-made structures in the environment increase the effect of raven predation, particularly in low canopy cover areas, by providing ravens with perches (Coates 2007).

Due to environmental factors such as Nevada being the driest State in the nation, coupled with altered sagebrush habitats from anthropogenic activities (Coates 2007) otherwise suitable habitat has changed into habitat sinks for sage-grouse. Further, the USFWS believes that where habitats have been altered by human activities, predation could be limiting local sage-grouse populations (Federal Register/Vol. 75, No. 55/ Tuesday, March 23, 2010/ Proposed Rules).

Because of a decline in greater sage-grouse populations and habitat losses range-wide, Nevada, like most western States, has engaged in a conservation planning process to maintain, enhance and restore sage-grouse and balance sage-grouse habitats and populations with local economic considerations (NDOW 2004). The Greater Sage-grouse Conservation Plan for Nevada and Eastern California (NDOW 2004) lists predation among many factors affecting sage grouse, and identifies habitat quantity and quality, and wildfire as having affected Nevada sage-grouse populations the most. The sage-grouse plan details specific projects that have been completed or are in progress to remedy the identified limitation. While habitat improvements and fire management are outside of the scope of analysis of this EA, these important efforts are mentioned to show how other efforts that provide long term benefits to sage-grouse populations are a high priority for multiple land management agencies. NDOW (2004) prescribes predation management projects to protect sage-grouse during more vulnerable strutting, nesting and early brood periods, on a short term basis, and in conjunction with habitat improvement projects.

Concerns over declines in sage-grouse populations resulted in numerous petitions filed with the USFWS to list the sage-grouse as a threatened or endangered species. On March 23, 2010, the USFWS announced that the Nevada-California (Bi-State) population was a Distinct Population Segment (DPS) under the ESA, and that listing the Bi-State DPS was warranted but precluded by the need for higher priority listing actions (75 FR 3910:13910-14010). Therefore, the sage-grouse in Nevada will be on the candidate list, meaning that it will be proposed for listing when funding and workload permit. The Bi-State DPS, which is roughly bounded on the east side of the Sierra's, received a higher (more urgent) candidate listing than the range wide sage-grouse population (sage grouse population outside of the Bi-State DPS), which was also given the candidate designation. Candidate species under the ESA receive 12 month status reviews so it is still possible to keep the sage-grouse off of the endangered species list if it shows recovery progress. Listing the greater sage-grouse as a threatened or endangered species would have a significant impact on Nevada's economy and land uses including development, water uses, and recreational uses. While sage-grouse still thrive over much of their range in Nevada, conservation measures including predator control actions will be helpful in alleviating problems before the species declines to a point from which recovery may be difficult.

Big Game Under certain conditions, predators, primarily coyotes and mountain lions, can have a significant adverse impact on deer (*Odocoileus spp*.), bighorn sheep (*Ovis spp*.), and pronghorn antelope (*Antilocapra americana*) populations, and this predation is not necessarily limited to sick or inferior animals (Pimlott 1970, USFWS 1978, Hamlin et al. 1984, Neff et al. 1985, Shaw 1977). Connolly (1978) reviewed 68 studies of predation on wild ungulate populations and concluded that in 31 cases, predation was a limiting factor. These cases showed that coyote predation had a significant influence on white-tailed deer (*O. virginianus*), mule deer (*O. hemionus*), pronghorn antelope, and bighorn sheep (*Ovis canadensis*) populations. Hamlin et al. (1984) observed that a minimum of 90% summer mortality of fawns was a result of coyote predation. Pojar and Bowden (2004) found for mule deer fawns in Colorado that 75% of predation mortality occurred by July 31. The habitat in this study is similar to high mountain desert areas in Nevada. Other authors also observed that coyotes were responsible for the majority of fawn mortality during the first few weeks of life (Knowlton 1964, White 1967). One study in the central Sierra Nevada in California found that predation was the largest cause of fawn loss, resulting in the death of 50.6% of all fawns during the first 12 months of life. In this instance, mountain lions were the main predator; however, coyotes still accounted for 27% of all predation (Neal 1990). Teer et al. (1991) concluded from work conducted at the Welder Wildlife Refuge, Texas that coyotes take a large portion of the fawns each year during the first few weeks of life. Another Texas study (Beasom 1974) found that predators were responsible for 74% and 61% of the fawn mortality for two consecutive years. Garner (1976), Garner et al. (1976), and Bartush (1978) found annual losses of deer fawns in Oklahoma to be about 88%, with coyotes responsible for about 88% to 97% of the mortality. Reductions of local coyote and other predator populations have been shown to result in increasing fawn survival of white-tailed deer (Guthery and Beasom 1977, Stout 1982, Knowlton and Stoddart 1992) and pronghorn antelope (Arrington and Edwards 1951, Smith et al. 1986).

A large scale, long term (seven-year) study has been ~~initiated~~funded in Nevada and should begin in 2011 to determine if, and to what extent, coyotes are affecting fawn survival, and under what conditions coyote removal may benefit fawn survival and deer densities. The need for the study and additional description are provided under Section 3.2.5, Description of the Proposed Action.

Mule Deer

Mule deer are the primary big game species in Nevada. Populations of mule deer have fluctuated historically and while numbers are greater today than they were 100 years ago, they have been in sharp decline over the past 15 years. Numerous factors likely contribute to declines including degraded habitat in terms of reduced forage productivity from land uses and practices, invasive plants and weeds, weather, fire management, human population growth and development, and climate have all likely ~~affected~~ contributed to the recent decline in mule deer numbers in Nevada. Predation is not necessarily a limiting factor for mule deer production when considered alone, but when it is combined with low production due to the numerous limiting effects mentioned here, the effect of predation is amplified because productivity is already compromised (NDOW 2004a).

Bighorn Sheep

NDOW has requested that NWSP remove limited numbers of mountain lions to improve bighorn sheep survival in some areas of Nevada. These actions are anticipated to benefit the bighorn sheep populations. NDOW's current Bighorn Sheep Management Plan (October 2001) states "Biologists with predator management expertise will evaluate possible predation on bighorn sheep release. If it is determined that predation is a limiting factor, predator management will be instituted until the population shows an increasing annual trend. If predator control does not result in an increasing annual trend, then other limiting factors will be examined. Commission Policy 25, "Wildlife Damage Management" will be followed." (NDOW 2001).

Pronghorn Antelope

NDOW's Policy Guidance for the Management of Pronghorn Antelope (2003) provides the objective to "Manage Nevada's Pronghorn herds to achieve a minimum statewide population goal of 25,000 by 2013.". The policy also includes the following strategy to meet the objective "Utilize predator management actions when it is demonstrated that predator control can be a timely and cost effective means of enhancing herd growth. Utilize the Commission's predator management process to propose projects.". It is therefore possible that NDOW may request NWSP assistance to meet that end.

Elk

Elk occur in low numbers in Nevada. With improved management of ranges that favor elk, Nevada could have higher densities of elk based on improved habitat quality. NDOW's 1997 Elk Management Plan indicated that predation had not been documented as a limiting factor for existing or released populations of elk in Nevada, but if evidence exists to show that predators are limiting elk populations, NDOW may implement a plan to reduce localized predator numbers (NDOW 1997).

Other Species It is possible that WS could receive requests for assistance from resource management agencies to control ravens for the protection of nesting waterfowl in refuge areas and State Wildlife Management Areas. The reduction of ravens in Clark County has been discussed as desirable to protect the desert tortoise as well as several other listed T&E species. The *Draft* "Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement" discusses the impact of the significant increase in the raven population in Clark County on desert

tortoises. It is believed by wildlife biologists that predation of juveniles by ravens has basically halted recruitment of juveniles into the adult population in many areas of the Mojave (USFWS 1994a). The USFWS 2008 Draft revised recovery plan for the Mojave population of the desert tortoise also reflected USFWS 1994a in that landfills subsidize the ravens and enable them to increase their numbers. In fact, Boarman and Kristen 2006, stated in their Draft Report to the USFWS that "Common raven populations clearly have increased in the Mojave and Sonoran Deserts over the past 37 years." The USFWS found that desert tortoises are still in need of aggressive management in tortoise conservation areas, that raven predation is a conservation concern (3% overall contribution to mortality), and their "Recovery Action Effectiveness Model" shows that controlling ravens is highly effective in mitigating raven specific threats to desert tortoises (USFWS 2008 Draft). Ravens also cause damage to grain, nut and fruit orchards, livestock feed, and property in Nevada.

NWSP may be requested to help protect other species. If a management agency finds that a particular species has been impacted by predation, NWSP would assist in determining if PDM efforts could help protect the species and implement necessary, if any, PDM actions to correct it. In particular, WS anticipates receiving continued requests to help reduce predation on sage grouse, mule deer, bighorn sheep, elk, antelope, and other species including wild turkey and sharp-tailed grouse. NDOW has management plans and goals for these species which include minimizing factors limiting healthy populations. These management plans include strategies to implement predator management when data suggest that numbers or population demographics are being negatively impacted by predators (NDOW 2010d).

Wildlife Disease Surveillance

NWSP has increased its assistance in disease surveillance for Nevada Health Departments and others by collecting blood samples from captured animals. From FY07-09, NWSP collected 1024, 1294, 1016 blood samples respectively from mammalian predators to test for the presence of a plague titer (primarily coyote blood samples). As is reflected by the number of samples taken, NWSP's assistance in this area has increased substantially. The increase in sample numbers is due in part to the addition of the National Wildlife Disease Surveillance & Emergency Response Program to the national WS program. Blood or tissue samples are obtained opportunistically from animals taken during regular PDM activities. Therefore, NWSP disease monitoring efforts do not result in additional predator mortality. Plague blood samples have helped the State of Nevada and county health departments identify plague "hot-spots" within Nevada. The county health departments have placed out warning signs notifying the public of the potential for disease contact areas.

The increase in raccoon damage and the potential for disease transmission has raised concern in many residential areas where the majority of raccoon damage complaints originate. The raccoon population in urban areas of Nevada is substantially higher than would be expected in the predominantly desert habitat. The raccoon is known to adapt to and flourish amidst human activities and recent urban development in Nevada has transformed the desert habitat. One serious concern associated with urban raccoons is the presence of the raccoon roundworm (*Baylisascaris procyonis*). The raccoon roundworm is a parasite that can cause severe health problems and fatalities in humans, with children being particularly at risk (CDC 2002). Raccoon roundworm was detected in fecal samples provided by NWSP to the Nevada Department of Agriculture in FY09. As stated above, raccoon complaints are usually handled by NDOW, but NWSP does provide technical assistance and may loan out cage traps to the public to capture problem raccoons.

NWSP has collected samples for several other diseases in the last several years at the request of concerned citizens and cooperating agencies as a result of risk to human health and safety, as well as concern for pets. NWSP expects this trend will continue in the future as urban expansion continues to bring humans and wildlife into conflict.

1.1.4 Predators in Nevada That Cause Damage

To conduct PDM, it is important to have knowledge about the species that can cause damage. Full accounts of life histories for these species can be found in mammal and bird reference books and field guides. Some background information is given here for each species in Nevada covered by this EA, especially information pertaining to their range in Nevada. The species are given in order of their importance as a predator involved in NWSP PDM efforts.

Coyote. Coyotes are classified as an unprotected species in Nevada and NDOW is the agency responsible to oversee their management. NWSP conducts PDM for coyotes under an MOU with NDOW and provides NDOW with information on damage and take. Coyotes cause the most damage of the predators in Nevada and, therefore, are the major focus of NWSP PDM efforts in Nevada.

Coyotes were once found primarily in western States, but have expanded their range in recent history to much of North America. They are very common in Nevada and found statewide. To discuss the impacts of various environmental constraints and external factors on coyote populations and density, it is essential to understand the basic mechanisms that play a role in the coyote's response to constraints and actions. This species is often characterized by biologists and rangeland managers as having a unique resilience to change because they have a strong ability to adapt to adverse conditions and persevere.

Determinations of absolute densities for coyote populations are frequently limited to educated guesses (Knowlton 1972). Coyotes are highly mobile animals with home ranges (territories) that vary seasonally and with the sex and age of the animal (Todd and Keith 1976, Althoff 1978, Pyrah 1984). The literature on coyote spatial organization is confusing (Messier and Barrette 1982, Windberg and Knowlton 1988). Coyote population densities will vary depending on the time of year, food abundance, and habitat. Coyote densities have ranged from a low of 0.39/mi^2 during the time when populations are low (just prior to the annual period of pup birth) to a high of 3.55/mi^2 when populations are high (just after the period of pup birth) (Pyrah 1984, Knowlton 1972). Coyote home ranges may vary from 2.0 mi^2 to 21.3 mi^2 (Andelt and Gipson 1979, Gese et al.1988[2]). Ozoga and Harger (1966), Edwards (1975), and Danner (1976), though, observed a wide overlap between coyote home range and did not consider coyotes territorial.

Each occupied coyote territory may have several nonbreeding helpers at the den during whelping (Allen et al. 1987, Bekoff and Wells 1982). Therefore, each defended coyote territory may have more than just a pair of coyotes. Messier and Barrette (1982) reported that from November through April, 35% of the coyotes were in groups of three to five animals and Gese et al. (1988) reported that coyote groups of 2, 3, 4, and 5 comprised 40%, 37%, 10% and 6% of the resident population, respectively. The presence of unusual food concentrations and nonbreeding helpers at the den can influence coyote densities, and complicate any effort to estimate abundance (Danner and Smith

4 All literature citations reported in km^2 have been converted to mi^2 for reader convenience and to maintain consistency.

1980). A positive relationship was established between coyote densities in mid-late winter and the availability of dead livestock (Roy and Dorrance 1985).

Common Raven. The common raven is a migratory bird and managed under the Migratory Bird Treaty Act by USFWS. NWSP responds to requests from livestock operators and others who experience depredation problems from ravens and work closely with USFWS to resolve damage complaints. Raven depredation problems are mostly related to calving and lambing periods. Ravens, though, cause a wide variety of damage in Nevada including predation on T&E species, other wildlife, and pets, and damage to crops, property, and threats to human health and safety such as damages associated with landfills

The common raven is widely distributed throughout the Holarctic Regions of the world including Europe, Asia, and North America and extends well into Central America (Goodwin 1986). Ravens generally are a resident species but some wandering and local migration occurs with immature and non-breeding birds (Goodwin 1986). Typical clutch size is between 3 and 7. Immature birds, which have left their parents, form flocks with non-breeding adults. These flocks tend to roam and are loose-knit and straggling (Goodwin 1986). The raven is an omnivorous species known to feed on carrion, crops, eggs and birds, small mammals, amphibians, reptiles, fish, and insects (Nelson 1934).

Mountain Lion. The mountain lion is managed by NDOW as a big game animal in Nevada. NDOW also manages mountain lion damage by issuing depredation permits, when needed and per Nevada regulations. NDOW has contracted with NWSP to assist with the management of mountain lion damage. Therefore, NWSP responds to requests for assistance concerning mountain lion depredations and evaluates and resolves these conflicts.

Mountain lions have an extensive distribution across Western North America including Nevada. It is known by several other names including cougar, panther, and puma. Mountain lions inhabit many habitat types from desert to alpine environments, indicating a wide range of adaptability. They are closely associated with deer and elk because of their dependence upon these species as prey.

Female mountain lions typically breed for the first time between 22 and 29 months of age (Ashman et al. 1983), but initial breeding may be delayed (Hornocker 1970). Mountain lions breed and give birth year round but most births occur during late spring and summer following a 90-day gestation period (Ashman et al. 1983, Seidernsticker et al. 1973, Robinette et al. 1961). One to six offspring per litter is possible, with an average of two to three young per litter.

Mountain lion density is related closely to prey availability and intraspecific competition (social tolerance for other mountain lions). Prey availability is directly related to prey habitat quality that directly influences mountain lion nutritional health, reproductive and mortality rates. Studies indicate that as available prey increases, so do mountain lion populations. As mountain lion population density increases, mortality rates from intra-specific fighting and cannibalism also increase, and/or mountain lions disperse into unoccupied or less densely occupied habitat. The relationship of the mountain lion to its prey and to other mountain lions is why their densities do not reach levels observed in a number of other wildlife species (ODFW 2006). It is also why mountain lions disperse into atypical mountain lion habitat and cause conflicts (Bodenchuk and Hayes 2006). Shaw (1981) presented evidence that livestock such as sheep and calves provide a supplemental prey base that supports mountain lions through seasonal declines in their primary prey, deer. Therefore, this allows an artificially high density to be reached.

NDOW estimates the current population at between 2500 to 3500 (Lansford and Woolstenhulme 2008). Mountain lion densities in other states, based on a variety of population estimating techniques, range from a low of about 1 per 100 square miles to a high of 24 per 100 square miles for all age classes (Johnson and Strickland 1992). An average density estimate for the western States was 7.5 per 100 square miles (Johnson and Strickland 1992). Cunningham et al. (1995) determined that cougar densities were about 75% higher in the portion of their study area which was subject to greater depredation control and sport hunting. Their estimates of density ranged from 4-7/100 mi^2.

Striped Skunk. Striped skunks are classified as an unprotected species in Nevada. The striped skunk is the most common member of the *Mephitidae* family. Striped skunks elicit numerous damage complaints with human health and safety although property damage is the most common issue.

Striped skunks have increased their geographical range in North America with the clearing of forests. They are not associated with any well-defined habitat type that can be classified as skunk habitat (Rosatte 1987), but are capable of living in a variety of environments including agricultural lands and urban areas. Skunks primarily cause odor problems around homes, can transmit diseases such as rabies to humans and domestic animals, and sometimes prey on poultry and their eggs. Skunks are primarily targeted to reduce these types of problems and control actions for this purpose are a minor part of NWSP's PDM activities.

The home range of striped skunks is not sharply defined over space and time, but is altered to accommodate life history requirements such as raising young, winter denning, feeding activities, and dispersal (Rosatte 1987). Home ranges reported in the literature averaged between 0.85 to 1.9/mi^2 for striped skunks in rural areas (Houseknecht 1971, Storm 1972, Bjorge et al. 1981, Rosaette and Gunson 1984). The range of skunk densities reported in the literature was from 0.85 to 67/mi^2 (Jones 1939, Ferris and Andrews 1967, Verts 1967, Lynch 1972, Bjorge et al. 1981). Many factors may contribute to the widely differing population densities. Habitat type, food availability, disease, season of the year, and geographic area are only but a few of the reasons (Storm and Tzilkowski 1982).

Spotted Skunk. Spotted skunks are managed by NDOW and are classified as unprotected. NWSP responds to complaints for this species under the MOU with NDOW. Spotted skunks are found throughout much of the continental U.S. including Nevada. They can be found in a wide variety of habitats, but primarily brushy or sparsely wooded areas to deserts. Damages caused by this species is similar to striped skunks, but is less frequently reported.

Feral Dog. Feral and free-roaming dogs are somewhat common in Nevada. Domestic dog predation of livestock and poultry is not uncommon, and they sometimes cause health and safety concerns for people. Free-roaming dogs are also known to prey on native wildlife such as deer and upland game. Primary responsibility for dog control rests with county and municipal authorities. It is NWSP policy to respond only to requests for controlling dogs that come from these county sheriffs, municipal police, or health departments. NWSP personnel are only authorized to control feral or free-roaming dogs to protect livestock, poultry, and human health and safety when requested by the sheriff or other authority. Consequently, NWSP does not receive the majority of calls concerning free-roaming or feral dogs and, thus, NWSP records only reflect minor damage for them.

Bobcat. NDOW is the agency responsible to oversee the management of bobcats since it is furbearer, but has contracted NWSP, on rare site specific occasions, to conduct PDM for bobcats

under an MOU. NWSP provides NDOW with information on damage and take. The confirmed and reported damage caused by bobcats in Nevada during FY 07, 08 and 09 was to chickens, lambs, kid goats, pets and human health and safety. Total value of these losses was about $630. Efforts to resolve bobcat depredation problems in Nevada are a relatively minor part of NWSP and only 25,000 acres were worked where target bobcats were taken by NWSP.

Bobcats are found in much of North America, excluding much of Canada and the East, but are most abundant in western States. They are typically associated with rimrock and chaparral habitat, but can be found in other habitats such as forests. They are found statewide in Nevada and are fairly common. Bobcats reach reproductive maturity at approximately 9 to 12 months of age and may have one to six kittens following a two-month gestation period (Crowe 1975, Koehler 1987). Bobcat population densities appear to range between 0.1 and 7/mi^2 according to published estimates. They may live up to 14 years, but annual mortality is as high as 47% (Rolley 1985).

Raccoon. Raccoons have unprotected species status in Nevada and NDOW is responsible for oversight of raccoon management. Under an MOU with NDOW, NWSP assists in PDM for problem raccoons and provides NDOW with information on their damage and take. The raccoon is a member of the family *Procyonidae* which includes ringtails. They are abundant throughout North America, except Canada and the Rocky Mountains and Great Basin regions. They are restricted to the northern and southern portions of Nevada and are not considered common except in suitable habitat. They are typically associated with forested habitats, but are especially common in urban areas. In 1988, their population was estimated to be 3,000-5,000 in Nevada, but decreasing (USDA 1997, revised). However, observations by NWSP personnel indicate their population to be increasing, primarily in the urban areas.

Raccoons are one of the most omnivorous of animals, feeding on carrion, garbage, birds, mammals, insects, crayfish, mussels, other invertebrates, a wide variety of grains, various fruits, other plant materials, and most or all foods prepared for human or animal consumption (Sanderson 1987). Raccoon damage problems involve predation on domestic fowl, damage to livestock feed, and human health and safety concerns.

Badger. Badgers are classified as an unprotected species in Nevada, managed by NDOW. However, NWSP is responsible for responding to damage requests for them under the MOU with NDOW. Badgers are found throughout most of the western States and are found in Nevada at moderate densities. They typically inhabit open grasslands and deserts. NWSP occasionally receives requests for assistance to resolve damages from badgers the protection of rangeland, pasture, and cropland.

Black bear. Black bear are protected as big game in Nevada. As such, NDOW manages them~~, but they do not have an open~~ and will hold their first black bear hunt during the August 20, to December 31, 2011 season~~ on them~~. NDOW has decision authority over black bear damage requests and calls on NWSP to take bear when the need arises because of a damage situation. NWSP receives occasional calls from individuals and NDOW to remove bears that have killed livestock (i.e., sheep and lambs), caused property damage, or threatened human health and safety.

Black bears can be found throughout the Rocky Mountains and west coast mountain ranges. Female black bears reach reproductive maturity at approximately 3.5 years (Kohn 1982, Graber 1981). Following a 7-8 month gestation period, they may have one to five cubs (Rogers 1976, Alt 1981, Kolenosky and Strathearn 1987). Juvenile black bear annual mortality ranges between 20 and 70 percent, with orphaned cubs having the highest mortality (Kolenosky and Strathearn 1987). Natural

mortality in adult black bears is approximately 10-20 percent per year (Fraser et al. 1982). Their density will vary between 0.3-3.4/mi.^{2}, depending on habitat, and black bears can live up to 25 years (Rogers 1976). In the southwestern U.S., black bear population densities have been documented at 1/mi.^{2} (LeCount 1982). The black bears in Nevada, though, are on the peripheral of a much larger population in California and found along the Sierra-Nevada Range in the western Counties.

Feral Cat. NWSP periodically takes feral cats in PDM activities. Feral cats are fairly common throughout Nevada. Complaints involving feral cats are most commonly received when they prey on poultry and native wildlife species. Primary responsibility for feral cat control rests with county and local authorities. NWSP responds only to requests from these entities as well as health departments. NWSP personnel are authorized to control feral cats to protect livestock, poultry, natural resources and human health and safety when requested by the sheriff or other authority.

Kit Fox. NDOW is the agency responsible to oversee the management of kit fox in Nevada and classify them as furbearers. Under a MOU between NDOW and NWSP, NDOW is responsible for responding to complaints involving the kit fox. At NDOW's request, NWSP may assist in damage management efforts. Kit fox are found in most of the southwest, and their population are scattered throughout much of Nevada, primarily in lower to mid-elevations in arid and semiarid desert grasslands, desert scrub and juniper savanna habitats. Kit fox are carnivorous and feed primarily on nocturnal prey such as cottontail rabbits, kangaroo rats, deer mice, birds, insects, and, occasionally, plant material (O'Farrell 1987). They reach reproductive maturity between 10 and 22 months of age and litters average 3-5 pups after a 49-55 day gestation period. They use underground dens throughout the year, so prefer areas with loose-textured soils (O'Farrell 1987). Trend indices suggest populations are scattered but found at moderate, but stable levels (NDOW 1998b).

Gray Fox. NDOW is the agency responsible to oversee the management, including damage management, of gray fox in Nevada. The gray fox is classified as a furbearer. At NDOW's request, NWSP can assist in efforts to control these native foxes. Gray fox are found throughout much of the southern U.S., including the southern two thirds of Nevada in scattered populations. Gray fox tend to prefer chaparral, rimrock country, and scattered forest habitat. Trend indices suggest populations are at low to moderate levels (NDOW 1998b) and NWSP receives few complaints for gray fox damage. This primarily represents the fact that NDOW has management authority for gray fox PDM in Nevada. Published estimates of gray fox density range between 3.1 and 5.4/mi^2 (Trapp 1978).

Red Fox. NDOW is the agency responsible to oversee the management of red fox in Nevada. The red fox is classified as a furbearer. Under the MOU between NDOW and NWSP, NDOW is responsible for responding to complaints involving the red fox. At NDOW's request, though, NWSP can assist in efforts to control their damage. Red fox are found throughout much of North America, but are uncommon in Nevada. They tend to be found at low densities near the borders on the west and north sides of the State. The populations in Nevada are on the peripheral of larger populations in other States. Red fox tend to predate smaller livestock, primarily poultry and lambs, and cause occasional property damage. NWSP received an average of 15 complaints for red fox during the FY 06 thru FY 09 time frame, resulting in an average loss of $293/yr (USDA 2010a). Published estimates of red fox densities have been as high as 50/mi^2 (Harris 1977, MacDonald and Newdick 1982, Harris and Rayner 1986) where there was an abundant food supply. In Ontario, population densities were estimated at 2.6/mi^2 (Voigt 1987). Others reported densities of fox dens at 1 per 3 mi^2 (Sargeant 1972).

Ringtail. Ringtails have unprotected status in Nevada. NDOW has management authority for them, but under the MOU, NWSP responds to damage complaints. The ringtail is found in southern Nevada at moderate levels and is associated with rimrock, desert, and rocky ridge habitats in close association with water. Because of their habitat choice and secretive nature, ringtails seldom become a problem, but have been known to become nuisance in and around human habitations. NWSP receives few calls for this species.

Weasels. The long- and short-tailed weasels are found in Nevada, both classified as unprotected species. NDOW has management authority over the weasels, but NWSP responds to damage complaints for them per the MOU. The short-tailed weasel is found mostly in northern North America and is rare in northern Nevada. The long-tailed weasel is more common and found in much of the continental U.S. including most of Nevada, excluding southern portions. They are found in a wide variety of habitats, usually brushy, and in close association with water. NWSP receive a small number of damage complaints for weasels, almost always for poultry predation.

Mink. NDOW is the agency responsible to oversee the management of mink in Nevada, including damage complaints. Mink are classified as furbearers. At NDOW's request, NWSP can assist in efforts to control them. Mink are found across much of northern North America and in scattered areas of northern Nevada. They are mostly found in moderate, but stable populations and associated with lakes, streams, and marshes where they feed on small mammals, birds, eggs, fish, insects, and amphibians. Damage complaints for mink are usually received for poultry, wild fowl, and fish predation.

1.2 RELATIONSHIP OF THIS ENVIRONMENTAL ASSESSMENT TO OTHER ENVIRONMENTAL DOCUMENTS

- **ADC Programmatic Final Environmental Impact Statement (FEIS).** WS issued an FEIS on the national APHIS-ADC (*WS*) program (USDA 1997, revised). This EA is consistent with the Record of Decision signed for the FEIS. Pertinent information available in the FEIS has been incorporated by reference into this EA.

- **National Level Memoranda of Understanding (MOU).** MOUs have been signed between WS and BLM and between WS and USFS which recognize WS's responsibilities for wildlife damage management and related compliance with the National Environmental Policy Act on BLM and USFS lands.

- **National Forest Land and Resource Management Plans (LRMP).** The National Forest Management Act requires that each National Forest prepare an LRMP for guiding long-range management and direction. The Humboldt and Toiyabe NFs have provided input into this EA to ensure consistency with LRMPs.

- **BLM Resource Management Plans (RMP).** BLM currently uses RMPs to guide land management for lands it administers. Nevada has eight BLM Field Offices. ~~Six of these coordinate~~NWSP coordinates with the BLM State Office to assure that ~~each BLM Field Office for~~ the ~~District has reviewed the document for~~EA is in conformance with RMPs as related to land management. ~~Two are in California, Eagle Lake and Suprise Field Offices which were the Susanville Office.~~

- **NWSP EA for Predator Damage Management.** An Environmental Assessment (EA) entitled Predator Damage Management in Nevada, prepared in 1999 and amended in 2004, evaluated NWSP's program in Nevada to resolve conflicts with predators, and a Decision and FONSI were issued in 2004. This EA will supersede the previous 1999 EA, as amended in 2004. The final decision resulting from this EA will supersede the 2004 Decision and FONSI.

- NWSP Monitoring of Predator Damage Management

Monitoring of the 1999 EA and 2004 amendment occurred routinely prior to the development of this EA to determine if the impacts on the quality of the human environment from the activities conducted pursuant to the 1999 EA, as amended and the 2004 FONSI/decision had changed substantially from what was described in the EA. Although no substantive changes have occurred since 2004, WS decided to prepare a new EA to streamline NEPA compliance, involve the public by inviting comments on a new pre-decision EA, and, update the description of the program and the impacts of the alternatives. Information from previous EA monitoring was used to aid in the development of this EA to help reveal the expected program environmental effects. Monitoring of NEPA documents will continue after a decision is issued.

- **Previous BLM and USFS EAs**
  Prior to the 1999 WS EA, nine EAs and their accompanying "Findings of No Significant Impact" issued by BLM and USFS authorized PDM work on the respective public lands. The EAs were superseded by the 1999 NWSP EA, however, all EAs found that PDM, similar to that proposed in this EA, would not result in significant impacts on the environment (BLM 1989, 1993a, 1993b, 1994a, 1994b, 1994c, and 1995; and USFS 1991 and 1992). The BLM Districts and NFs that issued EAs were:

  1) Ely BLM District
  2) Elko BLM District
  3) Winnemucca BLM District
  4) Carson City BLM District
  5) Battle Mountain BLM District
  6) Las Vegas BLM District
  7) Susanville BLM District
  8) Humboldt National Forest
  9) Toiyabe National Forest

1.3 DECISIONS TO BE MADE

NWSP is the lead agency for this EA, and therefore responsible for the scope, content, and decisions made. Cooperating agencies in the production of this EA are BLM, USFS, USFWS, NDOA and NDOW. Each of the cooperating agencies was asked to provide input and direction to NWSP to ensure that Program actions are in accordance with applicable regulations and policies, and with the desires of the State of Nevada.

Based on the scope of this EA, the following decisions need to be made.

- Should PDM, as currently implemented, be continued in Nevada?

- If not, how can NWSP best assist the public with managing wildlife damage in Nevada?
- Might this proposal have significant impacts requiring preparation of an EIS?

1.4 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.4.1 Actions Analyzed. This EA evaluates PDM to protect livestock, crops, property, natural resources and human health and safety in Nevada.

1.4.2 American Indian Lands and Tribes. As has occurred in the past across Nevada, the NWSP will only conduct PDM on Indian Lands held in trust by the United States Government upon the owner(s) request and in consultation with, or authorization by, the Bureau of Indian Affairs. If PDM activities are requested on Indian Lands NWSP will consult with the Tribal government and/or the Bureau of Indian Affairs to determine the methodology employed in order to efficiently resolve the problem while minimizing potential cultural resource conflicts. As a result, this EA would cover PDM operations on ~~Tribal lands~~all Indian Lands held in trust by the United States Government throughout Nevada, where requested and implemented.

1.4.3 Federal Lands. Nevada has a large proportion of federal lands and NWSP is often requested to conduct PDM on them. The methods employed and potential impacts would be the same on these lands as they would be on private lands upon which NWSP provides service. Therefore, if NWSP were requested to conduct PDM on federal lands for the protection of livestock, property, human health and safety, or natural resources, provided impacts of PDM activities for their protection is considered, this EA would cover such actions implemented. NEPA compliance for PDM conducted to protect natural resources such as T&E species at the request of USFWS or another federal agency is the requesting agency's responsibility. However, NWSP could accept NEPA responsibility at the request of the other agency.

1.4.4 Period for Which This EA Is Valid. This EA will remain valid until NWSP determines that new needs for action, new or different environmental issues, or new alternatives have arisen that have different environmental ~~a~~effects and must be analyzed. At that time, this analysis and document may be supplemented pursuant to NEPA. This EA will be reviewed periodically to ensure that it is complete and still appropriate for the scope of PDM activities in Nevada.

1.4.5 Site Specificity. This EA analyzes potential impacts of PDM and addresses NWSP's PDM activities on all lands under Cooperative Agreement or Agreements for Control within Nevada. It also addresses the impacts of PDM on areas where additional agreements with NWSP may be written in the reasonably foreseeable future in Nevada. Because the proposed action is to provide service when requested within the constraints of available funding and staffing, it is conceivable that additional PDM efforts could occur. Thus, this EA anticipates potential expansion and minor program changes and analyzes the impacts of such efforts as part of the current and proposed programs. This EA emphasizes substantive issues as they relate to specific areas whenever possible. However, the issues that pertain to predator damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. For example, the effects on social values or target species are evaluated wherever PDM actions may occur, potentially anywhere in the State. On the other hand, effects on T&E species can be more location specific (based on certain habitat types), and

therefore the analysis would be focused on PDM effects where a given endangered species may be found. The standard WS Decision Model, depicted in Figure 2, and WS Directive 2.105 will be the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by NWSP in Nevada (see (USDA 1997, revised), Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application). Decisions made using the model will be in accordance with standard operating procedures described herein and adopted or established as part of the decision.

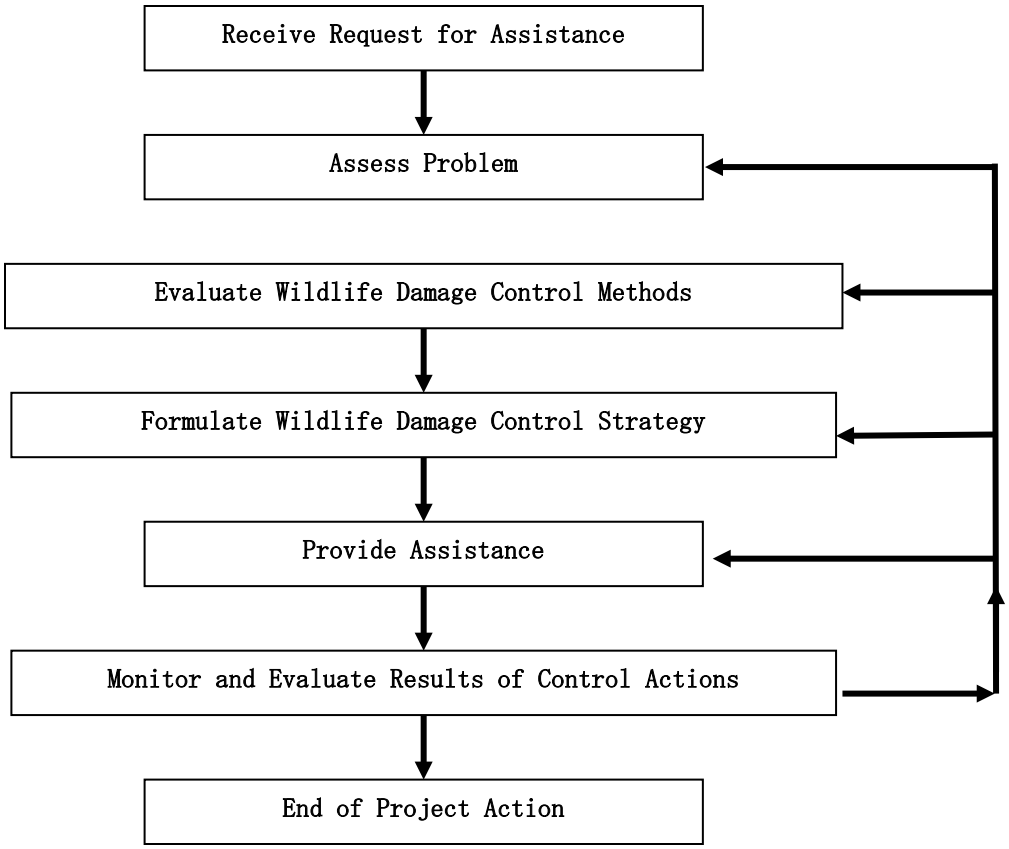


Figure 2. APHIS-WS Decision Model. The APHIS-WS Decision Model (Slate et al. 1992) is a standard professional undocumented thought process used for individual actions.

1.5 AUTHORITY AND COMPLIANCE

1.5.1 Authority of Federal and State Agencies

Wildlife Services' Legislative Authority

The primary statutory authority for the APHIS-WS program is the Act of March 2, 1931, as amended (7 U.S.C. 426-426c), which provides that:

The Secretary of Agriculture is authorized and directed to conduct such investigations, experiments, and tests as he may deem necessary in order to determine, demonstrate, and promulgate the best methods of eradication, suppression, or bringing under control on national forests and other areas of the public domain as well as on State, Territory or privately owned lands of mountain lions, wolves, coyotes, bobcats, prairie dogs, gophers, ground squirrels, jackrabbits, brown tree snakes and other animals injurious to agriculture, horticulture, forestry, animal husbandry, wild game animals, furbearing animals, and birds, and for the protection of stock and other domestic animals through the suppression of rabies and tularemia in predatory or other wild animals; and to conduct campaigns for the destruction or control of such animals. Provided that in carrying out the provisions of this Section, the Secretary of Agriculture may cooperate with States, individuals, and public and private agencies, organizations, and institutions."

Since 1931, with changes in societal values, WS policies and programs place greater emphasis on the part of the Act discussing "bringing (damage) under control," rather than "eradication" and "suppression" of wildlife populations. In 1988, Congress strengthened the legislative authority of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act (Public Law 100-202, Dec.22, 1987. Stat. 1329-1331 (7 USC 426c)). This Act states, in part:

That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with States, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities.

Nevada Wildlife Services Program

Nevada Department of Agriculture, Division of Resource Protection (NDRP) is authorized to enter into agreements with WS (Nevada Revised Statutes (NRS) 567.080) for the control of predatory animals and property destroying birds which includes ravens to provide "*a maximum of protection against losses of property, livestock, poultry, game birds, animals, and crops on a statewide basis...*" Under NRS Chapter 567 they are also authorized to contribute monies towards this effort. This close collaboration, between WS and NDRP, forms the Nevada Wildlife Services Program (NWSP). NRS 567.010-090 authorizes the Nevada Department of Agriculture (NDOA) Division of Resource Protection (DRP) to cooperate with the United States Department of Agriculture (USDA) for the control of predatory animals, crop destroying birds and rodents within the State of Nevada. DRP (State) and the USDA (federal) collectively form the Nevada Wildlife Services Program (NWSP). The mission of the NWSP is to provide leadership in managing problems caused by wildlife. WS recognizes that wildlife is an important public resource greatly valued by the people of Nevada. By its very nature, however, wildlife is a highly dynamic and mobile resource that can damage agriculture and industrial resources, pose risks to human health and safety, and affect other natural resources. The program carries out the State and federal responsibility for helping to solve problems that occur when human activity and wildlife are in conflict with one another. The NWSP also works cooperatively with the Nevada Department of Wildlife to conduct predation damage management projects to protect Nevada's natural resources such as mule deer, sage grouse, elk and bighorn sheep.

U.S. Fish and Wildlife Service

USFWS has the responsibility to manage migratory birds including the common raven and T&E species. NWSP discusses all raven control projects with USFWS to determine if the proposed project would impact the population. The USFWS evaluates the need for action and effects on ravens and other migratory birds before issuing permits. All raven take in Nevada is conducted in accordance with permit restrictions as issued by the USFWS.

NWSP consults with USFWS on its potential program effects on T&E species from PDM activities. No action occurs without either a determination that the program would have no effect on T&E species, a concurrence from USFWS that the program would not be likely to

adversely affect T&E species, or a USFWS formal Biological Opinion with measures to ensure that NWSP would not jeopardize the continued existence of T&E species in Nevada.

U.S. Forest Service and Bureau of Land Management

USFS and BLM have the responsibility to manage the resources of federal NFs and public lands for multiple uses including livestock grazing, timber production, recreation and wildlife habitat, while recognizing the State's authority to manage resident wildlife populations. Both USFS and BLM recognize the importance of reducing wildlife damage on lands and resources under their jurisdictions, as integrated with their multiple use responsibilities. For these reasons, both agencies have entered into MOUs with WS nationally to facilitate a cooperative relationship. Both agencies recognize WS's expertise in wildlife damage management and rely on WS to determine livestock and other resource losses and the appropriate methodologies for conducting PDM.

Nevada Department of Wildlife

NDOW has the primary responsibility to manage all protected and classified wildlife in Nevada, except federally listed T&E species, regardless of the land class on which the animals are found. NDOW is authorized to control predatory animals (NRS 503.595) and cooperate with NWSP for controlling predatory animals (NRS 501.351). NDOW also issues permits, including those for aerial hunting per the Fish and Wildlife Act of 1956, as amended, to landowners, lawful tenants, and lessees to take predatory animals (Nevada Administrative Codes (NAC) 503.710-503.760). Coyotes, skunks, weasels, badgers, raccoons, and ringtails are classified as unprotected in Nevada (NAC 503.035). NDOW has the responsibility to respond to damage complaints involving furbearers which are foxes, river otter, and mink under the MOU between NWSP and NDOW.

NDOW regulates the taking of wildlife. NRS 501.376 allows the take of black bear and mountain lion to protect life or property when a person feels that they are in immediate danger. NRS 502.010 allows the take of any unprotected bird or mammal to protect persons or property in the immediate vicinity of homes or ranches affected by such species. NRS 503.470 allows the take of any fur-bearing mammal doing damage provided a permit is obtained from the division.

Nevada Department of Agriculture

NDOA manages the pesticide laws in Nevada such as sodium cyanide, DRC-1339, and gas cartridges used for select predators. NWSP registers these chemicals with NDOA and all NWSP users become certified pesticide applicators through their agency.

Nevada Animal Control Laws

In Nevada, dog and cat control laws are the responsibility of local governmental agencies. County or municipal animal control officials or County sheriffs are responsible for responding to feral or estray dogs and cats that threaten, damage, or kill livestock. NWSP policy allows NWSP personnel to assist in feral dog and cat control at the request of local authorities upon approval of the NWSP State Director.

1.5.2 Compliance with Federal Laws.

Several federal laws authorize, regulate, or otherwise affect NWSP PDM activities. NWSP complies with these laws, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act (NEPA). All federal actions are subject to NEPA (42 U.S.C. §§ 4321 *et seq*.). APHIS-WS follows the Council of Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500 *et seq.*), and USDA (7 CFR 1b), and the APHIS' NEPA implementing regulations (7 CFR 372) as a part of the decision-making process. NEPA sets forth the requirement that all major federal actions be evaluated in terms of their potential to significantly affect the quality of the human environment.
Pursuant to NEPA and CEQ regulations, this EA documents the analysis of a proposed federal action's impact, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse impacts, and serves as a decision-aiding mechanism to ensure that the policies and goals of NEPA are infused into federal agency actions. This EA was prepared by integrating as many of the natural and social sciences as warranted based on the potential effects of the proposed action. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

Migratory Bird Treaty Act of 1918 (16 U.S.C. §§ 703-711), as amended. The Migratory Bird Treaty Act provides the USFWS regulatory authority to protect species of birds that migrate outside the United States and prohibits any take of migratory birds except as permitted by the USFWS. Migratory bird permits are discussed under Section 1.5.1 under the authority of the US Fish and Wildlife Service.

Bald and Golden Eagle Protection Act. This law provides special protection for bald (*Haliaeetus leucocephalus*) and golden (*Aquila chrysaetos*) eagles. Similar to the Migratory Bird Treaty Act, it prohibits any "*take*" of these species, except as permitted by the USFWS.

Endangered Species Act (ESA). It is NWSP and federal policy, under the ESA, that all federal agencies shall seek to conserve T&E species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts consultations with the USFWS, as required by Section 7 of the ESA, to use the expertise of the USFWS, to ensure that "*any action authorized, funded or carried out by such an agency. .. is not likely to jeopardize the continued existence of any endangered species or threatened species..* (Sec.7(a)(2)). WS has obtained a Biological Opinion from USFWS describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy ((USDA 1997, revised), Appendix F). NWSP has conducted informal consultations with USFWS and NDOW for the proposed PDM program specifically concerning the T&E species in Nevada and these letters are on file. Both agencies concurred with NWSP's finding that the proposed action would not likely effect T&E species.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. All pesticides used or recommended by NWSP are registered with and regulated by the Environmental Protection Agency (EPA) and NDOA. WS uses the chemicals according to labeling procedures and requirements as regulated by EPA and NDOA.

Fish and Wildlife Act of 1956 (section 742j-1) Airborne Hunting. This Act, approved in 1971 was added to the Fish and Wildlife Act of 1956 and is commonly referred to as the

Airborne Hunting Act or Shooting from Aircraft Act. The Act allows shooting animals from aircraft for certain reasons including protection of wildlife, livestock and human life as authorized by a federal or State issued license or permit. USFWS regulates the Airborne Hunting Act but has given implementation to the States. NDOW issues NWSP permits for aerial hunting.

National Historic Preservation Act of 1966, as amended (NHPA). The NHPA and its implementing regulations (CFR 36, 800) require federal agencies to: 1) determine whether proposed activities constitute "undertakings" that can result in changes in the character or use of historic properties; 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources; and 3) consult with appropriate American Indian tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings. Activities described under the proposed action do not cause major ground disturbance and are not undertakings as defined by the NHPA. The Nevada Historic Preservation Office has indicated no concerns with PDM activities in the State because construction and earth moving activities are not conducted.

The Wild Horse and Burro Act of 1971. The Wild Horse and Burro Act of 1971 (Public Law 92-195) as amended by The Federal Land Policy and Management Act of 1996 (Public Law 94-579) and The Public Rangelands Improvement Act of 1978 (Public Law 95-514) requires BLM and USFS to manage wild horse and burro herds at population levels that preserve and maintain a thriving natural ecological balance on areas that they roam.

Native American Graves Protection and Repatriation Act. The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

The Wilderness Act (16 U.S.C. §§ 1131-1136). The Wilderness Act established a national preservation system to protect areas *"where the earth and its community life are untrammeled by man*" for the United States. Wilderness areas are devoted to the public for recreational, scenic, scientific, educational, conservation, and historical use. This includes the grazing of livestock where it was established prior to the enactment of the law (Sept. 3, 1964) and PDM is an integral part of a livestock grazing program. The Act did leave management authority for fish and wildlife with the State for those species under their jurisdiction. Some portions of wilderness areas (WAs) in Nevada have historic grazing allotments and NWSP conducts limited PDM in a few per Nevada laws for protecting livestock and other resources.

Environmental Justice and Executive Order 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Environmental Justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Executive Order 12898 requires federal agencies to make Environmental Justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies and activities on minority and low-income persons or populations. A critical goal of Executive Order 12898 is to improve the scientific basis for decision-making by conducting assessments that identify and prioritize environmental health risks and

procedures for risk reduction. Environmental Justice is a priority within USDA, APHIS, and WS. APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA.

WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to ensure Environmental Justice. NWSP personnel use wildlife damage management methods as selectively and environmentally conscientiously as possible. All chemicals used by NWSP are regulated by the EPA through FIFRA, NDOA, by MOUs with federal land managing agencies, and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used following label directions, they are highly selective to target individuals or populations, and such use has negligible impacts on the environment ((USDA 1997, revised), Appendix P). The WS operational program properly disposes of any excess solid or hazardous waste. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

CHAPTER 2: ISSUES

Chapter 2 contains a discussion of the issues, including those that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), those used to develop standard operating procedures, and those that will not be considered in detail with rationale. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to developstandard operating procedures. Additional affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4.

2.1 ISSUES

The following environmental issues or concerns about PDM are evaluated for this EA under each alternative. The issues have been identified through interagency planning and coordination, prior NEPA compliance processes in Nevada, and the WS programmatic EIS ((USDA 1997, revised), revised). These issues are defined in Section 2.2.1 and are evaluated under each alternative in Chapter 4, Environmental Consequences.

Effects on the biological environment

- Effects on Target Predator Species Populations
- Effects on Non-target Species Populations, Including threatened and endangered (T&E) Species

Effects on the physical environment

- Impacts on Special Management Areas (such as Wilderness Study Areas)

Effects on the socioeconomic environment

- Humaneness and Ethical Perspectives
- Effects on Recreation (hunting and nonconsumptive uses)
- Cost Effectiveness

Effects on public health and safety

- Impacts on Public Safety and the Environment (e.g., effects of toxicants and hazardous materials)

Management considerations that may affect the decision

- Effectiveness of NWSP

Indirect and Cumulative Impacts

- Included under issues as applicable

2.2 ISSUES EVALUATED IN DETAIL

2.2.1 Effects on Target Predator Species Populations. Maintaining viable populations of all species is a concern of the public and of biologists within the State and federal land and wildlife management agencies, including NWSP. A concern of some is that NWSP PDM will adversely affect populations of target species, which, for purposes of this EA are primarily coyotes, ravens,

mountain lions, and striped skunks. To address these concerns, the effects of each alternative on populations for each target species are examined.

2.2.2 Effects on Non-target Species Populations, Including Threatened and Endangered (T&E) Species. A common concern among members of the public and wildlife professionals, including NWSP personnel, is the possible impact of PDM control methods and activities on non-target species, particularly T&E species. Standard operating procedures of NWSP include measures intended to mitigate or reduce the effects of PDM on non-target species populations and are presented in Chapter 3.

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or protection measures. The results of the biological evaluation are included in Chapter 4, and a description of pertinent minimization measures established are presented in Chapter 3.

2.2.3 Humaneness and Ethical Perspectives. Many people are concerned with the humane treatment of animals. The issue of humaneness and other sociological issues can be interpreted in a variety of ways and are discussed in Chapter 4.

2.2.4 Effects on Recreation (Hunting and Non-consumptive Uses). Some members of the public may be concerned that NWSP activities could conflict with recreation. Recreational activities include consumptive uses such as hunting and fishing, and non-consumptive uses such as wildlife viewing or hiking.

2.2.5 Impacts on Public Safety and the Environment. Some members of the public may be concerned that NWSP's management methods could threaten public safety, and that the use of toxicants could negatively affect the environment.

2.2.6 Cost Effectiveness of NWSP. The potential cost effectiveness of the alternatives is discussed in terms of benefits and costs to producers and to the public at large.

2.2.7 Impacts on Special Management Areas (SMAs). The effect of the proposal on SMAs such as Wilderness Study Areas are discussed.

2.2.8 Indirect and Cumulative Impacts. Indirect impacts are defined as those impacts which indirectly have an effect on the environment as a result of program implementation. Cumulative impacts, as defined by the Council on Environmental Quality (CEQ), are impacts on the environment that result from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions, regardless of who undertakes such other actions (40 CFR 1508.7).

2.3 ISSUES NOT CONSIDERED IN DETAIL WITH RATIONALE

NWSP's Impact on Biodiversity. No NWSP wildlife management program in Nevada is conducted with the purpose of eradicating a wildlife population. NWSP operates in accordance with international, federal, and State laws and regulations enacted to ensure species viability. Any reduction of a local population or group would be temporary because immigration from adjacent areas or reproduction would replace the

animals removed. The impacts of the current WS program on biodiversity are not significant nationwide or statewide (USDA 1997, revised). NWSP operates on a relatively small percentage of the land area of Nevada and NWSP's take is only a small proportion of the total population of any species as analyzed in Chapter 4.

Livestock Losses Are a Tax "Write Off". Some people believe that livestock producers receive double benefits because producers have a partially tax funded program to resolve predation problems while they also receive deductions for livestock lost as a business expense on tax returns. However, this notion is incorrect because the Internal Revenue Service tax code (Internal Revenue Code, Section 1245, 1281) does not allow for livestock losses to be "written off" if the killed livestock was produced on the ranch. Most predation occurs on young livestock (lambs, kids, and calves) in Nevada. Additionally, many ewes, nannies, and cows added as breeding stock replacements to herds from the lamb, kid, and calf crop, and if lost to predation they cannot be "written off" since they were not purchased. These factors limit the ability of livestock producers to recover financial losses. This analysis clearly shows that producers do not receive double benefits from having a federal program to manage wildlife damage and collect federal tax deductions for predation losses.

Livestock Losses Should Be an Accepted Cost of Doing Business. NWSP is aware of concerns that federal PDM should not be allowed until economic losses reach an identified threshold of loss or become unacceptable. Although some losses of livestock and poultry can be expected and are tolerated by livestock producers, NWSP has the legal direction to respond to requests for wildlife damage management, and it is WS policy to aid each requester to minimize losses. NWSP uses the Decision Model discussed in Chapter 3 to determine an appropriate strategy.

No Wildlife Damage Management at Taxpayer Expense, Wildlife Damage Management Should Be Fee Based. NWSP is aware of concerns that wildlife damage management should not be provided at the expense of the taxpayer or that it should be fee based. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Funding for NWSP PDM comes from a variety of sources in addition to federal appropriations. Such nonfederal sources include Nevada general appropriations, local government funds (county or city), livestock associations, grazing fees, and livestock producer head tax funds and these are all applied toward program operations. Federal, State, and local officials have decided that PDM needs to be conducted and have allocated funds for these activities. Additionally, wildlife damage management is an appropriate sphere of activity for government programs, since wildlife management is a government responsibility. A commonly voiced argument for publicly funded wildlife damage management is that the public should bear the responsibility for damage to private property caused by "publicly-owned" wildlife. In Nevada with its high ratio of federal to privately owned lands, the responsibility for PDM is especially true.

Cultural Resource Concerns. The National Historic Preservation Act of 1966, as amended, requires federal agencies to evaluate the effects of any federal undertaking on cultural resources and determine whether they have concerns for cultural properties in areas of these federal undertakings. In most cases, wildlife damage management activities have little potential to cause adverse effects to sensitive historical and cultural resources. In consideration of cultural and archeological interests, though, NWSP solicited input from the Nevada State Historic Preservation Office. Their response to NWSP was that wildlife damage management activities would have negligible impacts to historic properties in Nevada.

American Indian and Cultural Resource Concerns. The Native American Graves and Repatriation Act of 1990 provides protection of American Indian burials and establishes procedures for notifying Tribes of any new discoveries. Senate Bill 61, signed in 1992, sets similar requirements for burial protection and Tribal notification with respect to American Indian burials discovered on State and private lands. If a burial site is located by a NWSP employee, the appropriate Tribe will be notified. PDM activities will only be conducted at the request of a Tribe and, therefore, the Tribe will have ample opportunity to discuss cultural and archeological concerns with NWSP. In addition, in consideration of Nevada's Native American Indians, NWSP has included all of the recognized Tribes in Nevada and the Bureau of Indian Affairs on the mailing list for this EA to solicit their comments.

Global Climate Change/Greenhouse Gas Emissions. The WS program activities likely to result from the proposed action would have a negligible effect on atmospheric conditions including the global climate. Meaningful direct or indirect emissions of greenhouse gases would not occur as a result of the proposed action. The proposed action would meet requirements of applicable federal laws, regulations, and Executive Orders including the Clean Air Act and Executive Order 13514.

Protection of Children from Environmental Health and Safety Risks (Executive Order 13045). Children may suffer disproportionately from environmental health and safety risks for many reasons, including their development physical and mental status. Because APHIS-WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, APHIS-WS has considered the effects that this proposal might have on children. The proposed wildlife damage management would occur by using only legally available and approved damage management methods where it is highly unlikely that children would be adversely affected. For these reasons, APHIS-WS concludes that it would not create an adverse environmental health or safety risk to children from implementing this proposed action. In contrast, the proposed action may reduce adverse environmental health or safety risks by reducing risks (i.e., disease, attacks) to which children may potentially be exposed.

Other Environmental Resources. NWSP's PDM activities have been evaluated for their impacts on several other natural environmental factors. The FEIS (USDA 1997, revised) concluded that impacts on air quality from the methods used by the NWSP are considered negligible. The actions discussed in this EA do not involve major ground disturbance or construction. Therefore, the following resource values are not expected to be significantly affected by the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, vegetation, and cultural resources. There are no significant irreversible or irretrievable commitments of resources other than a minor use of fossil fuels to operate vehicles.

The NWSP activities likely to result from the proposed action would have a negligible effect on atmospheric conditions including the global climate. Meaningful direct and indirect emissions of greenhouse gases would not occur as a result of the proposed action. The proposed action would meet the requirements of applicable federal laws, regulations and Executive Orders including the Clean Air Act and Executive Order 13514.

CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

NWSP's alternatives must encompass the varied and diverse needs of wildlife damage management and be applicable throughout the program. The varied nature and species diversity inherent in the various requests for assistance to manage damages caused by predators requires NWSP to be diverse, dynamic and flexible. The program, under any selected alternative, must be adaptable to varied situations that can be accomplished in a timely manner. Table 3 compares the varied methods that should be used in each alternative.

The FEIS developed 13 possible alternatives (USDA 1997, revised). Of the 13 courses of action, the following six alternatives are relevant to NWSP and were considered in this process. Many of these alternatives were also considered by the seven BLM and two USFS wildlife damage management EAs (USDA 1991, 1992, USDI 1989, 1993a, b, 1994a, b, c, 1995). From all of the examined alternatives, the cooperating agencies determined that the following six alternatives were reasonable for consideration in this EA's analysis.

3.1 ALTERNATIVES ANALYZED IN DETAIL

3.1.1 Alternative 1 Continue the Current Federal PDM Program. This is the current NWSP. It is also the "No Action" alternative as defined by the Council on Environmental Quality for ongoing programs.

3.1.2 Alternative 2 No Federal PDM. This alternative consists of no federal PDM.

3.1.3 Alternative 3 Nonlethal Management Only. Under this alternative, NWSP would use only nonlethal PDM tools in attempting to resolve damage complaints.

3.1.4 Alternative 4 Nonlethal Required before Lethal Control. This alternative would not allow any lethal control by NWSP until nonlethal methods have been tried and found to be inadequate in each depredation situation.

3.1.5 Alternative 5 Modified Current Program, the "Proposed Alternative." The Proposed Action as summarized in Chapter 1 would be a continuance of the current program as modified to increase program focus on natural resource protection including sage grouse, bighorn sheep, mule deer, elk and pronghorn antelope.

3.2 DESCRIPTION OF THE ALTERNATIVES

3.2.1 Alternative 1 Continue the Current Federal PDM Program

The current PDM program is also termed the "No Action" alternative since it proposes no changes from the existing program, consistent with CEQ's definition for ongoing programs. The "No Action" alternative is also a procedural NEPA requirement (40 CFR 1502.14(d) and will serve as a baseline for comparison with the other alternatives.

Most of the requests for PDM come from private resource owners, particularly livestock operators who may utilize both private and public lands. The majority of the livestock owners are based on private land and many of these graze their livestock on public lands for some portion of the year. Thus predation can occur on both public

and private lands. Many of the livestock owners also graze their livestock on lands which adjoin public lands and experience predation which originates from the public lands. Livestock owners are given PDM assistance from NWSP within the fiscal constraints of the current program.

NWSP also receives some requests for PDM assistance to protect other agricultural products such as crops, property and natural resources, and human health and safety. Most of these requests also come from private individuals. However, requests may also come from public entities such as a county sheriff, City Park, or other local or State government office or resource manager. Occasionally, a federal land management agency will request NWSP assistance. PDM provided by NWSP personnel can be conducted on public, private, State, Tribal, and other lands, or any combination of these land class types.

The current PDM program on private lands is governed by WS policy and a specific private property agreement for that particular property which specifies the methods to be used and the species to be targeted.

The current program activity on public lands is defined specifically in AWPs. WS has MOUs with BLM, 1995, and USFS, 2004, giving WS the authority and responsibility to be the lead agency under NEPA, with BLM and USFS, respectively, as cooperating agencies, concerning PDM activities on lands managed by the BLM and USFS. All anticipated NWSP activities on USFS and BLM lands are outlined in NWSP AWPs. NWSP produces an AWP for each specific BLM Field Office and USFS NF annually. Coordination meetings are held yearly between NWSP and personnel from the land management agencies to discuss accomplishments of the previous year, issues of concern, and any anticipated changes in proposed AWPs. Site specific information for proposed work is detailed in the AWPs and on associated maps provided by BLM or USFS. Requests for control work on BLM and USFS lands can come from the livestock permittees, the land managing agency, or adjoining property owners. NDOW has management authority for the non-T&E, resident wildlife on BLM and USFS lands. NWSP signed an MOU with NDOW in 1987 which delineated responsibility for conducting PDM with the various species of wildlife that are managed by NDOW. USFWS has management authority for migratory birds and T&E species. Any of the land management agencies, NDOW, or USFWS could request NWSP to conduct PDM for the wildlife species managed by NDOW and USFWS.

During work planning meetings, NWSP provides information on proposed actions to the cooperating agencies (BLM, USFS, and NDOW). BLM and USFS are responsible for reviewing the proposed actions to assess their compatibility with established RMPs or LRMPs. It is the land management's responsibility to clearly show where a proposed action would likely conflict with land use plans. In cases where the land management agency demonstrates that a conflict between NWSP's proposed action and established land use plans exists, further discussions are initiated to establish what measures will be necessary to alleviate the conflict. Maps are used to delineate areas where wildlife damage management restrictions or limitations are needed to avoid conflicts with land uses. These meetings, along with the WS Decision Model (Slate et al. 1992), provide further site specific planning mechanisms to evaluate and monitor the program. The AWP is tiered to the EA for that specific NF or BLM District and all adopted measures from the EA are considered part of the AWP.

Planned Control Areas. Planned control areas are areas where NWSP is actively working or plans to work to limit agricultural or natural resource losses, damages to property, or threats to human health and safety. Planned activities are those which are anticipated to occur based on historical needs. Depredation control work is most concentrated in areas where livestock are most abundant and during times when they are most vulnerable to predators (e.g., during calving and lambing). Requests for assistance in reducing property damage and threats to human health and safety are by their nature, intermittent and thus less predictable.

Summary of Major Planned Seasonal Activities and PDM Methods Used for the NWSP Districts. NWSP is roughly divided into two management Districts, the West District and East District, which assist each other as necessary. The major planned activities and brief descriptions of the District programs are summarized below. The selection of methods to control depredation follows the WS Decision Model (Slate et al. 1992) on a case-by-case basis.

West District. The West District is comprised of Carson City, Churchill, Clark, Douglas, Esmeralda, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe Counties and parts of Nye County.

From December through February (winter), requests for PDM assistance on calving grounds is scattered throughout the District. Aerial hunting is generally the most effective control method. Other direct control methods such as traps, snares, M-44s, and shooting are used in sheep winter ranges where large concentrations of sheep occur. The sheep winter ranges are concentrated in: the area between Lovelock, Nixon, Gerlach and Jungo; the private lands and BLM winter allotments in the southern portion of the Reno District; the BLM winter allotments; and the Smith and Mason Valleys' private ranches.

During March, April and May (spring), most PDM is done to prevent depredation on lambing ranges. All legal methods are used as needed and appropriate. The areas of concentrated effort include: south of Interstate Hwy. 80 on the Toiyabe NF sheep allotments; BLM sheep allotments; the area north of Interstate Hwy. 80 that lies east of the California State line, south of the Oregon State line, west of Gerlach, and north of Smoke Creek; and a limited amount of private lands throughout the District.

During June, July and August (summer), assistance in controlling predation on spring lambing grounds continues until the third week of June. The need for PDM reduces with the onset of higher temperatures, the movement of sheep to higher grounds, and the availability of alternative prey including deer and antelope fawns. Aerial hunting activities are limited due to air density restrictions caused by higher temperatures, so ground methods are used more heavily. The areas of concentrated effort include: Bilk Creek Mountains and Humboldt Range (BLM sheep allotments); and the Humboldt and Toiyabe NFs sheep allotments.

During the months of September, October and November (fall), sporadic predation damage management is performed for sheep protection. The need for PDM is reduced because lambs reach docking age. The movement of sheep from the high country allotments to clean-up pastures reduces depredation incidences and PDM activities.

Requests for assistance with other resources come sporadically throughout the year. Winter is usually the slowest time of the year for PDM associated with other resources. Many of these requests come from the Reno and Carson City area.

East District. The East District encompasses Elko, Eureka, Lincoln, White Pine Counties and parts of Nye County.

During winter, PDM for the protection of sheep is provided mostly in the southern and eastern parts of the District. Again, all legal methods are used during this time. The calving grounds District-wide are protected mostly with aerial hunting; aerial hunting is the preferred method because of its selectivity, accessibility, effectiveness, and ability to traverse rough terrain during winter weather. In addition, it provides the greatest area of coverage needed to protect livestock resources.

During spring, coyotes inflict the greatest predation losses coinciding with lambing. Therefore, PDM is intensified with all necessary methods including traps, snares, M-44s and shooting. Aerial hunting is frequently used during the spring.

During summer, PDM to protect sheep is provided at higher elevations in White Pine, Eureka, and Elko Counties. All legal methods are used as appropriate.

PDM associated with other resources such as property and crops is sporadic, but is usually conducted more in the spring and summer. During the months of April, May and June, PDM efforts are greatest because coyote predation of lambs on lambing grounds is at its highest. All legal tools and techniques are used. The areas of concentrated effort are lambing allotments on BLM lands that include the south end of Elko County in Huntington Valley, Railroad Pass, and Brown and Red Rock allotments. Work is also concentrated in southwest Elko County in the Rock Creek allotment (Squaw Valley) and Pumpernickel Valley in western Humboldt County.

During summer, the majority of direct PDM is done on the Humboldt NF in Elko County: Martin Canyon, Copper Basin, Columbia Basin, and the Ruby Mountains. Some PDM is also conducted in northern Elko County on BLM lands.

During fall and winter, PDM is at its lowest level. Aerial hunting, traps, M-44s, and snares are the primary tools used during this period. PDM is provided to protect sheep in Lander County on the Gilbert Creek BLM sheep allotment and in eastern Humboldt and eastern Elko Counties. Cattle producers throughout the District receive assistance through aerial hunting during this time.

PDM associated with other resources such as property and crops is sporadic and normally is more prevalent in the spring and summer.

Unplanned/Emergency Control Areas. Unplanned and emergency PDM may be provided in areas where no control is scheduled in the AWP with the exception of areas designated as restricted for safety or other reasons. The restricted zones are identified by the cooperating agencies during the AWP meetings and noted on maps using a color scheme. Where unanticipated local damage problems arise that threaten human health and safety or property, NWSP may take immediate action to eliminate or curtail the problem upon receipt of a request for assistance provided the proposed control area is not located within a designated restricted activity zone. Emergency PDM activities are handled on a case-by-case basis, as the need arises. NWSP notifies the cooperating agency as soon as practical after the emergency action commences and the work is performed.

Integrated Wildlife Damage Management

The current program alternative is an IWDM approach and similar to the “current program” which was analyzed and discussed in the FEIS (USDA 1997, revised). It is composed of a variety of methods that are implemented based on the WS Decision Model (Figure 1). The discussion that follows contains further information intended to foster understanding of NWSP.

During more than 70 years of resolving wildlife damage problems, NWSP has considered, developed, and used numerous methods of managing damage problems ((USDA 1997, revised), P. 2-15). The efforts have involved

research and development of new methods and the implementation of effective strategies to resolve wildlife damage.

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. IWDM is the implementation and application of safe and practical methods for the prevention and control of damage caused by wildlife based on local problem analyses and the informed judgment of trained personnel. NWSP applies IWDM, commonly known as Integrated Pest Management (WS Directive 2.105), to reduce damage through the WS Decision Model (Slate et. al. 1992) described in the FEIS (USDA 1997, revised).

The philosophy behind IWDM is to implement effective management techniques in a cost effective manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM draws from the largest possible array of options to create a combination of techniques appropriate for the specific circumstances. IWDM may incorporate cultural practices (i.e. animal husbandry), habitat modification, animal behavior (i.e. scaring), local population reduction, or any combination of these, depending on the characteristics of the specific damage problems. The FEIS describes the procedures used by NWSP personnel to determine management strategies or methods applied to specific damage problems (USDA 1997, revised). As depicted in the Decision Model (Figure 1), consideration is given to the following factors before selecting or recommending control methods and techniques:

- Species responsible for damage
- Magnitude, geographic extent, frequency, and duration of the problem
- Status of target and non-target species, including T&E species
- Local environmental conditions
- Potential biological, physical, economic, and social impacts
- Potential legal restrictions
- Costs of control options
- Prevention of future damage (lethal and nonlethal techniques)

The WS Decision Making Process. The WS decision making process is a standardized procedure for evaluating and responding to damage complaints. NWSP personnel are frequently contacted only after requesters have tried the available nonlethal techniques and found them to be inadequate for alleviating or reducing damage to an acceptable level. Appendix D contains a description of producer implemented nonlethal methods used in Nevada. NWSP personnel evaluate the appropriateness of different PDM methods in the context of their availability (legal and administrative) and suitability based on biological, economic and social considerations (NWSP methods are given in appendix B). Following this evaluation, the methods deemed to be practical for the situation are formed into a management strategy. Once implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for additional management is ended. The FEIS provides detailed examples of how the WS Decision Model is implemented for coyote predation on sheep managed on public and private lands (USDA 1997, revised).

On most ranches, or allotments, predator damage can occur whenever vulnerable livestock are present. This continual threat exists because there is no cost-effective or socially acceptable method or combination of methods to permanently stop or prevent livestock predation. When damage continues intermittently over time, the NWSP

specialist and rancher (or resource manager) will monitor and periodically reevaluate the situation. If one method or combination of methods fails to stop damage, a different strategy is implemented.

In terms of the WS Decision Model, most damage management efforts consist of a continuous feedback loop between receiving the request and monitoring the results with the control strategy reevaluated and revised periodically. The cost of IWDM can be secondary in consideration of overriding environmental, legal, human health and safety, animal welfare, or other concerns.

The IWDM Strategies That NWSP Employs

- **Technical Assistance Recommendations** (implementation is the responsibility of the requestor). NWSP personnel provide information, demonstrations, and advice on many of the available IWDM techniques. Technical assistance includes demonstrations on the proper use of management devices (propane exploders, cage traps, etc.) and information and advice on animal husbandry practices, habitat management, and animal behavior modification devices. Technical assistance is generally provided by NWSP personnel following an on-site visit or verbal consultation with the requestor. Generally, several management strategies are described to the requestor for short and long-term solutions to damage problems. These strategies are based on the level of risk, the abilities of the requestor, need, and practical application. Technical assistance may require substantial effort by NWSP personnel in the decision making process, but the actual management is primarily the responsibility of the requestor.

- **Direct Control Assistance** (activities conducted or supervised by NWSP personnel). Direct control assistance is implemented when the problem cannot effectively be resolved through technical assistance and when Cooperative Agreements provide for NWSP direct control assistance. The initial investigation defines the nature and history of the problem, extent of damage, and the species responsible for the damage. Professional skills of NWSP personnel are often required to effectively resolve problems, especially if restricted-use pesticides are proposed, or if the problem is too complex and requires the direct supervision of the wildlife professional. NWSP considers the biology and behavior of the damaging species and other factors using the WS Decision Model (Slate et al. 1992). The recommended strategy (ies) may include any combination of proactive and reactive actions that could be implemented by the requestor, NWSP, or other agency, as appropriate. Two strategies are used by NWSP, proactive and reactive or corrective damage management.

- **Proactive Damage Management.** Proactive damage management is the application of wildlife damage management strategies prior to damage occurrences, based on historical damage problems. As requested and appropriate, NWSP personnel provide information, conduct demonstrations or take action to prevent these historical problems from recurring. For example, in areas where substantial lamb depredation has occurred on lambing grounds, NWSP may provide information about guard dogs, fences or other husbandry techniques, or be requested to conduct operational PDM prior to lambing. Proactive damage management

can take place on most lands without special authorization. NWSP must receive a request from the resource owner or individual that is experiencing the damage on federal lands. Proactive PDM cannot be conducted in BLM Wilderness Study Areas (WSAs).

- **Reactive (Corrective) Damage Management.** Reactive damage management is the application of PDM in response to an incurred loss with the intent of abating or reducing further losses. As requested and appropriate, NWSP personnel would provide information and conduct demonstrations or, with the appropriate signed agreement, take action to prevent additional losses from occurring. For example, in areas where lamb depredations are occurring, NWSP may provide information about guard dogs, fences or husbandry techniques, and conduct operational PDM to prevent further losses.

Predator Damage Management Methods Available for Use

Under the current program, NWSP receives requests for assistance from and may enter into cooperative agreements with private landowners, livestock managers, Tribal land managers for the Duckwater Shoshone, Goshute, Moapa River Paiute and other Tribes, cooperating counties, BLM, USFS, NDOW, and other federal, State, county, and municipal agencies. The methods used in the current program include technical assistance such as animal husbandry, fencing, frightening devices, chemical repellents, and harassment, and direct control methods such as leghold and cage traps, snares, shooting, calling and shooting, aerial hunting, M-44s, gas cartridges, and hunting dogs. Detailed descriptions of each method are given in Appendix B. Most PDM methods have recognized strengths and weaknesses relative to each specific predator damage situation. NWSP personnel can determine for each PDM activity what method or combination of methods is most appropriate and effective using the WS Decision Model (Slate et al. 1992). A number of methods are available for consideration in this process. NWSP conducts direct control activities on private lands only where signed *Agreements For Control On Private Property* have been executed. NWSP conducts direct control activities on municipal, county or other government lands where *Agreements For Control On Nonprivate Property* are in place. These agreements list the intended target animals and methods to be used.

Nonlethal Methods. Livestock producers and other resource owner practices consist primarily of nonlethal preventive methods such as animal husbandry, and habitat and animal behavior modifications. Producers are encouraged to use these methods, based on the level of risk, need, and professional judgment on their effectiveness and practicality (USDA 2002). ~~In addition, some~~Many nonlethal predator control practices are most appropriately implemented by the managers of livestock. All livestock producers who receive services from the NWSP employ nonlethal practices to protect their livestock from predation. Nonlethal approaches are used much more often than lethal practices in Nevada. NWSP supervisors and wildlife specialists are familiar with producer implemented practices based on the information that specialists must gain to assess producer needs. The WS Decision Model (Slate et al. 1992) shows that a predation problem must be assessed before an appropriate strategy for resolution can

be developed. A description of Nevada livestock producer employed nonlethal methods has been described by field staff and their supervisors and is contained in Appendix D.

Some methods such as leghold and cage traps can be used nonlethally or lethally, often depending on the species involved and the circumstances. Target animals are usually not relocated, especially with species that are numerous such as coyotes and striped skunks. Translocation of wild animals is discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal and poor survival rates due to intraspecific strife with established resident animals of the same species, and because of difficulties in adapting to new locations or habitats. Relocation of captured problem animals is also opposed by the American Veterinary Medical Association, the National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists because of the risk of disease transmission among wild mammals. In addition, Nevada State law allows the relocation of wild animals only with a permit (NAC 503.135).

Lethal Methods. Lethal control methods are often most appropriately used by NWSP personnel trained and certified to use them. The public, in general, does not have the capability or the necessary training to use many of these lethal techniques, or have access to them. Techniques that are used lethally are neck snares, firearms, aerial hunting, M-44s (sodium cyanide ejector mechanisms), gas cartridges and DRC-1339 (avian toxicant). Techniques that are often used lethally, but are not necessarily lethal, include leg-hold and cage traps, foot snares, dogs, and denning.

3.2.2 Alternative 2 No Federal NWSP PDM

This alternative would consist of no federal involvement in PDM activities in Nevada. Neither direct operational management nor technical assistance would be provided by the federal members (WS) of NWSP. Information on future developments in nonlethal and lethal management techniques that culminate from WS's research branch would not be as readily available to producers or resource owners. Under this alternative, wildlife damage conflicts would be addressed by NDOW, private resource owners and managers, private contractors, or other government agencies. If WS chooses to not provide the PDM services that NWSP feels are necessary, the State would likely rescind the federal management of that program, and the Nevada Department of Agriculture would probably handle agriculture related PDM complaints.

In the event that professional PDM assistance is eliminated, it is probable that some resource owners/managers would try to use PDM methods in an unsafe and improper manner, such as the illegal use of pesticides. The avicide DRC-1339 is a special restricted use pesticide and can only be used under direct supervision by WS employees. Consequentially, this technique would not be available under this alternative. This alternative is discussed in detail in the WS programmatic FEIS (USDA 1997, revised).

3.2.3 Alternative 3 Nonlethal Management Only

This alternative would allow NWSP to provide technical information and operational assistance with nonlethal control techniques, such as guard dogs, frightening devices, chemical repellents, harassment, fencing, exclusion, animal husbandry, modification of human behavior, habitat modification, and some use of cage traps and immobilization where relocation is an option (see Appendix B). NWSP would also loan equipment used for nonlethal control. Information and training on lethal control methods would not

be provided by NWSP. Lethal PDM methods and control devices could be applied by persons with little or no training or experience. As discussed in 3.2.2, many PDM methods could be used improperly because of the frustration of resource owners. The avicide DRC-1339 is a special restricted use pesticide and can only be used by WS employees, so this technique would not be available to private users who may take lethal actions on their own.

3.2.4 Alternative 4 Nonlethal Required before Lethal Control

This alternative would require that: 1) permittees, landowners or resource managers show evidence of sustained and ongoing use of nonlethal or husbandry techniques aimed at preventing or reducing predation, prior to receiving the services of NWSP; 2) employees of NWSP use or recommend appropriate nonlethal techniques in response to a confirmed damage situation prior to using lethal methods; and 3) lethal techniques be used only when the use of husbandry or nonlethal techniques had failed to keep livestock losses below an acceptable level as indicated by the cooperator. This alternative is analyzed and discussed in the WS programmatic EIS ((USDA 1997, revised), revised. Producers would still have the option of implementing lethal control measures on their own and NWSP would continue to recommend lethal control when and where appropriate.

3.2.5 Alternative 5 Modified Current Program and Proposed Action. This alternative would be ~~identical~~similar to Alternative 1 in all respects except that efforts to manage damage associated with predation on game species including sage grouse, bighorn sheep, mule deer, elk and pronghorn antelope would be likely to increase~~.~~, while efforts to protect livestock would decrease. Under this alternative, additional requests would be anticipated to come from NDOW where it has determined that predation is limiting productivity.

NDOW may request the assistance of NWSP to conduct PDM to protect game species anywhere they are managed throughout the State. NDOW's Statewide Deer and Multi Species Enhancement Project (NDOW 2010d) outline several criteria which drive NDOW's decisions to request PDM assistance from NWSP. The criteria are listed below and include but are not limited to:

1. mule deer herds below carrying capacity, below long term averages for fawn: doe ratios and where recruitment is below long term averages;
2. areas where multiple big game species exist;
3. areas where long term habitat improvements are under way;
4. areas where recent augmentations have occurred or where reintroductions are planned;
5. areas where other big game species are below carrying capacity, under long term averages for adult female; offspring ratios, and areas where recruitment is below long term averages.

~~Currently proposed or ongoing projects~~Although the Wildlife Commission can recommend NDOW change proposed and ongoing projects, and NDOW can also change proposed or ongoing projects, the currently proposed or ongoing projects to protect game species are described in (NDOW 2010d) and include the following:

●PDM to protect multiple species in Nye County. This project should begin in 2011 and is a collaboration between NWSP, NDOW, and Utah State University (USU) to study the impact of coyote removal on deer in Nevada. NWSP would conduct PDM where fawn to doe ratios are some of the lowest in the State and rarely have exceeded 30:100 in recent years. The area provides habitat for elk, bighorn

sheep and antelope. One of the management units in the area contains one of the most important source stocks of Nelson (Desert) bighorn sheep in the State. Researchers at USU have designed the study to determine if coyotes are decreasing fawn survival, and to determine what conditions are present when coyote removal improves fawn survival and deer densities. Results of the study are intended to help managers decide if and when coyote removal should be used to increase mule deer populations. The need for this project was determined from literature reviews which showed that most studies examining the effects of predator control on native ungulates have been conducted over short periods of time in relatively small areas (Ballard et al. 2001, 2003). Only two large-scale predator control studies have been conducted thus far. Those studies, by Harrington and Conover (2007) and Hurley and Zager (2007), looked at pronghorn and mule deer in Utah, and mule deer in southeast Idaho, respectively, and found that coyote control did not increase fawn to adult ratios but in some cases did improve herd densities. Based on these and earlier studies, there is a need to determine why predator control benefits mule deer recruitment and densities in some cases but not in others. Results of this seven-year study will be evaluated by both NDOW and NWSP when they are available and adjustments to management criteria may be made accordingly.

● Protection of desert bighorn sheep in the Delamar Mountains. This ongoing project would include mountain lion, bobcat and coyote removal on a case-by-case basis. This project is based on confirmed predation by all three predator species combined with high predation risk to augmented or introduced bighorns. Predation damage management would continue as long as predation losses exceed recruitment. This bighorn sheep herd has benefitted from water development projects and may become one of the largest populations of desert bighorn sheep in the State.

● Deer Fawn protection at Wilson Creek-White Rock. This ongoing project entails removal of coyotes in summer and winter ranges. Increased fawn to doe ratios are likely from various factors including PDM. Climatic conditions, water development and habitat restoration efforts are also factors.

●Deer fawn protection at Horse and Cattle Camp Loop, Schell Creek Range. Removal of coyotes is partially attributed to improved fawn to doe ratios. Climatic conditions, water development and habitat restoration efforts are also factors.

●Protection of mule deer in Granite Range, Washoe County. This ongoing project involves removing coyotes and mountain lions to protect mule deer. Results indicated radio collared deer benefitted from PDM. Fawn doe ratios were higher than adjacent areas and may indicate a benefit from PDM.

●Protection of sage-grouse at Winters Creek/Marble Canyon from Wildlife effects, Elko County. Coyotes and ravens would be removed from unburned areas where NDOW predicted that those remaining habitats would be predator pits and sinks for remaining wildlife including mule deer after catastrophic fires occurred in 2006 and 2007. (Ongoing project).

● Protection of Virginia Mountains bighorn sheep from mountain lion predation. This ongoing project would target mountain lions that are preying on bighorn sheep. NDOW recommends mountain lions be removed where populations of bighorn sheep are recently introduced or augmented, where herds are underachieving, or where lion predation is identified as excessive.

● Protection of sage-grouse in Elko and Lincoln Counties. NDOW requested NWS~~C~~P protect 20 sage-grouse leks based on the number of ravens associated with sage grouse nests and where nest production was low and are important sage-grouse nesting areas. Ravens would be removed with DRC 1339 baits.

●Protection of wild turkey in Overton Wildlife Management Area. NWSP would remove ravens to increase turkey nesting success after several years of no turkey poult production~~.~~ (roughly every four to five years).

● Protection of pheasant in Mason Valley. NWSP would target coyotes, raccoons, skunks, badgers and ravens in areas where ring-necked pheasant poults would be released from incubator boxes to augment the existing wild population of ring-necked pheasants~~.~~ (occurred in FY 2010 and 2011, likely to be repeated in three to four years).

No new techniques for predator damage management would be used, and, overall, the program would not be expected to expand, but the program would focus more resources on protection of natural resources than the current program alternative (Alternative 1).

3.2.6 Summary of Alternatives. The six alternatives would allow the use of different PDM methods. The methods that could be used under the different alternatives are summarized in Table 3. Table 4 gives the methods that could be used for the different land classes where NWSP would conduct PDM.

Table 3. Summary of PDM methods which would be authorized under each of the alternatives.

Control Method	Alt. 1 Current Program	Alt. 2 No Federal Program3	Alt. 3 Nonlethal Methods Only	Alt. 4 Nonlethal/ lethal	Alt. 5 Proposed Action
	Technical Assistance				
Animal Husbandry	X		X	X	X
Crop Selection /Planting Schedule	X		X	X	X
Habitat Management	X		X	X	X
Fencing	X		X	X	X
Entrance Barricades	X		X	X	X
Close Storage Containers	X		X	X	X
Chemical Repellants	X		X	X	X
Guard Animals	X		X	X	X
Frightening Devices	X		X	X	X
	Direct Control				
Leghold Traps	X		X	X	X
Cage Traps	X		X	X	X
Neck/body snares	X			X	X
Foot snares	X		X	X	X
Catch Pole	X		X	X	X
Quick-kill traps	X			X	X
Calling/Shooting	X			X	X

[3] All methods other than M-44 and DRC-1339 could be used by private individuals or their agents.

Control Method	Alt. 1 Current Program	Alt. 2 No Federal Program3	Alt. 3 Nonlethal Methods Only	Alt. 4 Nonlethal/ lethal	Alt. 5 Proposed Action
Aerial hunting	X			X	X
M-44	X			X	X
DRC-1339	X			X	X
Gas Cartridge	X			X	X
Denning	X			X	X
Hand Catch	X		X	X	X
Dogs	X		X	X	X
Euthanasia	X			X	X

Table 4. Summary of PDM methods which would be authorized for NWSP use by land jurisdiction.

PDM Methods by Land Jurisdiction									
Management Method	Private	State	BLM	BLM WA	BLM WSA	USFS	USFS WA	USFS SDA	Tribal
Nonlethal	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Immobilization	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Frightening	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Preventative Aerial Hunting	Yes	Yes	Yes	Yes [2]	No	Yes [6]	Yes [5, 7]	Yes [9]	Yes [10]
Lethal	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Traps, Leghold	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Traps, Cage	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Aerial Hunting	Yes	Yes	Yes	Yes [2]	Yes [1,2, 3]	Yes	Yes [5, 7]	Yes [9]	Yes [10]
Calling/Shooting	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Denning	Yes	Yes	Yes	No	No	Yes	No	No	Yes [10]
Dogs	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Foot Snares	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
Neck Snares	Yes	Yes	Yes	Yes [2]	Yes [1,2]	Yes	Yes [5]	Yes [9]	Yes [10]
DRC-1339	Yes	Yes	Yes	No	No	Yes [4]	Yes [4, 5]	Yes [9]	Yes [10]
M-44s	Yes	Yes	Yes	No	No	Yes [4]	Yes [5, 8]	Yes [9]	Yes [10]
Gas Cartridge	Yes	Yes	Yes	No	No	Yes	No	No	Yes [10]

1 Wilderness Study Areas (WSA) NWSP PDM activities are subject to BLM Interim Management Policy (BLM 2004).
2 Requires notification to BLM Point of contact as soon as practical.
3 Requires approval by Nevada BLM State Director.
4 Regional forester must pre-approve pesticide use per USFS Manual, May 4 ,1995 Sect. 2151, but rely on NWSP's expertise per Sect. 2650.3
5 HTNF Forest Supervisor must pre-approve PDM in Wilderness per USFS Manual May 4, 1995 Sect. 2323, but again rely on NWSP's expertise
6 Will be coordinated with FS District Ranger.
7 Requires receipt of approval from the HTNF Forest Supervisor.
8 Could only be used for federal T&E species protection, if it were requested by a management agency.
9 Only in emergency situations and with the approval of the District Ranger or Forest Supervisor.
10 Requires approval by Tribal Council and Bureau of Indian Affairs

3.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered but not analyzed in detail. These were not considered because of problems associated with their implementation as described below.

3.3.1 Compensation for Predator Damage Losses

The Compensation alternative would require the establishment of a system to reimburse resource owners for predation or other losses. This alternative was eliminated from further analysis because no federal or State laws currently exist to authorize such action. Under such an alternative, NWSP would not provide any direct control or technical assistance. Aside from lack of legal authority, analysis of this alternative in the FEIS indicates that the concept has many drawbacks (USDA 1997, revised).

- It would require larger expenditures of money and manpower to investigate and validate all losses, and determine and administer appropriate compensation.
- It would be difficult, if not impossible, to assess and confirm losses in a timely manner for all requests, and, therefore, many losses could not be verified and compensated. Additionally, compensation would most likely be below full market value.
- Compensation would give little incentive to livestock and other resource owners to limit predation or damages with PDM strategies such as improved animal husbandry practices and fencing.
- Not all ranchers would rely completely on a compensation program and PDM activities including lethal control would likely continue as permitted by State law.

3.3.2 Bounties

Payment of funds for killing predators (bounties) suspected of causing economic losses is not supported by Nevada State agencies such as NDOW. NWSP concurs because of the following.

- Bounties are generally not effective in controlling damage, especially over a wide area such as Nevada.
- Circumstances surrounding the take of animals are typically arbitrary and completely unregulated.
- No process exists to prevent paying for animals from outside the damage management area.
- NWSP does not have the authority to establish a bounty program.

3.3.3 Eradication and Long Term Population Suppression

An eradication alternative would direct all NWSP efforts toward total long term elimination of coyotes and perhaps other predator species in entire cooperating areas or larger defined areas in Nevada. The eradication of predator species is not a desired goal of State agencies. However, coyotes, badgers, skunks, weasels, raccoons, and ringtails may be taken year-round with no restriction and furbearers can be taken at any time if they are found destroying livestock or poultry. This is allowed because current population levels of these species can sustain this level of take without irreparable consequences. Some landowners would prefer that some species of predators be eradicated. However, eradication as a general objective for PDM will not be considered by NWSP in detail because:

- NWSP opposes eradication of any native wildlife species;
- NDOW, USFWS, BLM, and USFS oppose eradication of any native wildlife species;
- The eradication of a native species or local population would be extremely difficult, if not impossible to accomplish, and cost-prohibitive in most situations; and
- Eradication is not acceptable to most members of the public.

Suppression would direct NWSP efforts toward managed reduction of certain problem populations or groups. In localized areas where damage can be attributed to predation by specific groups, NDOW has the authority to increase hunting seasons and hunter tag quotas. When a large number of requests for wildlife damage management are generated from a localized area, NWSP would consider suppression of the local population or groups of the offending species, if appropriate.

It is not realistic, practical, or allowable under present NWSP policy to consider large-scale population suppression as the basis of NWSP. Typically, NWSP activities in Nevada would be conducted on a very small portion of the area inhabited by the problem species, and therefore, eradication or long term population suppression is unrealistic altogether.

3.3.4 Mountain Lion Sport Harvest Alternative

An alternative to offer sport harvest of mountain lions where control is required, prior to NWSP involvement, was considered but rejected from detailed analysis. NDOW has indicated that it is not feasible because the legal framework is not in place to institute such an alternative (BLM 1995).

3.3.5 Lithium Chloride as an Aversive Agent

Lithium chloride has been tested as a taste aversion agent to condition coyotes to avoid livestock, especially sheep. Despite extensive research, the efficacy of this technique remains unproven (Conover et al. 1977, Sterner and Shumake 1978, Burns 1980, 1983, Burns and Connolly 1980, 1985, Horn 1983). In addition, lithium chloride is currently unregistered by EPA or NDOA, and therefore cannot be used or recommended for this purpose.

3.4 STANDARD OPERATING PROCEDURES FOR WILDLIFE DAMAGE MANAGEMENT TECHNIQUES

NWSP uses protective or minimization measures built into the program in Standard Operating Procedures (SOPs) to prevent or minimize project related negative effects on the environment. For the purposes of this EA, those measures are termed SOPs. The key SOPs are incorporated into all alternatives as applicable, except the no federal program alternative (Alternative 2). Most SOPs are instituted to abate specific issues while some are more general and relate to the overall program.

3.4.1 Standard Operating Procedures (SOPs)

- NWSP activities comply with guidance established from USFS LRMPs, and BLM RMPs and Interim Management Guidelines for Wilderness Study Areas (WSA).

- National MOUs with the BLM and USFS delineate expectations for PDM on public lands administered by these agencies. NWSP AWPS are developed in coordination with BLM and USFS. AWPs detail activities, target species, and SOPs to be implemented on allotments where PDM is needed. This minimizes potential impacts on recreational and cultural resources, hunting, sensitive species, wildlife viewing and other land uses.

- NWSP coordinates with Tribal officials and Bureau of Indian Affairs for work on Tribal lands to identify and resolve any issues of concern to Indian Tribes.

- The use of PDM methods such as traps and snares conform to current rules and regulations administered by NDOW.

- Pesticide use complies with EPA rules and regulations administered by NDOA.

3.4.2 WS and NWSP SOPs Specific to the Issues

The following is a summary of SOPs that are specific to the issues listed in Chapter 2 of this document.

3.4.2.1 Effects on Target Predator Species Populations

- PDM agreements are made on a limited number of sites in any given year, and the agreements are based upon wildlife conflicts as they arise. It is not expected that the total land area under agreement for PDM would change greatly.

- PDM is directed toward localized depredating populations or individual offending animals, depending on the species and magnitude of the problem, and not an attempt to eradicate populations in the entire area or region.

- NWSP specialists use specific trap types, lures, and placements that are most conducive for capturing the target animal.

- NWSP's kill is monitored. Consideration of "Total Harvest" and estimated population numbers of key species are used to assess cumulative effects to maintain the magnitude of harvest below the level that would impact the viability of populations of native species (see Chapter 4). NWSP provides data on total take of target animal numbers to BLM, USFS and NDOW during annual coordination meetings and to the USFWS during annual reports.

- Decisions to relocate or kill problem bear and mountain lions are made by the NDOW. In mountain lion conflict situations involving an established threat to human safety or a verified loss of property, NWSP personnel can initiate control without prior NDOW input, but NDOW will be notified in a timely manner.

- NWSP currently has agreements for PDM on no more than 32% of the land area of Nevada and generally conducts PDM activities on less than 22% of the land area in any one year, and therefore, has no impact on target predator species on at least 78% of the land area in Nevada.

3.4.2.2 Effects on Non-target Species Populations, Including T&E Species

- NWSP personnel are highly experienced and trained to select the most appropriate method(s) for taking problem animals with little impact on non-target animals.

- Traps and snares are not set within 30 feet of exposed carcasses to prevent the capture of scavenging birds. The only exception to this policy is for the capture of cougar and black bear because the weight of these two target animals adequately allows foot capture device tension adjustments to exclude the capture of smaller non-target animals such as scavenging birds.

- Foot snare trigger and leghold trap underpan tension devices are used throughout the Program to reduce the capture of non-target wildlife that weigh less than the target species.

- Breakaway snares, which are snares designed to break open and release with tension exerted by larger non-target animals such as deer, antelope and livestock, have been developed and are being refined. These snares will be implemented into the NWSP program as appropriate.

- Non-target animals captured in leghold traps or foot snares are released at the capture site unless it is determined by NWSP specialists that the animal is not capable of self maintenance.

- NWSP specialists use specific trap types, lures and placements that are conducive to capturing the target animal, while minimizing potential impact on non-target species.

- NWSP personnel work with research programs to continue to improve the selectivity of management devices.

- NWSP avoids wild horses by directing aerial hunting operations that are conducted below 500 feet, away from their herds. NWSP strives to maintain a distance of ½ mile or more from wild horse herds seen during the foaling season (March 1 through June 30).

- NWSP has adopted and implemented all reasonable and prudent alternatives to protect desert tortoise from USFWS 2003 Biological Opinion, as updated in October 2010. In addition, NWSP conducted a site specific informal consultation with USFWS on March, 2003 as updated in October 2010 for PDM activities. NWSP has adopted the recommendations made by USFWS to protect the gray wolf and California condor, NWSP would have no other affect on T&E species in Nevada.

- A previous primary T&E species of concern covered by the formal consultation that occurs in Nevada is the bald eagle. Although the bald eagle was federally delisted in 2008, it is still listed as "State Endangered" in Nevada. SOPs designed to protect bald eagles, and the terms and conditions identified in the consultation as related to the proposed action and alternatives described in this EA are as follows.

- WS personnel will contact either the local NDOW office or the appropriate USFWS regional or field office to determine nest and roost locations for Bald Eagles.

- The appropriate USFWS office shall be notified within five days of the finding of any dead or injured bald or golden eagle. Cause of death, injury, or illness, if known, would be provided to those offices. In addition, any dead bald or golden eagle salvaged must be reported within 48 hours to the National Eagle Repository at (303) 287-2110 and to the Regional Migratory Bird Permit Office at (916) 978-6183.

- If a bald or golden eagle is incidentally taken from the Southwest population, use of the control method will be halted immediately, and WS will reinitiate consultation. Further, it will be reported to the Eagle Biologist at the Regional Migratory Bird Permit issuing Office at (916) 978-6183 immediately.

- Leghold traps (except those used to trap mountain lions) shall be placed a minimum of 30 feet from above-ground bait sets.

- When bald or golden eagles are in the immediate vicinity of a proposed wildlife damage management Program, WS personnel will coordinate with the USFWS prior to conduction of

any activity that is likely to disturb or directly take eagles to determine if an Eagle Act permit may be required and to ensure appropriate conservation and avoidance measures are implemented, WS will also conduct daily checks for carcasses or trapped individuals.

3.4.2.3 Humaneness of Control Techniques

- Chemical immobilization and euthanasia procedures that do not cause pain or undue stress are used by certified personnel when practical.

- NWSP personnel attempt to kill captured target animals that are slated for lethal removal as quickly and humanely as possible. In most field situations, a shot to the brain with a small caliber firearm is performed which causes rapid unconsciousness followed by cessation of heart function and respiration. A well placed shot to the head is in concert with the American Veterinary Medical Association's definition of euthanasia. In some situations, accepted chemical immobilization and euthanasia methods are used.

- Traps are set and inspected according to NDOW regulations and WS policy.

- Research continues with the goal of improving the humaneness of PDM devices.

3.4.2.4 Effects on Recreation

- Annual Work Plans (AWPs) provided by NWSP to BLM and USFS and associated maps provided by BLM and USFS delineate the areas where and when PDM can occur and the methods that will be used on public lands. The AWPs define zones where wildlife damage management will be limited, restricted, or not allowed because of potential conflicts with land use plans.

3.4.2.5 Impacts on Public Safety and the Environment

- A formal risk assessment ((USDA 1997, revised), Appendix P) reported hazards to the public from PDM devices and activities are low.

- Public safety zones are delineated and defined on AWP maps by BLM and USFS during the yearly AWP review phase. The public safety zone is one-quarter mile, or other appropriate distance, around any residence or community, county, State or federal highway, or developed recreation site. PDM conducted on federal lands within identified public safety zones will generally be limited to activity aimed at the protection of human health and safety. However, the land management agency could request PDM activities in the public safety zone for an identified need. Land management agencies will be notified of PDM activities that involve methods of concern such as firearms, M-44s, dogs, and traps before these methods would be used in a public safety zone, unless specified otherwise in the AWP.

- All pesticides are registered with EPA and NDOA. NWSP employees will comply with each pesticide's directions and labeling, and EPA and NDOA rules and regulations.

- NWSP Specialists who use restricted use chemicals (i.e., pesticides or drugs) are trained and certified by program personnel, or other experts, in the safe and effective use of these materials under EPA and NDOA approved programs. NWSP employees who use chemicals participate in continuing education programs to keep abreast of developments and to maintain their certifications.

- M-44's are used by NWSP personnel who are trained and have received State certification from NDOA to use sodium cyanide and the M-44 device within label restrictions. PDM activities that involve the use of sodium cyanide and the M-44 device are conducted in accordance with both State and federal EPA regulations and label restrictions ((USDA 1997, revised) Appendix Q).

- Conspicuous, bilingual warning signs alerting people to the presence of traps, snares and M-44s are placed at major access points when they are set in the field.

3.4.2.6 Effectiveness of NWSP

- The WS Decision Model, which is designed to identify effective wildlife damage management strategies and their impacts, is consistently used.

3.4.2.7 Impacts on Special Management Areas (SMAs)

- NWSP would conduct PDM on SMAs only when and where a need exists and is requested. All PDM activities conducted in SMAs including WAs and WSAs would be in accordance with the MOUs between NWSP and other agencies, enacted rules and regulations, and the land management agency's standard policies and procedures.

- WS personnel follow guidelines as specified in NWSP AWPs and as developed in cooperation with the land management agency. These plans include delineation of areas where certain methods may not be used during certain time periods when conflicts with recreational events may occur. If it were necessary to work in areas outside the planned area, the area manager or their representative would be contacted in a timely manner.

- NWSP would conduct PDM in accordance with and for the areas specified in BLM RMPs and USFS LRMPs.

- Vehicle access would be limited to existing roads, unless off-road travel is specifically allowed by the land managing agency and conforms to the LRMPs and RMPs.

- PDM in WAs would be in accordance with Wilderness Policies and MOUs.

- NWSP does not anticipate conducting PDM in National Parks. The potential exists that a request could come from the National Park Service or NDOW for responding to a threat to human health and safety or for research purposes.

- Should any of BLM's existing WSAs be officially designated as Wilderness Areas in the future, wildlife damage management would be performed in accordance with BLM Wilderness Management Policy of 1981 and the enacting legislation.

- Should any of BLM's existing WSAs be officially dropped as a WSA, PDM would follow standard procedures for public lands and as specified in the AWP.

- In WSAs, NWSP work is limited to actions allowed in BLM's Interim Management Policy for Lands Under Wilderness Review (H-8550-1, III. G. 5.), as revised (BLM 2002). Pertinent language currently states:

Wildlife damage management activities limited to an area-restricted effort and directed at offending animals may be permitted as long as the proposed activity meets the nonimpairment criteria, and except for invasive species, will not jeopardize the continued presence of other animals of the same species or any other species in the area. Shooting of animals from aircraft can occur in WSA's in any State where the activity is consistent with State law and has been previously coordinated with the BLM State Director.

3.4.2.8 Indirect and Cumulative Impacts

- NWSP personnel consult with BLM, USFWS, USFS, NDOW, and other appropriate agencies regarding program impacts. Frequent contacts are made with BLM and USFS when conducting PDM on public lands administered by these agencies. NWSP regularly coordinates with NDOW and USFWS concerning the wildlife species being targeted and numbers taken.

- PDM activities are directed at taking action against individual problem animals, or local populations to resolve problems associated with them. It is generally accepted that predators do not influence prey numbers substantially, rather the reversal tends to be true, in that the cyclic nature of most prey species may affect predator numbers (Clark 1972, Wagner and Stoddart 1972). This is especially true of highly fecund species such as rodents and rabbits, but less so for species such as deer and T&E species. However, the impact of predator removal in Nevada will not likely impact prey species except potentially in very local areas and is assessed further in section 4.2.1.8.

- NWSP take is monitored. Total animal take is considered in relation to the estimated population numbers of key species. These data are used to assess cumulative effects so as to maintain the magnitude of harvest below the level that could impact the viability of a population.

- NWSP has consulted with the Nevada State Historic Preservation Office on September 3, 1997 and has determined that the program is not likely to affect historic properties or archeological sites. NWSP consults with cultural resource specialists from BLM and USFS to determine the potential for the impacts of PDM activities to historic or cultural resources on public lands and the need for any SOPs. PDM does not cause any major ground disturbance and is not normally considered an undertaking that would trigger the need to consult with the State Historic Preservation Office under Section 106 of the National Historic Preservation Act.

3.4.2.9 Cost Effectiveness

- The cost effectiveness of different PDM methods and actions will be used to assist NWSP planning and decision making. Consideration will be given to different values such as selectivity and humaneness as well as overall monetary costs within the constraints of the financial resources available.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides the information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2.

4.1 ENVIRONMENTAL IMPACTS ANALYZED

The environmental consequences of each alternative are compared with the proposed action to determine if the real or potential impacts are greater, lesser or the same. Cumulative and unavoidable impacts and significant impacts to irreversible and irretrievable resources are discussed in relation to the identified issues for each of the alternatives. Some natural resources are not discussed in this EA because the impacts on them are considered non-significant.

4.1.1 Cumulative and Unavoidable Impacts. Cumulative and unavoidable impacts will be discussed in relationship to each of the issues under the six alternatives and the potentially affected species analyzed in this chapter.

4.1.2 Non-significant Impacts. The following resource values within Nevada are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality and quantity, floodplains, wetlands, other aquatic resources, visual resources, air quality, prime and unique farmlands, timber, and range. These resources will not be analyzed further.

4.1.3 Irreversible and Irretrievable Commitments of Resources. No irreversible or irretrievable commitments of resources are expected, other than the minor use of fuels for motor vehicles and other equipment, and similar materials. These will not be discussed further.

4.2 ISSUES ANALYZED IN DETAIL

The environmental consequences of the six alternatives are discussed below with emphasis on the issues given in Chapter 2. The comparison of alternatives that will be used to make a selection of the most appropriate alternative for NWSP under the current program are the same as those that have been used in recent years by NWSP. The PDM methods used in Nevada to meet the purpose and the need of the program as identified in Chapter 1 are also included.

4.2.1 Alternative 1 Continue the Current Federal PDM Program

The methods that would be used to take target predators in each damage situation depend on the species causing the damage and other factors including location, weather, and time of year as discussed in section 3.2. The methods include leghold traps, padded-jaw leghold traps, cage traps, aerial hunting, M-44s (sodium cyanide), shooting, calling and shooting, neck snares, denning (gas cartridge) and DRC 1339. All methods used in Nevada are described in Appendix B of this EA and in the FEIS (USDA 1997, revised) where they are fully assessed.

4.2.1.1 Effects on Target Predator Populations

NWSP conducts PDM annually for relatively few predator species in Nevada, but does have the potential for dealing with several of them. These species are listed in section 1.1.3 with general

information about them and which agency, NWSP or NDOW, has primary responsibility for responding to damage complaints that involve each of these species. The primary target species taken yearly are the coyote, raven, mountain lion, and raccoon. Most other target predators are taken by NWSP only on an occasional basis. Yearly averages of all target species taken during FY 06 thru FY 09 by NWSP on all land classes in each county are presented in Table 5. Of the take, coyotes represented 75%, ravens 22%, and all others 3%. It is important to point out that the number of predators taken as a result of PDM activities, can, and often does vary from year to year as a result of many different factors including availability of prey or other food, disease, and limiting climatic conditions such as drought. Additionally, for most species, the level of effort NWSP applies toward wildlife conflict resolution is typically related to the number of requests for assistance, new issues or concerns for that species, and/or the capability of conducting PDM activities with available funding. In general, when predator populations increase, the occurrence of damage caused by the predators increases which in turn results in increased PDM activities and, thus, the take. Likewise, when predator populations decrease, the occurrence of damage caused by the predators tends to decrease, which results in less PDM activities and, thus, less take. Because of this close coordination of "response to event", take tends to be consistent with increases and decreases in target species population levels.

Table 5. The average yearly number of target predators taken, by county, during FY 06 thru FY 09 by NWSP on all land classes including Private, BLM, USFS, USFWS, U.S. Department of Defense, Tribal, State, County, and Municipal (USDA 2010a).

County	Coyote	Common Raven	Mountain Lion	Raccoon	Striped Skunk	Badger	Bobcat	Feral Cat	Black Bear	Red Fox	Feral Dog	Spotted Skunk	Kit Fox	Gray Fox
Carson City	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Churchill	38.00	10.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00
Clark	19.50	187.75	0.50	14.50	0.50	0.25	1.50	2.25	0.00	0.00	0.00	0.50	0.00	0.25
Douglas	20.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elko	1900.50	235.00	3.25	0.50	3.25	2.75	1.75	0.00	0.00	0.50	0.00	0.00	0.00	0.00
Esmeralda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eureka	252.75	130.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Humboldt	975.75	416.75	2.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lander	687.25	17.50	1.50	0.00	0.00	7.25	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lincoln	345.00	190.75	1.25	0.00	0.00	0.50	0.75	0.00	0.00	0.25	0.25	0.00	0.50	0.00
Lyon	234.50	49.00	3.25	2.50	0.50	1.25	0.25	0.00	2.00	0.00	0.00	0.00	0.00	0.00
Mineral	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nye	216.50	237.50	1.00	0.00	0.00	0.50	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00
Pershing	284.75	35.00	0.75	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Storey	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Washoe	281.25	138.75	8.25	63.00	21.75	0.00	1.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00
White Pine	826.25	162.75	5.50	0.00	0.50	0.25	1.75	0.00	0.00	0.25	0.00	0.00	0.00	0.00
Totals	6083.50	1810.75	27.75	80.50	26.75	13.75	9.75	2.75	2.00	1.25	0.50	0.50	0.50	0.25

* The ravens taken in these counties were estimated at 50% of the number of DRC-1339 treated egg baits placed by NWSP.

For comparison and cumulative impacts analysis, the furbearers taken in the 2005-2009 Nevada fur seasons are compiled in Table 6 (NDOW 2010b). Fur harvest reflects the value of the fur, the relative abundance of the species, and the number of sportsmen involved in harvesting.

Table 6. Furbearers taken in the 06-07, 07-08 and 08-09 fur seasons as reported by NDOW (2009).

Furbearers Harvested in Nevada during the 06-07 (07), 07-08 (08), and 08-09 (09) Seasons																		
	Coyote			Bobcat			Gray Fox			Kit Fox			Red Fox			Badger		
Year	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09
County																		
Carson City	6	0	39	1	6	6	4	4	0	0	0	0	0	0	0	0	6	0
Churchill	162	288	102	152	84	103	47	33	11	60	199	65	0	0	0	2	10	1
Clark	194	456	211	464	190	183	596	736	426	89	138	77	0	0	1	34	6	0
Douglas	119	150	64	79	91	66	127	129	0	6	4	0	0	0	0	13	4	0
Elko	1,010	824	406	672	325	310	9	16	19	4	0	4	9	6	10	319	95	42
Esmeralda	6	18	11	77	52	69	19	78	6	6	10	6	0	0	0	2	4	0
Eureka	153	74	88	213	118	53	82	51	8	15	29	11	2	0	0	102	10	0
Humboldt	348	528	352	240	140	169	0	0	6	22	10	0	0	2	0	75	41	14
Lander	104	125	23	292	68	52	39	95	17	11	33	6	0	0	0	20	0	0
Lincoln	283	401	214	564	492	404	406	520	331	112	53	61	4	4	1	26	25	15
Lyon	97	105	62	258	128	63	291	119	43	35	14	11	0	0	0	6	4	1
Mineral	73	88	15	96	79	41	22	84	12	58	2	23	0	0	0	7	4	0
Nye	457	306	236	532	358	359	289	323	218	41	70	71	0	0	0	34	62	2
Pershing	145	169	287	253	201	132	78	80	10	203	191	63	0	0	0	20	25	4
Storey	73	58	2	32	9	12	24	14	1	0	2	21	0	0	0	0	0	0
Washoe	419	489	208	630	292	325	2	12	5	7	35	24	2	2	0	24	18	6
White Pine	227	290	105	356	178	185	73	88	59	9	27	10	0	8	1	43	45	7
Total	3,876	4,369	2,425	4,911	2,811	2,532	2,108	2,382	1,172	678	817	453	17	22	13	727	359	92
Average	3,557			3,418			1,887			649			17			393		

Furbearers Harvested in Nevada during the 06-07 (07), 07-08 (08), and 08-09 (09) Seasons continued																		
	Striped Skunk			Spotted Skunk			Mink			Weasel			Raccoon			Ringtail Cat		
Year	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09	07	08	09
County																		
Carson City	0	0	4	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0
Churchill	0	8	6	2	0	0	0	0	0	0	0	0	17	21	23	0	0	0
Clark	2	2	23	11	4	0	0	0	0	0	0	0	4	12	19	4	10	4
Douglas	48	45	12	6	4	0	6	12	24	0	0	0	6	53	17	0	0	0
Elko	86	23	7	15	18	6	11	8	10	7	4	1	32	10	21	0	6	0
Esmeralda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eureka	15	0	0	20	2	0	0	0	0	0	0	0	0	0	1	0	0	0
Humboldt	28	0	0	7	0	0	0	0	0	4	0	0	0	0	2	2	0	0
Lander	20	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0
Lincoln	2	10	0	4	2	0	0	0	0	0	0	0	2	10	6	4	6	6
Lyon	41	39	27	2	4	0	97	12	20	0	0	0	48	43	40	0	0	0
Mineral	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye	4	0	0	6	0	1	0	0	0	0	0	0	0	0	1	2	0	1
Pershing	19	0	7	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Storey	2	0	0	0	0	0	2	2	2	0	0	0	15	18	15	0	0	0
Washoe	37	21	7	2	10	5	26	4	6	0	0	0	30	51	26	0	0	0
White Pine	4	14	2	7	0	0	0	0	0	0	0	0	0	0	0	4	0	0
Total	308	162	96	84	44	12	142	38	62	11	4	1	154	238	172	16	24	11
Average	189			47			81			5			188			17		

Coyote Population Impact Analysis.

General Information

Coyotes are found throughout the continental United States. They flourish throughout the entire State of Nevada including urban areas. The ability to adapt to changing environmental conditions and its opportunistic nature have allowed the coyote to continually increase its numbers and expand its range. This species is often characterized by wildlife biologists as having a unique resilience to change because they have a strong ability to adapt to adverse conditions and persevere. Habitat changes that have occurred over the last two hundred years often favor this species.

Throughout much of Nevada coyotes consume rabbits, rodents and carrion. Deer and antelope fawns are occasionally prey in some areas, while in others the coyote diet may include insects and plant materials. In some areas coyotes prey on domestic sheep, cattle and poultry. Coyotes in urban areas forage at landfills, eat from garbage cans and may feed on domestic dogs and cats.

Coyotes are classified as an unprotected furbearer and non-game animal in Nevada and may be taken year-round for any reason. Most coyote damage management is limited to removal of chronic problem animals. In areas where coyotes prey on domestic livestock, animals are removed to prevent further losses.

Population Estimate

Many authors have estimated coyote populations throughout the west and elsewhere (Pyrah 1984, Camenzind 1978, Knowlton 1972, Clark 1972, USFWS 1979). Coyote population estimates for Nevada were not available in the literature or from Nevada agencies. However, an estimate suitable for purposes of analysis can be made using information on coyote biology and population dynamics and tempering the "reasonableness" of the estimate by considering field observations of NWSP personnel. These types of estimates of carnivore populations are based on knowledge of the species, experience, and intuition and may be as accurate as those based on more scientific methods (Fritzell 1987).

Knowlton (1972) estimated coyote densities west-wide to be an average of 0.5 to 1.0 per square mile over a large portion of the coyote's range. From predator surveys conducted from 1972-1977, Knowlton and Stoddart (1983) placed Nevada in a band of medium abundance. The opinions of NWSP Specialists that conduct PDM in Nevada generally agree that coyote numbers in Nevada are relatively moderate compared to low and high density areas. NDOW reports that coyote populations in Nevada are moderate to increasing, depending upon the region. Although not substantiated by scientific field studies, Knowlton's (1972) average of 0.5 to 1.0 per square mile can be considered reasonable for the area and is very likely to be lower than true average densities across Nevada. Thus, Knowlton's "average" for the western U.S. is assumed to be conservative for the area in question, but is used herein for analysis.

Nevada has a very healthy population of coyotes statewide (NDOW 2010b). Nevada is 109,895 square miles in size with most of the State comprised of habitat suitable for coyotes. A conservative estimate of the coyote population for Nevada, based on what we

believe to be a conservative assumption of 0.5 to 1.0 coyote per square mile would be about 55,000 to 110,000, prewhelping, and 109,000 to 219,000 postwhelping. These figures are based on reasonable assumptions of a 50:50 sex ratio of males to females, where 43% of the females breed, and the average litter size is 4.6 pups (Pitt et al. 2003). NDOW (2010a) estimates that the average litter size in Nevada is 5-6 pups, likely taking coyote populations higher than our more conservative estimate. NDOW (2010a) estimates the coyote population in Nevada is higher, at between 250,000 to 750,000.

Impacts

As discussed in USDA 1999 and 2004, coyotes were responsible for the largest percentage of requests for assistance from NWSP. As a result of these requests, NWSP has taken an annual average of 6,083 coyotes statewide from FY06 through to FY09 (Table 7). This is similar to the level of take analyzed in the USDA 1999 and USDA 2004. Thus, the data indicate that NWSP's coyote take has remained basically stable with fluctuations ranging from 4,173 to 7,409 coyotes taken per year. Based on the number of cooperative agreements, county, State and federal budgetary constraints, and projected future requests for assistance, NWSP expects that the past number of coyotes removed in recent years would be similar in subsequent years and therefore the analysis would be suitable for projecting coyote removal and impacts into the foreseeable future.

Relative to impacts, coyotes are highly prolific and able to rebound rapidly from harvest pressure. While removing animals from small areas at the appropriate time can protect vulnerable livestock, immigration of coyotes from the surrounding area quickly replaces the animals removed (Stoddart 1984). Take can be up to 60% of population for a sustained time because recruitment annually replaces breeders (Pitt et al. 2001, 2003). A population model (Pitt et al. 2001, 2003) assessed the impact of removing a set proportion of a coyote population during one year and then allowing the population to recover. In the model, all populations recovered within 1 year when <60% of the population was removed. Recovery occurred within 5 years when 60-90% of the population was removed. Pitt et al. (2001, 2003) also evaluated the impact of removing a set proportion of the population every year for 50 years. When the removal rate was <60% of the population, the population size was the same as for an unexploited population. These findings are consistent with an earlier model developed by Connolly and Longhurst (1975), and revisited by Connolly (1995) which indicated that coyote populations could withstand an annual removal of up to 70% of their numbers and still maintain a viable population.

NWSP worked in 22.5 million acres, based on area of land under cooperative management agreement (USDA 2010a). Therefore, coyote removal was limited to a maximum of 32 percent of the State's total area. Because generally coyote damage management occurs in only a fraction of each land unit under agreement, the area affected is actually overestimated. The land area under agreement is provided to show the proportional breadth of area in which WS works compared to the total range of coyotes in a State. This provides an indicator of the limited impact to overall State coyote populations. It should be noted that in areas where WS conducts coyote damage management, that coyotes are not completely removed. Rather, numbers are reduced to lower the potential for damage. Further, for small areas of WS operation, the influence of management activities can extend beyond the actual work area since coyotes do not recognize property boundaries.

Calculations using the low (most conservative) estimate for Nevada's coyote population and data for NWSP's take and private harvest showed that the potential combined coyote take ranged from 13% in FY 05 to 21% in FY 07 (FY04 FY09) of the population (Table 7), less than one-fifth the threshold of sustainable harvest. Therefore, NWSP concludes that the coyote population in Nevada has not been adversely impacted by NWSP. This conclusion is consistent with the U.S. General Accounting Office (GAO 1990) assessment regarding WS' impacts on coyote populations in the western U.S.

Table 7.Coyote impact analysis of NWSP take and private harvest in Nevada for FY2004-FY2009.

	FY 2004		FY 2005		FY 2006		FY 2007		FY2008		FY 2009	
Est.	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Populati	55,00	110,0	55,00	110,0	55,00	110,00	55,00	110,0	55,00	110,0	55,00	110,0
NWSP	5,730	5,730	5,329	5,329	6,660	6,660	7,447	7,447	6,129	6,129	4,173	4,173
Other*	2,726	2,726	2,003	2,003	1,776	1,776	3,876	3,876	4,369	4,369	2,425	2,425
Total	8,456	8,456	7,332	7,332	8,436	8,436	11,32	11,32	10,49	10,49	6,598	6,598
NWSP	10%	5%	10%	5%	12%	6%	14%	7%	11%	6%	8%	4%
Other*	5%	2%	4%	2%	3%	2%	7%	4%	8%	4%	4%	2%
Total	15%	8%	13%	7%	15%	8%	21%	10%	19%	10%	12%	6%
Allowab	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%

* Other take Coyotes taken by sources other than NWSP including sport hunting/trapping.

Cumulative Impacts

Private coyote take may legally occur at any time in Nevada. However, it is reasonable to assume that much of the private take of coyotes occurs in the winter period when furs are prime. Sport hunter and trapper harvest between 2004 and 2009 averaged 2,950 per year (NDOW 2010b). The NWSP coyote take for Nevada between 2004 and 2009 averaged 5,911 per year (USDA 2010a). These data indicate the average total number of coyotes taken (killed) in Nevada was about 8,861 during the 2004-2009 time frame. Based on our range of estimates of the coyote population in Nevada (55,000 to 110,000), cumulative take was between 13 and 21% of the population (Table 7). Therefore, annual recruitment would quickly replenish the population. Based on the impact model in USDA (1997), the magnitude of impact on the coyote population would be considered to be low.

Common Raven Population Impact Analysis.

The common raven, the largest bodied of the passerines, is geographically and ecologically one of the most widespread naturally occurring birds in the world. The current raven population level in the western United States is considered to be higher than it has ever been recorded and raven numbers are rebounding in some of the raven's eastern range (Boarman and Heinrich 1999).

In many areas of the West, the raven is seen as an indicator of human disturbance because it is often associated with garbage dumps, sewage ponds, highways, agricultural fields, urbanization, and other typical signs of human-altered landscapes (Boarman 1993, Kristen and Boarman 2003). Supplemental food sources such as garbage, crops, road-kills, etc., may give the raven an advantage over other less opportunistic feeders and appear to have allowed the raven population to increase precipitously in some areas. In western California portions of the Mojave Desert raven populations have increased 1500% over the last several decades consistent with urban growth in the region (Kristin and Boarman 2003). The Mojave Desert includes portions of southern Nevada.

NWSP has been receiving a wide range of complaints relating to raven damage. Agriculture related complaints have included damage to livestock by pecking the eyes and other soft tissues on newborn livestock, eating livestock feed, and feeding on grains, pistachios, pecans, and other crops. Non-agricultural property damage complaints have included damage to electrical lines, power outages, fouling of satellite dishes, and holes pecked in airplane wings. Health related complaints have included entering garbage containers and strewing trash, accumulation of fecal material on equipment used at landfills, and carrying trash from landfills to nearby residential areas. These damage scenarios would be resolved through technical assistance non lethal control or lethal control approaches or a combination of the two, as described under the "Proposed Action".

The 2004 predator damage management EA amendment (USDA 2004) and a US Fish and Wildlife Service Biological Review on WS' proposed take of up to 3000 ravens annually (USFWS 2004), concluded that the cumulative effect of NWSP's activities, as combined with other forms of take, would be unlikely to cause a decline in the raven population in Nevada, and highly unlikely to cause a decline in the raven population westwide. Table 8 shows that since the 2004 evaluations, WS direct management activities in Nevada resulted in the lethal take of between 36 and 70 percent of the allowable take of 3000 ravens. The average annual take over the past five years was just 56 percent of the proposed take and therefore the potential to reduce the raven population is lower than anticipated.

Table 8. Raven take

Calendar Year	2004	2005	2006	2007	2008	2009
Ravens taken in Nevada by NWSP	1,751	1,087	1,448	2,062	2,086	1,837
Ravens taken in Nevada by other sources[1]	118	243	382	523	417	48
Total ravens taken in Nevada	1,869	1,330	1,677	2,585	2,503	1,885

[1] Data provided by USFWS (Depredation Permit Year)

Population Estimation

The best information currently available for monitoring trends in raven populations is data from the Breeding Bird Survey (BBS). The BBS is a large-scale inventory of North American birds coordinated by the U.S. Geological Survey, Patuxent Wildlife Research Center (Sauer et al. 2004) that is comprised of a set of over 3,500 roadside survey routes primarily covering the continental United States and southern Canada. The effort was started in 1966, and routes are surveyed each June by experienced birders. The primary objective of the BBS is to generate an estimate of population change for songbirds. Populations of birds tend to fluctuate, especially locally, as a result of variable annual local habitat and climatic conditions. Therefore, statistical analyses are used to check for long-term trends in population data. Estimates of population trends from BBS data are derived primarily from route-regression analysis (Geissler and Sauer 1990) and are dependent upon a variety of assumptions (Link and Sauer 1998). The statistical significance of a trend for a given species is reflected in the calculated P-value (i.e., the probability of obtaining the observed data or more extreme data given that a hypothesis of no change is true, a P value of less than 0.05 is considered statistically significant). Data for the western BBS region show a 2. 3% annual increase (average % change/year in birds per route) from 1980 through 2007 ($N = 1089$, $P < 0.00$ (Sauer et al. 2008)). Nevada BBS data, however, indicate a non-significant stable trend during the same period ($N = 28$, $P = 0.98$ (Sauer et al. 2008)).

In the Mojave Desert which includes portions of southern Nevada, populations increased rapidly (16.0% per year) during the period from 1966-1979 ($N = 8$, $P = 0.08$ (Sauer et al. 2008)). Raven populations appear to be relatively stable for the period of 1980 - 2007 (0.0%, $N = 28$, $P = 0.98$ (Sauer et al. 2008)). The BBS was designed to detect large scale trends in bird populations, and the lack of significance for Nevada and Mojave Desert data is not surprising given the variability of the data and the relatively low number of observations per area. Reasons for the differences in the long term population trend data between Nevada and the Western region are uncertain but may be related to the low number of BBS routes in Nevada. Location of the BBS routes in Nevada may be influential since the number of ravens observed is highest near human-related food sources (Kristin and Boarman 2003). For this reason, population trend data from the Western BBS region may provide a more accurate indication of the overall status of the raven population.

NWSP conducts its' raven damage management operations on a local population level, which are often not adequately represented with large scale area trend analysis. Local

population levels can be very high in comparison to a regional level, particularly in areas of human disturbance which tend to attract corvid species. For example, raven counts along the Falcon-Gondor transmission line corridor in NV (construction completed in spring of 2004) have increased by approximately 200 percent (Atamian et al. undated, p. 2 as cited in the Federal Register/Vol. 75, No. 55/Tuesday, March 23, 2010/Proposed Rules).

In most areas ravens are a year-round resident, there is no evidence of migration from radio-tagged or marked populations in North America and Iceland (Boarman and Heinrich 1999), however, the species has been known to move into areas just outside its range during non-breeding season. Further, there is some question as to whether some of the birds in flocks of floaters may be migrants (Boarman and Heinrick 1999).

A sharp decline in raven numbers in NV around 2002-3 show up in the BBS data are believed to be at least in part a result of West Nile Virus, which entered NV during that time frame. Mortality is common among the corvids which have been tested including American crows, blue jays, and fish crows (Field Manual of Wildlife Diseases in the Southeastern United States, Third Edition).

The BBS data are intended for use in monitoring raven population trends, but it is also possible to use BBS data to develop a general estimate of the size of the raven population. Using methods adopted by Partners in Flight (PIF) to estimate population size with BBS data (Rich et al. 2003), yields an estimate of 100,991 ravens in Nevada (Table 9, M. Green, USFWS, letter to WS, December 23, 2003). The PIF system involves extrapolating the number of birds in the 50 quarter-mile circles (total area/route = 10 mi^2) from the BBS survey to the area of the bird conservation regions in Nevada. Correction factors are applied to the resulting calculations to adjust for the biology of ravens and the environment in Nevada. Correction factors include a correction for the relatively large distances that can be seen by BBS observers in Nevada. The BBS assumes a detection radius of 0.25 miles, which is increased to 0.5 miles for ravens in Nevada. The BBS surveys are conducted in the morning, but not all birds are equally visible in the morning. The PIF system applied a time-of-day correction factor of 1.3 to the raven estimate to adjust for daily patterns in raven activity. Finally, the PIF calculations apply a correction for the fact that the survey is likely to detect only one member of a breeding pair at any given time. During the nesting season, only one bird is likely to be observed because the other bird in the pair is likely to be on the nest.

Table 9. Estimation of Nevada Raven Population using BBS Data[1].

Bird Conservation Region (BCR)	Area (mi^2)[2]	BBS Avg.[3]	cv BBS Avg.[4]	Distance[5]	Pair[6]	Time[7]	Population Estimate	SE Population Estimate[8]
9	95,149	14.91	0.90	0.25	2	1.3	95,386	17,433
15	386	2.49	1.65	0.25	2	1.3	65	
16	103	23.31	0.60	0.25	2	1.3	162	

33	14,898	5.37	0.09	0.25	2	1.3	5,378	266
	110,536						100,991	

[1] Calculations provided by M. Green USFWS, December 23 letter to WS.
[2] Area of polygon (combination of BCR and jurisdiction (e.g. Nevada))
[3] Average BBS count for ravens in this combination of BCR and jurisdiction.
[4] Coefficient of variation for BBS average.
[5] Distance correction - corrects for effective detection distance of the species.
[6] Pair correction - assumes only one member of a pair is seen at any given time
[7] Time of day correction - corrects for changes in bird activity/visibility during the day
[8] Standard error of the population estimate.

Using BBS data to estimate the size of the raven population requires making some additional assumptions. The first assumption is that chosen survey routes are totally random and are fully representative of Nevada habitats. However, while routes are randomly picked throughout the State, the randomness of the selection is compromised when the survey route is subsequently assigned to the nearest available road, which can be at some distance from the randomly selected survey location. Second, it would have to be assumed that ravens are equally distributed throughout the survey area (i.e. Nevada). Therefore, if survey routes included stops at raven congregation sites with excellent food availability, such as a landfill or, if ravens generally congregate near roads to scavenge roadkill, then the data might be biased and would tend to overestimate the population. However, if the survey routes were primarily located in flat open desert areas, as is generally the case in Nevada, the population could be consistently underestimated.

In the Western US, ravens are known to scavenge along roadsides where automobile-killed animals can be found. If a BBS route is along a road that has heavy traffic and an abundance of vehicle-killed animals, more ravens would be expected to occur in the count area and, thus, the population would be overestimated. However, with the exception of a limited number of freeway and highway routes, the majority of Nevada's roads are not subject to heavy traffic and do not have an abundance of vehicle-killed animals. It would thus not be expected that the BBS counts would tend toward overestimating raven numbers due to the roadway bias. In fact, because it is not uncommon for rural Nevadans to shoot at predators spotted along roadways, ravens may well avoid roadway locations in rural Nevada locations. In a study by Kristin and Boarman (2003), proximity to roads was not a significant predictor of the number of ravens observed.

Raven nesting numbers are not precisely known over broad areas, and densities in Nevada probably vary throughout the State depending on the availability of food and water, and the presence of human disturbance (Boarman and Heinrich 1999). Within Nevada, the breeding densities of ravens are likely higher in southern and eastern Nevada, and possibly lower in some areas of western Nevada according to BBS data (Sauer et al. 2003). Knight and Call (1981) summarized a number of studies on raven territories and home ranges in the western U.S. Nesting territories ranged in size from 1 pair/3.62 mi^2 - 15.7 mi^2 in Wyoming and Oregon. In coastal California where an

abundant food supply was available, raven nesting pair density was found to be 1 pair/1.7 mi^2 and 2.0 mi^2 (Linz et al. 1990, 1992). The densities in the Linz et al. (1990, 1992) studies were probably very high as a result of human food "subsidies" and were not representative of all of California. It is likely that Nevada also has sites with similar high nesting densities, although these sites are probably less common than in the more human-populated state of California. Based on nesting pair densities from studies in areas with similar BBS raven indices as Nevada (Sauer et al. 2003), the raven territorial pair density in Nevada could be estimated to be at least 1 pair/3mi^2-6 mi^2 or about 18,500 - 37,000 (median = 27,750 pairs) territorial pairs.

Information on raven mortality including age-specific mortality rates and causes of mortality is limited. Current data from the Mojave Desert in California indicate 38% fledgling survival, 47% survival in the first year, 81% survival in the second year, 83% survival in the third year and 83% survival for adult birds (Webb et al. 2004). Some information on the longevity of ravens in the wild is available in banding records. The oldest known wild raven from band data was 13 years and 4 months old (Klimkiewicz 2002). However, ravens have been known to live much longer in captivity (Boarman and Heinrich 1999). Mortality factors for ravens are not well known, and probably include predation (including nest predation by other ravens), weather-related factors, disease, and human-induced mortality such as shooting. Illegal shooting is not likely to be a major contributor to the cumulative mortality because ravens quickly learn to avoid humans with firearms after witnessing a fellow raven being shot.

Population Growth Model

For purposes of this analysis, the following equation was used to calculate the number of fledglings produced annually in the raven population.

$$F = (N) \times (Pb) \times (Fls),$$

Where F represents the number of fledglings produced per year, N is the number of nesting pairs, Pb is the probability of nest success, and Fls is the average number of young fledged per successful nest.

The median number of territorial raven pairs (N) in Nevada estimated above is 27,750 territorial pairs in any one year. Boarman (USGS, 2004, pers. comm.) estimates that only 80% of territorial pairs will nest in a given year, which would yield an estimate of 22,200 nesting pairs in Nevada. Studies have shown a 58% to 100% nesting success rate (Pb) for ravens, with an average of 72.7% success (Boarman and Heinrich 1999). At the 72.7% average level, Nevada would have 16,139 productive nests per year. Average (± SD) clutch size reported by Boarman and Heinrich (1999) was 5.4 ± 0.42, but average fledgling success (Yf) was 2.5 ± 0.48 birds. Using the average nesting success rate (72.7%) and fledging success data (2.5) yield an estimate of 40,349 fledglings produced annually. Calculations using minimum values for nest success (58%) and fledgling success (2.5 – SD = 2.02) yield an estimate of 26,010 fledglings produced per year (Table 10). Likewise, calculations using maximum nest success (100%) and fledging success (2.98) yield an estimate of 66,156 fledglings produced per year. For purposes of a conservative analysis only estimates derived from low (26,010 = low) and average (40,349 = avg.) values will be used in subsequent discussions of population impacts.

The number of young ravens successfully fledged each year is the annual production. The annual production combined with the estimated pre-breeding population represents the post-fledgling population (Table 10). Using the estimates for low and average nesting and fledging success, post-fledging population estimates of 127,001 (low) and 141,340 (avg.) ravens, respectively, can be derived (Table 10). Assuming no immigration into the population, the estimated number of ravens produced is also the number of ravens (fledglings, sub-adults, and adults) that must either die or emigrate annually in a stable population (i.e. no growth or decline in raven density). The annual mortality (a composite of juvenile, sub-adult, and adult mortality/emigration) for ravens in Nevada, assuming a stable population, would be 24% (low) – 33% (avg.) of the post-fledging population density (Table 10).

Table 10. Estimated raven population and annual mortality for Nevada using different assumptions.

	Low Nesting and Fledging Success	**Average Nesting and Fledging Success**	**High Nesting and Fledging Success**
Pre-breeding Raven Population (Year 1)	100,991	100,991	100,991
# of Territorial Pairs	27,750	27,750	27,750
# of Nesting Pairs	22,200	22,200	22,200
Non-Breeding Birds ("floaters")	45,491	45,491	45,491
% of successful nests	58%	72.7%	100%
# Young Fledged/Successful Nest	2.02	2.5	2.98
Total Fledglings (annual production)	26,010	40,349	66,156
Total Population Post-Fledgling	127,001	141,340	167,147
STABLE POPULATION (no immigration)			
Raven Pop. Pre-Breeding (Year 2)	100,991	100,991	100,991
# of Ravens lost to mortality or emigration	26,010	40,349	66,156
POPULATION INCREASING 2.3 percent PER YEAR (no immigration)			
Raven Pop. Pre-Breeding (year 2)	103,415	103,415	103,415
# of ravens lost to mortality or emigration	23,586	37,925	63,732

Using the estimated pre-breeding raven population of 100,991, and an estimated 55,500 ravens in territorial pairs (i.e., 27,750 territorial pairs equals 55,500 birds), then 44,500 ravens would be non-breeders or "floaters." Floaters are primarily immature and non breeding birds (i.e., fledgling, 1 and 2 year old birds). Ravens do not breed until they are 3 years old, though some unsuccessful attempts to nest have been documented for 2-year old birds (Boarman and Heinrich 1999). The "floater" ravens tend to roam in loose-knit flocks that can number in the hundreds (Goodwin 1986). It is likely that these "free-floating" flocks are responsible for much of the raven-associated damage because these flocks tend to congregate at feedlots, landfills, and calving and lambing grounds where

food is abundant while the breeding birds tend to remain near their territories. NWSP take, especially take associated with congregation sites such as calving grounds and landfills, would likely impact the floater segment of the raven population more than the less mobile territorial pairs. Boarman and Heinrick (1999) cite Sherman (1993) as reporting that nesting ravens in the Mojave Desert of California spent 75% of foraging time within437 yards of the nest and cites Dorm (1972) that, in many areas, breeders probably remain near their territories throughout the year.

NWSP Operations

The majority of NWSP's take of ravens has been the result of requests for the protection of livestock and for the protection of natural resources. The majority of ravens are taken by use of avicide (DRC-1339) treated egg-baits. Treated egg-baits are placed in areas where ravens have been found depredating on or harassing newborn livestock, in areas where ground nesting birds are losing eggs or young to ravens, at sites where damage to agricultural or other resources is occurring and at landfills where raven foraging and accumulation of raven feces result in a number of nuisance and health and safety problems. The methodology used by NWSP to place treated egg baits is described in Spencer (2002).

NWSP program activities at human-generated food and water sources generally result in a reduction in the number of ravens present. This reduction is thought to be partially attributable to declines in the local population of ravens, but is also likely due to the removal of those birds with knowledge of the feeding site. Kristen and Boarman (2003) note that not all human related food and water sources are used by ravens and that ravens seem to learn about the location of food and water sources from other ravens. Birds with knowledge of feeding sites tend to lead other birds to these sites. In a study by Webb (2001) fledgling chicks moved to human-related food sources which already had large flocks of ravens, even though similar food sources without raven activity were closer. Removing birds with historical knowledge of the feeding site may reduce the incidence of new birds being attracted to the site.

Number of Ravens Killed by NWSP

Wildlife Specialists monitor the raven numbers at baiting sites and then place an appropriate number of eggs needed to reduce the local raven numbers to the level needed to stop further damage from occurring. At the conclusion of the treatment period the WS specialist collects the unconsumed eggs and disposes of them in accordance with label directions. DRC-1339, which causes death primarily due to kidney failure, is relatively slow-acting and birds do not die at the treatment site. This makes it necessary for the attending Wildlife Specialist to estimate the number of ravens killed. Wildlife Specialists use a combination of monitoring the number of ravens at a site before and after treatment, watching ravens during treatment and monitoring the number of eggs consumed to estimate the number of ravens killed. Each of these strategies has its strengths and weaknesses. The number of birds at a site may decrease for reasons not related to the use of DRC-1339 (e.g. a roadkill carcass or spilled food attracts scavenging ravens), the amount of avicide needed for a lethal dose varies among individual ravens (each egg contains approximately 1.5 times the amount needed to kill half the birds tested (LD50), and ravens may consume or cache more than one egg. The number of egg-baits taken per

raven taken varies, ranging from about 1 to 4. The National Wildlife Research Center using data and input provided by NV and several other western States conducted computer simulations of baiting efficacy for raven management using DRC-1339 egg baits. This analysis looked at several scenarios to account for differences in feeding behaviors at the bait site and the resulting dose consumed. The simulations used a bioenergetics model to predict the caloric requirement for corvids for any geographic location in the contiguous United States (Stahl et al. 2008). The development of the model is an effort to provide an alternative to estimate efficacy based on bird feeding behavior at the bait site and the resulting dose consumed. The researchers concluded that "simulations of baiting ravens with DRC-1339 provide an efficient means of estimating consumption of a lethal dose by a bird" (Stahl et al. 2008). NWSP and the National Wildlife research center would like to conduct more research on the different variables involved in estimating take using DRC-1339 treated egg baits. Another variable that NWSP would like to incorporate into raven take estimates would be consumption of treated egg baits by non-target species such as ground squirrels. Recent research conducted in Nevada using videography indicates that the traditional 1:2 ratio (ravens to missing eggs) used by managers to estimate raven take may result in substantial overestimation, especially if ground squirrels begin consuming egg baits (Coates et al 2007). This research enforces WS belief that it may be overestimating raven take. It is unlikely that the ground squirrels that consume the egg baits are affected by DRC-1339 as the LD50 for similar sized small mammals is very high. In fact, the amount needed to kill a fasted female albino rat (1170 mg/kg) is essentially more than would be placed out during an entire project. Conservatively, at the concentration that the DRC-1339 is used, a ground squirrel would have to consume 50 treated eggs at one sitting which is not physically possible.

Impact on the Raven Population

The maximum cumulative raven take of 5,134 birds in 2002 represented only 5% of the population estimate of 100,991 and 4% of the minimum estimated post-fledging population. Under this alternative, future NWSP annual raven take would be capped at 3,000 ravens or 3% of the raven population. Using the maximum number of known ravens taken by sources other than NWSP (Table 11) would result in a maximum cumulative take of approximately 3,210 ravens or 3% of the estimated population. For reasons noted above, population trend data from the Western BBS region is believed to provide the most accurate representation of the status of ravens in Nevada. Given a rate of population increase of 2.3 percent per year from 1980 to 2007 and a raven population estimate of 100,991, approximately 2,424 ravens are added to the Nevada population each year. Assuming that known cumulative human-caused raven mortality (Table 11) is additive to all other sources of mortality, raven take of 2,400 birds would be approximately equal to the number of birds added to the population. This would result in a stable raven population. If raven mortality is in some part compensatory to other forms of mortality (i.e. some of the ravens killed by NWSP would have died anyway from other causes) then the raven population would still be increasing, but at a rate lower than the rate for the Western BBS region 2.3 percent/year. If cumulative take reaches the maximum of 3,207 ravens, and all known human-caused raven mortality is additive to other sources of raven mortality, then take would exceed the number of ravens that could be removed from a stable population by approximately 810 ravens. This would be an annual decrease in the raven population of less than once percent. Given the estimated

productivity of the raven population noted in Table 10 and rate of population increase of 2.3 percent for the Western BBS region, the raven population would likely recover within 1 year of NWSP discontinuing take. Mortality attributable to NWSP is likely at least partially compensatory to other forms of mortality. NWSP often takes ravens from flocks of "floaters" at raven congregation sites. Many of these birds are young birds without breeding territories. Data from Webb et al. (2004) indicates that first year birds have much lower survival than older birds. In other wildlife populations with high mortality rates for young non-territorial individuals, human caused mortality is often compensatory to other forms of mortality, and it seems likely that this would also be true for ravens. Eight hundred and ten birds is three percent of the lowest number of ravens lost to mortality or emigration for a stable population as estimated in Table 10. Therefore, if cumulative human-caused mortality is compensatory to even a small degree, i.e., to at least three percent of other sources of mortality, then the raven population would remain stable. If NWSP caused raven mortality is compensatory to a higher level of other raven mortality, then the population would be increasing at some level lower than the rate for the Western BBS region (2.3%/year). Given this analysis and the research and monitoring discussed below, WS concludes that this alternative will have a low to moderate impact on the raven population.

Depending upon the season, some of the ravens in Nevada may be migrants, especially some of the birds in the large winter flocks (Boarman and Heinrick 1999). Therefore, the WS take for the western U.S. (Washington, Oregon, California, Idaho, Nevada, Montana, Utah, Arizona, Wyoming, Colorado, New Mexico, and Texas) was also considered. Table 11 provides data on WS and cumulative take of ravens for the western U.S. The methods described above for estimating the number of ravens in Nevada were used to estimate that there are approximately 577,400 ravens in the western U.S. (B. Bortner USFWS, Portland, OR, letter to WS April 6, 2004) Using the 2.3 percent rate of population increase for the Western BBS region yields an estimate of population growth of 13,857 ravens. In 2002, cumulative raven take in the western U.S. was estimated at 6451. During that year, cumulative raven take in the western U.S. has been lower than the estimated annual number of birds added to the raven population. Therefore, the current program, with substantially lower probable take, would not result in a decrease in the raven population in the Western U.S.

Table 11. Data on WS take of Ravens in the Western U.S.

Calendar Year	2001	2002	2003
Ravens taken in Nevada by WS	4,759	5,036	2,475
Ravens taken in Nevada by other sources[1]	149	98	207
Total ravens taken in Nevada	4,908	5,134	2,682
Ravens taken in western U.S[2] by WS	5,734	6,022	4,042
Ravens Taken in Western US[2] by other sources[1]	798	429	895
Total ravens taken in Western U.S.	6,532	6,451	4,937

[1] Data provided by USFWS (Depredation Permit Year)
[2] Washington, Oregon, California, Idaho, Nevada, Montana, Utah, Arizona, Wyoming, Colorado, New Mexico, and Texas (Depredation Permit Year)

Research and Population Monitoring

The National Wildlife Research Center and the U.S. Geological Survey are cooperating to develop refinements to the Partners in Flight (PIF) model used to determine raven population levels, to address concerns about some of its assumptions and to improve the precision of raven population estimates. The study is expected to be completed this summer and the results of their findings would be expected to be published in the near future.

As new information becomes available, NWSP will apply new findings to this analysis to determine if any changes would trigger the need for additional NEPA compliance.

Mountain Lion Population Impact Analysis.

History and estimate/trend of lion population

Nevada's mountain lions inhabit every game management unit and major mountain range in the State. While densities have been variable over time, distribution of mountain lions has been constant (Lansford and Woolstenhulme 2008). The mountain lion population in Nevada was at near-record highs in the late 1980's following unusually high deer densities (NDOW 1995 unpublished data in Lansford and Woolstenhulme 2008). Various factors including drought caused deer populations to decline but mountain lions did not appear to decrease proportionately, probably due to the abundance of alternative prey including domestic livestock, elk, feral horses, and bighorn sheep (NDOW unpublished data 2007 and NDOW 2007). Mountain lion numbers remained high until the mid 1990's when data indicated that the population was stable to slightly decreasing from the historically high levels (NDOW, letter to WS, January 21, 2004). More recently, NDOW has determined that mountain lion population is stable (NDOW 2010b).

Allowable harvest:

Various studies on mountain lion population dynamics provide insights into harvest levels that can be sustained by populations. Ashman et al. (1983) believed that under "moderate to heavy exploitation of 30%-50% removal", mountain lion populations for their study area in Nevada had the recruitment (reproduction and immigration) capability of rapidly replacing annual losses. The allowable annual harvest level for mountain lion populations used in USDA (1997, revised) was 30 percent, and less than 23 percent removal was considered a low magnitude impact. Logan et al. (1996) determined the average annual rate of increase in the adult lions in a New Mexico study varied from ~~8-11% in an unhunted, uncontrolled mountain~~5-17% during a seven year period without exploitation that followed four years of intensive lion ~~population~~ control,, to 21-28% in a population where harvest and control was simulated by removing half of the lions from the study area. They concluded that rates of increase in mountain lion populations are density dependent, meaning that, as a population declines in relation to carrying capacity, the rate of increase becomes greater. This

is a natural mechanism of wildlife populations in general that serves to protect species by enhancing the ability of populations to recover from declines. The Logan et al. (1996) study suggested that, for a lion population to remain at or near the maximum supported by the habitat, the carrying capacity, no more than 11% of the adults should be harvested per year. Logan's study was based on a relatively isolated population in the San Andres Mountains. An important distinction to be made is that the mountain lion population in Nevada is not isolated and unhunted, but because of available habitat, is mostly contiguous throughout much of the State. Logan et al. (1996) suggested that, for a population managed for control, the harvest level might need to exceed 28% per year to cause the population to decline substantially. It appears that a viable population can be maintained at about 50% of carrying capacity with harvest levels that are at or below 21% or, in some years, as high as 28%.

Take by NWSP and Other

An impact analysis of sport harvest and depredation take is shown in Table 12. Mountain lion take by NWSP varied over the five years presented from a low of 19 in FY06 to a high of 33 in FY 08, but was very low when considered as a percentage of the population. NWSP removed mountain lions during the past five years for the protection of livestock, human safety, mule deer, California and Rocky Mountain bighorn sheep subspecies.

Analysis of the combined mountain lion take by NWSP and sport harvest shows that the harvest percentage has been fairly stable at less than seven percent of the estimated State population. The seven percent figure is lower than the harvest level established in the 1999 EA and is also lower than even the 11% sustainable harvest level identified by Logan et al. (1996).

USDA 1999 and 2004 concluded that the NWSP activities would have minimal effects on local or statewide mountain lion populations. This conclusion remains valid after reviewing newer information. Over the past five years (FY 2004 through FY 2009), NWSP lethally removed an average of 27 mountain lions per year in Nevada. The total take by NWSP, when combined with other forms of lethal take, or the cumulative take, remains well below the acceptable 21% level for sustaining a viable population in Nevada. In addition, NDOW has indicated that NWSP has had no adverse effect on the mountain lion population in Nevada (Appendix A). Finally, estimated effects on the mountain lion population may be underestimated since the lowest population estimate was used to err on the side of caution, further reducing the likelihood that NWSP would have any adverse effect on the mountain lion population in Nevada.

Table 12. Cumulative mountain lion removal and effect on population FY 04-09 (USDA 2010a and NDOW 2010b).

Year	FY04	FY05	FY06	FY07	FY08	FY09
Mountain Lion Population[1]	2,700	2680	2500	2500	2500	2500
NWSP Take	23	29	19	27	32	32
Other Take[2]	192	105	116	134	145	138
Total Take	127	183	135	161	177	170
NWSP Take as % of population	1%	1%	1%	1%	1%	1%
Other Take as % of population	4%	6%	5%	5%	6%	6%
Total Take as % of population	5%	7%	6%	6%	7%	7%
Allowable Harvest	21%	21%	21%	21%	21%	21%

Significant?	No	No	No	No	No	No

[1] NDOW estimates the current population at between 2500 to 3500 (Lansford and Woolstenhulme 2008)
[2] Other take Mountain Lions taken by sources other than NWSP (e.g., sport hunting).

In response to damage occurrences and requests for assistance between FY 2006 and FY 2009, NWSP killed 19 mountain lions in Nevada in FY 06, 27 during FY 07, 32 in FY 08 and 32 in FY 09 (USDA 2010a) on a four year average of 1.5 million acres of property under agreement(USDA 2010a). Of those killed, an average of 28 were taken on BLM land, 6 on private and 2 on USFS (USDA 2010a~~)..~~). The greatest number of mountain lions anticipated to be taken in any one year by NWSP in the future should be no more than 57 (57 were taken in CY 1991). During the sport harvest seasons 06 thru 09, the sport harvest of mountain lions in Nevada averaged 133 (NDOW 2010b). For the purposes of the analysis, NWSP FY08 and "Other take" for harvest year 08 will be used for cumulative take as it represents the highest take of the last four years. Thus, cumulative take is 177 (Table 12). This total take represents a 7% take on the overall mountain lion population (Table 12), or 33% of the allowable harvest of 21%. From studies, this level of harvest is sustainable for the estimated population and even more so if it is assumed that a percentage of the take is subadult. The Arizona Game and Fish Department has records indicating that an average of 30% of the sport harvest is subadult (J. Phelps, Ariz. Game & Fish Dept., pers. comm. 1998). Assuming that the same holds true in general for sport harvest in Nevada, but not for depredation take, then the total number of adults taken cumulatively in the FY/HY 08 season was about 134 ((145 * 70%) + 32) or 8% of the adult population for the conservative population estimate. That level of harvest is well below the 11% level that should be sustainable by a mountain lion population at or near carrying capacity and less than a third of the level that should be sustainable by a population that is at half of carrying capacity, as suggested by Logan et al. (1996).

The Nevada Board of Wildlife Commissioners and the Nevada Department of Wildlife were given management authority over mountain lions and most other wildlife species by Nevada State law (Nevada Revised Statute (NRS)). Mountain lion management by these entities considers the diversity of human values and biological factors, while recognizing public safety issues, economic factors and recreation values. NDOW is responsible for controlling wildlife causing damage to personal property or endangering personal safety (NRS 503.595) and may utilize APHIS-Wildlife Services to control offending mountain lions. However, NDOW has made it clear that with or without the services of NWSP, the NDOW would control offending mountain lions themselves or contract the work with another entity (Appendix A).

Under the current program, NWSP would continue to take mountain lions on a case-by-case basis on public and private lands in Nevada. NDOW (1999a 2002) has a mountain lion conflict protocol that they follow for damage situations. In the foreseeable future, NWSP expects that NDOW will request its assistance in managing mountain lion predation on bighorn sheep and mule deer in response to NDOW management plans for bighorn sheep, as discussed in Chapter 1. WS would not expect its take of mountain lions to increase substantially, however, even if in the unlikely event that it doubled its take of mountain lions, total take would only be approximately 2 percent of the mountain lion population in Nevada, and when combined with other forms of mortality, would be expected to be well below allowable harvest levels.

Further evidence that the cumulative harvest levels of past years has not affected the mountain lion population is shown by records of historic total harvests which have steadily increased since 1970 with a high reached in 1998 (NDOW 1998a). The fact that there have been enough lions to maintain total harvest at increasing levels for so long a period is strong evidence that the State's lion population has been near carrying capacity and able to withstand the levels of harvest and depredation take that have occurred. Therefore, from this evidence, it is assumed that the NWSP has not contributed to a decline in the mountain lion population in Nevada. Based on the significance criteria established in USDA (1997, revised), the impacts are considered to be of low magnitude.

Table 13. Other Predator Species taken by NWSP in FY 04-09 (USDA 2010a).

YEAR	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
Badgers	11	7	10	36	39	27
Bobcats	3	7	7	13	22	13
Raccoons	11	15	108	129	79	11
Striped Skunks	6	2	50	28	31	14
Kit Fox	7	1	2	1	5	1
Red Fox	4	2	1	4	2	1

Striped Skunk Population Impact Analysis. Population estimates and trend data are not available for striped skunks in Nevada. Therefore, the lowest reported density estimates from the literature will be used to estimate skunk populations. Using an estimate of 0.85 striped skunks per square mile, the estimated population in Nevada could be conservatively estimated to be about 93,500 striped skunks. This is considered very conservative because much of Nevada consists of fairly good skunk habitat.

NWSP striped skunk take averaged 22/year, with a peak of 50 in FY 06 (Table 12). Other take (furbearer harvest as reported by NDOW) included 308 in harvest year (HY) 06, 162 in HY 07 and 96 in HY08 An allowable harvest level has not been determined for striped skunks (USDA 1997, revised). However, the highest cumulative take of 358 striped skunks (FY 06 and HY 06) was still less than 0.4% of the conservatively estimated population. This is intuitively believed to be of low impact. It is anticipated that NWSP striped skunk take in Nevada would continue to be a low percentage of total take, even if PDM activities were increased significantly. Thus, striped skunk population impacts of the current program should be low and would remain low in the reasonably foreseeable future even in the event that program activities were expanded considerably.

Feral Dog Impact Analysis. Feral and free-roaming dogs are common in Nevada. In response to 8 damage occurrences involving dogs, NWSP took one feral dog in FY 06, one in FY 07, zero in FY 08, and one in FY 09 (USDA 2010a). Take of feral or free-ranging dogs by the program is considered to be of no significant impact on the human environment since dogs are not an indigenous component of ecosystems in Nevada. In addition, the take of dogs by NWSP is minor in comparison to the millions killed by animal control and humane organizations in the country and Nevada each year. Therefore, no analysis of population impacts is given.

Bobcat Population Impact Analysis. USDA (1997) reported a bobcat population estimate for Nevada to be 20,000 in 1988 which would approximate a density of about 0.2 bobcat/mi^2

which is at the low end of their density range and suitable for population analysis. Population trends since this estimate have varied, but mostly have been stable (NDOW 2009), so this estimate is probably very conservative. NWSP lethal take in Nevada during FY 06 was 23, 13 in FY 07, 22 in FY 08, and 13 in FY 09. Private trapper and hunter harvest totaled 4,911 in HY 06, 2,811 in HY 07, and 2,532 in HY 08 (NDOW 2009). The total known take for FY07/HY06 was 4,924 bobcats or 25% of the population; 2,833 or 14% of the population for FY 08/HY 07; and 2,545 or 13% of the population for FY 09/HY 08. USDA (1997) reported an allowable harvest level for bobcat populations of 20%. Therefore, total harvest could increase, on average 3% without having an effect on the population. NWSP lethal take did not equal or exceed 1% of total take in Nevada during FY 06-FY 09. Thus, NWSP lethal take is a minor component of overall bobcat mortality and could increase significantly as long as private harvest remained the same. It is anticipated that the NWSP bobcat take in Nevada would continue to be a low percentage of total take, even if PDM activities were doubled or tripled. Thus, bobcat population impacts of the current program should be low and would remain low in the reasonably foreseeable future, even in the event that NWSP activities were expanded considerably.

Raccoon Population Impact Analysis. Raccoon populations vary considerably, depending on habitat suitability. Sanderson (1987) stated that absolute population densities of raccoons are difficult if not impossible to determine, because of the difficulty in knowing what percentage of the population has been counted or estimated, and the additional difficulty of knowing how large an area the raccoons are using. Twichell and Dill (1949) reported one of the highest densities, with 100 raccoons removed from a winter tree den area on 101 acres of a waterfowl refuge in Missouri during winter. Other studies have found raccoon densities that ranged from 9.3/mi^2 to 80/mi^2 (Yeager and Rennels 1943, Urban 1970, Sonenshine and Winslow Dorm1972, Hoffman and Gottschang 1977, and Rivest and Bergerson 1981). The allowable harvest level for raccoons found in USDA (1997) was established at 49% of the total population. From Table 13, NWSP averaged taking 59 raccoons per year, with a peak of 129 during FY 07. Furbearer harvest reported by NDOW was 154 raccoons in HY 06, 238 in HY 07 and 172 in HY 08. NWSP also loans out cage traps to Washoe County citizens through technical assistance to resolve their own problems.

If the raccoon population was still considered to be only 3,000, which is very conservative, the cumulative take of 367 during the highest “take” year (FY and HY 07) was still only 12.2% of the population or 25% of the allowable harvest level. Therefore, even under very conservative assumptions, cumulative take is insignificant to the population in Nevada and cumulative take is minor. It is anticipated that NWSP raccoon take would continue to be a low percentage of total take, even if NWSP PDM activities were doubled or tripled. However, take could increase, if NWSP was contracted to provide an urban specialist where their populations and associated damage were significant, such as in the Reno area. This still would most likely have a minor effect on the raccoon population in Nevada. Thus, raccoon population impacts of the current program should be low and would remain low in the reasonably foreseeable future even in the event that program activities were expanded considerably.

Badger Population Impact Analysis. Little is known about badger densities other than a few intensely studied populations. Lindzey (1971) estimated that the Curlew Valley on the Utah-Idaho border supported 1/mi^2 and Messick and Hornocker (1981) found 13/mi^2 in

southwestern Idaho. For purposes of this analysis, we will conservatively use the low density estimate of 1/mi^2 for Nevada or about 110,000 badgers.

In response to damage, NWSP removed 10 badgers in FY 06, 36 in FY 07, 39 in FY 08, and 27 in FY 09. Badgers are more often taken by NWSP as non-target species incidental to PDM activities. Badger populations can safely sustain an annual harvest rate of 30-40% annually (Boddicker 1980) or about 33,000 in Nevada. NDOW reported 727 badger harvested statewide in HY 07, 359 in HY 08 and 92 in HY 09 (Table 13). Combined take (NWSP and NDOW reported) for the highest year (FY 07/HY 07) is much less than 1% of the estimated harvest potential. Because this is substantially less than allowable harvest and badger populations appear at least stable (NDOW 2009), cumulative impacts are very low in magnitude.

Black bear Population Impact Analysis. Black bear numbers are healthy and stable (200-400) though primarily limited to suitable habitat in western Carson City, Douglas, Lyon and Washoe Counties along the eastern slope of the Sierra-Nevada Range (NDOW 2009).

In response to depredation events, NWSP killed three black bears in CY 06, five in CY 07, none in CY 08, and no black bears in FY 09 (NDOW-black bear status reports-2006, 2007, 2008, and 2009). NDOW reported take (including NWSP take) was: 10 bears in CY 2006, while 22 were struck by cars; 26 in CY 2007, while 36 were struck by cars and 3 were poached; 26 in CY 2008, while 6 were struck by cars; and 7 in CY 2009, while 7 were struck by cars (NDOW-black bear status reports-2006, 2007, 2008 and 2009). From the prior mentioned NDOW reports, total black bear take for NV was: 32 for CY 06; 63 for CY 07; 32 in CY 08; and 14 in CY 09. No other take was reported for bear since Nevada ~~does~~has not ~~yet have~~held a black bear hunting season ~~for them~~in the past, although 2011 will see the first Nevada black bear hunt, which will be open from August 20th to December 31st. Since the estimated black bear population averages 300, NWSP's average take, over the four year period, represents less than 1% of the population. The average cumulative take (NDOW reported take including NWSP take), over the four year period, represents an average of 35, or 12% black bear take. NDOW's black bear hunt quota restrictions are as follows: total hunter harvest is not to exceed 20 bears, of which only six can be female (as soon as six females have been harvested, the hunt will be closed) (NDOW 2011). If we consider that a total of 20 bears will be harvested, and that the harvest take would be additive to depredation, poaching and vehicular take, then that would add an additional 6% take, resulting in a total cumulative potential take of 18%. USDA (1997) reported an allowable harvest level of 20% for black bear. Therefore, NWSP's impact on the black bear population in Nevada is insignificant and could ~~increase several-fold~~triple (if all other take remained the same) before an impact was probable. NDOW has decision authority over the take and disposition of all black bears in Nevada and, therefore, NWSP only responds to NDOW's decision to take bears causing damage. NDOW (1999b) follows guidelines for responding to black bear complaints. NDOW monitors the black bear population closely, and, therefore, NWSP's impact on the population has a built-in measure to assure that NWSP has a low cumulative impact.

Feral Cat Impact Analysis. Feral cats are fairly common in Nevada. In response to protecting the sensitive Palmer's chipmunk (*Tamias Palmeri*), the NWSP captured and euthanized four feral cats in FY 06, five in FY 07, and four in FY 08 (which was the last year of the necessary protection efforts) (USDA 2010a). However, the take of feral cats by the

program is considered to be of no significant impact on the human environment since cats are not an indigenous component of ecosystems in Nevada. NWSP may be contracted again in the future to control feral cats for the protection of the Palmer's chipmunk. Cats have been cited as having an impact on this species (Clark County 1999) and nationwide (American Bird Conservation 1997). An increase in PDM activities focused on feral cats would increase the level of take, but not to significant levels, particularly because some Nevada Counties, such as Clark County, promote the establishment and care of feral cat colonies (Clark County Ordinances Chapter 10.06). However, the effect of feral cat control would likely be positive, especially for species such as the chipmunk. Even if the program were expanded to include control of the cats for the chipmunk, the kill of cats by NWSP is comparably minor to the number killed by animal control and humane organizations in Nevada each year.

Kit Fox Population Impact Analysis. NWSP rarely takes kit fox in PDM activities because few complaints are ever received for them. NWSP kit fox take was: two in FY 06, one in FY 07, five in FY 08 and one in FY 09. Private harvest (as reported by NDOW) was: 678 in HY 07, 817 in HY 08, and 453 in HY 09 (statewide) (NDOW 2010). Published estimates of kit fox density vary from 1/43 ha (106 acres) in California to 1/1,036 ha (2,560 acres) in Utah (O'Farrell 1987). No estimate of the kit fox population is available for Nevada. Assuming that kit fox population densities in Nevada fall at the low end of those recorded in the literature (0.25-6/mi^2) or 1/2mi^2 which is fairly conservative, then a moderate population density estimate would be about 55,000 kit fox. The peak cumulative take (private and NWSP) of 822 kit fox in HY/FY 08 in Nevada is less than 2% of their projected population which is clearly insignificant to the overall population. Therefore, if NWSP were requested by NDOW to assist with greater PDM efforts for kit fox, take would have to be at a much higher magnitude before it would impact the population.

Gray Fox Population Impact Analysis. NWSP rarely takes gray fox for PDM, reflecting NDOW authority for their management. NWSP gray fox take was: two in FY 06, three in FY 07, two in FY 08 and one in FY 09. Statewide private harvest, as reported by NDOW, was 2,108 in HY 07, 2,382 in HY 08, and 1,172 in HY 09 (NDOW 2009). Published estimates of gray fox density range between 3.1 and 5.4/mi^2 (Trapp 1978). Since populations tend to be scattered over the southern portion of Nevada in suitable habitat, they conservatively may be found in pockets covering 25% of the State. Using the low density estimate and low range of habitat hypothetically used, a conservative estimate of gray fox abundance would be about 56,000 in Nevada. An allowable harvest level for gray fox is 25% of the total population or 14,000 per year. The peak (private and NWSP) cumulative take of 2,384 gray fox in HY/FY 08 in Nevada was about 17% of that allowable harvest level which is clearly insignificant to gray fox populations. On average, NWSP take is less than .06% of the allowable harvest level. If NWSP were requested by NDOW to assist with greater PDM efforts for gray fox, take would have to be at a high magnitude before it would impact the population.

Red Fox Population Impact Analysis. NWSP rarely takes red fox for PDM, reflecting that NDOW has management authority for them in Nevada. NWSP red fox take was: one in FY 06, four in FY 07, two in FY 08, and one during FY 09. Statewide private harvest as reported by NDOW was: 17 during HY 07, 22 during HY 08, and 13 during HY 09 (NDOW 2009). If we assumed that red fox were found at the low density of about 2/mi^2 in pockets covering only 1,100 mi^2 or 1% of Nevada, this would amount to 2,200 red fox. An allowable harvest for red fox is 70% (USDA 1997, revised) of the total population or 1,540 per year. Peak cumulative (NWSP and Private) take of 24 red fox in HY/FY 08 results in 1.5% of allowable

harvest. Therefore, NWSP take is clearly insignificant (<0.1%) and could increase significantly before an impact on the population were realized.

Other Predator Species Impacts. The other predator species that may cause occasional problems in Nevada are mink, long- and short-tailed weasels, spotted skunks, and ringtails, but, with the exception of 1 spotted skunk in FY 06 and 07, none have been taken by NWSP from FY 06-FY 09 (USDA 2010a). NWSP receives periodic complaints involving these species and may conduct operational control in the future to take offending animals. Unless equipment is specifically set to capture them, the PDM methods mostly used by NWSP exclude these species because of their size and weight. All of these species are found at moderate levels locally within their range in the State. During HY 07, 08 and 09, fur harvesters took 142, 38, and 62 mink, 11, 4 and 1 weasel, 84, 44 and 12 spotted skunks, and 16, 24 and 11 ringtails, respectively. Even with minimal take by NWSP, these populations are highly unlikely to be cumulatively negatively affected by NWSP PDM efforts. Therefore, unless a subtantive project is proposed that may involves the take of a large number of one of these species (more than 50), NWSP will not analyze population impacts further.

4.2.1.2 Alternative 1 Effects on Non-target Species Populations, Including T&E Species

Non-target Species Taken Unintentionally While Conducting PDM. Measures to avoid non-target impacts are built into Alternative 1 and the proposed action as standard operating procedures and were described in section 3.4.2.2. Those standard measures have helped ensure that non-target take in Nevada remains at relatively low levels. Non-target species taken in Nevada were recorded as unintentional target and non-target animals. In addition, any non-target Migratory Birds taken during PDM will be reported to the Migratory Bird Regional Office within 48 hours ((916) 978-6183).

Unintentional target and non-target animals[4] killed by NWSP during PDM activities during FY 06-FY 09, by county, are included in Table 14 below. Take included badgers, striped skunks, bobcats, kit fox, mule deer, gray fox, raccoons, red fox, feral dogs, beaver, pronghorn antelope, porcupines and feral cats (USDA 2010a). On average, 29 non-target animals are taken per year, with the badger being the most common, followed by striped skunks and bobcats. No more than one or a few of these species were taken and impacts to these species would be considered negligible. Thus far, impacts to non-target species have been minimal.

Non-target take was included in the population impacts analysis under 4.2.1.1 for badgers, feral dogs, kit and red fox, and striped skunks. It has been concluded that cumulative impacts to these populations, including the take of non-target animals, was not significant. As far as the other species taken in the last 5 FYs: no analysis for mule deer, black-tailed jackrabbit or cottontail population impacts is presented here because these species are common in Nevada and the minimal non-target take by NWSP PDM is low enough to be intuitively insignificant to populations; predator impacts on rabbit and hare populations were addressed in 4.2.1.8; predator impacts to mule deer were discussed in 1.1.3; and bobcat and gray fox population impacts were presented in 4.2.1.1. The average number of non-target animals taken during

4 / Unintentional target species are listed on the agreement as target species but are taken unintentionally during efforts to take other target species. Non-target species are not listed as target species on the agreement and are taken unintentionally during efforts to take target species.

PDM assistance by NWSP, by county, during PDM FY 06 thru FY 09, appear in the following table.

Non-Target Species

Table 14. Average number of non-target species taken during PDM assistance by NWSP, by county, from FY 06 thru FY 09.

Average Number of Non-target Species Taken By NWSP During PDM activities (FY 06 through FY 09)														
County	Badger	Striped Skunk	Bobcat	Kit Fox	Mule Deer	Gray Fox	Raccoon	Red Fox	Feral Dog	Beaver	Pronghorn Antelope	Porcupine	Feral Cat	Totals
Carson City	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Churchill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Clark	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Douglas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elko	2.75	3.00	0.00	0.25	0.25	0.00	0.25	0.50	0.00	0.00	0.00	0.00	0.25	7.25
Esmeralda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eureka	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50
Humboldt	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
Lander	2.75	1.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	5.00
Lincoln	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Lyon	0.00	0.25	0.25	0.00	0.00	1.00	0.50	0.00	0.00	0.25	0.00	0.25	0.00	2.50
Mineral	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nye	0.25	0.00	0.25	0.00	0.25	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	1.25
Pershing	0.00	0.00	0.00	2.00	0.50	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	2.75
Storey	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Washoe	0.50	0.50	2.50	0.25	0.75	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	5.00
White Pine	1.50	0.25	0.50	0.25	0.00	0.25	0.00	0.50	0.00	0.00	0.00	0.00	0.00	3.25
Totals	9.50	5.00	4.00	3.50	2.00	1.50	1.25	1.25	0.25	0.25	0.25	0.25	0.25	29.25

The non-target take continues to be low and not consequential to any population.

Effects on non-target animals from consumption of lead fragments The primary concern with the use of lead is the consumption of carcasses containing lead pellets or bullet fragments by scavenging birds. There are some circumstances where studies have shown that toxicity has occurred, such as in waterfowl and in California condors. In those circumstances, NWSP uses non-toxic shot according to federal and State law such as 50 CFR

20.21(j) which prohibit the use of lead shot for taking waterfowl. In addition, in accordance with Standard Conditions for our Migratory Bird Depredation Permits, non toxic shot must be used if using a firearm for depredation take of migratory birds. NWSP also restricts its use of lead ammunition in the range of the California condor in Clark County which is potential, but not necessarily occupied range of the California Condor (see effects on threatened and endangered species in this section). In compliance with the ESA, NWSP has consulted with the USFWS which has determined that removing carcasses shot with lead bullets from areas that may be seen by soaring birds would conclude that NWSP would not be likely to adversely affect the California condor in Nevada.

Most concern expressed in the literature points to recreational shooting of prairie dogs and ground squirrels, and gut offal from deer and elk hunting as having the greatest potential to impact scavenging birds. If State or federal law or WS policy were changed to require an adherence to more restrictive use of lead ammunition, NWSP would at that time adopt the more stringent measures into its standard operating procedures accordingly.

Effects on the Bald and Golden Eagle. Although the bald eagle is no longer protected under the federal ESA, NWSP continues to follow provisions for the protection of the bald eagle from former ESA consults with the USFWS, as the bald eagle is still protected under the Bald and Golden Eagle Protection Act. NWSP adheres to the USDA/APHIS/WS policies for use of leghold traps and snares including not using visible bait at trap or snare sets and that trap set sites (except traps used for mountain lions) will be no closer than 30 feet from a draw station. NWSP will not shoot standard lead shot from aircraft. The NWSP is currently using steel shot for aerial hunting, but, for safety reasons, NWSP may convert to other non-lead shot. All animals shot on the ground by NWSP using lead bullets within the immediate vicinity of bald and golden eagles will be retrieved whenever possible and/or disposed of in a manner that renders them inaccessible to eagles. NWSP will notify the appropriate USFWS office within 5 days of the finding of any dead or injured bald or golden eagle. Cause of death, injury, or illness, if known, will be reported to USFWS. NWSP will monitor for and routinely remove carcasses or trapped animals resulting from PDM activities conducted in the immediate vicinity of active bald or golden eagle sites to prevent attracting eagles to the immediate area of ongoing predator control activities.

The accidental take of a golden eagle occurred in the spring of 2005. The incident was reported to a USFWS warden in charge of the geographic area of eastern Nevada where the incident occurred. The site was investigated and the take was ruled purely accidental in nature. Nevada Wildlife Services Program was found to be following all required program policies and the accident occurred during the normal course of duties. The bird was turned in to the warden who expressed satisfaction that the incident was reported in a timely fashion. The bird was placed in an eagle repository for eventual release to Native Americans.

The program has never taken a bald eagle and with these precautions, NWSP expects the take of eagles will continue to be unlikely.

Impacts on Wildlife Species Populations Caused by Low-level Flights during Aerial Hunting. NWSP uses low-level fixed-wing aircraft and minimal use of helicopters to take target coyotes and ravens throughout much of Nevada. NDOW uses low-level fixed-wing airplane and helicopter flights routinely to census big game populations. A concern sometimes expressed is that aerial hunting might disturb other wildlife species populations and wild

horses and burros to the point that their survival and reproduction might be adversely affected. Deer, wild horses, pronghorn antelope, and other wildlife are occasionally seen during aerial hunting operations. However, NWSP avoids horses and wildlife seen during aerial operations and presents little disturbance to them. Additionally, as per BLM AWP, aerial hunting is restricted to after 09:30 am within 2 miles of sage-grouse leks on BLM lands. Aerial hunting is an important method of taking primarily target coyotes in Nevada, especially in the spring when the majority of lambing and calving take place. NWSP can use aerial hunting to control coyotes and ravens under a permit from NDOW and feral dogs pursuant to the Fish and Wildlife Act (section 742j-1). Fixed-wing aircraft are the primary tool used for aerial hunting in Nevada, but a limited use of helicopters is employed in locations where the terrain is rough, heavily wooded, or mountainous.

In FY 06, 1,727 hours of fixed-wing airplane hunting were expended; 1,585 in FY 07; 1,492 in FY 08; and during FY 09, 24 hours of helicopter and 1,354 hours of fixed wing airplane hunting were expended (USDA 2010a). NWSP conducted PDM activities on areas only under agreement. Of the hours, NWSP flew a yearly average of 59% on BLM lands, 31% on private lands, 5% on USFS lands, and 5% on other lands. Though NWSP does concentrate flying efforts during certain times of the year to specific areas such as lambing grounds, this basically represents little time annually flown over properties under agreement. For acres under agreement where target predators were taken, the average amount of time spent on the different classes of lands was 46 min/mi^2 flying for private lands, 4 min/mi^2 for USFS lands, 3 min/mi^2 for BLM lands, and 396 min/mi^2 [5] for other lands in during FY 06-09 (USDA 2010a). Thus, the average amount of time during any given year that NWSP spends on a given property is minimal. Of interest, the area that comprises the "other lands" is extremely small as compared to the vast acreage of BLM property. The effect is that relatively little time spent repeatedly on a small portion of property provides an extremely high ratio of time per square mile. Additionally, acreage flown or direct control performed during PDM by NWSP is tracked by MIS through individual agreements. Therefore even if an aerial crew, or Wildlife Specialist, performed work on only 100 acres, the MIS will show it as flying/working the number of acres listed under that specific agreement, which could be and usually is considerably more (e.g. 5,000 acres).

A number of studies have looked at responses of various wildlife species to aircraft overflights. The National Park Service (1995) reviewed studies on the effects of aircraft overflights on wildlife. The report revealed that a number of studies have documented responses by certain wildlife species that suggest adverse impacts could occur. Few, if any studies, have proven that aircraft overflights cause significant adverse impacts on populations, although the report stated it is possible to draw the conclusion that impacts to wildlife populations are occurring. It appears that some species will frequently or at least occasionally show adverse responses to even minor overflight occurrences. In general, it appears that the more serious potential impacts occur when overflights are frequent such as hourly and over long periods of time which represents "chronic exposure." Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. NWSP aerial hunting operations occur in relatively remote rangeland areas where

5 Other lands include county, tribal, city, municipal and equates to a relatively high flight time per area when compared with private, USFS and BLM lands due to the small parcel sizes.

tree cover is at most scattered to allow for visibility of target animals from the air. In addition, NWSP spends relatively little time over any one area.

Several examples of wildlife species that have been studied with regard to low-level flights are available in the literature. Grubb et al. (2010) evaluated golden eagle response to civilian and military (Apache AH-64) helicopter flights in northern Utah. Study results indicated that golden eagles were not adversely affected when exposed to flights ranging from 100 to 800 meters along, towards and from behind occupied cliff nests. Eagle courtship, nesting and fledging were not adversely affected, indicating that no special management restrictions were required in the study location.

Colonial waterbirds were reported that low level overflights of 2-3 minutes in duration by a fixed-wing airplane and a helicopter produced no "drastic" disturbance of tree-nesting colonial waterbirds, and, in 90% of the observations, the individual birds either showed no reaction or merely looked up (Kushlan 1979). Conomy et al. (1998a) quantified behavioral responses of wintering American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) exposed to low-level flying military aircraft in North Carolina and found that only a small percentage (2%) of the birds reacted to the disturbance. They concluded that such disturbance was not adversely affecting the time-activity budgets of the species. Krausman et al. (1986) reported that only 3 of 70 observed responses of mule deer to small fixed-wing aircraft overflights at 150 to 500 feet above ground resulted in the deer changing habitats. These authors felt that the deer may have been accustomed to overflights because the study area was near an interstate highway which was followed frequently by aircraft.

Krausman et al. (1983) reported that, in 32 observations of the response of bighorn sheep to low-level flights by small fixed-wing aircraft, 60% resulted in no disturbance, 21% in "slight" disturbance, and 19% in "great" disturbance. Unlike this study, when NWSP views wildlife, it avoids the area, whereas in this study, researchers made up to 10 passes directly above the surveyed animal. When Krausman et al. (1996) evaluated the effects of simulated low-altitude jet aircraft noise on desert mule deer (*Odocoileus hemionus crooki*) and mountain sheep (*Ovis canadensis mexicana*), they found that heart rates of the ungulates increased according to the dB levels, with lower noise levels prompting lesser increases. When they were elevated, heart rates rapidly returned to pre-disturbance levels suggesting that the animals did not perceive the noise as a threat. Responses to the simulated noise levels were found to decrease with increased exposure. Fancy (1982) reported that only 2 of 59 bison (*Bison bison*) groups showed any visible reaction to small fixed-wing aircraft flying at 200-500 feet above ground. The study indicated bison are relatively tolerant of aircraft overflights. Andersen et al. (1989) conducted low-level helicopter overflights directly at 35 red-tailed hawk (*Buteo jamaicensis*) nests and concluded their observations supported the hypothesis that red-tailed hawks habituate to low level flights during the nesting period. Their results also showed similar nesting success between hawks subjected to such overflights and those that were not. White and Thurow (1985) did not evaluate the effects of aircraft overflights, but showed that ferruginous hawks (*B. regalis*) are sensitive to certain types of ground-based human disturbance to the point that reproductive success may be adversely affected. However, military jets that flew low over the study area during training exercises did not appear to bother the hawks, and neither were they alarmed when the researchers flew within 100 feet in a small fixed-wing aircraft (White and Thurow 1985). White and Sherrod (1973) suggested that disturbance of raptors by aerial surveys with helicopters may be less than that

caused by approaching nests on foot. Ellis (1981) reported that 5 species of hawks, 2 falcons, and golden eagles were “incredibly tolerant” of overflights by military fighter jets, and observed that, although birds frequently exhibited alarm, negative responses were brief and never limiting to productivity. Further reassuring, the considerable analyses of the Air National Guard (1997a, 1997b) show that, despite considerable research on numerous wildlife species, no scientific evidence exists that indicates any substantive adverse effects on wildlife populations will occur as a result of any of the types of low-level or other overflights that do or may occur.

A stated concern with the NWSP aerial hunting program is that it might disturb wild horses, especially during foaling. Nevada is home to most of the nation's wild horses and burros. The 2009 Wild horse and Burros population estimate (BLM 2010) for Nevada **nonprivate** lands is:

Wild Horses:	16,642
Wild Burros:	819

In Nevada, wild horses and burros are found throughout the State (BLM 2010). The majority of the wild horses are located on the public lands administered by the BLM's Battle Mountain, Winnemucca, Las Vegas and Carson City Districts. Las Vegas has the highest population of burros in Nevada. BLM has designated 84 Herd Management Areas which encompass those areas known to have the largest numbers of horses. The total Nevada Herd Area Acreage is 18,871,875 or approximately 27% of Nevada's total land area, of which the BLM manages for 14.7 million acres. BLM has set the "appropriate management level" for Nevada wild horse and burro at 12,618 (BLM 2010). However, Nevada's wild horse and burro population is currently at 17,461. BLM recognizes that Nevada has an excess population of wild horse and burros of almost 4,861 which clearly indicates that their populations are fairing quite well.

Many of the areas inhabited by wild horses and burros in Nevada, or immediately adjacent to them, are also grazed by livestock. In these grazing areas, NWSP does conduct PDM. An expedient, efficient, and selective PDM method is aerial hunting. Aerial hunting also allows minimal, if any, contact with sensitive desert terrain. Because lambing and calving grounds are primary target areas for removal of depredating coyotes, NWSP frequently flies in the vicinity of livestock with young. The aircraft activity has shown to produce little or no effect on these animals. NWSP has cooperated with NDOA in surveying horse herds in Storey County from fixed-wing aircraft with little or no observed effect on the horses during surveys (P. Iverson, NDOA, pers. comm. 1999). In addition to horses, wildlife species associated with the area inhabited by the livestock are also seen commonly. It is NWSP's practice to avoid disturbing any non-target species encountered during the aerial hunting activity. Non-target animals displaying any signs of aversion to the aircraft are purposely avoided.

While wild horses and burros have been reported to become alarmed at the sight and sound of helicopter activity, especially in areas where helicopters are predominately used by BLM in round-ups, the small fixed-wing aircraft that are used by NWSP have little notable effect on either wild burros or wild horses. Frequently the wild horses in the proximity of the hunt area are seen as ignoring the fixed-wing's aerial hunting activities, even to the point of not getting up from a reclining position. Because NWSP is in active search of coyotes, which are significantly smaller than most wild horses, the presence of larger non-target species, such as

horses and burros, is quickly detected. During the foaling season of March 1 to June 30, when wild horses or burros are detected and a disturbance is noted, the aircraft will respond by keeping a minimum of ½ mile distance away from them. It is possible that an inadvertent flyover may occur with a wild horse that has not been previously spotted during the aerial hunting activities. However, such events are uncommon. Such an encounter could possibly induce a flight response from the wild horse to the presence of the aircraft. NWSP pilots respond quickly to such situations and remove the aircraft from causing any further effect on the animal by leaving the immediate area. These "disturbances" are accidental and of a singular nature, and not persistent or repetitive, and do not harass the animals.

NWSP has actively used fixed-wing aircraft for aerial hunting in areas inhabited by wildlife, and wild horses and burros for decades. No known problems to date have occurred nor are they anticipated in the future. Based on the above information and analysis, it is reasonable to conclude that NWSP aerial hunting low-level flights should not cause any significant adverse impacts to non-target wildlife populations including raptors, big game, and wild horses.

Effects on Threatened and Endangered Species

Federal agencies are required to consult with the US Fish and Wildlife Service (USFWS) when actions may affect listed species that are protected by the Endangered Species Act of 1973 (ESA). NWSP consulted with the USFWS and received a Biological Opinion for its program effects on the desert tortoise (March 2003). NWSP also conducted an informal consultation for program effects on the gray wolf, and the California condor, and received concurrence that the NWSP was not likely to adversely affect those species (also contained in March 2003 correspondence with the USFWS). In October 28, 2010, USFWS concurred with NWSP that the consultations remained valid and new information would not affect its earlier determinations. NWSP would not affect any plant or other animal species in Nevada since it would either not work in habitats occupied by listed species, or because NWSP does not alter habitat or affect waterways.

The WS program is also currently engaged in a programmatic consultation on the impacts of WS actions on federally listed T&E species. When the national consultation is completed, NWSP will incorporate all relevant Reasonable and Prudent Measures and Reasonable and Prudent Alternatives and Terms and Conditions from the National Consultation into standard operating procedures for PDM in Nevada.

Desert Tortoise. NWSP conducts predation management activities for the protection of wildlife (especially desert tortoises), livestock, and human health and safety in desert tortoise habitat. Formal consultation with the USFWS identified a remote risk that these types of NWSP actions could result in the accidental death of individual tortoises. Based on that consultation, the following reasonable and prudent measures were established to minimize the likelihood of incidental take of desert tortoises.

1. NWSP shall implement measures to minimize injury or mortality of desert tortoises by:

    a. A NWSP specialist trained to distinguish target from non-target species dens will inspect all areas proposed for application of fumigants including vehicle access routes for the presence of desert tortoises. All burrows capable of providing shelter for desert tortoises will be inspected with a fiber-optic scope, if necessary, to determine

occupancy of each burrow by desert tortoises. Fumigants will not be applied to burrows that appear to be occupied by desert tortoises.

b. A maximum speed limit of 25 mph shall be required for all vehicles on unpaved secondary roads and 15 mph on unimproved roads.

c. Where accessible to desert tortoises, only leghold traps and foot snares with pan tension devices set for more than 4 pounds of pressure will be used. Traps not equipped with pan tension devices (e.g. pole traps) will be set no less than 6 inches above ground. Neck snares will be placed 6 or more inches from ground level or a stop will be placed on the snare so that it will not capture a desert tortoise.

d. A qualified desert tortoise biologist will be responsible for informing NWSP personnel administering PDM programs in desert tortoise habitat about desert tortoises. This will include information on the life history, legal protection for the tortoise, penalties for violations of federal and State laws, general tortoise activity patterns, reporting requirements, measures to protect tortoises, and personal measures employees can take to promote the conservation of tortoises.

e. Fumigants shall only be used by qualified individuals in accordance with EPA label instructions.

f. The agency requesting PDM activities shall be responsible for providing a qualified desert tortoise biologist for the tortoise education project and for clearing vehicle routes of tortoises. The agency is also responsible for informing NWSP of the occurrence of tortoises in project areas.

g. NWSP staff shall check under vehicles for desert tortoises seeking temporary shelter prior to moving vehicles during the tortoise active season from March 1 through October 31.

2. NWSP shall implement measures to minimize predation on tortoises by predators drawn to carcasses or trash resulting from PDM activities by using covered raven-proof trash receptacles, removing trash from project sites, and removal and appropriate off-site disposal of retrievable animal carcasses resulting from PDM activities

3. NWSP will implement measures to minimize destruction of desert tortoise habitat such as soil compaction, erosion, or crushed vegetation due to PDM activities by restricting vehicles to existing roads or trails that have been cleared of tortoises, and by restricting overnight parking and storage of vehicles and equipment to previously disturbed areas.

4. NWSP will implement procedures to ensure compliance with the above reasonable and prudent measures, terms and conditions, reporting requirements, and consultation reinitiation requirements in the USFWS BO by submitting an annual report which includes information on the number of tortoises taken and the circumstances relating to the take, a list of all tortoises encountered or observed in project areas including exact locations and dates, the number of PDM activities abandoned due to the presence of tortoises, and recommendations for enhancing the effectiveness of the terms and conditions set forth in the BO. NWSP will also

designate a field contact representative for PDM projects within desert tortoise habitat who will be responsible for overseeing compliance with the stipulations of the BO.

If the above reasonable and prudent measures are implemented, the USFWS concluded that WS take of tortoises should not exceed two tortoises annually up to a maximum of 5, cumulatively, as a result of PDM activities. If at any time take exceeds the allowable take, NWSP will reinitiate consultation with the USFWS. It was the determination of the USFWS that NWSP actions were not likely to jeopardize the continued existence of the threatened Mojave population of the desert tortoise and that no critical habitat would be destroyed or adversely modified by NWSP actions if the above reasonable and prudent measures were in place.

Since the 2003 Biological Opinion was issued, NWSP incidentally killed one desert tortoise during the course of normal wildlife damage management activities when a tortoise was trapped in a cage trap. The take was reported to the USFWS and was allowed under its 2003 Biological Opinion, and does not jeopardize the continued existence of the desert tortoise. NWSP anticipates it will continue to remain well within the take level authorized in its 2003 Biological Opinion, as updated in its October 28, 2010 correspondence from the USFWS. NWSP will continue implementing Reasonable and Prudent Measures and Terms and Conditions as specified.

Gray Wolf. The gray wolf was extirpated from much of the lower 48 continental United States by the 1930's. They were reintroduced into Idaho, Montana and Wyoming as outlined in the USFWS Wolf Recovery Plan as nonessential experimental populations. Wolves outside the designated experimental population area, including those believed to have originated from the nonessential experimental population, but that have wandered out of the experimental population area, retain endangered status, however no confirmed wolf sightings have occurred in Nevada. Due to the success of the recovery actions in Idaho, NWSP consulted with the USFWS as a contingency measure to determine what actions the agency should take in the event of the confirmed presence of wolves in Nevada. Several tools used in WDM such as leghold traps, snares, M-44s, and aerial hunting for coyotes have the potential of taking a wolf. Standard Operating Procedures that would be used by the NWSP to minimize risks to the gray wolf include:

- Contact USFWS's Gray Wolf Recovery Coordinator to verify any APHIS-WS sightings of gray wolves in Nevada.

- APHIS-WS will not use M-44s and neck snares in the immediate area of "occupied endangered gray wolf range. Occupied gray wolf range is defined as 1) an area in which gray wolf presence has been confirmed by State or federal biologists through interagency wolf monitoring programs, and the Fish and Wildlife Service has concurred with the conclusion of wolf presence, or 2) an area from which multiple reports judged likely to be valid by the Fish and Wildlife Service have been received, but adequate interagency surveys have not yet been conducted to confirm presence or absence of wolves.

- NWSP will require that all leghold traps and leghold snares be checked at least once a day in areas known to be occupied by gray wolves. Use of electronic monitoring of traps or snares for daily checks may be used in monitoring traps and/or snares.

- NWSP will require that aerial hunting and shooting in areas where gray wolves have been documented will be limited to those personnel who can distinguish coyotes from wolves.

- All NV WS employees attended a basic wolf identification training course taught by C. Nemyer, USFWS in 2003. Idaho WS personnel further provided additional gray wolf identification training and behavior to all NWSP personnel August 2008 and 2010.

- NWSP will abide by all applicable reasonable and prudent alternatives, measures, and terms and conditions required as a result of findings in any ESA consultations between APHIS-WS and FWS.

- NWSP may assist the Wolf Recovery Team in trapping wolves so that they can be examined. The use of immobilizing drugs to capture a wolf will only be conducted by NWSP personnel certified in their use.

NWSP received concurrence from the USFWS on March 27, 2003, as updated on [October 28, 2010] that the NWSP would not be likely to adversely affect gray wolves.

California Condor. Some concern has arisen about the potential of PDM to affect wandering condors from the reintroduced experimental/nonessential population along the Colorado River in Arizona and a small portion of Nevada that surrounds Lake Mead National Park, that venture out of the projected range into greater Nevada. The designated experimental range of the condors includes areas in Nevada and Utah. Reports indicate that several of these condors have temporarily ranged outside of their experimental population zone, which changes their status to endangered while they are out of the experimental population area. The last confirmed report of condors in Nevada occurred on May 21, 1999, where an NDOW employee observed two condors at Mount Wilson near the radio tower shack (NDOW Sight Records Database 2010(internal database)). Based on neck bands/patagial flag markings, the condors were from the experimental population that was banded at the Vermillion cliff in Utah/Arizona. Therefore, the potential exists for condors to wander into southern Nevada beyond the experimental range where its status would change.

The California condor is strictly a scavenger, eating carrion such as cattle, sheep, deer, and ground squirrel carcasses. The condor finds carrion by sight and not smell, unlike a turkey vulture which relies as much, or more, on odor to locate dead animals as it does sight. WDM tools that may affect California condors include primarily the M-44, leghold traps, strychnine for rodent control, and lead poisoning from ingesting lead pellets/bullets from carcasses of predators taken by shooting.

Through consultation with the USFWS, the following measures were established for the protection of California Condors in Nevada. NWSP will continue to adhere to the USDA/APHIS/WS policies for use of leghold traps and snares including not using visible bait at the set site and that trap set sites (except traps used for mountain lions) will be no closer than 30 feet from a draw station. Additionally, in Clark County, South and East of I-15, the only area of NV in the experimental population area for California condors, WS will not use double leghold sets (more than 1 trap within 20 ft of one another) for coyotes or other large

predators. NWSP will not use strychnine bait (not used in PDM but below ground for pocket gopher control) in Clark County, South and East of I-15. NWSP will not shoot standard lead shot from aircraft. The NWSP is currently using steel shot for aerial hunting, but, for safety reasons, NWSP may convert to non-lead shot. In Clark County, all animals shot on the ground by NWSP using lead bullets will be retrieved whenever possible and/or disposed of in a manner that renders them inaccessible to condors. NWSP will not use M-44s South and East of I-15. If a Condor sighting is confirmed within Nevada North and West of I-15, M-44 sets will be recessed, covered or placed in single sets (not closer than 1000 feet from one another-). The California Condor Recovery Coordinator with USFWS in Ventura, California will contact NWSP should a condor be found in Nevada. NWSP will contact the Coordinator on an annual basis to make sure that the Coordinator knows contact points in Nevada should a condor be seen. In addition, this will ensure that changes in personnel and phone numbers are exchanged.

Nevada State Listed Species

The only State listed endangered or threatened species, as listed in (NAC 503), that may be affected by the NWSP, and which is not a federally listed Tor E species are the peregrine falcon (F*alco peregrine*), and the bald eagle. The bald eagle is discussed under Section 4.2.1.2. The NWSP would not be likely to adversely affect the peregrine falcon because the program does not utilize methods that would likely capture or harm a falcon, and because peregrine falcons almost exclusively feed on birds captured in flight (letter from NDOW, 1998 on effects of NWSP on State listed species, and 2010 NDOW draft EA review comments).

The only State listed mammal in Nevada that is not federally listed is the spotted bat (*Euderma maculatum*). NWSP has no potential to affect the spotted bat because it is insectivorous, inhabits arid areas, and is fairly solitary.

4.2.1.3 Alternative 1 and Humaneness and Ethical Considerations

The issue of humaneness, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Humaneness is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. People concerned with animal welfare are concerned with minimizing animal suffering as much as possible, or eliminating unnecessary suffering. The determination of what is unnecessary suffering is subject to debate (Schmidt 1989). WS personnel are experienced and professional in their use of management methods that are as humane as possible. The lead and cooperating agencies have determined that management actions are necessary to resolve problems with predation on private and public resources.

Animal welfare organizations are concerned that some methods used to manage wildlife damage expose animals to unnecessary pain and suffering. Research suggests that with methods such as restraint in foothold traps, changes in the blood chemistry of trapped animals indicate "stress." Blood measurements of fox indicate that this is the case for fox that have been held in traps and chased by dogs ((USDA 1997, revised), Revised). The situation is likely to be similar for other animals caught in snares or chased by dogs.

The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology. WS personnel are concerned about animal welfare. WS is aware that some of the lethal management techniques are controversial, but also

believes that these activities are being conducted as humanely and responsibly as practical. To ensure the most professional handling of these issues and concerns, WS has numerous policies giving direction toward the achievement of the most humane wildlife damage management program possible. WS and the National Wildlife Research Center are striving to bring additional nonlethal damage management alternatives into practical use. Research continues to improve the selectivity and humaneness of management devices. Until new findings and products are found practical, a certain amount of animal suffering could occur when some methods are used in situations when nonlethal damage management methods are not practical or effective.

Selectivity of wildlife damage methods is related to the issue of humaneness in that greater selectivity results in less potential suffering of non-target animals. Methods vary in their selectivity for non-target animals. The selectivity of each method is augmented by the skill and discretion of the WS specialist applying the technique, and on specific measures and modifications designed to reduce or minimize non-target captures. All WS specialists are trained in techniques to minimize the risk of capturing non-target wildlife. Section 4.2.1.2 discussed the proposed program's potential for affecting non-target species.

WS supports the most humane, selective, and effective damage management techniques, and would continue to incorporate advances into program activities. WS field specialists conducting predator damage management are highly experienced professionals, skilled in the use of management methods and committed to minimizing pain and suffering.

The project related effects on individual animal welfare may include: anxiety, fear, stress, and injury. Dogs used to pursue mountain lions or bears may also be injured or killed.

Few premises are more obvious than that animals can feel pain (AVMA 2007). Determining whether an animal is experiencing pain or suffering is difficult. Despite this difficulty, many manifestations of pain are shared by many animal species (AVMA 2007). The intensity of pain perceived by animals could be judged by the same criteria that apply to its recognition in human beings. If a condition causes pain in a human being, it probably causes pain in other animals. Suffering is a much abused and colloquial term that is not defined in most medical dictionaries. Neither medical nor veterinary curricula explicitly address suffering or its relief. Therefore, there are many problems in attempting a definition. Nevertheless, suffering may be defined as a highly unpleasant emotional response usually associated with pain and distress. Suffering is not a modality, such as pain or temperature. Thus, suffering can occur without pain; and although it might seem counter-intuitive, pain can occur without suffering (AVMA 2007). The degree of pain experienced by animals that are shot probably ranges from little to no pain to significant pain depending on the nature of the shot and time until death. Since the connotation of suffering carries with it the connotation of time, it would seem that there is little or no suffering where death comes immediately. WS personnel are trained professionals experienced in the placement of shots that result in quick death and minimize pain and suffering.

When implementing management activities, WS evaluates all potential tools for their humaneness, effectiveness, ability to target specific individuals as well as species, and potential impacts on human safety. The American Veterinary Medical Association (AVMA 2007) also recognizes that "for wild and feral animals, many recommended means of euthanasia for captive animals are not feasible. The panel recognized there are situations involving free-ranging wildlife when euthanasia is not possible from the animal or human safety standpoint, and killing may be necessary." AVMA states that in these cases, the only practical means of animal collection may

be gunshot and lethal trapping, and that personnel should be proficient, and use the proper firearm and ammunition. WS policy and operating procedures are in compliance with these guidelines, and the WS program recognizes the importance of careful decision-making regarding use of lethal methods.

Wildlife Values and Ethical Perceptions of Predator Damage Management

Ethics can be defined as the branch of philosophy dealing with values relating to human conduct, with respect to the rightness or wrongness of actions and the goodness and badness of motives and ends (Costello 1992). Individual perceptions of the ethics of wildlife damage management and the appropriateness of specific management techniques would depend on the value system of the individual. These values are highly variable (Schmidt 1992, Teel et al. 2002), but can be divided into some general categories (Kellert and Smith 2000, Kellert 1994 Table 15). An individual's values on wildlife may have components of various categories and are not restricted to one viewpoint. The tendency to hold a particular value system varies among demographic groups. For example, one major factor influencing value system is the degree of dependence on land and natural resources as indicated by rural residency, property ownership and agriculture or resource dependent occupations (Kellert 1994). People in these groups tend to have a higher tendency for utilitarian and dominionistic values. Socioeconomic status also influences wildlife values with a higher occurrence of naturalistic and ecologistic value systems among college educated and higher income North Americans (Kellert 1994). Age and gender also influence value systems with a higher occurrence of moralistic and humanistic values among younger and female test respondents (Kellert 1980, 1994).

Table 15 Basic wildlife values. Table taken from Kellert and Smith (2000) and Kellert (1994).

Term	Definition
Aesthetic	Focus on the physical attractiveness and appeal of large mammals
Dominionistic	Focus on the mastery and control of large mammals
Ecologistic	Focus on the interrelationships between wildlife species and natural habitats
Humanistic	Focus on emotional affection and attachment to large mammals
Moralistic	Focus on moral and spiritual importance of large mammals
Naturalistic	Focus on direct experience and contact with large mammals
Negativistic	Focus on fear and aversion of large mammals
Scientific	Focus on knowledge and study of large mammals
Utilitarian	Focus on material and practical benefits of large mammals

Two philosophies on human relationships with animals are commonly considered relative to ethical perceptions of wildlife damage management techniques. The first philosophy, Animal Rights, asserts that all animals, humans and nonhumans, are morally equal. Under this philosophy, no use of animals, e.g. for research, food and fiber production, recreational uses such as hunting and trapping, zoological displays and animal damage management, etc. should be conducted or considered acceptable unless that same action is morally acceptable when applied to

humans (Schmidt 1989). The second philosophy, Animal Welfare, does not promote equal rights for humans and nonhumans, but focuses on reducing pain and suffering in animals. Advocates of this philosophy are not necessarily opposed to utilitarian uses of wildlife but they are concerned with avoiding all unnecessary forms of animal suffering. However, the definition of what constitutes *unnecessary* is highly subjective (Schmidt 1989). In general, only a small portion of the U.S. population adheres to the Animals Rights philosophy, but most individuals are concerned about Animal Welfare.

Alternative 1 would be unacceptable to Animal Rights advocates, individuals with strong Humanistic and Moralistic values, and to others with strong emotional or spiritual bonds with certain wildlife species. Some individuals assert that killing the offending animal is not the response of a moral or enlightened society. Response of other individuals and groups would vary depending on individual assessments of the need for damage management, risk to the target animal population, risk to non-target species and individuals, the degree to which efforts are made to avoid or minimize the pain and suffering associated with the various management techniques, and the perceived humaneness of individual methods.

4.2.1.4 Alternative 1 Effects on Recreation

Recreation encompasses a wide variety of outdoor entertainment in the form of consumptive and non-consumptive uses. Consumptive uses of public lands include hunting, fishing, and rock-hounding. Non-consumptive uses include activities such as bird watching, photography, camping, hiking, biking, rock climbing, winter sports, and water sports. Recreationists are the general public and their pets which includes hunting dogs. NWSP is aware that most concerns of recreationists about PDM centers around the perceived impacts on hunting, photography, wildlife viewing, and pet safety.

Public opinion about the best ways to reduce conflicts between humans and wildlife is highly variable, making the implementation and conduct of damage management programs extremely complex. Ideas about how these programs are implemented and conducted are as unique as the almost infinite combinations of philosophies, psyches, aesthetic values, personal attitudes, and opinions found in humans. These differences in opinion result in concerns that the proposed action or the alternatives would result in the loss of aesthetic benefits to the general public and resource owners. The mere knowledge that wildlife exists is a positive benefit to many people (Decker and Goff 1987).

Wildlife populations also provide a range of direct and indirect social and economic benefits. Direct benefits are derived from a user's personal relationship or direct contact with wildlife and may include both consumptive (e.g. hunting), or nonconsumptive (e.g. observing or photographing bears). Indirect benefits, or indirect exercised values arise without a human being in direct contact with an animal and are derived from experiences such as looking at pictures or videos of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). According to Decker and Goff (1987), two forms of indirect benefits exist; bequest and pure existence. Bequest benefits arise from the belief that wildlife should exist for future generations to enjoy, pure existence benefits accrue from the knowledge that the animals exist in the human environment (Decker and Goff 1987), or that they

contribute to the stability of natural ecosystems (e.g. ecological, existence, bequest values; Bishop 1987).

Under the proposed alternative some predators would be lethally removed. WS programs for managing predation damage focus on individual problem predators or localized populations of predators. The proposed action has a low magnitude of impact on target predator populations in Nevada. Dispersal from adjacent areas typically contributes to repopulation of a site, depending upon the level of removal and predator population levels in the surrounding sites. Problem wildlife which cause the most damage typically have relatively high populations. While the likelihood of seeing a predator in some localized areas could be temporarily reduced as a result of WS activities, those that are more commonly observed (such as ravens), would continue to be observed, while those that are less commonly or rarely, if ever observed (such as mountain lions due to their secretive nature), will continue to be present in the environment but there would be little visual impact due to the very low likelihood of observing them in the first place. Therefore, the aesthetic and visual impact would probably not be noticeable.

Game and non-game wildlife populations are not significantly impacted by NWSP's take on public lands (Tables 13 and 14) allowing hunters ample opportunities for pursuit. Recreationists interested in viewing and photography opportunities for wildlife also have ample areas in Nevada that are suitable for seeing abundant wildlife to include those areas that NWSP has worked. NWSP activities do not significantly impact animal populations; it does not remove a significant number of any one species. In fact, NWSP activities could bolster particular populations of wildlife such as PDM focused for the protection of game species or T&E species, thereby increasing opportunities for recreational enjoyment.

Procedures and policies designed to minimize potential negative effects on recreationists are in place that help minimize the potential for effects of NWSP activities on recreation. NWSP personnel post signs in prominent places to alert the public that PDM tools are set in an area. On private lands, the cooperators or landowners are aware that PDM control tools are set and can alert guests using the property of their presence. Landowners determine the areas and timing of equipment placement, thereby avoiding conflicts with recreationists.

For public lands, NWSP coordinates with the different land management agencies to determine high public use areas and for what particular time of the year such as hunting season. High use recreational areas are mostly avoided or the types of equipment used are limited. These areas are designated in AWPs and on maps so PDM does not unnecessarily interfere with recreational activities. NWSP avoids conducting PDM in high-use recreational areas except for the purposes of human health and safety.

Some individuals may believe their recreational experiences on public lands are impaired by knowing that any lethal PDM actions are occurring on these lands. Others feel that they are being deprived of the aesthetic experience of viewing or hearing coyotes or other predators because of NWSP PDM actions. On the other hand, some believe that PDM is wholly acceptable since it can help bolster certain species populations such as game species (e.g. bighorn sheep or sage grouse) or sensitive/threatened species.

The take of animals on BLM and USFS lands is minimal averaging about one target predator for every six square miles of land under BLM or FS agreement for PDM which would have little impact on recreation. Although the primary reason for the take of these animals is for predation

damage management, such take also indirectly offers benefits to recreationists because blood samples from many of the mammalian predators are analyzed for plague titers. This information has allowed the Health Department to warn recreationists such as campers about plague "hot spots" in certain areas of Nevada by posting signs.

Some groups or individuals have expressed concerns regarding the effects of NWSP's low level aerial hunting flights on non-target wildlife and on public land recreational users. NWSP has agreements for conducting PDM on no more than about 32% of the lands in Nevada and much less for aerial hunting. NWSP conducts PDM on a fraction of the land under agreement, so the actual land affected by NWSP PDM activities is much less than 32% of the lands in Nevada. The slight increase since the last environmental assessment (approximately one percent), is due to the increased need to protect natural resource species, specifically: sage grouse, bighorn sheep species, elk and mule deer. NWSP conducts aerial operations on a small percentage of the lands in Nevada: 19% in FY 06; 18% in FY 07; 20% in FY 08 and 26% in FY 09. On average during the FY 06 thru FY 09 time frame, 59 percent of the land use area receiving aerial hunting was BLM lands, 31% for private lands, 5% for USFS lands, and 5% for other lands. NWSP concentrates flying efforts during certain times of the year to specific areas such as lambing grounds so the amount of time spent flying over properties under agreement is relatively small on an annual basis. For acres under agreement where target predators were taken, the average amount of time spent on the different classes of lands was 46 min/mi^2 flying for private lands, 4 min/mi^2 for USFS lands, 3 min/mi^2 for BLM lands, and 396 min/mi^2 for other lands in during FY 06-09 (USDA 2010a). Thus, the average amount of time during any given year that NWSP spends on a given property is minimal. Of interest, the area that comprises the "other lands" is extremely small as compared to the vast acreage of BLM property. The affect is that relatively little time spent repeatedly on a small portion of property provides an extremely high ratio of time per square mile. Additionally, acreage flown or direct control performed during PDM by NWSP is tracked by MIS through individual agreements. Therefore even if an aerial crew, or Wildlife Specialist, performed work on only 100 acres, the MIS will show it as flying/working the number of acres listed under that specific agreement, which could be and usually is considerably more (e.g. 5,000 acres). The 1999 EA, 2004 supplement, and other WS EAs in the western U.S. have all concluded that effects on recreational users of public lands were insignificant, and this analysis shows that the potential for such effects continues to be low. Additionally, as the majority of low level flying in Nevada is typically conducted in remote spring lambing and calving grounds, it is unlikely that recreationists would find themselves in a situation to be disturbed.

Table 16. Average number of predators taken on BLM land by NWSP during FY 06-09 by jurisdiction (USDA 2010a).

Average number of Predators taken on BLM land by NWSP during FY 06-09 by Jurisdiction									
Predator Species	**Battle Mountain**	**Carson City**	**Eagle Lake**	**Elko**	**Ely**	**Las Vegas**	**Surprise**	**Winnemucca**	**Total**
Coyote	472.5	36.25	50.75	852.75	967.75	1	150.5	584.25	3,115.75
Common Raven	55	10	50	188.75	298.25	13.75	37	337	989.75
Mountain lion	1	1.25	0.75	2	5.75		2.5	6.5	19.75
Bobcat	4	0.25	0.5	1.25	2.75	0.75	4.25	2	15.75
Badger	6.5		0.25	3.5	2.75		0.75	1	14.75
Gray fox					0.75				0.75
Kit fox	0.25				0.75		0.25	2.25	3.5
Red fox					1				1
Feral dog								0.25	0.25
Feral cat		0.25							0.25
Raccoon				0.25					0.25
Striped skunk		0.75		0.25	0.25				1.25
Total take by Jurisdiction	539.25	48.75	102.25	1,048.75	1,280	15.5	195.25	933.25	4,163

Table 17. Average number of predators taken by NWSP on USFS lands by Ranger district from FY 06-09 (USDA 2010a).

Average Number of Predators taken by NWSP on USFS lands by Ranger district from FY06-09							
Predator Species	**Ely**	**Mountain City**	**Ruby Mountains**	**Austin**	**Bridgeport**	**Spring Mountains**	**Total**
Coyote	36	44	99.75	9	44		232.75
Bobcat					0.25	0.25	0.5
Mountain Lion	0.25	0.25	1.25				1.75

Average Number of Predators taken by NWSP on USFS lands by Ranger district from FY06-09							
Predator Species	**Ely**	**Mountain City**	**Ruby Mountains**	**Austin**	**Bridgeport**	**Spring Mountains**	**Total**
Badger	0.5	1		0.25			1.75
Red fox		0.25					0.25
Gray fox					0.5		0.5
Striped skunk				1			1
Feral cat						2.25	2.25
Total	36.75	45.5	101	10.25	44.75	2.5	240.75

On federal lands, NWSP coordinates with the land management agency through AWPs and designates different work zones on maps to reduce potential problems. For example, high-use recreational areas are designated on maps associated with the AWP and NWSP does not set equipment within a ¼ mile of these areas. Furthermore, upland game and other high-use hunting areas are delineated by NDOW, USFS, or BLM, and if NWSP works on them, control equipment is removed a week or more prior to the hunting season. NWSP does not conduct PDM in high use recreational areas except for the purposes of human health and safety protection. High use recreation and other sensitive areas are identified at a site specific level in NWSP AWPs on maps, or as new damage situations arise. Human safety zones, planned control areas and restricted or coordinated control areas are identified through interagency coordination.

Furthermore, NWSP reduces conflicts with recreationists due to inherent features of PDM. NWSP conducts PDM on public lands almost entirely for grazing allotments with sheep and cattle, with an approximate increase of 1% for the protection of natural resources listed previously. Of interest, much of the area worked is likely to not be noticed by recreationists due to the remote and hostile terrain of where these species occur (e.g. bighorn sheep species). Regarding livestock protection and natural resource protection, these areas are generally not used extensively by recreationists. Most recreational areas are set aside for that specific purpose and grazing is not allowed. The highest seasonal PDM activity for the protection of livestock coincides with lambing and calving which is in the spring. During this time, aerial hunting is a method of choice because many of the grazing areas have poor access and driving conditions are usually limited by wet grounds. Many recreationists as well as NWSP Specialists do not have access to these public lands because of these limitations. In addition, NWSP currently averages only 3 and 4 minutes of flight time per square mile on BLM and USFS lands, respectively. Most recreationists are totally unaware of the PDM actions and the quality of the outdoor experience is not disrupted. Thus, NWSP avoids significant effects on recreational users.

4.2.1.5 Alternative 1 Effects on Public Safety and the Environment

Standard operating procedures (SOPs) to reduce risks to public safety and the environment are built into the program and are listed in Chapter 3 under standard operating procedures. A formal risk assessment of WS methods, including those used for PDM in Nevada, concluded low risks to humans ((USDA 1997, revised), Appendix P) including traps, snares, firearms, aerial hunting, immobilization drugs, and chemical toxicants. The use of chemical drugs and toxicants by NWSP

is regulated by EPA under FIFRA, Nevada Pesticide Control Laws, and WS Policies and Directives. Under several of the alternatives proposed in this EA, NWSP would use sodium cyanide in the M-44 device, DRC-1339 in eggs or meat baits, and carbon monoxide produced from the gas cartridge used for fumigating coyote, skunk, and fox dens. Based on a thorough Risk Assessment, WS concluded that, when NWSP chemical methods, including those referenced above, are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible impacts on the environment and do not represent a risk to the public (USDA 1997, revised).

NWSP control methods do not pose a significant potential hazard to employees or the public because all methods and materials are consistently used in a manner known to be safe to the user and the public. A detailed risk assessment analyzed all PDM methods used by WS in Appendix P of the FEIS for their impacts on public safety and the FEIS found low level risks associated with only a few of them (USDA 1997, revised). This assessment included potential risks to WS employees, the public, and non-target animals. While some of the materials and methods used by NWSP have the potential to represent a threat to health and safety if used improperly, problems associated with their mis-use have rarely occurred in Nevada. This favorable record is due to training and a certification program for the use of PDM methods such as the M-44, proper use and safety being stressed, and mandatory compliance with use of PDM methods with policies and pesticide labels. The risk to the public is further reduced because most NWSP PDM methods are used in areas where public access is limited and warning signs are prominently posted to alert the public whenever toxic devices or traps are deployed. NWSP coordinates with cooperators or landowners about where and when PDM methods are to be used, thereby decreasing the likelihood of conflicts with the public.

NWSP PDM activities are also not likely to negatively affect the public in terms of “Environmental Justice” and “Executive Order 12898” (see section 1.5.2). “Environmental Justice” and “Executive Order 12898" relates to the fair treatment of people of all races, income and culture with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is a priority within USDA, APHIS, and WS. Also, all APHIS-WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to ensure Environmental Justice.

Under the current program alternative, PDM methods could be used to resolve complaints involving predators that represent a risk to public health and safety. Recent projects involving predators that represented a human health and safety risk, such as those described in 2.2.5, were effectively resolved using PDM methods such as traps and firearms.

Risks associated with the use of lead ammunition. WS has determined that the use lead from ground shooting is not significant in terms of effects from accumulation in the soil (USDA 2005). Very small amounts are used which are sparsely and widely disbursed, rather than concentrated in small areas. Lead artifacts and lead from spent ammunition are relatively stable, and are not readily released into aquatic or terrestrial systems (TWS 2008), especially in alkaline soil environments such as are typically found in Nevada. To minimize the use of lead, WS uses non-lead shot when shooting from aircraft. Additional discussions of the effects of lead are contained under discussions of effects on non-target species.

Risks Associated with Aerial Hunting: One group has raised an issue stating that the potential for aircraft accidents by WS aerial hunting operations to cause catastrophic ground fires or pollution as a result of spilled fuel and oil. As a result of these issues, the following information was

obtained from Mr. Norm Wiemeyer, Chief, Denver Field Office of the National Transportation Safety Board (the agency that investigates aviation accidents):

Regarding major ground or forest fires, Mr. Niemeyer stated he had no recollection of any major fires caused by government aircraft since he has been in his position beginning in 1987. Also, an informal polling of WS State Directors in the Western Region affirms that no major ground fires have resulted from any WS aviation accidents (USDA 2005).

Regarding fuel spills and the potential for environmental hazard from aviation accidents, Mr. Wiemeyer stated that aviation fuel is extremely volatile and will evaporate within a few hours or less to the point that even its odor cannot be detected. Thus, there should be no environmental hazard from unignited fuel spills. The quantities involved in WS aircraft accidents are small (10 30 gallons). In some cases, not all of the fuel is spilled.

Regarding oil and other fluid spills, the aircraft owner or his/her insurance company is responsible for cleanup of spilled oils and other fluids if required by the owner or manager of the property on which the accident occurred. In the case of BLM, Forest Service, and National Park Service lands, the land managing agency generally requires that contaminated soil be removed and disposed of. In most accidents involving private property, the property owner is generally not concerned about the quantities of spilled oil involved in these types of accidents and has not requested or required clean-up. With the size of aircraft used by Wildlife Services, the quantities of oil capable of being spilled in any accident are small and insignificant with respect to the potential for environmental damage 6-8 quarts maximum for reciprocating (piston) engines and 3-5 quarts for turbine engines. Aircraft used by WS are single engine models, so the greatest potential amount of oil that could be spilled in one accident would be about 8 quarts.

Petroleum products biodegrade through volatilization and bacterial action, particularly when exposed to oxygen (EPA 2000). Thus, small quantity oil spills on surface soils can be expected to biodegrade readily. Even in subsurface contamination situations involving underground storage facilities which would generally be expected to involve larger quantities than would ever be involved in a small aircraft accident, EPA guidelines provide for "natural attenuation" or volatilization and biodegradation in some situations to mitigate environmental hazards (EPA 2000). Thus, even where oil spills in small aircraft accidents are not cleaned up, the oil does not persist in the environment. Also, WS accidents occur in remote areas away from human habitation and drinking water supplies. Thus, the risk to drinking water appears to be exceedingly low or nonexistent.

For these reasons, the risk of ground fires or fuel/oil pollution from aviation accidents is considered to be low. Based on the history and experience of the program in aircraft accidents, it appears the risk of significant environmental damage from such accidents is exceedingly low.

4.2.1.6 Cost Effectiveness of Alternative 1

The three primary mechanisms by which predators can negatively affect livestock profitability are directly through death losses, and indirectly through reduced weaning weights caused by stress from the presence or harassment of predators, and increased labor and management costs. Direct livestock mortality alone can significantly reduce the viability of the ranching business. A reduction in weaning weights can affect the whole herd and in extreme cases may also threaten

insolvency in the ranch business. Labor and management costs associated with increased effects from predators can include an increase in the need for veterinary services and additional herders, among others. Rashford et al. (2010) found that the effect of predators in western Wyoming cow-calf operations was most costly from reduced herd weaning weights, followed by calf death loss to predation and lastly, increased management costs. While the collective impacts on the ranch economy from all three predator effects were not studied, intuitively it would seem that the combination of the three would more significantly reduce ranch business viability. This study suggested that predator control activities would need only to reduce death or weaning weight losses a small amount to be economically efficient. Rashford et al. (2000) also point out the value of protecting the long-term viability of western ranch lands as they provide beneficial public and ecosystem services such as open space and wildlife habitat.

A common concern about government-funded wildlife damage management programs is that the value of livestock losses reported to, or verified by, APHIS-WS is often less than the cost of providing wildlife damage management services for the protection of livestock. However, this concern, stated in that way, indicates a misconception of the purpose of wildlife damage management for livestock protection, which is not to wait until the value of losses is high, but to prevent or stop losses in order to minimize them. Wildlife damage management would reach its maximum potential success if it prevented all losses, which would mean the value of losses would be zero. However, in the real world, it is not reasonable to expect zero loss. The concern should be whether the cost of providing wildlife damage management services is equal to or greater than the value of livestock losses avoided.

A team of economic specialists from the National Wildlife Research Center in Ft. Collins, CO, conducted an economic assessment of select benefits and costs of USDA-APHIS-WS in California. The assessment focused primarily on damage in agricultural areas because urban wildlife damage figures were not readily available. Funding for the study was provided by the California Department of Food and Agriculture Vertebrate Pest Control Research Advisory Committee. Results of the study indicate that for every $1.00 California counties invest in Wildlife Services, they save between $6.50 and $10.00 in wildlife damage and replacement program costs (Shwiff et al. 2005).

Other studies have also shown positive results for benefits to costs. Using the best information available at the time, the APHIS-WS EIS (USDA 1997, revised) concluded that benefits, in terms of avoided sheep and lamb losses plus price benefits to consumers are 2.4 times the cost of providing USDA-APHIS-WS predation damage management services for sheep protection in the 16 western States. An economic assessment of the California Cooperative Animal Damage Control program was completed for a 10-year period between 1980 and 1990. The results showed a cost to benefit ratio of 1:8 for direct producer benefits, and a cost to benefit ratio of 1:21 for the general public[6] (USDA 1991). Schwiff and Merrill (2004) reported 5.4 percent increases in numbers of calves brought to market when coyotes were removed by aerial hunting. Bodenchuk et al. (2002) reported predation management benefit-cost ratios of 3:1 up to 27:1 for agricultural resource protection, and 2:1 to 22:1 benefit-cost ratios for predation management for wildlife. Wagner and Conover (1999) found that the percentage of lambs lost to coyote predation was

[6]Economists with the U.S. Department of Agriculture have published studies that indicate the CONSUMER IMPACTS are 2.62 times greater for the public or the consumer of agricultural commodities, than the costs of production and losses on profits received by the agricultural producer of these products.

reduced from 2.8 percent to less than one percent on grazing allotments in which coyotes were removed 3-6 months ahead of summer sheep grazing.

Variables that would change the cost to benefit ratio of a predation damage management program include: local market values for livestock, age, class and type of livestock preyed upon, management practices, geographic and demographic differences, local laws and regulations and USDA-APHIS-WS polices, the skill and experience of the individual USDA-APHIS-WS specialist responding to the damage request, and others.

Connolly (1981) examined the issue of cost effectiveness of federal predator control programs and concluded that public policy decisions have been made to steer the program away from being as cost effective as possible. This is because of the elimination of control methods believed to be effective but less environmentally preferable such as toxic baits. Thus, the increased costs of implementing the remaining available methods were to achieve other public benefits besides livestock protection and could be viewed as mitigation for the loss of effectiveness in reducing damage. The ADC EIS (USDA 1997, revised) states that cost effectiveness should not be the primary goal of the USDA-APHIS-WS program. Additional constraints, such as environmental protection, land management goals, and others, are considered whenever a request for assistance is received. These constraints increase the cost of the program while not necessarily increasing its effectiveness, yet they are a vital part of the APHIS-WS program.

4.2.1.7 Alternative 1 Effects on Special Management Areas

Special Management Areas (SMAs) include protected lands such as Designated Wilderness, Wilderness Study Areas, and Wild and Scenic Rivers. During the analysis period (FY 06-FY 09), NWSP conducted work on 11 Wilderness Study Areas, of which contained 10 Designated Wildernesses. The majority of predator damage management activities occurred during select and critical birthing times for mule deer, bighorn sheep, and more recently sage grouse, as requested by the Nevada Department of Wildlife. WS will continue to conform to Revisions and Clarifications to H-8550-I, Interim Management Policy for Lands Under Wilderness Review (March 19, 2002 memorandum (No. 2004-140) from BLM and FS Acting Director to BLM and FS Washington and Field Office Officials). Because of the relatively low amount of work on special management areas, because of the limited and temporary nature of the work, and because NWSP coordinates all planning with federal land managers for conformance to land use plans, NWSP continues to have no impact on SMAs. NWSP anticipates that the NDOW could request assistance on an additional 10 Designated Wilderness Areas for the protection of such natural resources as: bighorn sheep species, mule deer, antelope, elk and sage grouse. Any WSA or WA is considered a potential work area for NWSP as outlined at annual work planning meetings. Any raven damage management work in these areas would be closely coordinated with land managers to fully conform with desert tortoise management area land use plans, including restrictions to avoid or minimize harm to desert tortoise and their habitat, as described in the WS 2003 Biological Opinion, as updated in October 2010.

Sections 2.2.7 and 3.4.2.7 discuss the issue of NWSP PDM activity in SMAs such as WAs and WSAs and SOPs to ensure no effects in SMAs. PDM is only conducted in designated WAs or WSAs when allowed by the legislation that designated the WA, or under regulations and policies developed by USFS or BLM for PDM in these areas. PDM in SMAs is only a very minor component of the current program.

BLM SMAs. NWSP follows BLM's Interim Management Policy for Lands Under Wilderness Review, H-8550-1 of (BLM 2002) and the MOU between BLM and WS. NWSP would follow BLM's policies for WAs should the need to work these areas arise. WS proposed activities on lands under wilderness review (WSAs) do not conflict with BLM management objectives as set forth in the RMPs. Proposed NWSP AWPs are presented for review by BLM during the work planning process to ensure that areas of conflict do not exist. Therefore, NWSP actions should have no effect on wilderness characteristics such as size, naturalness, solitude, aesthetics, primitive or unconfined type of recreation, supplemental values, and the possibility of returning the area to a natural condition as stated in BLM's Wilderness Inventory Handbook from 1978 and the Interim Management Policy for lands under wilderness review (BLM 2002). PDM under the current program has been limited in scope and has not interrupted the wilderness review processes, or impaired the potential suitability for wilderness designation of these areas by Congress. In FY 06-FY 09, NWSP conducted work on 11WSA's with grazing allotments in response to predation of livestock, mule deer, bighorn sheep, antelope and sage-grouse (USDA 2010a). NWSP has also worked on 9 BLM Designated Wilderness Areas over the past several years (USDA 2010a). The amount of work performed in SMAs on BLM lands has been minor. From 2006 to 2009, approximately 220 staff hours were worked per year on BLM SMAs. A list of PDM methods used in WSAs are given in Table 4. NWSP worked on the following BLM WSA's and WA's. NWSP may work on these and others in the future:

WSA NV-020-012/CA-020-618/621 – NWSP provided sporadic, seasonal (winter and spring time fawning/lambing) natural resources related PDM on roughly 1.5 square miles to protect bighorn sheep and mule deer from the predation of mountain lions and coyotes.

WSA CA-020-619A – NWSP provided sporadic, seasonal (spring time calving/lambing) livestock related PDM to reduce predation by coyotes.

WSA CA-020-615 – NWSP provided sporadic, seasonal (spring time calving/lambing) livestock related PDM to reduce predation by coyotes.

WSA NV-020-406Q – NWSP provided sporadic natural resource related PDM at the request of NDOW to protect bighorn sheep from mountain lion predation.

WSA NV-030-104 – NWSP provided sporadic natural resource related PDM at the request of NDOW to protect bighorn sheep from mountain lion predation.

WSA NV-030-525A – NWSP provided sporadic, seasonal (spring time calving/lambing) livestock related PDM mainly to reduce coyote predation, and minimal assistance of one mountain lion specialist.

WSA NV-060-158/199 – NWSP trailed a mountain lion from outside the WSA where it had killed livestock.

WSA NV-040-166 – NWSP trailed a mountain lion from outside the WSA where it had killed livestock.

WA Meadow Valley Range – NWSP made site visits at the request of NDOW regarding bighorn sheep damages.

WA Delamar Mountains – NWSP provided sporadic, seasonal natural resource and livestock related PDM for the protection of desert bighorn sheep from coyotes, mountain lions and bobcats.

WA Parsnip Peak – NWSP provided PDM for the protection of mule deer from coyote predation.

WA White Rock Range – NWSP provided sporadic PDM for the protection of mule deer from coyote predation.

WA Fortification Range - NWSP provided sporadic natural resource related PDM for the protection of mule deer from coyote predation.

WA Mount Grafton - NWSP provided sporadic natural resource related PDM for the protection of mule deer from coyote predation.

WA Highland Ridge - NWSP provided seasonal (mostly winter) livestock related PDM to reduce mountain lion and coyote damage.

WA Mount Moriah - NWSP provided sporadic, seasonal natural resource (winter) related PDM at the request of NDOW for the protection of bighorn sheep and mule deer from mountain lions and coyotes.

WA Goshute Canyon - NWSP provided some livestock related PDM to reduce losses caused by coyotes.

NWSP future sporadic and seasonal PDM at the request of NDOW for natural resource protection (bighorn sheep species, elk, mule deer, sage grouse) from mountain lion, coyote and raven predation may include the above listed BLM SMA's and the following.

WA's Muddy Mountain, Lime Canyon, Mormon Mountains, South Pahroc Range, North Jackson Mountain and South Jackson Mountain.

USFS SMAs. NWSP follows policies outlined in the USFS Manual, particularly Section 2323, and the national MOU between USFS and WS when conducting PDM in WAs and SDAs (no PDM in SDAs except for emergency human health situations). Proposed NWSP PDM plans are reviewed by USFS during the work planning process to ensure that areas of conflict do not exist. Therefore, NWSP PDM would have almost no effect on wilderness characteristics or management objectives of SDAs. Proposed PDM would be limited in scope to grazing areas with a limited buffer zone for the protection of livestock, natural resources (bighorn sheep, mule deer and sage grouse) and it would not impair the wilderness designation by Congress. In FY 06-FY 09, NWSP conducted work on 2 USFS WA's, Mount Moriah and Grant Range.

WA Mount Moriah - NWSP provided sporadic, seasonal natural resource (winter) related PDM at the request of NDOW for the protection of bighorn sheep and mule deer from mountain lions and coyotes.

WA Grant Range - NWSP provided a few pursuits of mountain lions by one Mountain Lion Specialist from outside the WSA where they had killed livestock.

NWSP future sporadic and seasonal PDM at the request of NDOW for natural resource protection (bighorn sheep species, mule deer, sage grouse) from mountain lion, coyote and raven predation may include the above listed USFS SMA's and the following.

USFS WA's High Schells, Ruby Mountain, East Humboldt and Jarbidge.

A list of PDM methods that may be used in USFS WAs are given in Table 4.

Other SMAs. Areas of Critical Environmental Concern (ACECs), SDAs, and other types of SMAs are areas managed for the protection of certain qualities or values such as biological, riparian, cultural, historic, scenic, geological, paleontological, recreation, rangeland, or sensitive plant species. In general, PDM has not been needed in these types of areas primarily because livestock have not been grazed on them. However, it may be conducted on such areas if the need arises. Similar to WAs and WSAs, sport hunting and PDM by private individuals using firearms and trail hounds is not always subject to additional restrictions in these areas. The BLM and USFS are responsible for identifying any conflicts that PDM might have with the management of any of these types of areas during the work planning process. If, for example, the respective federal land management agency determines that an area with special management emphasis is to be closed to all public hunting and the use of firearms, or to all low level flights, then NWSP would be subject to those restrictions unless provided a special exemption. When the need arises, restrictions on methods for these areas may be established in the AWPs.

Because of the relatively low amount of work on special management areas and because NWSP coordinates all planning with federal land managers for conformance to land use plans, NWSP has no impact on SMAs.

NWSP and WS policies require *Agreements for Control* or *AWPs* be in place prior to conducting PDM. NWSP meets with land management agencies to discuss PDM activities and their location. If NWSP were requested to conduct PDM in a "Special Management Area" (SMA), all applicable guidelines, restrictions, and SOPs would be followed to ensure PDM would not affect the SMA and its particular values. Therefore, it is highly unlikely that PDM activities would impact SMAs.

4.2.1.8 Indirect and Cumulative Impacts of Alternative 1

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such other actions. Based on NWSP's impact on target animal populations (USDA 2010a), combined with other harvest (NDOW 2006, 2007, 2008, 2009 and 2010), cumulative impacts are determined to be minimal. The national WS programmatic FEIS (USDA 1997, revised) also concluded that no significant cumulative impacts were identified or expected under the current program (integrated wildlife damage management).

Effects of Predator Removal on Prey Populations. NWSP takes several species of predators in Nevada as discussed in 4.2.2.1, but NWSP conducts most PDM for the coyote. Since NWSP deals predominantly with coyotes, much of the following information is given for coyote effects on prey species.

Some people have expressed a concern that reducing predators might result in an over abundance of rodents or rabbits. The relationship between predators and rodent and rabbit populations has been summarized in USFWS (1979). Rabbit and rodent populations normally fluctuate

substantially in several-year cycles. Two hypotheses attempt to explain these cyclic fluctuations: 1) rodent and rabbit populations are self-regulated through behavior, changes in reproductive capacity due to stress, or genetic changes (Chitty 1967, Myers and Krebs 1983); and 2) populations are regulated by environmental factors such as food and predation (Pitelka 1957, Fuller 1969). The impact analysis on rodents and lagomorphs (rabbits and hares) showed that predators generally prolong the low points in rodent population cycles and spread the duration of the peaks. Predators generally do not "control" rodent populations (Keith 1974, Clark 1972, Wagner and Stoddart 1972). It is more likely that prey abundance controls predator populations. USFWS (1979, p. 128) concluded that "ADC Program (former name of WS) activities have no adverse impacts to populations of rodents and lagomorphs." The FEIS did not specifically analyze this issue (USDA 1997, revised).

Keith (1974) concluded that: 1) during cyclic declines in prey populations, predation has a depressive effect and as a result, the prey populations may decline further and be held for some time at relatively low densities; 2) prey populations may escape this low point when predator populations decrease in response to low prey populations; and 3) since rabbit and rodent populations increase at a faster rate than predator populations, factors other than predation must initiate the decline in populations. Wagner and Stoddart (1972) and Clark (1972) independently studied the relationship between coyote and black-tailed jackrabbit populations in northern Utah and southern Idaho. Both concluded that coyote populations seemed to respond to an abundance of jackrabbits. When a broad range of prey species is available, though, coyotes generally feed on any of the species available. Therefore, coyote populations may not vary with changes in the availability of a single prey species (Knowlton 1964, Clark 1972).

Henke (1995) reviewed literature concerning coyote-prey interactions and concluded that short term (≤6 months) coyote removal efforts typically do not result in increases in small mammal prey species populations. However, longer term intensive coyote removal (9 months or longer) can in some circumstances result in changes in rodent and rabbit species composition which may lead to changes in plant species composition and forage abundance. Most PDM actions in Nevada are not year round but occur for short periods after damage occurs (corrective control situations) or for short periods (< 6 months) at the time of year when benefits are most likely such as the 2 -3 month period immediately preceding calving in the spring. This factor, combined with the fact that NWSP conducts PDM on only about 26% of the land area of Nevada, in any one year where predators are taken, and kills a low cumulative percentage (6-14%) of Nevada's population of coyotes, indicates that PDM has a minimal effect on the overall ecosystems in Nevada (USDA 2010a). Also, take of other carnivores that prey on rodents and rabbits such as gray fox is too low to represent any potential for a significant effect. Evidence also exists to suggest other carnivores such as gray and red fox increase in number when coyote populations are reduced (Robinson 1961, Nunley 1977). The greatest limiting factor for swift fox, a closely related species to the kit fox, has been suggested to be coyotes (USFWS 1995). Therefore, even if coyote numbers were reduced temporarily, other species that prey on rodents and rabbits would probably increase in number to mitigate the reduction in coyote predation on those prey species.

Other prey species of predators in Nevada include T&E and sensitive species and big game as discussed in section 1.1.3. Under certain conditions, predators, primarily coyotes and ravens in Nevada, have been documented as having a significant adverse impact on sensitive species (Pimlott 1970, Bartush 1978, USFWS 1978, Hamlin et al. 1984, Neff et al. 1985).

Based on the above information, it is clear that local short term predator population reductions do not have a significant long term effect on rodent and rabbit populations, but could enhance T&E

and sensitive species, and big game populations. As far as the latter, this could either be a beneficial or detrimental effect depending upon whether local big game populations were at or below the capacity of the habitat to support them. However, NWSP only conducts PDM on limited and specific areas to benefit prey populations where predation has been identified as a limiting factor to success. Except where NWSP is specifically requested by a management agency to conduct PDM for species enhancement, the current program has little effect on prey species populations in Nevada.

4.2.2 Alternative 2 No Federal NWSP PDM

This alternative was discussed in 3.2.2. It would not allow WS to provide wildlife damage management assistance in Nevada. This alternative was considered in detail for the national level in the ADC FEIS (USDA 1997, revised) and found to have the potential for significant impacts on target and non-target species, humaneness, public safety, and other resources. It was assumed that without professional oversight, training, and experience, the environmental consequences of a no federal program alternative could be significant. A no federal program alternative in Nevada, though, would probably still retain NDRP. Therefore, the impacts that were described in the FEIS for this alternative (USDA 1997, revised) would not be quite the same in Nevada as in other areas. The impacts under the no federal NWSP alternative would likely be intermediate between the current program alternative and the FEIS analysis of the no federal program because some professional services would still be available for the public. The primary concern of not having a federal program is that impacts would increase because non-professional private individual's efforts conducting PDM on their own would increase. NDRP may conduct PDM, however it is unlikely NDRP would conduct PDM at the same levels as the NWSP program and, therefore, the demand for PDM from private individuals would exceed NDRP's capabilities. Many of these individuals would probably be untrained and unlicensed to use certain PDM methods that have the potential for high impacts when not properly used. Because private persons conducting PDM would not be associated with a federal program, accountability, records maintenance, regulatory and policy compliance, and coordination with other agencies would not always be required or adhered to, thus, impacts would have the potential to be much higher than under the current program alternative. Finally, it is hypothetically possible that the inability of some of these private individuals to resolve damage problems would lead to the illegal use of chemical toxicants which could have a great potential for significant negative impacts on the environment.

4.2.2.1 Alternative 2 Effects on Target Predator Populations

Under this alternative, the federal portion of NWSP would have no impact on target predator populations in Nevada. However, private organizations and individuals conducting PDM would most likely increase in proportion to the reduction of services, and NDRP, the State portion of NWSP, would probably still provide some level of PDM, but without federal supervision. These efforts to reduce or prevent depredations would probably result in effects similar to those of the proposed action depending on the level of effort expended by NDRP, private persons and organizations. For the same reasons shown in the population impacts analysis, section 4.2.1.1, it is highly unlikely that predator populations would be affected significantly by implementation of this alternative. However, the possible use of illegal chemical toxicants, as described in 4.2.2, could lead to unknown impacts on carnivore populations.

Raven take would be likely to decrease substantially because the primary proposed means of removing ravens is with DRC-1339, a toxicant registered exclusively for use by federal Wildlife Services employees or individuals under their supervision. Alternative methods (e.g. shooting) are

likely to be more time consuming and expensive to implement and considerably fewer birds are likely to be taken and, based on WS experience, considerably less success would be realized in raven damage management.

Additionally, if NWSP was not conducting the work, NDOW, by Nevada Revised Statute and Nevada Administrative Codes would still be required to perform PDM (See appendix C).

4.2.2.2 Alternative 2 Effects on Non-target Species Populations, Including T&E Species

Under this alternative, the NWSP would be unable to provide assistance with predation management including programs to protect T&E species. The amount of professional oversight in PDM would diminish but would still be available to some extent through NDRP. In the 1999 EA, the reduction in professional oversight was anticipated to result in an increase in impacts on non-target species populations over that described for Alternative 1 because the individuals conducting the work may not have the same access to training and current PDM tools and techniques as the federal NWSP PDM specialists. This Alternative would also result in less aerial hunting and increased ground work for predation management. The increase in ground work would result in increases in potential risks to non-target animals from an increased use of traps and snares (Wagner and Conover 1999). This alternative would not include the use of DRC-1339 to take ravens, so shooting would presumably increase.

Private efforts to reduce or prevent depredations would likely increase which may result in less experienced persons implementing control methods leading to a greater take of non-target wildlife than under the current program. Similar to NWSP PDM, private individuals could trap coyotes and unprotected predators year-round. However, private individuals would not be restricted to SOPs such as NWSP's self-imposed restrictions (ie. setting traps closer than 30 feet to livestock carcasses to avoid capturing scavenging birds or using pan tension devices to exclude smaller animals). Therefore, hazards to raptors, including bald eagles, and other non-target animals could be greater under this alternative. As described in 4.2.2, the hypothetical use of chemical toxicants could impact non-target species populations, including T&E species. Therefore, it is likely that more impacts would occur under this alternative than the current program as discussed in section 4.2.1.2. Aerial hunting, though, would probably not be used as much under this alternative because it requires a permit from NDOW and pilots experienced at low-level flying. Even if NDOW issued several more aerial hunting permits, the effects of low level flights on wildlife and wild equines would likely be similar to those discussed in section 4.2.1.2, barring illegal activities.

4.2.2.3 Alternative 2 Humaneness

Under this alternative, the federal portion of NWSP would not employ methods viewed by some persons as inhumane and, thus, have no program effect on humaneness. NDRP would probably still provide some level of professional direct control assistance with PDM, but without federal supervision, and would continue to use the PDM methods considered inhumane by some individuals, but at lower levels. NDRP personnel, though, would no longer receive training from federal sources, nor would the program benefit from federal research focused on improved humaneness, selectivity, and nonlethal methods. However, private individuals, who are no longer provided professional assistance from NWSP and have experienced resource losses, could conduct lethal controls on their own. This could have the potential for increased and unnecessary pain and suffering to target and non-target species. Use of leghold traps, snares, and shooting by private individuals would probably increase. This could result in less experienced persons implementing use of PDM methods such as

traps without modifications like the underpan tension devices that exclude smaller non-target animals. Greater take and suffering of non-target wildlife could result. It is hypothetically possible that frustration caused by the inability of resource owners to reduce losses could lead to illegal use of chemical toxicants. The illegal use of toxicants could result in increased animal suffering.

PDM actions taken by individuals would probably be less humane than with a federal program for other reasons. NWSP is accountable to public input and humane interest groups often focus their attention and opposition on PDM activities employed by NWSP. PDM methods used by private individuals may be clandestine. The people that perceive some PDM methods as inhumane would be less aware of PDM activities being conducted by private individuals but mostly because the private individuals would not be required to provide information under any policies or regulations similar to those NWSP follows. Thus, the perception of inhumane activities would probably be reduced, although the actual occurrence of PDM activities may increase.

Under this alternative, predation rates would be expected to increase. It has been determined that livestock losses are expected to be 4 times higher in areas without effective PDM (USDA 1997, revised). Therefore, more domestic animals, including livestock and pets, would suffer inhumanely from injuries caused by predation than under the current program.

Therefore, this alternative would likely result in more negative impacts with regard to humaneness than the current program. This is primarily due to the fact that more private individuals would attempt to alleviate predator damage without professional training and guidance, and more domestic animals would be lost to predation.

The federal WS portion of this Alternative may be more acceptable to Animal Rights activists and to a wider range of animal welfare advocates because WS would not be involved in the lethal removal of predators. Livestock producers and others who receive services of NWSP are likely to perceive this as an unethical restriction of their access to legally available damage management techniques from professional, accountable WS Specialists, and may perceive this Alternative as an imposition of additional costs of livestock production and results in unacceptable losses. People concerned about the use of public resources to reduce damage (e.g. enhance profit) on private and public lands may find this alternative preferable to Alternative 1. However the NDRP component would still be operational.

4.2.2.4 Alternative 2 Effects on Recreation

Under this alternative, there would be no NWSP involvement in predation management and, consequentially, no impact on recreation. However, NDRP would probably provide some level of predation management on public lands. Private efforts to reduce or prevent depredations on livestock allotments would likely increase which could result in less experienced persons implementing PDM methods and a greater impact on recreation than Alternative 1. Aerial hunting would probably be greatly reduced under this alternative because it requires pilots with experience at low level flying and a permit from NDOW. Even if NDOW increased permits, impacts are not likely to be greater than analyzed for Alternative 1. A reduction in aerial hunting would result in an increase in the amount of ground traffic and hours of PDM required for an equivalent level of predation management (Wagner and Conover 1999). This increase in PDM activity on the ground would increase the risk of damage to the environment from vehicular traffic and increase the likelihood of a conflict between PDM and recreational activities.

The federal portion of NWSP would not impact hunting and nonconsumptive uses with the no federal program alternative. NDRP would probably provide some level of direct control assistance with PDM. NDRP would have similar effects on recreation as described under the current program alternative, except that with no federal portion, effects would be decreased proportionately. Private efforts to reduce or prevent depredations would likely increase which could result in less experienced persons implementing PDM methods leading to a greater effect on recreation than described under the current program alternative. As discussed with other issues, it is hypothetically possible that the frustration caused by the inability of novice PDM persons to reduce losses could lead to the illegal use of chemical toxicants which could impact recreationists and their pets. This activity could also have impacts on game species, as described for predators in 4.2.2.1 and non-target species in 4.2.2.2, but it is not likely to impact these species greatly. Aerial hunting would probably not be used as much under this alternative because it requires pilots with experience at low level flying and a permit from NDOW, and therefore, recreationists would be affected minimally with this PDM method. Even if NDOW issued several more permits, the effects would likely be similar to those in section 4.2.1.4, barring illegal activities. PDM activities would probably cause damage to the environment from off-road vehicle use where NWSP would normally aerial hunt. This is because much of the desert environment is sensitive by nature and vehicles can leave long-lasting scars, especially when vehicles are used during the wet season because ruts are made. These scars can be an eyesore to recreationists. Therefore, it is likely that some negative impacts could occur under this alternative which are more than the current program, as discussed in section 4.2.1.4.

4.2.2.5 Alternative 2 Impacts on Public Safety and the Environment

Under this alternative, there would be no NWSP involvement in predator damage management and, consequentially, there would not be any risks to human health and safety from NWSP pesticide or aircraft use. Conversely, NWSP would not be available to provide assistance with wildlife threats to human health and safety. However, NDRP would probably provide some level of assistance with these issues. Private efforts to reduce or prevent depredations on livestock allotments would likely increase which could result in less experienced persons implementing PDM methods and greater health and safety risks associated with improper use of PDM tools. Aerial hunting would probably be greatly reduced under this alternative because it requires pilots with experience at low level flying and a permit from NDOW. Even if NDOW increased permits, impacts on public safety are not likely to be greater than analyzed for Alternative 1. The reduction in aerial hunting would result in further increases in use of ground-based PDM techniques (Wagner and Conover 1999). As stated above, increased ground-based private efforts to reduce or prevent depredations on livestock allotments could result in less experienced persons implementing PDM methods and greater health and safety risks associated with improper use of PDM tools.

The federal portion of NWSP would have no effect on public safety, the environment, or Environmental Justice (Executive Order 12898) issues under this alternative. NDRP would probably still provide some level of PDM without federal supervision and their effects would be similar to those discussed under section 4.2.1.6, except these would be comparatively less. Compared to the current program alternative, private individuals would likely have more significant negative effects on the environment and human safety. This would result from untrained and unlicensed individuals using PDM methods and toxicants, legal and illegal. As discussed in section 4.2.2.1, it is possible that individuals frustrated by their inability to reduce losses could resort to illegally using chemical toxicants; such unregulated use could lead to unknown impacts on public safety. In addition, private individuals are not accountable and can conduct PDM for unprotected species year-round and without many of the policies, regulations, and restrictions that NWSP personnel must follow. Of the

alternatives, this one would have the greatest potential for negative impacts on public safety and the environment.

In addition to some of the problems noted above, under this alternative, the federal portion of NWSP would not be able to respond to predator complaints involving human health and safety. NDRP could respond to complaints within reasonable proximity of their duty stations. However, it is unlikely that NDRP would be able to respond to all predator complaints involving human health and safety because it would lack resources and methods that can only be used or supervised by the federal component. Therefore, human health and safety problems associated with predators would likely increase and either go unresolved or be handled by private individuals with similar risks described above.

4.2.2.6 Cost Effectiveness of Alternative 2

Federal funds would not be expended for NWSP services. The federal program currently provides much of the supplies for PDM and supervision of the cooperative program. NDRP would have to increase their expenditures in this area with State funds. Damage control costs could be large or small depending on the role of the public sector (USDA 1997, revised). It was estimated that in a statewide "no program" option, monetary losses to producers would be expected to increase an average of four times the present level (USDA 1997, revised). Indirect consumer and producer impacts could be expected to be substantially higher. NDRP would reduce monetary losses, but the cost effectiveness under this alternative is estimated to be lower than under the current program alternative.

4.2.2.7 Alternative 2 Impacts on Special Management Areas

The current program has been determined to have no significant effect on the SMAs, so the same program reduced by the federal component would similarly not affect SMAs. Without a federal program to provide assistance, individuals affected by predator damages could conceivably have a negative effect on SMAs for reasons described under this alternative elsewhere in 4.2.2. Therefore, this alternative would likely have more negative effects on SMAs than the current program alternative.

4.2.2.8 Indirect and Cumulative Impacts of Alternative 2

Indirect impacts under the no federal program alternative would be the lowest and would correlate with program effectiveness. Positive contributions to the local economy would be expected to be lowest under the no federal program alternative because resource losses are expected to be higher (USDA 1997, revised) as discussed in section 4.2.2.6.

Cumulative impacts would be expected to be higher under this alternative than under the current program alternative as a result of uncoordinated control actions or misapplication of control methods by individuals. These impacts could result in higher impacts on target and non-target wildlife and public safety, thereby affecting wildlife populations and the environment.

Effects of Predator Removal on Prey Populations. Under Alternative 2, the effects on prey populations from predator removal would be somewhat less than those of the proposed action because no federal PDM activities would occur. However, the difference is not likely to be substantial because of the following factors: 1) Private efforts to reduce coyote populations could still occur and would probably increase without NWSP operational activities; 2) NDRP PDM actions would still occur

without federal involvement, but would likely be to a lesser extent than under a cooperative program with federal involvement; 3) eliminating federal involvement would probably only reduce the percentage of land area worked from 32% to 10% which is not a major change in terms of potential impacts on prey populations; and 4) anticipated effects on coyote populations and other carnivore populations are expected to be minimal as identified by the analysis in section 4.2.1.

4.2.3 Alternative 3 Nonlethal Management Only

This alternative was discussed in 3.2.3. The nonlethal control only alternative is a modification of the current program alternative wherein no lethal technical assistance or direct control would be provided or used by NWSP. Both technical assistance and direct control would be provided in the context of a modified IWDM that administratively constrains NWSP personnel to use nonlethal strategies to resolve wildlife damage problems (methods allowed in Table 3). Similar to Alternative 2, this alternative could have negative environmental consequences where individuals implement lethal control without professional oversight, training, and experience.

4.2.3.1 Alternative 3 Effects on Target Predator Populations

Under this alternative NWSP would be limited to using nonlethal methods, whereas other agencies, organizations, or individuals would be free to carry out necessary lethal control work to resolve wildlife damage. Since nonlethal controls alone do not always prevent or reduce wildlife damage to acceptable levels, other government agencies, private organizations, and individuals would likely assume responsibility for implementing lethal controls necessary to adequately deal with these problems. Therefore, NWSP would have no impact on target predator species populations directly under this alternative. As under Alternative 2, NDRP would probably provide some level of direct control assistance with predator damage problems but without federal supervision, and private efforts to reduce or prevent depredations would likely increase which would result in impacts on those populations. For the same reasons shown in the population impacts analysis in section 4.2.1.1, it is highly unlikely that coyote populations or other predators would be impacted significantly by implementation of this alternative. Impacts and possible risks of illegal chemical toxicant use under this alternative would probably be about the same as those under Alternative 2. As discussed for Alternative 2, due to the lack of access to DRC-1339, the total raven take is likely to be substantially lower than with Alternative 1.

Additionally, if NWSP was not conducting the work, NDOW, by Nevada Revised Statue and Nevada Administrative Codes would still be required to perform PDM (See appendix C).

4.2.3.2 Alternative 3 Effects on Non-target Species Populations, Including T&E Species

Alternative 3 would not allow NWSP to conduct direct operational PDM. Therefore, NWSP would not have any direct impact on non-target or T&E species. NWSP would not conduct aerial hunting and would not impact wildlife with that method. Although technical support might lead to more selective use of control methods by private parties than that which could occur under Alternative 2, private efforts to reduce or prevent depredations could result in less experienced persons implementing control methods leading to greater take of non-target wildlife and T&E species as discussed in section 4.2.2.2. This alternative would have the potential for increased adverse impacts resulting from NWSP not providing quality PDM and the compensatory actions of private individuals. Presumably, many service recipients would become frustrated with NWSP's failure to resolve their wildlife damage, and would turn somewhere else for assistance. Higher variability in the level and scope of wildlife damage control activities could occur without a full IWDM program,

and this could have a greater negative effect on some local wildlife species, including T&E species. Aerial hunting activities would not be used by NWSP, but could be by the private sector or NDRP. Even if NDOW issued several more aerial hunting permits, the effects of low level flights from aerial hunting on wildlife and wild equines would likely be similar to those discussed in section 4.2.1.2, barring illegal activities.

4.2.3.3 Alternative 3 Humaneness and Ethical Considerations

Nonlethal control techniques are generally considered more humane by animal welfare groups. However, nonlethal control techniques such as cage traps and netting must be used in a proper fashion. For example, cage traps can be potentially inhumane if the trap is not attended to regularly and a caught animal is exposed to the elements such as being left out in the sun. The effects of this alternative with regards to the issue of humaneness would be most similar to those under Alternative 2. However, these effects would not be as great because some service recipients would be successful with nonlethal control techniques while others would tolerate the predator damage and not do anything about the situation. However, some NWSP service recipients may not be successful and conduct lethal controls on their own resulting in similar effects as described in section 4.2.2.3.

The federal WS portion of this Alternative would be more acceptable to Animal Rights activists and to a wider range of animal welfare advocates because WS would not be involved in the lethal removal of predators. Livestock producers and others who receive services of NWSP are likely to perceive this as an unethical restriction of their access to legally available damage management techniques from professional, accountable WS Specialists, and may perceive this Alternative as an imposition of additional costs of livestock production and as resulting in unacceptable losses. People concerned about the use of public resources to reduce damage (e.g. enhance profit) on private and public lands may find this alternative preferable to Alternative 1. However NWSP would still use federal funds for supervision, reporting, and compliance with State and federal regulations, and the NDRP component would still be operational.

4.2.3.4 Alternative 3 Effects on Recreation

NWSP would not impact hunting and nonconsumptive uses with the nonlethal alternative. However if individuals implement lethal control this could have adverse impacts on both the hunting and nonconsumptive user groups as was discussed under Alternative 2, section 4.2.2.4. However, the negative effects on recreation would probably be slightly less under this alternative than in Alternative 2, but more than under the current program alternative.

4.2.3.5 Alternative 3 Impacts on Public Safety and the Environment

Most PDM methods with the potential for negative impacts on the physical environment or public safety, such as chemical toxicants, traps, and snares, would not be used by NWSP under this alternative. Since lethal controls would no longer be used, NWSP would not have an effect on public safety. NDRP, though, would still probably provide lethal PDM services at some reduced level. However, as discussed in section 4.2.1.5, the effects of these services would likely be negligible. Private individuals would increase their use of lethal PDM methods. As discussed in Alternative 2, many of these individuals would use registered toxicants incorrectly or illegal toxicants and these could adversely impact the environment and public safety. In addition, traps, snares, and firearms used by novices could have adverse effects on public safety and the environment as discussed in 4.2.2.5. NWSP nonlethal PDM activities would not be likely to have a negative effect on the public concerning “environmental justice and executive order 12898” issues. NWSP would be able to

respond to predator complaints with lethal PDM for incidences involving human health and safety and, therefore, would have the same effect as under the current program alternative. As with Alternative 2, aerial hunting would probably be greatly reduced under this alternative because it requires pilots with experience at low level flying and a permit from NDOW. Even if NDOW increased permits, impacts are not likely to be greater than analyzed for Alternative 1. The reduction in aerial hunting would result in an increase in the amount of ground traffic and hours of PDM required for an equivalent level of predation management (Wagner and Conover 1999). This increase in PDM activity on the ground would increase the risk of damage to the environment from vehicular traffic and increase the likelihood of a conflict between PDM and recreational activities.

4.2.3.6 Alternative 3 Cost Effectiveness

Livestock losses would be greater than in the current program (USDA 1997, revised). Direct federal costs to implement this alternative would be lower than the current program. The number of NWSP personnel could be reduced to only those needed to provide technical assistance and make recommendations to landowners or permittees wishing to conduct their own control work. Monies would only be spent on nonlethal operational activities. Livestock owners would likely have to absorb the cost of hiring private control agents or conduct lethal PDM themselves. Livestock losses caused by predators would probably increase substantially, and some sheep operations would probably not be able to stay in business.

4.2.3.7 Alternative 3 Impacts on Special Management Areas (SMAs)

Impacts on SMAs under this alternative would be expected to be higher than under the current program alternative, since producers might conduct their own lethal control. The effects would probably be much closer to the no federal program alternative for the same reasons identified in section 4.2.2.7.

4.2.3.8 Alternative 3 Indirect and Cumulative Impacts

Indirect impacts under the nonlethal control only alternative would be almost as low as the no program alternative and would correlate with program effectiveness. Positive contributions to the local economy would be expected to be low and similar to the no federal program alternative because resource (livestock and game species) losses are expected to be higher (USDA 1997, revised) as discussed in section 4.2.2.6.

Cumulative impacts would be expected to be higher under this alternative than under the current program alternative as a result of uncoordinated control actions or misapplication of control methods by individuals. These impacts could result in higher impacts on non-target wildlife and public safety, thereby affecting wildlife populations and the environment. The effects of predator removal on prey populations would be similar to that discussed in section 4.2.2.8.

4.2.4 Alternative 4 Nonlethal Required before Lethal Control

This alternative could affect NWSP's ability to quickly address wildlife threats and damage problems by limiting control actions to nonlethal control methods before lethal measures could be used. Under this

alternative, agricultural and property resource losses would be more than under the current program alternative due to the restrictions placed on this management alternative.

4.2.4.1 Alternative 4 Effects on Target Predator Populations

Under this alternative, NWSP take of target predator species would probably be somewhat less than that of the proposed action because lethal actions by NWSP would be restricted to situations where the requestor or, possibly, NWSP had attempted nonlethal controls without success. No proactive lethal control actions would be taken by NWSP. For many individual damage situations, this alternative would be similar to the current program because many producers, prior to contacting NWSP, have attempted one or more nonlethal methods such as predator resistant fencing without success, as described in Appendix D, or have considered them and found them to be impractical in their particular situations. Without NWSP conducting proactive control activities, it is likely that private efforts at proactive control would increase. These increased private PDM activities would lead to potentially similar cumulative impacts as those described under the current program alternative. For the same reasons shown in the population impacts analysis in section 4.2.1.1, it is highly unlikely that the coyote or other predator populations would be significantly affected by implementation of this alternative. Impacts and hypothetical risks from illegal chemical toxicant use under this alternative would probably be the same as those under Alternatives 2 and 3. Any reductions in targeted wildlife by NWSP as a result of this alternative would have no major adverse impacts to the species involved or Nevada's statewide population. Most sheep and cattle producers already use one or more nonlethal control methods. Connolly and Wagner (1998) found that 55% of the U.S. sheep producers, that own 70% of the nations' sheep, used one or more nonlethal control measures in 1994. Fencing, husbandry, guard animals, and frightening tactics were the most common nonlethal control methods used during the survey. NWSP has determined that all of its livestock producing cooperators in Nevada are now implementing nonlethal measures on their own (Appendix D), therefore, the effects on target species populations would probably be insignificant, similar to that described under the current program alternative.

4.2.4.2 Alternative 4 Effects on Non-target Species Populations, Including T&E Species

The nonlethal before lethal control alternative would not consistently allow NWSP to respond to wildlife threats quickly or adequately. If cooperators were not satisfied by corrective control operations by NWSP, private efforts to reduce or prevent depredations could increase, but at a much lower effort than described in Alternatives 2 and 3. However, the impacts of persons implementing control would be similar to those described in Alternatives 2 and 3. Additionally, this alternative is not supported by the FEIS and Record of Decision (USDA 1997, revised) and WS Directive 2.101, which addresses NWSP's policy for applying IWDM. Under this alternative, NWSP take of non-target animals would probably be a little less than that of the current program because no preventive lethal control actions would be taken by NWSP. SOPs to avoid T&E impacts were described in Chapter 3 and they would ensure that adverse impacts are not likely to occur to T&E species by implementing Alternative 4. Aerial hunting activities may be reduced, and minimal impacts would occur as described in section 4.2.1.2.

4.2.4.3 Alternative 4 Humaneness of Control Techniques

The amount of suffering by target and non-target wildlife under this alternative would likely be less than under the proposed action since proactive preventive control activity by NWSP would not be allowed. However, some private individuals would increase their use of leghold traps, snares, and shooting for preventive control activities and where NWSP could not resolve a damage problem in

a timely manner because nonlethal control measures needed to be implemented first. This could result in similar, but lesser, effects as those described for Alternatives 2 and 3, but more than those under the current program. Suffering of livestock because of injuries caused by predation would likely increase under this alternative because PDM actions by NWSP could not be implemented until after the onset of depredation.

Alternative 4 would still be unacceptable to animal rights advocates and to many individuals because it permits lethal removal of predators. However, a larger number of animal welfare advocates would find this alternative more acceptable than the current program because it provides an assurance that predators would not be killed unless a nonlethal alternative has been tried. Livestock producers may perceive this alternative as an unjustified imposition of additional cost of production, and, potentially, additional losses on resource owners may be borne (since most livestock producers already implement some form of nonlethal protective measures and need assistance when those have failed). Individuals concerned about the use of public resources to enhance private profit are unlikely to perceive this alternative as an improvement over Alternative 1.

4.2.4.4 Alternative 4 Effects on Recreation

NWSP would minimally affect recreationists with the nonlethal before lethal PDM alternative. In areas where nonlethal control had already been implemented and found to be unsatisfactory, the full array of PDM methods could be used and their effects were considered minimal as discussed in section 4.2.1.4. However, some individuals would implement lethal control on their own because NWSP might seem unresponsive. This could have significant adverse effects on recreationists as discussed for Alternatives 2 and 3. However, the effects on recreation of Alternative 4 would probably be less than Alternatives 2 and 3, but more than the effects discussed for Alternative 1.

4.2.4.5 Alternative 4 Impacts on Public Safety and the Environment

NWSP would not have an adverse effect on public safety, the environment, or the public concerning “environmental justice and executive order 12898.” The effects of the use of toxicants and other PDM methods are discussed in detail in the current program alternative section and the FEIS (USDA 1997, revised). Because NWSP could not necessarily resolve problems in a timely manner, some cooperators would resort to tactics described in section 4.2.2.5. If private individuals conduct lethal PDM without federal oversight, effects on public safety and the environment under this alternative would be greater than the current program alternative, but less than the nonlethal alternative.

4.2.4.6 Alternative 4 Cost Effectiveness

The cost effectiveness of requiring the use of nonlethal methods would be low in situations where they are not effective and resource losses are allowed to continue. The full array of management tools would be available, but nonlethal methods would be used first, regardless of whether or not they were determined to be the most effective or appropriate choice using the WS Decision Model (Slate et al. 1992). Thus, the use of nonlethal methods first may delay effective wildlife damage management and the protection of livestock, property, human health and safety. The current program uses or recommends nonlethal methods in instances in which they are considered likely to be effective. Mandating nonlethal methods as a first option when they are unlikely to resolve a damage situation would reduce the effectiveness of PDM. Under the IWDM approach, NWSP always considers if nonlethal methods would be effective before contemplating the use of lethal

methods. Therefore, this alternative would be more costly and less effective than the current program, but more effective than the no federal program alternative and nonlethal only alternative.

4.2.4.7 Alternative 4 Impacts on Special Management Areas (SMAs)

Impacts on SMAs under this alternative would be similar to the current program, Alternative 1. Although the effectiveness may not be as high as the current program, this alternative would allow the use of all methods eventually. Producers would be less inclined to impact SMAs since coordinated assistance would still be available.

4.2.4.8 Alternative 4 Indirect and Cumulative Impacts

The nonlethal before lethal alternative would have somewhat lower positive indirect impacts on the economy (USDA 1997, revised) than that under the current program, but more than under the nonlethal alternative. Cumulative impacts on target and non-target species would be expected to be greater than the current program, since individuals who find this alternative unacceptable would be more likely to implement their own lethal control actions without waiting for nonlethal methods to be attempted first. Cumulative impacts under this alternative would be less than the nonlethal only program. Impacts of implementing Alternative 4 on prey species populations would not likely differ much from those of the proposed action for the same reasons identified in section 4.2.3.1.

4.2.5 Alternative 5 Proposed Alternative. Integrated Predator Damage Management with Expanded Natural Resource Damage Management.

This alternative would be identical to Alternative 1 in all respects except that efforts to manage damage associated with predation on game species such as sage-grouse and big game such as bighorn sheep, pronghorn antelope and mule deer would be likely to increase.

4.2.5.1 Alternative 5 Effects on Target Predator Populations

The effects on target species would be similar to the current program since any program emphasis of game species protection over livestock protection would be likely to take a similar number of predators. Overall, the number of individual animals removed would remain within the low magnitude range and would not contribute towards the decline of any species populations.

4.2.5.2 Alternative 5 Effects on Non-target Species Populations, Including T&E Species

The effects of the program on non-target species populations and on T&E species would be similar to the current program. WS would follow all standard operating procedures and measures required from ESA consultations to ensure that the program would minimize the potential to harm T&E species and would not jeopardize the continued existence of any threatened or endangered species. Non-target take is expected to continue to remain low due to the high selectivity of management measures used combined with the expertise and training of NWSP Specialists.

4.2.5.3 Alternative 5 Humaneness of Control Techniques

Alternative 5 would be likely to be unacceptable to animal rights advocates and many individuals with strong humanistic and moralistic values similar to Alternative 1, and with the enhanced feature of PDM to benefit game species.

4.2.5.4 Alternative 5 Effects on Recreation

Similar to Alternative 1, NWSP would not notably affect recreational land uses, however, this alternative would be likely to provide benefit to both consumptive and nonconsumptive recreational users of public and private lands (e.g. hunters, photographers, wildlife viewers) as discussed in Section 4.2.5.6.

Relating to non-consumptive uses, as noted in NDOW's bighorn sheep management plan (NDOW 2001), it is difficult to place value on wildlife and while it is not well documented, there is no doubt that thousands of recreational days annually are spent on wildlife viewing and photography (NDWO 2001, 2003). Where this alternative is successful in assisting NDOW to achieve its management goals of big game and sage-grouse populations in Nevada, the public would benefit by knowing that populations are healthy, and there is an increased opportunity to enjoy the resource.

4.2.5.5 Alternative 5 Impacts on Public Safety and the Environment

Effects from this alternative would be similar to the current program, Alternative 1, because methods would be similar.

4.2.5.6 Alternative 5 Cost Effectiveness

Cost effectiveness would be similar to the current program. Cost effectiveness would vary if program emphasis were refocused more on natural resource protection and less on livestock protection based on the value of the resources protected, but either way is expected to be positive. Bodenchuk et al. (2000) looked at benefits to protecting sage-grouse, bighorn sheep, mule deer and pronghorn antelope and found that the benefit to cost ratios for predation damage management to protect these and other wildlife species ranged between 2:1 and 22.6:1.

PDM to protect game resources is likely to benefit local and State economies by increasing hunting opportunities for the sportsmen in the State. The number of hunters in Nevada totaled 47,000 in 2001, and those hunters spent over 490,000 days hunting. Expenditures associated with hunting are significant and include everything from equipment to lodging and travel. The International Association of Fish and Wildlife Agencies reports that hunting in Nevada in 2001 benefitted the economy from expenditures of 156.3 million dollars in retail sales, 246.7 million dollars from the multiplier effect, and 2,256 jobs, many of them vital to small town economies (IAFWA 2002).

Nevada Department of Wildlife biologists collected anecdotal information that indicated that the success of some recent PDM projects for the protection of big game were highly effective. For example, a Vya antelope herd experienced a 115% increase in herd size (2000 thru 2004) when fawns were protected from coyote predation compared with a control antelope herd where fawns were not protected (Spencer 2006).

Other reports similarly indicate that predator control may be substantially beneficial. In 2010, project results from coyote and mountain lion damage management to protect adult and juvenile mule deer in NDOW game management unit 14 showed an increase in the mule deer herd size from 850 to 1300, a 53 percent increase after PDM was initiated over a five-year period (USDA 2010c). A control game management unit where no PDM occurred showed an estimated 38 percent decline in its mule deer populations over the same time period. And although another game management unit was not considered a control unit (unit 15, adjacent to unit 14), the mule deer population there declined 38 percent over the same time period. Mule deer numbers in game management unit 231

in northeastern Lincoln County increased 48 percent over five years when PDM was conducted there to protect mule deer and mule deer fawns from coyote predation (USDA 2010d). Otherwise, overall, the statewide mule deer population in Nevada remained unchanged at an estimated 107,000 in 2004 and 2010.

When NWSP implemented PDM to protect a bighorn sheep herd in Nevada's Granite Mountains, the herd experienced a 200 percent increase in size over five years. In addition, the age structure of the herd appeared to increase so that larger rams were being harvested by hunters. The larger herd size also provided a source population for NDOW to capture some of the Granite project bighorn sheep and translocate them to the nearby Jackson Mountains (USDA 2010c).

While other factors such as weather, disease, and habitat conditions can influence wild ungulate herd size, these reports indicate that PDM may be beneficial to improving wild ungulate herd size, thus enhancing hunting opportunities. Hunting revenues collected by the State of Nevada would be expected to be favorable based on the likelihood of success where PDM protects game resources.

Based on the information provided here, the benefit to cost ratio is expected to be favorable. PDM to protect game species in Nevada is conducted with monies that come from fees associated with hunting licenses, and is not revenue that can be used for purposes other than PDM.

4.2.5.7 Alternative 5 Impacts on Special Management Areas (SMAs)

Impacts on SMAs under this alternative would be similar to the current program, Alternative 1. There may be a slight increase to work in SMAs such as Wilderness to protect some big game, however, the increased program presence would not affect SMAs for the reasons discussed under section 4.2.1.7.

4.2.5.8 Alternative 5 Indirect and Cumulative Impacts

This alternative would not be likely to result in a net increase in NWSP size, an increase in target animal take, and would not involve any new methods. Some program losses to the livestock protection sector would likely be diminished by county and State budgetary constraints, while the balance would probably be made up by increased emphasis to protect big game and sage grouse. Indirect effects on prey (game species) and effects on recreation (both consumptive and non-consumptive), would be expected to be positive by removing predators when NDOW has determined that they are limiting game populations.

4.3 SUMMARY AND CONCLUSION

The current program, Alternative 1, and the proposed program, Alternative 5, provide the lowest overall negative environmental consequences combined with the highest positive effects and benefits (cost effectiveness, reduced losses). Impacts associated with activities under consideration here are not expected to be "significant." Based on experience, impacts of the PDM methods and strategies considered in this document are very limited in nature. The addition of those impacts to other impacts associated with past, present, and reasonably foreseeable future actions, as described in the ADC FEIS (USDA 1997, revised), USDA (1999), USDA (2004), and herein, would not result in cumulatively significant environmental impacts. Monitoring the impacts of the program on the populations of both target and non-target species will continue. All predator control activities that may take place will comply with relevant laws, regulations, policies, orders, and procedures, including the Endangered Species Act, Migratory Bird Treaty Act, and Federal Insecticide, Fungicide, and Rodenticide Act. The environmental consequences of

each alternative as discussed in this document are summarized and compared in Table 18.

The Proposed Action and Current Program Alternatives are likely to have the lowest cumulative effect on target species since a professional program with federal oversight and research programs would be expected to remove only those individuals or groups of depredating animals after nonlethal options have been determined to be ineffective or impractical. Alternatives that inhibit NWSP would be likely to draw upon other public agencies, such as NDRP, or private individuals, but probably also individuals with lesser skills or experience in wildlife damage management. These individuals would be likely to take action and would not be expected to be as selective for target animals. For similar reasons, the non-target species affected would be expected to be the lowest under the Proposed Action and the Current Program Alternatives. The humane treatment of animals is likely to be highest under these two alternatives, according to perspectives of wildlife professionals, but perhaps not viewed as such by some members of the public who are opposed to predator damage management. The Proposed and Current Program Alternatives are likely to be effective in resolving damages.

Under the No Federal Program Alternative, NWSP would have no impact on the issues evaluated. This alternative would likely result in the greatest negative environmental impact when professional and accountable assistance is not available.

The Nonlethal Methods Only Alternative could affect APHIS-WS' ability to quickly address wildlife threats and damage problems by limiting control actions that could be used. Continued or increased threats to agricultural producers, property owners, and human safety would be likely to occur due to the restrictions placed on this management program. The No Federal Program and Nonlethal Methods only alternative would, to varying degrees, not allow NWSP to respond to wildlife threats quickly or adequately. These alternatives do not fully support the APHIS-WS Directive 2.101, which addresses APHIS-WS policy for applying Integrated Wildlife Damage Management. However, components of the restricted methods alternative are preferred since lethal methods are considered only when non lethal methods have been determined by the wildlife professional to be either ineffective, inhumane, not biologically sound, or not economically feasible.

Table 18. A summary of the environmental consequences of each program alternative relative to each issue.

Table 18. Summary of Environmental Consequences					
Issues/	Alternative 1 Current Program	Alternative 2 No Federal Program	Alternative 3 Nonlethal	Alternative 4 Nonlethal before Lethal	Alternative 5 Proposed Action
Impacts on Target Species Populations	Well below sustainable harvest levels, including cumulative effects.	NWSP would have no effect on target species. NDRP may increase efforts but would not replace NWSP. Impact of private actions to resolve damages is likely to have increased negative consequences. Additionally, if NWSP was not conducting the work, NDOW, by Nevada Revised Statue and Nevada Administrative Codes would still be required to perform PDM (See appendix C).	Effects likely to be similar to Alternative 2 since nonlethal methods that are not effective would likely result in lethal controls implemented by others. Additionally, if NWSP was not conducting the work, NDOW, by Nevada Revised Statue and Nevada Administrative Codes would still be required to perform PDM (See appendix C).	~~More animals would be removed but the total would be below sustainable harvest levels, including cumulative effects~~Similar to the current program alternative because nonlethal approaches are already used by producers.	Similar to Alternative 1 since focus would shift slightly from livestock protection to game protection. Overall program effort and effects on target species would be similar.

Table 18. Summary of Environmental Consequences					
Issues/	Alternative 1 Current Program	Alternative 2 No Federal Program	Alternative 3 Nonlethal	Alternative 4 Nonlethal before Lethal	Alternative 5 Proposed Action
Non-target Species	Low negative impact on other non-target species.	NWSP would have no negative effects on non-target species populations. Depending upon who implements predation damage controls, the actions of others in the absence of a federal program is likely to have a higher negative effect on non-target species.	Similar to Alt. 2.	Likely to be similar to Alt. 1	Similar to Alt. 1 with benefits to big game from predation control.
T/E Species	Not likely to adversely affect threatened and endangered species. Ongoing coordination with USFWS and NDOW will ensure the program would not jeopardize the continued existence of any threatened or endangered species.	NWSP would have no effect. NDRP may increase efforts but would not replace NWSP. The uncoordinated and unprofessional actions of others in the absence of a government assistance program are likely to have a higher negative effect on T&E species.	Similar to Alt. 2	Likely to be similar to the Alt. 1	Similar to Alt. 1.
Humaneness/Ethical Perspectives	Public perceptions vary by method, familiarity with the tools, and by their	NWSP would have no effect. NDRP may increase efforts but would not replace	Similar to Alt. 2. Preferred by some groups and individuals opposed	Similar to Current Program. Some individuals prefer that nonlethal methods	Similar to Alternative 1. Some individuals may oppose PDM to protect game species.

Table 18. Summary of Environmental Consequences					
Issues/	Alternative 1 Current Program	Alternative 2 No Federal Program	Alternative 3 Nonlethal	Alternative 4 Nonlethal before Lethal	Alternative 5 Proposed Action
	relationship to the natural world and to resources protected. WS uses selective control techniques that reduce unnecessary pain and death.	NWSP. This is the least humane of the alternatives due to actions of untrained private individuals that would likely implement damage control measures in absence of professional assistance. Domestic animals (livestock and pets) would be likely to experience increased predation effects.	to lethal control.	always be used first, and that lethal methods only be used as a last resort.	
Aerial Hunting	Not considered to be significant on non-target animals, the public, or the environment.	Not Applicable	Not Applicable	Similar to Alternative 1.	Similar to Alternative 1.
Recreation	No notable effects. Coordination with land management agencies ensures minimum effects on recreational users.	APHIS-WS would have no effect.- Individuals resolving damages in the absence of the NWSP may have negative effects to recreationists and pets.	Similar to Alt. 2 since resource owners may implement their own PDM in the absence of professional assistance.	Similar to Alternative 1.	Similar to Alternative 1.

Table 18. Summary of Environmental Consequences					
Issues/	Alternative 1 Current Program	Alternative 2 No Federal Program	Alternative 3 Nonlethal	Alternative 4 Nonlethal before Lethal	Alternative 5 Proposed Action
Public safety	Low risk to public safety due to procedures built into the NWSP program that minimize the potential for public exposure to dangerous tools.	APHIS-WS would have no effect. NDRP may increase efforts but would not replace NWSP. Potential for higher negative impact from individuals that may improperly use toxicants or other tools to resolve wildlife damage.	Similar to Alt. 2	Similar to Alternative 1.	Similar to Alternative 1.
Cost Effectiveness	Positive benefit to cost ratios repeatedly demonstrated.	Not applicable. Resource losses likely to be higher.	Low where nonlethal methods are ineffective.	Moderate due to losses incurred while ineffective or inadequate nonlethal controls are being implemented, thus delaying the effective use of lethal measures.	Positive benefits expected, similar to Alt 1.
Special Management Areas	Coordination with land management agencies, minimal disturbance effects and minimal work performed in SMAs ensures no notable effects on SMAs.	No effect. Potential for negative effects where individuals implement actions to protect livestock grazing on SMAs.	No notable effects, similar to Alternative 1.	No notable effects, similar to Alternative 1.	No notable effects, similar to Alternative 1.

Table 18. Summary of Environmental Consequences					
Issues/	Alternative 1 Current Program	Alternative 2 No Federal Program	Alternative 3 Nonlethal	Alternative 4 Nonlethal before Lethal	Alternative 5 Proposed Action
Cumulative Impact	Species populations would not be negatively affected.	No effect by NWSP. NDRP may increase efforts but would not replace NWSP. The uncoordinated and unprofessional actions of individual resource owners/managers has the highest potential for negative environmental consequences.	Increased potential for negative effects over that of the current program due to the actions of others in the absence of effective professional assistance (where nonlethal methods are not effective).	Similar to Alternative 1.	Similar to Alternative 1.
Indirect Impacts	No notable negative effects. Benefits to game species	Unlikely effects.	No negative effects	Similar to Alternative 1.	Similar to Alternative 1.

5.0 CHAPTER 5 LIST OF PREPARERS AND PERSONS CONSULTED

5.1 List of Preparers

Luke Barto, Urban Wildlife Specialist USDA-APHIS-WS, Reno, NV

Joe Bennett, East District Supervisor USDA-APHIS-WS, Ely, NV

Zack Bowers, Wildlife Disease Biologist, USDA-APHIS-WS, Reno, NV

Shannon Hebert, Environmental Coordinator, USDA-APHIS-WS, Portland, OR

Mark Jensen, State Director, USDA-APHIS-WS, Reno, NV

Samuel Sanders, Assistant East District Supervisor USDA-APHIS-WS, Elko, NV

Jack Sengl, Staff Biologist, USDA-APHIS-WS, Reno, NV

Jack Spencer Jr., West District Supervisor USDA-APHIS-WS, Reno, NV

5.2 List of Persons and Agencies Consulted

State of Nevada
- Department of Business and Industry, Department of Agriculture
  - Tony Lesperance, Director, State Office, Reno, NV
- Department of Wildlife
  - Ken Mayer, Director, State Office, Reno, NV
  - Carl Lackey, Wildlife Biologist, Washoe Valley, NV
  - Kevin Lansford, Wildlife Biologist, State Office, Reno, NV
  - Mike Dobel, Game Supervisor, State Office, Reno, NV
- Department of Parks and Recreation,
  - Rebecca Lynn Palmer, Office of Historic Preservation, Carson City, NV
- Preservation of Wild Horses Commission
  - Cathy Barcomb, Chairwoman, State Office, Reno, NV

United States Forest Service
Humboldt-Toiyabe National Forest, State Office
Randall Sharp, Reno, NV

U.S. Department of Interior
Bureau of Land Management
Sandra Brewer, Reno, NV

Fish and Wildlife Service
Bob Williams, Wildlife Biologist, Ecological Services, Reno, NV
Marie Strassburger, Region 8 Migratory Bird Chief, Sacramento, CA.
Jennifer Miller, Biologist, Region 8 Migratory Bird Permit Office, Sacramento, CA.
Dr. Chris Nicolai, Region 8 Regional Migratory Bird Biologist, Reno, NV

Bureau of Indian Affairs,
Western Nevada Agency, Carson City, NV
Steve Brown, Superintendent, Carson City, NV
Eastern Nevada Agency, Elko, NV
Joseph Mcdade, Superintendent , Elko, NV

APPENDIX A

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APPENDIX B WILDLIFE SERVICES WILDLIFE DAMAGE MANAGEMENT METHODS

Description of Methods

A variety of methods are used by U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) including personnel from the Nevada Division of Resource Protection (NDRP), collectively the Nevada Wildlife Services Program (NWSP), in wildlife damage management. Control strategies are based on applied Integrated Wildlife Damage Management (IWDM) principles. NWSP employs three general strategies for control of wildlife damage: resource management, physical exclusion, and wildlife management. Each of these approaches is a general strategy or recommendation for addressing wildlife damage situations. Within each approach there are available a number of specific methods or tactics. Selection of the appropriate approach and method is the result of the WS decision making process or Decision Model (Slate et al. 1992). . Mechanical methods generally are used and recommended in preference to chemical pesticides. No pesticide is used or recommended if it is likely to adversely affect fish, wildlife, food safety, or other components of the natural environment.

Various Federal, State, and local statutes and regulations as well as WS Directives govern the use of control tools and substances. The following basic wildlife damage control methods and materials are used or recommended in the direct - control and technical assistance efforts of NWSP.

• Resource Management

Animal Husbandry
Habitat Management
Modification of Human Behavior

• Physical Exclusion

Fencing
Sheathing (hardware cloth, solid metal, chain link)
Tree Protectors, Barriers, Netting, Wire Grids, Porcupine Wire (Nixalite), and Other Methods

• Wildlife Management

Habitat Management
Frightening Devices
Chemical Repellents
Capture Methods
Chemical Toxicants

The methods listed above all have limitations which are defined by the circumstances associated with individual wildlife damage problems. When NWSP specialists receive a request for assistance, they consider a wide range of limitations as they apply the decision making process described in the 1997 FEIS, Chapter 2, to determine what method(s) to use to - resolve a wildlife damage problem. Examples of limitations which must be considered and criteria to evaluate various methods are presented in the 1997 FEIS, Appendix N and in the following discussions.

Resource Management

Resource management includes a variety of practices that may be used by agriculture producers to reduce their exposure to potential wildlife depredation losses. Implementation of these practices is appropriate when the potential for depredation can be reduced without significantly increasing the cost of production or diminishing the resource owner's ability to achieve land management and production goals. Changes in resource management are recommended through the technical assistance extended to producers when the change appears to present a continuing means of averting losses.

Animal Husbandry. This general category includes modifications in the level of care and attention given to livestock, shifts in the timing of breeding and births, selection of less vulnerable livestock species to be produced, and the introduction of human custodians or guarding animals to protect livestock.

The level of care or attention given to livestock may range from daily to seasonal. Generally, as the frequency and intensity of livestock handling increase, so does the degree of protection. In operations where livestock are left unattended for extended periods, the risk of depredation is greatest. The risk of depredation can be reduced when operations permit nightly gathering so livestock are unavailable during the hours when predators are most active. Additionally, the risk of depredation is usually greatest with immature livestock. This risk diminishes as age and size increase and can be minimized by holding expectant females in pens or sheds to protect births and by holding newborn livestock in pens for the first 2 weeks. Shifts in breeding schedules can also reduce the risk of depredation by altering the timing of births to coincide with the greatest availability of natural prey to predators or to avoid seasonal concentrations of migrating predators such as golden eagles.

The use of human custodians and guarding animals can also provide significant protection in some instances. The presence of herders to accompany bands of sheep on open range may help ward off predators. Guard animals have also proven successful in many sheep and goat operations.

Altering animal husbandry to reduce wildlife damage has many limitations. Nightly gathering may not be possible where livestock are in many fenced pastures and where grazing conditions require livestock to scatter. Hiring extra herders, building secure holding pens, and adjusting the timing of births is usually expensive. The timing of births may be related to weather or seasonal marketing of young livestock. The expense associated with a change in husbandry practice may exceed the savings.

The supply of proven guarding dogs is generally quite limited, requiring that most people purchase and rear a pup. Therefore, there is usually a 4-to-8 month period of time necessary to raise a guarding dog before it becomes an effective deterrent to predators. Since 25 to 30 percent of dogs are not successful, there is a reasonable chance that the first dog raised as a protector will not be useful. The effectiveness of guarding dogs may not be sufficient in areas where there is a high density of predators, where livestock widely scatter in order to forage, or where dog-to-livestock ratios are less than recommended. Also, guarding dogs often harass and kill non-target wildlife.

Habitat Management. Change in the architectural design of a building or a public space can often help to avoid potential wildlife damage. For example, selecting species of trees and shrubs that are not attractive to wildlife can reduce the likelihood of potential wildlife damage to parks, public spaces, or residential areas. Similarly, incorporating spaces or open areas into Landscape designs

that expose wildlife can significantly reduce potential problems. Modifying public spaces to remove the potential for wildlife conflicts is often impractical because of economics or the presence of other nearby habitat features that attract wildlife.
Predators are more likely to be successful if the area is conducive to ambush or allows the predator to approach the prey species under the cover of dense brush. Removal or thinning of the brush can discourage predator activity. Also, opening the area allows for better monitoring of the area and also increases the value of shooting.

Predatory birds utilize trees and poles and the removal or modification of these items will often reduce the attractiveness of the area to predatory birds.

Modification of Human Behavior. NWSP may recommend alteration of human behavior to resolve potential conflicts between humans and wildlife. For example, NWSP may recommend the elimination of feeding of wildlife that occurs in parks, forest, or residential areas. This includes inadvertent feeding allowed by improper disposal of garbage. Many wildlife species adapt well to human settlements and activities, but their proximity to humans may result in damage to structures or threats to public health and safety. Eliminating wildlife feeding and handling can reduce potential problems, but many people who are not directly affected by problems caused by wildlife enjoy wild animals and engage in activities that encourage their presence. It is difficult to consistently enforce no-feeding regulations and to effectively educate all people concerning the potential liabilities of feeding wildlife.

Physical Exclusion

Physical exclusion methods restrict the access of wildlife to resources. These methods, (including fences, sheathing, netting, porcupine wire, and wire grids) provide a means of appropriate and effective prevention of wildlife damage in many situations. Physical exclusion methods used or recommended by NWSP are described in the following section.

Fencing. Fences are widely used to prevent damage. Predator exclusion fences constructed of woven wire or multiple strands of electrified wire are also effective in some areas, but fencing does have limitations. Even an electrified fence is not predator proof and the expense exceeds the benefit in most cases. If large areas are fenced, the predators have to be removed from the enclosed area to make it useful. Some fences inadvertently trap, catch or affect the movement of non-target wildlife. It is not uncommon for coyotes to use fences to trap deer or antelope. Lastly, fencing is not practical or legal in some areas (e.g., restricting access to public land).

Sheathing. Sheathing consists of using hardware cloth, solid metal flashing, or other materials to - protect trees from predators or to block entrances to gardens, fish ponds, dwellings, or other areas. Tree protectors are most often used as protection from bears, beavers, or porcupines. Entrance barricades of various kinds are used to exclude bobcats, coyotes, foxes, opossums, raccoons, skunks, or starlings from dwellings, storage areas, gardens, or other areas. Metal flashing may be used to prevent entry of small rodents to buildings. Sheathing may be impractical where there are numerous plants to protect.

Tree Protectors, Barriers, Netting, Wire Grids, and Other Methods. Netting consists of placing plastic or wire nets around livestock pens, fish ponds, or agricultural areas. Netting is used to exclude a variety of birds and mammals from poultry operations and other areas requiring exclusion

of animals. Two types of physical barriers frequently used to protect fish from foraging birds are (1) complete enclosure of ponds and raceways with screen or net and (2) partial exclusion using overhead wires, lines, net, or screen. Complete enclosures are costly but effectively exclude all problem birds. Partial enclosures, such as overhead lines, cost less but may not exclude all bird species. Selection of a barrier system depends on the bird species and expected duration of damage, size of facility, compatibility of the barrier with other operations (e.g., feeding, cleaning, harvesting, etc.), possible damage from severe weather, and effect on site aesthetics. Complete enclosure of ponds and raceways to exclude all fish-eating birds requires 1.5- to 2-inch mesh netting secured to frames or supported by overhead wires. Gates and other openings must also be covered. Some hatchery operators use mesh panels placed directly on raceways to effectively exclude predatory birds. Small mesh netting or wire with less than 1-inch openings, secured to wood or pipe frames, prevents feeding through the panels. Because the panels may interfere with feeding, cleaning, or harvesting operations, they are most appropriate for seasonal or temporary protection.

Ponds or raceways can be protected with overhead wires or braided or monofilament lines suspended horizontally in one direction or in a crossing pattern. Spacing between wires or lines should be based on the species and habits of the birds causing damage.

Perimeter fencing or wire around ponds and raceways provides some protection from wading birds and is most effective for herons. For ponds, fencing at least 3 feet high should be erected in water 2 to 3 feet deep. Small mesh can be used to prevent fish from entering the shallow water. If fences are built in shallow water, birds can easily feed on the pond side of the fence. Raceway fences should be high enough to prevent feeding from the wall. Occasionally, blackbirds will cling to fencing or screening near the water and feed on small fish. A slippery surface created by draping plastic over the fence or screen can be used to eliminate this problem. Electric fences or wires have also been used with limited success. Some areas in need of protection are too large to be protected with netting or overhead wires. This type of exclusion can make routine work around ponds and -hatcheries difficult or impossible.

Wildlife Management

Controlling wildlife damage through wildlife management is achieved through the use of a myriad of techniques. The objective of this approach is to alter the behavior of the target animal to eliminate or reduce the potential for loss or damage to property.

Habitat Management. Just as habitat management is an integral part of other wildlife management programs, it also plays an important role in wildlife damage control. The type, quality, and quantity of habitat are directly related to the wildlife that are produced. Therefore, habitat can be managed to not produce or attract certain wildlife species. Most habitat management methods for IWDM are used by NWSP at airports to reduce bird aircraft strike problems, in winter roosts to reduce problems associated with large numbers of blackbirds and European starlings, and in orchards and crops to control field rodent populations. Habitat management around airports is aimed at eliminating nesting, roosting, loafing, or feeding sites. Generally, many predator problems on airport grounds can be minimized through management of vegetation (grass, shrubs, brush, and trees) and water from runway areas, because the presence of an attractive prey species is reduced or eliminated.

Limitations of habitat management as a method of controlling wildlife damage are determined by the characteristics of the species involved, the nature of the damage, economic feasibility, and other factors. Also, legal constraints may exist which preclude altering particular habitats.

Frightening Devices. The success of frightening methods depends on animals' fear of, and subsequent aversion to offensive stimuli. Once animals become habituated to a stimulus, they often resume their damaging activities. Persistent effort is usually required to consistently apply frightening techniques and then vary them sufficiently to prolong their effectiveness. Over time, some animals learn to ignore commonly used scare tactics. In many cases animals frightened from one location become a problem at another. The effects of frightening devices on non-target wildlife need to be considered. For example, sensitive birds may be disturbed or frightened from nesting sites.

Electronic Distress Sounds. Distress and alarm calls of various animals have been used singly and in conjunction with other scaring devices to successfully scare or harass animals. Many of these sounds are available on records and tapes. Calls should be played back to the animals from either fixed or mobile equipment in the immediate or surrounding area of the problem. Animals react differently to distress calls; their use depends on the species and the problem. Calls may be played for short (few second) bursts, for longer periods, or even continually, depending on the severity of damage and relative effectiveness of different treatment or "playing" times. Some artificially created sounds also repel birds in the same manner as recorded "natural" distress calls.

Propane Exploders. Propane exploders operate on propane gas and are designed to produce loud explosions at controllable intervals. They are strategically located (elevated above the vegetation, if possible) in areas of high wildlife use to frighten wildlife from the problem site. Because animals are known to habituate to sounds, exploders must be moved frequently and used in conjunction with other scare devices. Exploders can be left in an area after dispersal is complete to discourage animals from returning.

Pyrotechnics. Double shotgun shells, known as shell crackers or scare cartridges, are 12-gauge shotgun shells containing a firecracker that is projected up to 75 yards in the air before exploding. They can be used to frighten birds or mammals but are most often used to prevent crop depredation by birds or to discourage birds from undesirable roost locations. The shells should be fired so they explode in front of, or underneath, flocks of birds attempting to enter crop fields or roosts. The purpose is to produce an explosion between the birds and their objective. Birds already in a crop field can be frightened from the field; however, it is extremely difficult to disperse birds that have already settled in a roost.

Noise bombs, whistle bombs, racket bombs, and rocket bombs are fired from 15 millimeter flare pistols. They are used similarly to shell-crackers but are projected for shorter distances. Noise bombs (also called bird bombs) are firecrackers that travel about 75 feet before exploding. Whistle bombs are similar to noise bombs, but whistle in flight and do not explode. They produce a noticeable response because of the trail of smoke and fire, as well as the whistling sound. Racket bombs make a screaming noise in flight and do not explode. Rocket bombs are similar to noise bombs but may travel up to 150 yards before exploding.

A variety of other pyrotechnic devices, including firecrackers, rockets, and Roman candles, are used for dispersing animals. Firecrackers can be inserted in slow-burning fuse ropes to control the timing of each explosion. The interval between explosions is determined by the rate at which the rope burns and the spacing between firecrackers.

Lights. A variety of lights, including strobe, barricade, and revolving units, are used with mixed results to frighten predators. Brilliant lights, similar to those used on aircraft, are most effective in frightening night-feeding birds and mammals. These extremely bright-flashing lights have a blinding effect, causing confusion that reduces the predator's ability to locate the prey.

Flashing amber barricade lights, like those used at construction sites, and revolving or moving lights may also frighten predators when these units are placed on raceway walls, fish pond banks, or ingress corridors. However, most predators rapidly become accustomed to such lights and their long-term effectiveness is questionable. In general, the type of light, the number of units, and their location are determined by the size of the area to be protected and by the power source available.

Water Spray Devices. Water sprays from rotating sprinklers placed at strategic locations in or around ponds or raceways will repel certain predatory birds, particularly gulls. However, individual birds may become accustomed to the spray and feed among the sprinklers. Best results are obtained when high water pressure is used and the sprinklers are operated with an on-off cycle. The sudden startup noise also helps frighten the predatory birds.

Harassment. Scaring and harassment techniques to frighten animals are probably the oldest methods of combating wildlife damage. A number of sophisticated techniques have been developed to scare or harass wildlife from an area. The use of noise-making devices is the most popular and commonly used; however, other methods, including aerial hazing and visual stimuli, are also used. Harassment using vehicles, people, falcons or dogs is used to frighten predators or birds from the immediate vicinity. Boats, planes, automobiles, and all-terrain vehicles are used as harassment methods. As with other wildlife damage control efforts, these techniques tend to be more effective when used collectively in a varied regime rather than individually. However, the continued success of these methods frequently requires reinforcement by limited shooting (see Shooting).

Other Scaring Devices. The Electronic Guard, a portable unit that houses a strobe light and siren has been developed by the Denver Wildlife Research Center and is produced by the Pocatello Supply Depot. In certain situations, this device has been used successfully to reduce coyote depredation on sheep. The device activates automatically at nightfall and is programmed to discharge periodically throughout the night. The technique has proven most successful when used at “bedding grounds” where sheep gather to sleep for the night.

Chemical Repellents. Chemical repellents are compounds that prevent consumption of food items or use of an area. They operate by producing an undesirable taste, odor, feel, or behavior pattern. Effective and practical chemical repellents should be nonhazardous to wildlife; nontoxic to plants, seeds, and humans; resistant to weathering; easily applied; reasonably priced; and capable of providing good repelling qualities. The reaction of different animals to a single chemical formulation varies, and for any species there may be variations in repellency between different habitat

types. Lithium chloride and capsicum derivatives have been examined as mammalian predator repellents, but no successful application has yet been found. Methyl anthranilate is an avian repellant that shows some favorable results. Development of chemical repellents is expensive and cost prohibitive in many situations. Chemical repellents are strictly regulated, and suitable repellents are not available for many wildlife species or wildlife damage situations.

Capture Methods

Leghold Traps. Leghold traps are used to capture animals such as the coyote and bobcat. These traps are the most versatile and widely used tool for capturing these species. The leghold trap can be set under a wide variety of conditions but can be difficult to keep in operation during rain, snow, or freezing weather. When placed without baits in the travel lanes of target animals, leghold traps are known as “trail sets.” More frequently, traps are placed as “baited sets,” meaning that they are used with a bait consisting of the animal's preferred food or some other lure, such as fetid meat, urine, or musk, to attract the animal. In some situations a “draw station,” such as a carcass or large piece of meat, is used to attract target animals. In this approach, one to several traps are placed in the vicinity of the draw station. WS program policy prohibits placement of traps closer than 30 feet to the draw station. This provides protection to scavenging birds.

Before leghold traps are employed, their limitations must be considered. Injury to target and non-target animals, including livestock, may occur. Weather and the skill of the user will often determine the success or failure of the leghold trap in preventing or stopping wildlife damage. Various tension devices can be used to prevent animals smaller than target animals from springing the trap. Effective trap placement also contributes to trap selectivity; however, livestock and non-target animals may still be captured. These traps usually permit the release of non-target animals.

Cage Traps. A variety of cage traps are used in different wildlife damage control efforts. The most commonly known cage traps used in the current program are box traps. Box traps are usually rectangular, made from wood or heavy gauge mesh wire. These traps are used to capture animals alive and can often be used where many lethal or more dangerous tools would be too hazardous. Box traps are well suited for use in residential areas.

Cage traps usually work best when baited with foods attractive to the target animal. They are used to capture animals ranging in size from mice to deer, but are usually impractical in capturing most large animals. They are virtually ineffective for coyotes; however, large cage traps work well to capture bears and have shown promise for capturing mountain lions, provided the traps can be transported by vehicle to the control sites.

Large decoy traps, modeled after the Australian crow trap, are used to capture crows, ravens, gulls, and vultures. They are large screen enclosures with the access modified to suit the target species. A few live birds are maintained in the baited trap to attract birds of the same species and, as such, act as decoys. Non-target species are released unharmed.

There are some animals that avoid cage traps and others that become “trap happy” and purposely get captured to eat the bait, making the trap unavailable to catch other animals. Cage traps must be checked frequently to ensure that captured animals are not subjected to

extreme environmental conditions. Some animals fight to escape from cage traps and become injured.

Snares. Snares made of wire or cable are among the oldest existing control tools. They can be used effectively to catch most species but are most frequently used to capture coyotes, beaver, and bears. They have limited application but are effective when used under proper conditions. They are much lighter and easier to use than leghold traps and are not generally affected by inclement weather.

Snares may be employed as either lethal or live-capture devices depending on how and where they are set. Snares set to capture an animal by the neck are usually lethal but stops can be applied to the cable to make the snare a live capture device. Snares positioned to capture the animal around the body can be useful live-capture devices. Also, most snares incorporate a breakaway feature to release non-target wildlife and livestock. These snares can be effectively used wherever a target animal moves through a restricted lane of travel (i.e., "crawls" under fences, trails through vegetation, or den entrances). When an animal moves forward into the loop formed by the cable, the noose tightens and the animal is held.

The foot or leg snare is a spring-powered nonlethal device, activated when an animal places its foot on the trigger. Foot snares are used effectively to capture black bears. In some situations using snares to capture wildlife is impractical due to the behavior or animal morphology of the animal, or the location of many wildlife conflicts. Snares must be set in locations where the likelihood of capturing non-target animals is minimized.

The catch-pole snare is used to capture or safely handle problem animals. This device consists of a hollow pipe with an internal cable or rope that forms an adjustable noose at one end. The free end of the cable or rope extends through a locking mechanism on the end opposite of the noose. By pulling on the free end of the cable or rope, the size of the noose is reduced sufficiently to hold an animal. Catch poles are used primarily to remove live animals from traps without danger to or from the captured animal.

~~**Quick-Kill Traps.** A number of specialized "quick-kill" traps are used in wildlife damage control work. They include Conibear, snap, gopher, and mole traps. Some quick-kill traps are potentially dangerous to people and cannot be used in populated areas. Quick-kill traps are available only for a limited number of species. Conibear traps are used mostly in shallow water or underwater to capture muskrat, nutria, and beaver. The Conibear consists of a pair of rectangular wire frames that close like scissors when triggered, killing the captured animal with a quick body blow. Conibear traps have the added features of being lightweight and easily set.~~

Denning. Denning is the practice of seeking out the dens of depredating coyotes or red fox and destroying the young, adults, or both to stop or prevent depredations on livestock. Denning is used in coyote damage control efforts primarily in the western States. The usefulness of denning as a damage control method is limited because coyote dens are difficult to locate in many parts of the country and den use is restricted to approximately 2 to 3 months during the spring.

Coyote depredations on livestock and poultry often increase in the spring and early summer because of the increased food requirements caused by the need to feed pups. The removal of pups will often stop depredations even though the adults are not taken. When the adults are taken it is customary to kill the pups to prevent their starvation. In this method, pups are removed from dens by excavation and then shot, or they are killed in the den with a registered fumigant. Denning is highly selective for the target species and family groups responsible for damage. Den hunting for adult coyotes and their young is often combined with calling and shooting. Denning can be labor intensive with no guarantee of finding the den of the target animal.

Shooting. Shooting is used selectively for target species but may be relatively expensive because of the staff hours sometimes required. Nevertheless, shooting is an essential control method. Removal of urban coyotes may be achieved by night shooting because urban wildlife are primarily active at that time. Many airports have perimeter fences for security purposes that also confine resident wildlife populations. The wildlife frequently stray onto active runways and pose a significant threat to aircraft. Removal of these troublesome wildlife may be effectively achieved by shooting.

Lethal reinforcement through shooting is often necessary to ensure the continued success in bird scaring and harassment efforts (see the discussion on shooting under Modification of Human Behavior). This is especially important where predatory birds are drawn to birthing grounds, aquaculture facilities, sanitary landfills, and other locations where food is readily available. In situations where the feeding instinct is strong, most birds quickly adapt to scaring and harassment efforts unless the control program is periodically supplemented by shooting.

Shooting is frequently performed in conjunction with calling particular predators such as coyotes, bobcats, and fox. Trap-wise coyotes are often vulnerable to calling. Shooting is limited to locations where it is legal and safe to discharge firearms. Shooting may be ineffective for controlling damage by some species and may actually be detrimental to control efforts.

Aerial Shooting. Shooting from aircraft, or aerial hunting, is a commonly used coyote damage control method. Aerial hunting is species-selective and can be used for immediate control where livestock losses are severe if weather, terrain, and cover conditions are favorable. Aerial hunting can be effective in removing offending coyotes that have become "bait-shy" or are not susceptible to calling and shooting. Local depredation problems can often be quickly resolved by the use of aerial hunting.

Fixed-wing aircraft are useful for aerial hunting over flat and gently rolling terrain. Because of to their maneuverability, helicopters have greater utility and are safer over timbered areas, or broken land where animals are more difficult to spot. In broken timber or deciduous ground cover, aerial hunting is more effective in winter when snow cover improves visibility.

NWSP aircraft-use policy helps ensure that aerial hunting is conducted in a safe and environmentally sound manner, in accordance with federal and State laws. Pilots and aircraft must be certified under established NWSP procedures. Only properly trained NWSP employees are approved as gunners.

Hunting Dogs. Dogs are essential to successful hunting of mountain lion and bear. Dogs trained for coyote denning are also valuable in luring adult coyotes to be shot. Trained dogs are used primarily to locate, pursue, or decoy animals. Training and maintaining suitable dogs requires considerable skill, effort, and expense and, therefore, a sufficient need for dogs must exist to make the effort worthwhile.

Egg, Nest, and Hatchling Removal and Destruction. ~~Nesting populations of cattle egrets and gulls, especially if located near airports, may pose a threat to public health and safety, as well as equipment. Pigeons and starlings can also cause extensive damage to public facilities.~~ Egg and nest destruction is used mainly to control or limit the growth of a nesting population in a specific area through limiting reproduction of offspring or removal of nest to other locations. Egg and nest destruction is practiced by manual removal of the eggs or nest.

This method is practical only during a relatively short time interval and requires skill to properly identify the eggs and hatchlings of target species. Some species may persist in nesting and the laying of eggs, making this method ineffective.

Chemical Immobilizing and Euthanizing Agents. Several NWSP Specialists are trained and certified to use drugs for capturing or euthanizing wildlife. Drugs such as ketamine hydrochloride ~~and alpha-chloralose~~ are used as immobilizing agents. Drugs such as sodium phenobarbital are used for euthanasia. Most drugs fall under restricted-use categories and must be used under the appropriate license. ~~For example, alpha-chloralose is an immobilizing agent used to capture and remove nuisance waterfowl and other birds (e.g., pigeons, gulls, etc.). It is typically used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts. Single bread or corn baits are fed directly to the target waterfowl, while corn baits are placed in feeding areas to capture pigeons. NWSP personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment.~~

Chemical Toxicants. Several toxic chemicals have been developed to control wildlife damage and are widely used because of their efficiency. Toxicants are generally not species specific, and their use may be hazardous unless used with care by knowledgeable personnel. The proper placement, size, type of bait, and time of year are keys to selectivity and successful control. Development of appropriate toxicants is expensive, and the path to a suitable end product is filled with legal and administrative hurdles. Few private companies are inclined to undertake such a venture. Most chemicals are aimed at a specific target species, and suitable chemicals are not available for most animals. Available delivery systems make the use of chemical toxicants unsuitable in many wildlife damage situations. This section describes the chemical toxicants used currently by NWSP.

Sodium cyanide is used in the M-44 device, a spring-activated ejector device developed specifically to kill coyotes and other canine predators. The M-44 device consists of a capsule holder wrapped with fur, cloth, or wool; a capsule containing 0.8 gram of powdered sodium cyanide; an ejector mechanism; and a 5- to 7-inch hollow stake. The hollow stake is driven into the ground, the ejector unit is chocked and placed in the stake, and the capsule holder containing the cyanide capsule is screwed onto the ejector unit. A fetid meat bait is spread on the capsule holder. An animal attracted by the bait will try to pick up or pull the baited capsule holder. When the M-44 device is pulled, a spring-activated plunger propels sodium cyanide into the animal's mouth.

Fumigants or gases used to control burrowing wildlife are efficient but often expensive. Fumigants are only used in rodent burrows and predator dens. The WS' Pocatello Supply Depot manufactures denning cartridges especially formulated for fumigation of dens and burrows. The cartridges are placed in the active burrows of target animals, the fuse is lit, and the entrance is then tightly sealed with soil. The burning cartridge causes death by oxygen depletion and carbon monoxide poisoning.

EPA Label Gas Cartridge (EPA Reg. No. 56228-21)
EPA Label M-44 (EPA Reg. No. 56228-15)
EPA Label LPC (EPA Reg. No. 56228-22)

DRC-1339 concentrate is used effectively in hard-boiled eggs to control raven damage under several State-specific registrations for the protection of livestock and certain endangered species. It is also registered for application on various materials, such as grain, meat baits, sandwich bread, and cull French fries to control pigeons, gulls, crows, ravens, blackbirds, and starlings. DRC-1339 concentrate is only available for use in Nevada under NWSP supervision

LETTER FROM THE NEVADA DEPARTMENT OF WILDLIFE

RECEIVED OCT 2 9 2010

STATE OF NEVADA
DEPARTMENT OF WILDLIFE
1100 Valley Road
Reno, Nevada 89512
(775) 688-1500 • Fax (775) 688-1595

JIM GIBBONS
Governor

KENNETH E. MAYER
Director

RICHARD L. HASKINS, II
Deputy Director

PATRICK O. CATES
Deputy Director

October 28, 2010

Mr. Mark Jensen, State Director
USDA-APHIS-Wildlife Services
8775 Technology Way
Reno, NV 89521

Re: Assessment of Impact to Wildlife in Nevada by USDA-APHIS-Wildlife Services

Dear Mr. Jensen:

The Nevada Board of Wildlife Commissioners and the Nevada Department of Wildlife (NDOW) were given management authority over mountain lions and most other wildlife species by Nevada State law (Nevada Revised Statute (NRS) 501.100, 501.181, 501.331) which was passed via the State's system of representative government. Under this authority, the Board of Wildlife Commissioners and NDOW are charged with the management of wildlife. A diversity of human values and biological facts help guide these entities to a management strategy that preserves wildlife as a contributing member of the fauna of the State of Nevada, but also recognizes public safety issues, economic factors, and recreation values.

NDOW is responsible by State statute (NRS 503.595) for controlling wildlife causing damage to personal property or endangering personal safety. A protocol established by NDOW and approved by the Board of Wildlife Commissioners sets forth policies and procedures to be followed in controlling and preventing wildlife damage and addressing public safety issues. In carrying out these policies where wildlife/human interactions are involved, NDOW has the discretion to choose the most applicable management action, following guidelines outlined within the policy.

In order to comply with this responsibility, NDOW utilizes USDA-APHIS-Wildlife Services (WS) to control offending wildlife which are causing, or about to cause, damage to livestock, wildlife resources, agricultural crops, or personal property and to protect the public from dangerous animals when it is warranted and as authorized by Nevada Administrative Code (NAC) (NAC 503.710 thru 503.740 inclusive).

Without WS participation, NDOW would, by statue, carry out the management of wildlife with existing personnel or contract the work to other capable entities.

Sincerely,

Richard L. Haskins II
for

Kenneth E. Mayer
Director

Producer Implemented Nonlethal methods used in Nevada.

All livestock producers who receive services from the NWSP employ nonlethal methods to protect their livestock from predation. Nonlethal practices implemented by livestock producers are used far more than the employment of lethal practices in Nevada. NWSP supervisors and wildlife specialists have are familiar with producer implemented practices based on the information that specialists must gain to assess producer needs to provide appropriate damage management strategies. The WS Decision Model (Slate et al. 1992) indicates that a predation problem must be assessed before a strategy for resolution can be developed. A description of Nevada's producer employed nonlethal methods has been described by field staff and their supervisors to indicate how producers take responsibility for their livestock enterprises. Producers implement many nonlethal measures to protect their livestock prior to, during, and after requesting the services of NWSP.

West District Cooperator Employed Nonlethal Methods

Livestock producers in the West District of Nevada employ various nonlethal approaches as a first line of defense against losses to predation. Methods utilized are dependent on situational conditions, such as: funding; number of livestock; land class; terrain; proximity to water; sustainable grazing capacity; remoteness; and weather.

Exclusion

Nevada's West District livestock producers occasionally have the resources and conditions to place livestock in protective confinement, such as night pens. Experienced drawbacks to night penning in Nevada include: not practical or ecologically sound for free ranging cattle and sheep that are dispersed over large geographical areas to be confined in a small area (over grazing does not benefit ranching for following years); restrains the livestock for predatory wildlife that are not hindered by penning (such as mountain lions or bears) that can cause extreme losses in a very short amount of time.

Two large university ranches in Lyon and Washoe Counties have been using "predator proof" fencing in an effort to minimize livestock losses. Most coyotes readily cross over, under, or through conventional livestock fences that are used by many of the West Districts livestock producers on private land. A coyote's response to a fence is influenced by various factors, including the coyotes experience and motivation (e.g. to eat livestock) for crossing the fence. Total exclusion of all coyotes by fencing especially in large areas, is highly unlikely as some coyotes eventually learn to either dig deeper or climb higher to get over the fence. Nevada free range producers do not have the funding or the authority to develop large scale fencing projects as fencing interferes with public land multiple use and wildlife migration.

Predator proof fencing has been effective where livestock do not leave an area, however, even with the electric fences and five foot high fencing, predators such as black bears will climb over the tops of the fences and absorb the electric shock, whereas mountain lions leap over the fences to access and depredate the livestock. The cost for predator proof fences on private lands often outweighs the benefits of producing livestock when the fence is not capable of excluding all predators.

Frightening Agents

Nearly 100% of the largest free range sheep producers in the State of Nevada, use guard dogs. The use of guard dogs can and has significantly reduced coyote predation on sheep bands. Guard dogs are typically aggressive towards other canines such as coyotes and chase coyotes away from sheep flocks. Guard dogs, however, can be overwhelmed during the lambing period when sheep producers have ewes and lambs spread over a 20 mile or more area. Guard dogs can also become overwhelmed when several groups of coyotes come into sheep areas, thus reducing their effectiveness as a nonlethal approach.

Guard donkeys and llamas are used by numerous Nevada small sheep and cattle producers in small acre fields, several of which are in the West District. Unfortunately, several guard llamas in the West District have been killed by mountain lions and black bears. This nonlethal approach has worked best in small areas.

Audio/visual repellents

Nevada livestock producers use frightening devices as these devices are effective for reducing losses during short periods or until the offending predators are removed. West District livestock producers use frightening devices such as propane cannons, strobe lights and radios. Propane cannons produce loud explosions at timed intervals when a spark ignites a measured amount of propane gas. Strobe lights and radio's are another nonlethal approach that is used and works well until predators learn that the lights and radios are not capable of harming them.

Carrion removal

Several Nevada West District livestock produces remove or bury dead livestock to reduce coyote attraction, unfortunately, this practice is not practical in many areas of Nevada due to: remoteness, rocky terrain, and accessibility. In short, removing dead carrion is employed when favorable conditions exist and will be a continued practice for Nevada livestock producers.

Season and location of lambing or calving areas

The highest predation loss of sheep and calves typically occurs from late spring through September, when coyotes increase their food intake to raise juvenile coyotes. Husbandry practices such as shortening the lambing and calving periods by using synchronized or group breeding is utilized by the majority of livestock producers in the West District to reduce predation. Additionally, several West District livestock producers shed lamb and keep calves in small pastures until they reach an age structure to help the vulnerable livestock elude predation. Many Nevada livestock producers practice early weaning and do not allow young to go out to large pastures or grazing areas, which reduces the likelihood of excessive predation. This practice is utilized for the livestock producers who operate solely on private land.

Herders

Almost all (conservatively 90%) of Nevada's large free range sheep operators employ the use of herders to tend sheep and they are often on the front lines when dealing with predatory wildlife causing injury or death of livestock. Herders often employ a wide variety of nonlethal control measures while performing their daily duties: caring for and training guard dogs; burying dead livestock where permitted by terrain; deploying, maintaining and moving propane cannons; shooting harassment and general animal husbandry. Herders will continue to be a permanent fixture near Nevada's livestock practicing nonlethal approaches and animal husbandry practices to protect livestock from predatory wildlife.

East District Cooperator Employed Nonlethal Methods.

Employment of nonlethal practices in the East District differs slightly from those in other areas of Nevada. An integrated predation management practice is most effective in preventing livestock losses to predation. Many factors determine the most effective predation management practice(s). Below, is a very general description and discussion of nonlethal predation management practices employed by livestock producers in the **East District.**

Sheep and Goat Producers in the East District, Ely Nevada.

All sheep and goat producers in Nevada use a wide array of nonlethal practices to prevent direct and indirect losses to predation.

Exclusion:
All sheep and goat producers in the East District use predatory exclusion practices during some part of the year. Usually, exclusion practices are used when and where predation and the act of predation can have highly negative effects on livestock production. Of the large scale (800+ head) sheep and goat producers, only a fraction (around 20 %) use exclusion regularly throughout the year. This is due to the fact that it is feasible and cost effective at the locations. For the remaining (roughly 80%) large scale sheep and goat producers, exclusion on a regular basis isn't a reasonable practice. Portable electric fence and net wire fence are most often used forms of exclusion.

All of the small scale (400- head) sheep and goat producers use exclusion regularly throughout the year if predation is a problem. This is due to the fact that production is on private ground and access and facilities (corrals, barn yards, electricity, feed production, etc…) are present. Electric, permanent net wire and permanent corral fencing are most often used.

Guard Dogs:
All large scale sheep and goat producers, in the East District, use guard dogs to help reduce losses to predation. Guard dogs may not be used during some parts of the year, depending on a variety of factors, such as those that follow.

- Sheep scattered over a large lambing area (some producers don't like guard dogs around ewes that are lambing, due to a canid's natural tendency to eat raw flesh, placenta, blood covered lambs, etc…) and; area and number of coyotes is more than guard dogs can handle effectively.

- Guard dogs in heat; tend to lure male dogs from work. Whelping dogs stay with pups.

- In situations where a high volume of people pass by (human/pet and guard dog conflicts), like on hiking trails, urban areas (e.g. fire suppression around Carson, holistic weed management on parks, etc...) guard dogs are not the best tool to reduce predation losses.

- In Nevada, private trappers not familiar with guard dogs can cause significant conflict situations. A private trapper's goal is to catch as many furbearers (while still respecting

the concept of sustainability) as possible to maximize profit. The density of predators is higher around a prey base, such as sheep and goats. Guard dogs are around sheep and goats, and travel similar places where predators do and can often be caught. As private trappers are seasonal, the sheep and goat producers would rather maintain their guard dogs as they are available longer.

Some of the small scale sheep and goat producers use guard dogs. Almost all of the small scale sheep and goat producers have dogs that will alert them to predators, which are then harassed away.

Other Guard Animals:
Some of the small scale sheep and goat producers, in the East District, use either guard llamas or guard donkeys.

Since the effectiveness is nil over large areas, no large scale producers use them.

Harassment/hazing:
All sheep and goat producers in the East District employ harassment/hazing techniques. Harassment/hazing used include sound and visual deterrents to help reduce predation. Everything from shooting to vehicle harassment techniques is employed.

Audio Repellents:
All of the sheep and goat producers employ the use of audio repellents to help reduce losses to predation. Radios, voice, dog barks, car horns, running vehicles and even gun shots are most commonly used in the East District.

Visual Repellents:
All large scale sheep and goat producers in the East District use visual repellents to help reduce losses to predation. Fladry, "scare crow" type figures, people, vehicles, and lights are most often used.

All small scale sheep and goat producers use visual repellents to help reduce losses to predation, with more limited success. Flashing lights, 'scare crow' structures, people, vehicles, and flagging are most commonly used.

Carrion Removal:
Most (75 + %) of the large scale sheep and goat producers will remove carrion when reasonably able, to help reduce losses to predation. Often times the carrion is hauled to a "dead" pit and buried.

All of the small scale sheep and goat producers remove carrion to help prevent losses to predation. Often times a "dead" pit is used or a local landfill is used for final disposition.

Location Change:
All of the large scale sheep and goat producers will change locations of livestock to help reduce losses to predation. This can range from a few hundred yards to a few hundred miles depending on the situation.

All of the small scale producers will also change location of livestock to help reduce losses to predation. Livestock are most often brought closer to where they are more easily visually inspected by the herders.

Change in Lambing Practices (timing and/or area and /or location):
Approximately 75 % of the large scale producers in the East District will change the timing or location of livestock lambing to reduce losses to predation. As predation losses can be exceedingly high in certain areas at certain times, changes made can be based on that alone. 'Shed lambing', change of lambing area, and early or late lambing are common practices. All large scale producers confine the timing of lambing to help reduce perpetual losses to predation.

More than 75 % of small scale producers may try to 'shed lamb' or confine the lambing area to help reduce losses to predation. Additionally, some will confine the timing of lambing to help reduce losses to predation.

Herders:
For the large scale sheep and goat producers, the most important practice in reducing sheep and goat losses to predation is using a herder. All large scale producers in the East District employ herders. The herder himself can and does use a variety of nonlethal practices to reduce predation on the livestock that they are tending. Herders are most effective, at reducing losses to predation, when supplied with a variety of tools and knowledge of such tools. Of course, the skill and motivation of the herder also influence effectiveness of nonlethal practices to reduce predation. Most herders are provided with a gun that is often times used as a harassment tool. Both during the daytime as well as night, herders will fire a shot when coyotes are heard vocalizing thus scaring the coyotes from the area.

Few, if any, of the small scale sheep and goat producers employ full time herders, as they either act as a herder themselves or delegate the task to other family members.

Integration of Nonlethal Practices:
All sheep and goat producers use integrated predation management practices to reduce losses to predation. A wide variety of variables influence the application of the variety of nonlethal practices and no two producers manage predation damage exactly the same.

Change Class of Livestock/ Stop Livestock Production:
Some sheep and goat producers stop production of sheep and goats. Some may sell out and run more cattle or other livestock. This can change the amount of losses to certain predators. For example; fewer cattle are lost to coyote predation where a high number of sheep were lost to coyote predation previously.

Some may quit livestock production all together. Then there is no livestock producer to employ nonlethal predation damage management.

Other Nonlethal Practices often used:
All sheep and goat producers in the East District will use some form of harassment to reduce losses to predation.

Most producers will or have used habitat modification to help reduce losses to predation.

A few of the small scale producers may try supplemental feeding in an effort to reduce predation.

Cattle Producers in the East District:

As cattle are much different than sheep and goats, the losses to predation are different than that of sheep and goats. As such, the predation damage management practices vary from those used by sheep and goat producers. Since most losses to cattle from predation occur during calving, most predation damage management practices are centered on that time.

Exclusion:
Some (probably 20 %) cattle producers, in the East District, employ exclusion when cows are in an area where they can be 'calved out' in the corrals or well fenced calving pasture. This is most common with small bunches of cattle such as heifers, a pure bred or registered herd, or a small scale producer on private ground.

Confinement of Livestock:
Most (75 + %) cattle producers in the area confine some cattle to an area that is easily accessible and visually inspected, to help reduce losses to predation.

Guard Dogs/ Llamas/ Donkeys:
Few cattle ranchers use guard dogs due to the fact that cows with calves don't like dogs. However, almost all cattle producers have dogs that will alert them to predators.

Few use guard llamas or donkeys.

Carrion Removal:
Most (75 + %) cattle producers will remove carrion when reasonably able, to help reduce losses to predation. Often times the carrion is hauled to a "dead" pit and buried.

Audio Repellents:
All East District cattle producers employ the use of audio repellents to help reduce losses to predation. Radios, voice, dog barks, car horns, running vehicles and even gun shots are most commonly used in the Elko field area.

Visual Repellents:
All large cattle producers in the East District use visual repellents to help reduce losses to predation. Fladry, "scare crow" type figures, people, vehicles, and lights are most often used.

Change in Calving practices (timing and/or area and /or location):
If losses to predation are high in certain areas, most producers may visit the area more often or move the cattle to a place more easily inspected. Many cattle producers confine the timing of calving to help reduce losses to predation. Some experience less predation loss by changing the time of calving to a little later in the spring or to fall to reduce predation losses.

"Cowboys" or "Buckaroos":
All the large scale cattle producers have people who regularly tend to the cattle, especially during calving. The cowboys or buckaroos as they say in the East District often perform the same role

for cattle as sheep herders do for sheep. The buckaroos are responsible for the health and well being of the cattle, this includes protecting them from predators. The effectiveness of reducing losses to predation is a result of the buckaroos tools, knowledge, and skill.

Integration of Nonlethal Practices:
Most cattle producers use integrated predation management practices to reduce losses to predation. A wide variety of variables influence the application of the variety of nonlethal practices and no two producers manage predation management exactly the same.

Change Class of Livestock/ Stop livestock Production:
Over 90 % of cattle producers breed cattle for their "mothering" ability, to help reduce losses to predation. A few will even breed cattle with a very outgoing temperament to protect themselves and their young; this is most common on "outside" operations where the cattle have to fend for themselves. This type of breeding is also doubled with leaving horns on the mother cows, allowing them to better ward off predators.

Some cattle producers may quit livestock production all together. Then there is no livestock producer to employ nonlethal predation damage management.

Other Nonlethal Practices often used:
All cattle producers in the East District will use some form of harassment to reduce losses to predation.

Most producers will or have used habitat modification to help reduce losses to predation.