PREDECISION

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:

[redacted]

and

[redacted]

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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
[redacted]	[redacted]
CEQ	Council on Environmental Quality
CFR	Codes of Federal Regulations
CY	Calender 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
HSUS	The Humane Society of the United States
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
[redacted]	[redacted]
NASS	National Agriculture Statistics Service
NDOA	Nevada Division of Agriculture
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Policy Act
NF	National Forest
NHPA	National Historical Preservation Act
NRS	Nevada Revised Statutes
[redacted]	[redacted]
PDM	Predator Damage Management
[redacted]	[redacted]
SDA	Specially Designated Area
SMA	Special Management Area
SOP	Standard Operating Procedure
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):

> *"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[1] (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 authorities for the WS program come from the Animal Damage Control Act of March 2, 1931, as amended (46 Stat. 1468; 7 USC 426-426b and 426c) and the Rural Development, Agriculture and Related Agencies Appropriations Act of 1988 (Public Law 100-202). WS activities are conducted in cooperation with other federal, state, and local agencies, as well as private organizations and individuals. WS cooperates with and supervises the [redacted] and the [redacted], programs found within the [redacted]. The three entities form the [redacted].

This Environmental Assessment (EA) evaluates a portion of [redacted] 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 (*Felis 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*).

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1 Wildlife Services was previously known as the Animal Damage Control program. The name change became effective in 1997. Throughout this document, the acronyms "ADC" and "WS" refer to the same federally authorized program and will be considered analogous.

With the exception of feral dogs, feral cats, and common ravens, the above species are managed by the [redacted]. Under a Memorandum of Understanding (MOU) with [redacted], [redacted] has primary responsibility to respond to complaints involving coyotes, mountain lions, bobcats, skunks, weasels, badgers, raccoons, and ringtails and [redacted] has primary responsibility for responding to complaints involving foxes, minks, and black bears. [redacted] can request assistance from [redacted] for any species under their primary responsibility, but they are the lead agency at all times. [redacted] often requests assistance from [redacted] for responding to black bear depredation complaints. Feral dogs and cats are managed under the authority of county and municipal laws and [redacted] 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.

[redacted] refers all complaints received for river otters (*Lutra canadensis*) and marten (*Martes caurina*), the only other mammalian predators in Nevada, to [redacted]. [redacted] also responds to requests involving other 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 analysis in this EA includes a significant effort to consider existing data contained in other NEPA and related documents. These other documents (see section 1.2) primarily include the ADC FEIS (USDA 1997) to which this EA is tiered, and seven previously issued environmental assessments specifically for PDM activities in Nevada prepared by the [redacted], [redacted] and two issued by the USDA Forest Service (USFS).

The Nevada ADC Program

WS's mission, developed through a strategic planning process, is to “provide leadership in wildlife damage management for the protection of America's agricultural, industrial and natural resources, and to safeguard public health and safety” (APHIS 1989). 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’s Policy Manual[2] reflects the mission and provides guidance for engaging in wildlife damage control activities. [redacted] personnel abide by the WS mission and policies. Before wildlife damage management is

2 WS Policy Manual - Provides guidance for [redacted] personnel to conduct wildlife damage management activities through Directives. WS Directives referenced in this EA can be found in the manual but will not be cited in the Literature Cited Section.

conducted, an *Agreement for Control* must be signed by [redacted] 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. [redacted] cooperates with land and wildlife management agencies, when appropriate and as requested, to combine efforts to effectively and efficiently resolve wildlife damage problems in compliance with all applicable federal, state, and local laws and MOUs between [redacted] and other agencies. At the State level, [redacted] has current MOUs with [redacted] and the [redacted] that specify roles and functions. The MOU with [redacted] specifically addresses which agency is responsible for the different species causing damage. National level MOUs were signed between WS and [redacted] in 1995, and between WS and USFS in 1998. These MOUs transferred the responsibilities for wildlife damage management and related compliance with NEPA from [redacted] and USFS to WS. This EA will encompass the responsibility for NEPA and all proposed PDM activities in Nevada under a comprehensive Statewide EA. [redacted] believes that a comprehensive document would best address all issues and potential cumulative impacts throughout Nevada. A comprehensive EA would also provide a more usable working tool for coordination with all cooperating agencies and promote a more consistent approach to PDM across the State. All pertinent issues and alternatives discussed in the other documents are summarized in this new EA. Therefore, upon final decision determined from this EA, the [redacted] and 2 USFS National Forest (NF) EAs and FONSIs will be superseded by this EA and Record of Decision.

Purpose

This EA analyzes PDM for the protection of livestock, crops, property, natural resources, and human health and safety 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), 60 Fed. Reg. 6,000-6,003, 1995). 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. The WS program has determined that an environmental impact statement (EIS) is not required and that preparation of an EA for the program on all land classes in Nevada complies with NEPA, and with the Council on Environmental Quality (40 CFR 1500) and APHIS NEPA implementing regulations (7 CFR 372).

Nevada encompasses 110,540 square miles and is comprised of 17 counties: [redacted]. [redacted] personnel receive requests to conduct PDM throughout the various counties on private, federal, state, tribal, county, and municipal lands. As of September 30, 1998 cooperative agreements (active and inactive) were in place on approximately 22 million acres, about 31% of the State's total acreage (MIS[3] 1998). [redacted] 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, [redacted] conducted PDM on properties totaling almost 15 million acres in FY 98 (federal fiscal year 1998 = Oct. 1, 1997 - Sept. 30, 1998) where target predators were taken representing only 21% of the lands in Nevada. [redacted] typically spends only a few hours or days on any specific property during the year resolving damage problems. [redacted] usually conducts PDM on an average of less than 5 million acres per month which is only about 7% of the land area in Nevada. The majority of property under

3 MIS - Computer-based Management Information System used for tracking [redacted] PDM activities. The current MIS system has been operational since FY 92 and other methods were in place to track data prior to that. Throughout the text, MIS will be noted along with the year, ie. 1998, when the data was entered. MIS reports will not be referenced in the Literature Cited Section because MIS reports are not kept on file. A database is kept that allows queries to be made to retrieve the information needed.

agreement for PDM is under grazing lease from the [redacted] or privately owned. As of September 30, 1998, [redacted] had agreements for conducting PDM on over 16 million acres of [redacted] lands, 4 million acres of private lands, 1 million acres of USFS lands, ½ million acres of American Indian Tribal lands, and ¼ million acres of other public lands.

1.1 NEED FOR ACTION

1.1.1 Summary of Proposed Action

The proposed action is to continue the current [redacted] PDM activities in Nevada for the protection of livestock, crops, property, natural resources, and human health and safety under this one EA rather than several different but similar EAs in effect prior to this. 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 predators by responding to all public requests with technical assistance (advice or demonstrations) or direct control. [redacted] 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. [redacted] 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, is most often given where cooperative funding is available. Resource owners that are given 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 predators. 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 [redacted] personnel who are trained professionals and equipped to handle most damage situations. The resource, species, location and the type of damage, and the available biologically sound, cost-efficient and legal methods will be analyzed by [redacted] personnel to determine the action taken to correct a conflict with a predator.

The proposed action will allow the use of all legal methods. A wide range of methods is available for resource owners and [redacted] 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 population management (ie. traps, shooting, and toxicants). Population management methods used by [redacted] personnel will include shooting, calling and shooting, aerial hunting, traps, snares, M-44s, denning, gas cartridges, and decoy and tracking dogs. The population management 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 *AWP* are in place. All PDM

will comply with federal, state, and local laws and current MOUs between [redacted] and the various management agencies. [redacted] personnel will communicate with other agency personnel as appropriate and necessary.

1.1.2 Need for Predator Damage Management for Protection of Livestock

Contribution of Livestock to the Nevada Economy. In 1992, agriculture generated over $288 million in annual sales from farm and ranch commodities in Nevada (NDOA 1997). Of this, livestock production, primarily cattle, sheep, hogs, and poultry, accounted for about 70% of total farm commodity cash receipts and is, therefore, considered a primary agricultural industry sector in the State. In 1992, the total cash value from sales of all livestock products was about $208 million in Nevada (NDOA 1997). 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 1996 were $77,924,000 for cattle and calves providing $82,167,000 gross income and $2,382,000 for sheep and lambs providing $4,139,000 gross income (NDOA 1997). However, the declining number of AUMs (animal unit months) allotted on [redacted] 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 1998, Nevada livestock inventories included 510,000 cattle and calves, 85,000 sheep and lambs, and 7,500 swine (NASS 1998). 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).

Of the predators that affect livestock, coyotes inflict highest predation rates. 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. [redacted] Specialists do not attempt to locate every livestock kill reported by ranchers, but rather make attempts to verify sufficient losses to determine if a predator problem exists that requires PDM actions. Therefore, [redacted] 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). In evaluating cost effectiveness of PDM, the ADC

programmatic FEIS concluded that benefits, in terms of avoided sheep and lamb losses plus price benefits to consumers, are 2.4 times the cost of providing WS PDM services for sheep protection in the 16 western states (USDA 1997). That analysis did not address the value of calf protection which is a substantial component of [redacted] PDM services in Nevada.

Scope of Statewide Livestock Losses. NASS conducted comprehensive surveys of sheep and cattle losses to predators in 1994 (NASS 1995) and 1991 (NASS 1992), respectively. NASS (1995) reported that predators killed 3,775 adult sheep valued at $290,675 and 12,375 lambs valued at $383,625 in 1994 throughout Nevada. Of these, coyotes were responsible for over 80% of the losses and mountain lions about 10%. NASS (1992) data indicated predation losses in Nevada during 1991 of less than 100 cattle (exact number not reported) and 1,600 calves valued at $530,000. These losses occurred in spite of control efforts by producers, who must tolerate additional costs for these activities (Jahnke et al. 1987), and [redacted] personnel.

[redacted] personnel respond to reports from resource owners of losses to predators which may or not be verified. Verified losses are defined as those losses examined by an [redacted] 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. An [redacted] specialists 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 [redacted] and not confirmed during a site visit. Livestock losses reported to [redacted] by cooperators are recorded as confirmed losses only if [redacted] 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 are not made. Losses caused by predators before the [redacted] specialist is contacted for assistance and not verified are reported losses. Other reported losses might involve situations where the identity of the predator species could not be determined by the [redacted] specialist. In Nevada during FY 98, [redacted] personnel responded to complaints where reported and verified losses from predators of all classes of livestock including poultry and commercially raised game were worth about $219,070 (MIS 1998). Livestock losses in FY 98 included 3 cattle, 129 calves, 2 horses, 3 foals, 2 goats, 19 kid goats, 3 llamas, 1 rabbit, 439 sheep, 1,028 lambs, and 390 poultry and commercial fowl. Of the value for these losses, coyotes accounted for 72%, mountain lions 23%, common ravens 3%, and feral/free-roaming dogs, black bear, bobcats, raccoons, feral cats, and skunks together accounted for about 2%. The only other predators in Nevada to predate or injure livestock from FY 92-97 were weasels (MIS 1992-1997). 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, but [redacted] has not received any damage complaints or verified livestock damage from these species since FY 92 in Nevada. The absence of information for these species is partially due to the primary responsibility for resolving complaints involving the 3 species of foxes and mink is [redacted] and not [redacted].

Cooperator surveys for the 1997 calender year (CY) revealed livestock losses of $1.3 million to predators (MIS 1998). Table 1 displays the supplemental information for the primary classes of livestock lost in Nevada to predator activities in 1997, the species of predator responsible for the loss, and the value of the lost resources. These figures do not represent all livestock losses which occurred as a result of predation throughout Nevada, but rather gives accounts of [redacted] cooperator predator losses incurred during 1997. The predators responsible for livestock lost to predation were coyotes at 88%, mountain lions at 8%, feral dogs at 3%, and bobcats, ravens, and bears at 1%. A five year average of the value of livestock resources from 1993 through 1997 lost to predation in Nevada, as reported to

[redacted] by resource owners, averaged about $1.2 million (MIS 1994-1998). It is expected that losses will continue to occur at roughly this five year average and that the predation percentages by the different species will probably remain more or less the same.

Table 1. Livestock lost to predators in Nevada reported to [redacted] during CY 1997 (MIS 1998). The reported losses are determined from cooperator surveys and civil agreements. The coyote is the species most often found to be responsible for livestock losses caused by predator activity, followed by mountain lions and bobcats. Lambs, sheep, and calves were most impacted by these predators reflecting their availability throughout Nevada and preference by predators.

Livestock Losses to Predators Reported by Cooperators to [redacted] for Calender Year 1997								
Livestock	**Coyote**	**Mtn. Lion**	**Feral Dog**	**Bobcat**	**Raven**	**Black Bear**	**Total Lost**	**Value ($)**
Cattle	235		3		2		240	$99,080
Calves	1,446	8	10		18		1,482	$529,338
Sheep	1,383	309	100	10		2	1,804	$196,843
Lambs	4,248	310	129	53	4		4,744	$487,317
Goats	1	4					5	$400
Kid Goats	16						16	$1,760
Horses		1					1	$3,000
Poultry	39						39	$207
Total	7,348	632	242	63	24	2	8,331	$1,317,945

Public lands in Nevada are used extensively for grazing sheep, lambs, cows, and calves, and, therefore, primarily show these livestock losses (Table 2a and 2b). All [redacted] Districts, except [redacted], and USFS NFs showed substantial losses of sheep and lambs to coyote predation. The few [redacted] cooperators assisted in the [redacted] [redacted] grazed only dry ewes. Most [redacted] [redacted] showed losses of calves, but a few and the USFS NFs did not. Total losses of all livestock classes caused by predators were valued at $401,681 on [redacted] lands and at $135,226 on USFS lands in FY 98. Losses in FY 98 were typical of previous years and losses of livestock can be expected to be similar in future years.

Private lands are used much more as lambing and calving grounds and raising other types of livestock. Losses on private lands reflects this and a wider variety of livestock losses (Table 2c). Total losses of all livestock classes caused by predators on private lands in Nevada for FY 98 were 3,038 head of livestock valued at $685,922.

Private lands account for about 12% of the lands in Nevada, but 52% of the total losses. Conversely, nonprivate lands account for approximately 88% of the lands in Nevada and only 48% 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 [redacted] and USFS allotments were reduced by 342,600 (about 20%) from 1980-1998 (Pearce et al. 1999) which has reduced the percentage of nonprivate lands needing PDM. Therefore, the percentage of losses is expected to be higher on private than nonprivate lands. Indeed, losses were 5 times higher per acre under agreement on private lands than on nonprivate in FY 98. Consequently, [redacted] concentrates more effort per acre on private lands than on nonprivate lands.

Table 2a. Livestock lost to predators in Nevada on [redacted] public lands reported to [redacted] for CY 1997 (MIS 1998).

Livestock Losses on Public Lands - [redacted] Districts							
Livestock	Predator	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Sheep	Coyote	260	15	143	216	129	156
	Mtn. Lion	17	8	8	100		14
	Feral Dog				4		
	Bobcat			10			
	Total	277	23	161	320	129	170
	Value	$22,655	$2,850	$19,500	$35,649	$15,190	$17,510
Lambs	Coyote	125	77	195	558	688	534
	Mtn. Lion	3	2	2	35		22
	Feral Dog			19	4		
	Bobcat				6		28
	Raven						4
	Total	128	79	216	603	688	588
	Value	$12,380	$7,771	$20,620	$64,530	$68,750	$58,800
Cattle	Coyote		1				
	Total		1				
	Value		$750				
Calves	Coyote	55	49		118	7	45
	Raven	3					
	Total	58	49		118	7	45
	Value	$16,960	$33,610		$40,650	$1,176	$22,250
Total Number Livestock Lost		463	152	377	1,041	824	803
Total Value of Livestock Lost		$51,995	$44,981	$40,120	$140,829	$85,116	$98,560

* 1 goat killed valued at $80

Table 2b. Livestock lost to predators in Nevada on public lands other than [redacted] reported to [redacted] for CY 1997 (MIS 1998).

Livestock Losses on Public Lands - NF and Other									
Livestock	Predator	Battle Mtn. Toiyabe NF	Carson City Toiyabe NF	[redacted]	Elko Humboldt NF	[redacted]	Ely Humboldt NF	[redacted]	[redacted]
Sheep	Coyote	30	17		59		46		45
	Mtn. Lion	25	11		50		43		15
	Total	55	28		109		89		60
	Value	$5,500	$4,200		$12,936		$11,850		$7,500
Lambs	Coyote	75	65	23	730		63	2	15
	Mtn. Lion	10	20		149		13	1	15
	Total	85	85	23	879		76	3	30
	Value	$8,500	$8,680	$2,576	$76,400		$7,160	$240	$2,400
Calves	Coyote					108		2	
	Total					108		2	
	Value					$21,600		$800	
Total Livestock Lost		140	113	23	988	108	165	5	90
Total Value of Livestock		$14,000	$12,880	$2,576	$89,336	$21,600	$19,010	$1,040	$9,900

Table 2c. Livestock lost to predators on private lands in Nevada reported on [redacted] supplements for CY 1997 (MIS 1998).

Livestock Losses on Private Lands within [redacted] Districts							
Livestock	Predator	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Sheep	Coyote	24	42	23	102	18	58
	Mtn. Lion		6		12		
	Feral Dog						96
	Bear		2				
	Total	24	50	23	114	18	154
	Value	$2,335	$5,685	$2,450	$13,078	$2,175	$15,780
Lambs	Coyote	90	282	135	146	237	208
	Mtn. Lion		36		2		
	Feral Dog		30				95
	Total	90	348	135	148	237	303
	Value	$8,900	$62,405	$9,125	$14,565	$23,215	$30,300
Cattle	Coyote	46	8	156	3		21
	Feral Dog			3			
	Raven	2					
	Total	48	8	159	3		21
	Value	$21,455	$2,425	$67,300	$1,050		$6,100
Calves	Coyote	112	124	392	117	14	303
	Mtn. Lion		3	1	2	2	
	Feral Dog			10			
	Raven	12					3
	Total	124	127	403	119	16	306
	Value	$46,630	$32,852	$140,175	$41,130	$5,075	$126,430
Other - horses, goats, poultry	Coyote		52				4
	Mtn. Lion				4		
	Total		52		4		4
	Value		$1,842		$3,240		$205
Total Number Livestock Lost		286	585	720	388	271	788
Total Value of Livestock Lost		$79,320	$105,209	$219,050	$73,063	$30,465	$178,815

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, and Human Health and Safety

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

Table 2d. A comparison of livestock losses by predators on Nonprivate and private lands reported to [redacted] (MIS 1998).

Comparison of Losses on Public & Private Lands					
Livestock	**Predation**	**[redacted] Public Land**	**Other Nonprivate Land**	**Nonprivate Land Total**	**Private Land Total**
Sheep	**Total**	1,080	341	1,421	383
	Value	$113,354	$41,986	$155,340	$41,503
Lambs	**Total**	2,302	1,181	3,483	1,261
	Value	$232,851	$105,956	$338,807	$148,510
Cattle	**Total**	1	-	1	239
	Value	$750	-	$750	$98,330
Calves	**Total**	277	110	387	1,095
	Value	$114,646	$22,400	$137,046	$392,292
Other	**Total**	1*	-	1	60
	Value	$80	-	$80	$5,287
TOTAL VALUE		$461,681	$170,342	$632,023	$685,922

* not included in Table 2a (1 goat)

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 in FY 98 being responsible for $2,800 damage to nut, grain, and alfalfa crops (MIS 1998). During CY 1997, coyotes were reported responsible for 2 incidences of fruit damage at $200 (MIS 1998). In addition, striped skunks (MIS 1996), raccoons (MIS 1994), and ring-tailed cats (MIS 1993) have caused damage to crops in the past 5 years.

- **Aquaculture** - [redacted] responds to requests from cooperators to resolve problems at aquaculture facilities including home ponds involving predators, primarily mink and raccoons. In FY 98, raccoons were involved in 3 incidences of damaging brood goldfish at a value of $330. [redacted] responds to complaints involving river otter and mink, the predators mostly associated with damage at these facilities, so [redacted] usually obtains little information for them..

- **Other Agriculture** - Several other commodities associated with agricultural can be damaged by predators such as beehives, haystacks, livestock feed, and eggs. Losses in FY 98 included $50 damage to a hay stack from skunks burrowing and $30 damage to livestock feed from raccoons. In addition, ravens have damaged other agriculture in the past 5 years (MIS 1994, 1995) including $18,000 damage to livestock feed at a feedlot where winter congregations can cause severe losses.

- **Property** - [redacted] also responds to requests from permittees, landowners, and [redacted] to alleviate property damage from predators such as: black bears destroying beehives or breaking in and destroying the interiors of homes or other structures; coyotes, mountain lions, or raccoons killing pets; 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. In FY 98, [redacted]

reported predator damage to property for 204 incidences from striped skunks (60%), raccoons (28%), coyotes (2%), black bear (2%), badgers (2%), feral cats (2%), ravens (2%), and long-tailed weasels (1%) at $10,674 (MIS 1998). In addition, 186 pets were predated or injured by coyotes (86%), raccoons (5%), feral cats (4%), bobcats (1%), and mountain lions (<1%) at a value of $10,735. Feral dogs (MIS 1997), badgers (MIS 1995), and striped skunks (MIS 1994) have also injured or predated pets in the last 5 years.

- **Human Health and Safety** - [redacted] 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). [redacted] assists many residents in the [redacted] 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. Coyotes (50%), striped skunks (29%), raccoons (12%), mountain lions (3%), black bear (2%), raven (2%), badger (1%), kit fox (1%), feral dog (1%), and bobcats (1%) were responsible for 193 human health and safety requests in FY 98 (MIS 1998). In addition, feral cats have been involved in human health and safety concerns in the last 5 years (MIS 1997).

- **Natural Resources** - Predators are sometimes responsible for requests for assistance involving natural resources such as threatened and endangered (T&E), sensitive, and game species protection. [redacted] did not conduct PDM for natural resources in FY 98 (MIS 1998). However, [redacted] 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, [redacted] works with the agency to identify and provide the level of protection needed. When such actions are requested by [redacted] or another federal agency, the responsibility for NEPA compliance rests with that agency. However, [redacted] could agree to meet the responsibility for NEPA compliance at the request of the other federal agency.

  - **Nesting waterfowl and shorebirds** - [redacted] has received requests from [redacted] and private landowners to provide protection for certain species of nesting waterfowl and shorebirds from predators at the [redacted] Area. The predator control projects have been of short duration and limited to the critical nesting periods when the eggs and setting birds are most vulnerable. Control activities were primarily aimed at the common raven, but also targeted mammalian nest robbers such as the coyote and striped skunk. Production of sandhill cranes (*Grus canadensis*) at [redacted] in southeastern Oregon was limited by predation from coyotes, ravens, raccoons, and mink. Control of these species on the refuge resulted in increased colt survival as well as increased production of other waterfowl (USFWS 1989, 1990, 1991, 1994b). [redacted] use of DRC-1339, a selective avicide, in egg baits placed in simulated nest sites, results in

the selective removal of nest egg raiding ravens. This technique has proven to be effective for the protection of sandhill cranes in Oregon (USFWS 1994b). Several other predators can damage nesting waterfowl, primarily their eggs, such as skunks and foxes.

- **Sage Grouse** (*Centrocercus urophasianus*) - [redacted] has received inquiries concerning the possibility of providing protection for sage grouse nesting areas from nest and chick predators during the vulnerable nesting periods. Nest predation and early brood (chicks) mortality appear to be a significant role in the sage grouse decline and ravens have been implicated as a primary predator (S. Stiver, NDOW, pers. comm. 1999). Studies conducted in [redacted] and [redacted] Counties showed that ravens have the potential to seriously impact sage grouse production (Alstatt 1995). Research in other portions of the country have shown that the removal of nest predators can have a dramatic benefit for nesting birds (USFWS 1994b). While no control activities have been conducted to date by [redacted], the status of the sage grouse population makes nest site protection a possibility. [redacted] could use several methods to reduce the local population including DRC-1339-treated egg baits, a selective avicide, placed in simulated nest sites to remove ravens responsible for raiding eggs from sage grouse nests.

- **Desert Tortoise** (*Gopherus agassizii*) - The desert tortoise is listed as a threatened species by the USFWS. While loss and degradation of habitat is considered the greatest threat to the tortoise, other negative factors are believed to include predation of juvenile tortoise by common ravens, spread of an upper respiratory tract disease, illegal collection, vandalism, and road kills. The *Draft* [redacted] Framework Plan Amendment and Environmental Impact Statement for the Management of Desert Tortoise Habitat ([redacted]) and the [redacted]) lists several limiting factors that constitute a threat to the decline and continued existence of the desert tortoise. The Recovery Plan for the desert tortoise states that predation by the common raven is intense on younger age classes and that the USFWS Breeding Bird Survey data has shown a 15-fold increase for the raven population in the Mojave Desert from 1968 to 1988 (USFWS 1994a). It also states that predation pressure from ravens probably has resulted in such high losses of juveniles in some portions of the Mojave region that recruitment of immature desert tortoises into the adult population has been halted. The Recovery Plan recommends raven control to reduce predation on juvenile tortoise for portions of the [redacted] Unit. Localized control on predator populations, as proposed in the [redacted] and the [redacted], would allow for survival of a greater number of juvenile tortoise to a reproductive age [redacted] 1998). The proposed management actions which limit their food source, nesting and roosting opportunities, may result in lower rates of increase in populations. As is pointed out in the Recovery Plan, however, a healthy population of desert tortoise only has a 2% survival rate from birth to adulthood and a substantial die off of young is normal (USFWS 1994a). The opinion of most biologists familiar with the species is that the tortoise is unlikely to survive over the long term in southern Nevada without the direct aid of some form of habitat conservation or recovery plan.

  In California, predation of young tortoises by ravens is considered a serious problem ([redacted]). Raven predation is suspected of being responsible for reduced numbers of hatchlings, reduced recruitment of juveniles into the adult population, overall shift in the age structure of tortoise populations, and general population decline in certain portions of the tortoise's range. Other predators of tortoises and their eggs include coyotes, bobcats,

badgers, skunks, kit foxes, ring-tailed cats, domestic dogs, feral cats, golden eagles *(Aquila chrysaetos*), hawks, roadrunners (*Geococcyx californicus*), burrowing owls (*Athene funereus*), gopher snakes (*Pituophis melanoleucus*), larger rattlesnakes (*Crotalus spp*.), and larger coachwhips (*Masticophis flagellum*). [redacted] is currently proposing a management plan for the monitoring and control of raven populations in the [redacted], including a number of lethal and nonlethal control methods ([redacted]). While no raven control activities for the protection of tortoise young have been conducted by [redacted], the precarious nature of the desert tortoise population makes the possibility of raven control for the protection of the desert tortoise a reasonable possibility for [redacted].

- **Big Game -** Under certain conditions predators, primarily coyotes, can have a significant adverse impact on deer (*Odocoileus* 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. Other authors observed that coyotes were responsible for the majority of fawn mortality during the first few weeks of life (Knowlton 1964, White 1967). Teer et al. (1991) concluded from work conducted at the [redacted], 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).

- **Other Species -** [redacted] may be requested to help protect other species. If a management agency finds that a particular species has been impacted by predation, [redacted] would assist in determining if PDM efforts could help protect the species and implement necessary, if any, PDM actions to correct it.

1.1.3 Predators in Nevada That Cause Damage

To conduct PDM, it is important to have a 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 [redacted] PDM efforts.

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

Coyotes were responsible for almost $170,000 in reported or verified damage to livestock, crops, and pets during FY 98 (MIS 1998). The resources protected, in order of reported economic loss in FY 98 included livestock, primarily lambs, calves, and ewes, property (e.g., drip irrigation lines, pets) and human health and safety (i.e., concern for children's and pet's safety). Coyotes predated 7,348 livestock as reported by [redacted] cooperators for CY 1997 (MIS 1998).

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[4]). 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 1980). A positive relationship was established between coyotes 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. [redacted] 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. Ravens were responsible for $10,550 in reported or verified damage to livestock, crops, and pets in FY 98 (MIS 1998). The resources protected, in order of reported economic loss and number of occurrences included 64 calves and lambs, 15 incidences of property damage (i.e. pets and buildings), and 4 incidence of human health and safety concerns, and 2 incidence of crop

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

damage. [redacted] cooperators reported that ravens were responsible for predating 24 livestock in CY 1997(MIS 1998).

The common raven is widely distributed throughout the Holarctic Regions of the world including Europe, Asia, 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).

Ravens are attracted to and concentrate around livestock birthing grounds. Ravens will sometimes 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. To a lesser extent, ravens have also been controlled for the protection of nesting waterfowl in refuge areas. The reduction of ravens in [redacted] County has been discussed as desirable to protect the desert tortoise as well as several other listed T&E species. The *Draft* "[redacted] County Multiple Species Habitat Conservation Plan and Environmental Impact Statement" discusses the impact of the significant increase in the raven population in [redacted] 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 plan also states that landfills subsidize the ravens and enable them to increase their numbers. In fact, USFWS Breeding Bird Survey data reported a 15-fold increase in the raven population for the Mojave region from 1968-1988. Ravens also cause damage to grain, nut and fruit orchards, livestock feed, and property in Nevada.

Mountain Lion. The mountain lion is a big game animal in Nevada. [redacted] manages mountain lions including their damage. They issue depredation permits when needed per Nevada regulations. [redacted] has been contracted by [redacted] to provide PDM for them. Therefore, [redacted] responds to requests for assistance concerning mountain lion depredations and evaluates and resolves these conflicts. In FY 98, [redacted] recorded $50,746 in reported and verified damage for lions in 171 occurrences. All of the damage value, except for $200 for a pet, was for predation of livestock. In addition to these, 5 incidences of human health and safety concern were reported where people feared for their well-being.

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

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 until a territory has been established (Hornocker 1970). Mountain lions breed and give birth year-round with most occuring in late spring and summer after a 90-day gestation period (Ashman et al. 1983, Seidensticker et al. 1973, Robinette et al. 1961). One to six offspring per litter is possible, with an average of 2-3.

Mountain lion density is primarily dependent on prey availability and intraspecific (between or among members of the same species) competition with other mountain lions. Prey availability is directly related to prey habitat quality which directly influences a mountain lion's nutritional health, and reproductive and mortality rates. Studies indicate that as available prey increases, so do mountain lion populations, and since mountain lions are territorial animals, the rate of population increase tends to decrease as the mountain lion density increases. As mountain lion population density increases, the mortality rate from intraspecific strife also increases or mountain lions disperse into unoccupied habitat. 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.

Mountain lion densities, based on a variety of population estimating techniques, range from a low of about 1/100 mi^2 (McBride 1976, Hemker 1984) to a high of 24/100 mi^2 (Sitton 1972) with an average density of 7.5/100 mi^2 for the western states (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 *Mustelidae* family. Striped skunks elicited 150 damage complaints in FY 98, most human health and safety or property related, because of a skunk's odor or damaging homes and landscaping. The value of skunk caused damage was $980 in FY 98 (MIS 1998). The value is usually low relative to the number of complaints received because many of the complaints relate to the nuisance factor of the foul odor.

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, 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 [redacted] 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).

Feral Dog. Feral and free-roaming dogs are somewhat common in Nevada. Domestic dog predation of livestock and poultry not uncommon. In FY 98, free ranging dogs were responsible for 7 reported or

verified damage incidences with a value of $1,350 in damages (MIS 1998). They sometimes cause health and safety concerns to people and in FY 98 one incidence was reported. 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 [redacted] policy to respond only to requests for controlling dogs that come from these county sheriffs, municipal police, or health departments. [redacted] 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, [redacted] does not receive the majority of calls concerning free-roaming or feral dogs and, thus, [redacted] records only reflect minor damage for them.

Bobcat. [redacted] is the agency responsible to oversee the management of bobcats since it is furbearer, but has contracted [redacted] to conduct PDM for bobcats under an MOU. [redacted] provides [redacted] with information on damage and take. The confirmed and reported damage caused by bobcats in Nevada during FY 98 was to chickens, lambs, pets, and human health and safety in 8 occurrences. Total value of these losses was about $630. Efforts to resolve bobcat depredation problems in Nevada are a relatively minor part of [redacted] and only 25,000 acres were worked where target bobcats were taken by [redacted].

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 [redacted] is responsible for oversight of raccoon management. Under an MOU with [redacted], [redacted] assists in PDM for problem raccoons and provides [redacted] 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). However, observations by [redacted] 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, including human health and safety concerns, were reported on 99 occasions in FY 98 (MIS 1998) in Nevada. They accounted for overt $7,000 worth of reported and verified damage to various resources and property such as domestic fowl and livestock feed.

Badger. Badgers are classified as an unprotected species in Nevada, managed by [redacted]. However, [redacted] is responsible for responding to damage requests for them under the MOU with [redacted].

Badgers are found throughout most of the western States and are found in Nevada at moderate densities. They typically inhabit open grasslands and deserts. [redacted] occasionally takes badgers as target species, most often for the protection of rangeland, pasture, and cropland damage. In FY 98, badgers were responsible for $1,010 damage in 10 occurrences (MIS 1998).

Black bear. Black bear are protected as big game in Nevada. As such, [redacted] manages them, but they do not have an open season on them. [redacted] has decision authority over black bear damage requests and calls on [redacted] to take bear when the need arises because of a damage situation. [redacted] contracts with [redacted] to conduct bear damage management. [redacted] receives occasional calls from individuals and [redacted] to remove bears that have killed livestock (i.e., sheep and lambs), caused property damage, or threatened human health and safety. They were responsible for 13 damage complaints and $2,385 in reported and verified damage in FY 98 (MIS 1998).

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. [redacted] periodically takes feral cats in PDM activities. Feral cats are fairly common throughout Nevada. In FY 98, [redacted] received 9 complaints involving feral cats, most for predation of poultry and native wildlife species. Primary responsibility for feral cat control rests with County and local authorities. [redacted] responds only to requests from these entities as well as health departments. [redacted] 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. [redacted] is the agency responsible to oversee the management of kit fox in Nevada and classify them as furbearers. Under the MOU between [redacted] and [redacted], [redacted] is responsible for responding to complaints involving the kit fox. At [redacted] request, though, [redacted] can assist in efforts to control them. Kit fox are found in most of the Southwest. They are found throughout much of Nevada in scattered populations, primarily inhabiting areas of 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. [redacted] 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 [redacted] request,

[redacted] 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). [redacted] did not receive any complaints for gray fox in FY 98 (MIS 1998). This primarily represents the fact that [redacted] 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. [redacted] 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 [redacted] and [redacted], [redacted] is responsible for responding to complaints involving the red fox. At [redacted] request, though, [redacted] can assist in efforts to control them. 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. [redacted] did not receive any complaints for red fox in FY 98 (MIS 1998). 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).

Spotted Skunk. Spotted skunks are managed by [redacted] and are classified as unprotected. [redacted] responds to complaints for this species under the MOU with [redacted]. 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. They are smaller than their relative, the striped skunk, and less common. Damage for this species is similar to striped skunks, but is less frequently encountered. [redacted] has not received a damage complaint for this species in several years (MIS 1992-1998).

Ringtail. Ringtails have unprotected status in Nevada. [redacted] has management authority for them, but under the MOU, [redacted] responds to damage complaints. The ringtail is found in southern Nevada at moderate levels and are 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. No damage has been reported for ringtails to [redacted] over the past several years (MIS 1992-1998).

Weasels. The long- and short-tailed weasels are found in Nevada, both classified as unprotected species. [redacted] has management authority over the weasels, but [redacted] 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. [redacted] does receive damage complaints for weasels, almost always for poultry predation, but did not in FY 98 (MIS 1998).

Mink. [redacted] is the agency responsible to oversee the management of mink in Nevada, including damage complaints. Mink are classified as furbearers. At [redacted]'s request, [redacted] 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. [redacted] has not received a complaint for this species in recent years (MIS 1992-1998).

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). 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 [redacted] and between WS and USFS which recognize WS's responsibilities for wildlife damage management and related compliance with the National Environmental Policy Act on [redacted] 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.

- **NF EAs for Wildlife Damage Management.** The Humboldt and Toiyabe NFs have issued environmental assessments on PDM. Pertinent analyses from these EAs have been incorporated into this analysis. Upon final decision, this EA would supersede the USFS EAs.

- [redacted] **(RMP).** [redacted] currently uses RMPs to guide land management for lands it administers. Nevada has eight [redacted] Field Offices. Six of these coordinate with the [redacted] State Office to assure that each [redacted] Field Office for the District has reviewed the document for conformance with RMPs as related to land management. Two are in California, [redacted] and [redacted] Field Offices which were the [redacted] Office.

- [redacted] **EAs for Wildlife Damage Management.** Each [redacted] District has prepared an EA for lands within it's District and these have addressed PDM activities for those lands. The seven [redacted] Districts located within Nevada that had EAs covering PDM activities are [redacted], [redacted], [redacted], [redacted], [redacted], [redacted], and [redacted][5]. [redacted] supplemented the EAs of the [redacted], [redacted], [redacted] and issued Findings of No Significant Impact (FONSI) for each of them in 1996. The [redacted] District's EA was adopted by the California WS Program and is formally recognized by [redacted]. All remaining [redacted] EAs were reviewed and recognized as acceptable without supplementation

5 [redacted] Field Office recently split into the Eagle Lake ([redacted], CA) and [redacted] (Cedarville, CA) Field Offices, These will be considered one District ([redacted]) for the purposes of this EA because the EA written by [redacted] for [redacted] encompassed both ([redacted] 1989). Additionally, the 2 offices are only comprised of a small portion of Nevada in [redacted] County. However, future AWPs will reflect the areas encompassed by each Field Office.

until this EA could be finalized. All pertinent issues and alternatives discussed in the seven [redacted] EAs are represented in this EA. The final decision resulting from this EA will supersede these [redacted] EAs, and those previously adopted by [redacted].

1.3 DECISIONS TO BE MADE

[redacted] 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 [redacted], USFS, NDOA and [redacted]. Each of the cooperating agencies were asked to provide input and direction to [redacted] to insure 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 under one EA?
- If not, how should [redacted] fulfill its legislative responsibilities in Nevada?
- Does the 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. [redacted] only conducts PDM at a Tribe's request. [redacted] has been requested to provide assistance with PDM in Nevada on Tribal lands. Since Tribal lands are sovereign and the methods employed are the same as for any private land upon which [redacted] provides services, Tribal officials determine if PDM is desired and what PDM activities are allowed. Because the Tribal officials have the ultimate decision on whether PDM is conducted, no conflict with traditional cultural properties or beliefs is anticipated. Therefore, this EA would cover PDM on Tribal lands, where requested and implemented.

1.4.3 Federal Lands. Nevada has a large proportion of federal lands and [redacted] 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 [redacted] provides service. Therefore, if [redacted] were requested to conduct PDM on federal lands for the protection of livestock, property, human health and safety, or natural resources such as T&E species, 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, [redacted] 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 [redacted] determines that new demands for action or new alternatives have arisen that have different environmental affects and must be analyzed. At that time, this analysis and document will be supplemented pursuant

to NEPA. This EA will be reviewed each year 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 [redacted] 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 [redacted] may be written in the reasonably foreseeable future in Nevada. Because the proposed action is to continue the current program under one EA, and because the current program's goal and responsibility is to provide service when requested within the constraints of available funding and manpower, it is conceivable that additional PDM efforts could occur. Thus, this EA anticipates potential expansion and analyzes the impacts of such expanded efforts as part of the current program. This EA emphasizes significant 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. The standard WS Decision Model (figure 1) 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 [redacted] in Nevada (see USDA 1997, 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 any mitigation and standard operating procedures described herein and adopted or established as part of the decision.

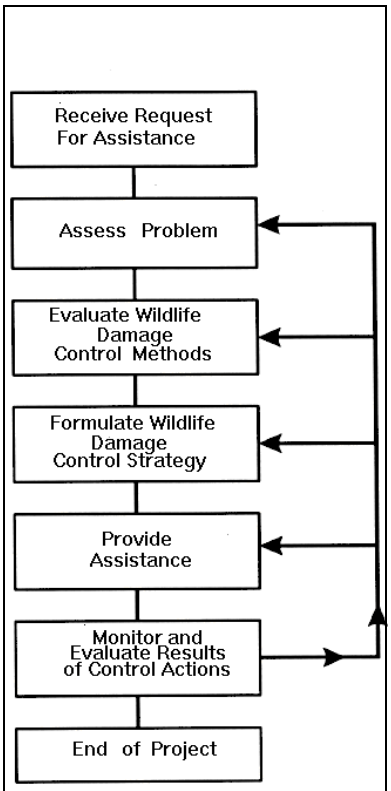

Figure 1. WS Decision Model used at the field level (Slate et al. 1992).

1.5 AUTHORITY AND COMPLIANCE

1.5.1 Authority of Federal and State Agencies for Wildlife Damage Management in Nevada[6]

WS Legislative Authority

The primary statutory authority for the WS Program is the Animal Damage Control Act of 1931, 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*

6 See Chapter 1 of USDA 1997 for a complete discussion of federal laws pertaining to WS.

> *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."*

Predatory Animal and Rodent Committee

PARC 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.

U.S. Fish and Wildlife Service

USFWS has the responsibility to manage migratory birds including the common raven and T&E species. [redacted] discusses all raven control projects with USFWS to determine if the proposed project would impact the population. In addition, [redacted] consults with USFWS on [redacted] impacts on T&E species from PDM activities. In an informal consultation with USFWS and NDOW, it was determined that [redacted] would have minimal, if any, impacts on the listed T&E species in Nevada. Mitigation measures have been incorporated into [redacted] PDM activities to minimize potential impacts to T&E species.

U.S. Forest Service and Bureau of Land Management

USFS and [redacted] 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 wildlife populations. Both USFS and [redacted] 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.

[redacted] 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. [redacted] is authorized to control predatory animals (NRS 503.595) and cooperate with [redacted] 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). [redacted] has the responsibility to respond to damage complaints involving furbearers which are foxes, river otter, and mink under the MOU between [redacted] and [redacted].

[redacted] 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 Division of Agriculture

NDOA manages the pesticide laws in Nevada such as sodium cyanide, DRC-1339, and gas cartridges used for select predators. [redacted] registers these chemicals with NDOA and all [redacted] 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. [redacted] policy allows [redacted] personnel to assist in feral dog and cat control at the request of local authorities upon approval of the [redacted] State Director.

1.5.2 Compliance with Federal Laws. Several federal laws authorize, regulate, or otherwise affect [redacted] PDM activities. [redacted] complies with these laws, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act (NEPA). This EA for PDM, with [redacted] as the lead agency, is the first time that all land classes under Cooperative Agreements or Agreements for Control will be analyzed in the analysis area in a comprehensive manner. [redacted] coordinates specific projects and programs with other agencies. The purpose of these contacts is to coordinate any wildlife damage management that may affect resources managed by these agencies or affect other areas of mutual concern. Federal agency requests for [redacted] assistance to protect resources outside the species discussed in this EA would be reviewed, and if necessary, the agency requesting the assistance would be responsible for NEPA compliance.

Migratory Bird Treaty Act of 1918 (16 USC 703-711; 40 Stat. 755), as amended. The Migratory Bird Treaty Act provides the USFWS regulatory authority to protect species of birds that migrate outside the United States. Some PDM projects target migratory birds, specifically the common raven, and periodically individual raptors in infrequent projects. In addition, a few migratory birds are taken as nontargets incidental to PDM**.**

Bald and Golden Eagle Protection Act. This law provides special protection for bald (*Haliaeetus leucocephalus*) and golden eagles. Similar to the Migratory Bird Treaty Act, it prohibits any "*take*" of these species, except as permitted by USFWS. Federal policy interpretations as to whether permit requirements of this law apply to federal agencies are pending.

Endangered Species Act (ESA). It is [redacted] 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, Appendix F). [redacted] has conducted informal consultations with USFWS and [redacted] for the proposed PDM program specifically concerning the T&E species in Nevada and these letters are on file. Both agencies concurred with [redacted] 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 [redacted] 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.

National Historical 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 [redacted] 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 (Public Law 88-577(USC 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 [redacted] 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. [redacted] personnel use wildlife damage management methods as selectively and environmentally conscientiously as possible. All chemicals used by [redacted] 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, 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 mitigation measures and 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 develop mitigation measures. Additional affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4.

2.1 ISSUES

The following issues or concerns about PDM have been identified through interagency planning and coordination, from the seven [redacted] and 2 USFS EAs which preceded this document, and from the FEIS (USDA 1997) as areas of concern that need to be addressed in this EA.

- Effects on Target Predator Species Populations
- Effects on Nontarget Species Populations, Including T&E Species
- Humaneness of Control Techniques
- Effects on Recreation (hunting and nonconsumptive uses)
- Impacts on Public Safety and the Environment (e.g., effects of toxicants and hazardous materials)
- Effectiveness of [redacted]
- Impacts on Special Management Areas (such as Wilderness Study Areas)
- Indirect and Cumulative Impacts
- Cost Effectiveness

2.2 ISSUES USED TO DEVELOP MITIGATION

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 [redacted]. A concern of some is that [redacted] PDM will adversely affect populations of target species, which, for purposes of this EA are primarily coyotes, ravens, mountain lions, and striped skunks. Scoping during the ADC FEIS (USDA 1997) process revealed that some persons believe PDM interrupts the "balance of nature" and this should be avoided. Others believe that the "balance" has shifted to unfairly favor generalist species, including predators. To address these concerns, the effects of each alternative on populations for each target species are examined.

2.2.2 Effects on Nontarget Species Populations, Including T&E Species. A common concern among members of the public and wildlife professionals, including [redacted] personnel, is the possible impact of PDM control methods and activities on nontarget species, particularly T&E species. Standard operating procedures of [redacted] include measures intended to mitigate or reduce the effects of PDM on nontarget 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 mitigation measures. The results of the biological evaluation and a description of mitigation measures established are presented in Chapter 3.

2.2.3 Humaneness of Methods Used by [redacted]. 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. Mitigation measures and standard operating procedures used to maximize humaneness are listed in Chapter 3.

Some individuals and groups are opposed to some management actions of [redacted]. [redacted] personnel are experienced and professional in their use of management methods. This experience and professionalism allows [redacted] personnel to use equipment and techniques that are as humane as possible within the constraints of current technology. Professional predator control activities are often more humane than nature itself (ie. death from starvation) because these activities can produce quicker deaths that cause less suffering. Research suggests that with some methods, such as restraint in leghold traps, changes in the blood chemistry of trapped animals indicate "stress." Blood measurements indicated similar changes in foxes that had been chased by dogs for about five minutes as those restrained in traps (USDA 1997). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness. People concerned with animal welfare often express that they would like to see animal suffering minimized as much as possible and that unnecessary suffering be eliminated. The interpretation of what is unnecessary suffering is the point to debate (Schmidt 1989).

Humaneness, as perceived by the livestock industry and pet owners, requires that domestic animals be protected from predators because humans have bred many of the natural defense capabilities out of domestic animals. It has been argued that man has a moral obligation to protect these animals from predators (USDA 1997). Predators frequently do not kill larger prey animals quickly, and will often begin feeding on them while they are still alive and conscious (Wade and Bowns 1982). The suffering apparently endured by livestock damaged in this manner is unacceptable to many people.

Thus, the decision-making process involves tradeoffs between the above two aspects of humaneness. The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology, yet provide sufficient PDM to resolve problems. Humaneness, as an issue under the current program, is considered to be more humane than alternatives which do not allow for an integrated program.

[redacted] has improved the selectivity of management devices through research and development of pan tension devices, break-away snares, and chemical immobilization/euthanasia procedures that minimize

pain. Research continues to improve selectivity, practicality, and humaneness of management devices (USDA 1997). Until such time as new findings and products are found to be practical, a certain amount of animal suffering will occur if PDM objectives are to be met in those situations where nonlethal control methods are ineffective or impractical. Furthermore, if it were possible to quantify suffering, it is possible that the actual net amount of animal suffering would be less under the proposed action (or any other alternative involving the use of lethal methods) than under the no federal [redacted] PDM alternative since suffering experienced by livestock preyed upon by predators is reduced if PDM is successful in abating predation.

2.2.4 Effects on Recreation (Hunting and Nonconsumptive Uses). Some members of the public believe that [redacted] activities conflict with recreation. Recreational activities include hunting, fishing, wildlife viewing, sightseeing, horseback riding, camping, hiking, fuelwood gathering, skiing, snowmobiling, and boating. Mitigation measures and policies are in place that help minimize the effects of [redacted] activities on recreation. [redacted] 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, [redacted] 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. [redacted] avoids conducting PDM in high-use recreational areas except for the purposes of human health and safety.

In addition, some individuals 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 [redacted] PDM actions. On the other hand, some believe that PDM is wholly acceptable since it can help bolster certain species populations such as T&E and sensitive species and big game such as antelope and deer.

2.2.5 Impacts on Public Safety and the Environment. A formal risk assessment of WS methods, including those used for PDM in Nevada, concluded low risks to humans (USDA 1997, Appendix P) including traps, snares, firearms, aerial hunting, immobilization drugs, and chemical toxicants. The use of chemical drugs and toxicants by [redacted] is regulated by EPA under FIFRA, Nevada Pesticide Control Laws, and WS Policies and Directives. Under several of the alternatives proposed in this EA, [redacted] would use sodium cyanide in the M-44 device, 1080 compound in the Livestock Protection Collar, 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 [redacted] 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).

On the other hand, public health and safety may be jeopardized by not having a full array of PDM methods for responding to complaints involving threats to human health and safety such as attacks on

humans from predators, disease transmission, and airstrike hazards. Predators have been responsible for attacks on humans in Nevada. A woman jogging in [redacted], Nevada was bitten several times by an attacking coyote March 15, 1999. Coyotes have been reported crossing the runways at [redacted] Airports on several occasions, but have not been struck. However, they do represent a significant strike hazard for aircraft. [redacted] often uses several PDM methods to capture offending animals, depending on the specifics of these types of situation. Firearms, traps, snares, or chemical toxicants may be used to take an offending animal and eliminate further encounters. PDM methods that may pose a slight public safety risk may be used effectively to eliminate a recognized public safety risk. For example, on March 16, 1999, 2 coyotes were removed with a firearm from the [redacted] area where the woman was attacked. The firearm was deemed the most effective for that particular situation and could be used safely without delaying testing them for rabies.

2.2.6 Effectiveness of [redacted]. [redacted] effectiveness can be evaluated in many ways, but the overall effect is often difficult to ascertain. The effectiveness of the program can be defined in terms of economic losses reduced for agriculture and property, the decreased number of incidences of public health and safety, and the natural resources protected. The effectiveness analysis includes costs of the program to the individual resource owners, the public, states, and other jurisdictions, and direct and indirect impacts, including costs of impacts on the environment. The current program alternative was compared with the other alternatives in the ADC FEIS and it was concluded to be the most effective of the alternatives considered (USDA 1997). The ADC FEIS did not analyze an expanded program alternative in detail. The effectiveness of the current program alternative is compared to the expanded program alternative in Chapter 4.

The effectiveness of [redacted] can also be measured by public satisfaction with the PDM program. In a survey that Policy and Program Development of APHIS conducted, it was determined that the satisfaction of the people assisted with wildlife damage management by the WS program nationwide was very high (APHIS 1994).

Another measure of effectiveness could be the cumulative impacts of [redacted] PDM activities on wildlife species and the environment. The U.S. Government Accounting Office (1990) analyzed the WS Program's western States effects on predators and determined that the WS Program does not have an overall effect on predators. However, [redacted] is reviewing the possibility of such an effect in this EA.

2.2.7 Impacts on Special Management Areas. [redacted] and WS policies require *Agreements for Control* or *AWPs* be in place prior to conducting PDM. [redacted] meets with land management agencies to discuss PDM activities and their location. If [redacted] were requested to conduct PDM in a "Special Management Area" (SMA), all applicable guidelines, restrictions, and mitigation measures 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. However, the impacts under the different alternatives on SMAs are discussed.

2.2.8 Indirect and Cumulative Impacts. Indirect impacts are defined as those impacts which indirectly have an effect on the economy as a result of direct losses to an individual. An example of an indirect impact would be a rancher who has lost 3 calves valued at $600 will not have that money to spend at local stores. These types of indirect impacts associated with economic contributions to the local

economy were described in the ADC FEIS (USDA 1997). 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). The ADC FEIS (USDA 1997) concluded that no significant cumulative impacts were identified or expected under the current program from a national perspective. This EA will analyze possible cumulative impacts at the local level.

2.2.9 Cost Effectiveness. CEQ regulations (40 CFR 1502.23) do not require a formal cost-benefit analysis to be in compliance with NEPA regulations. Since a major intent of this EA is to assist agency planning and decision making, this EA will compare the relative costs of the alternatives being considered and the relative benefits to livestock operators and to the public.

2.3 ISSUES NOT CONSIDERED IN DETAIL WITH RATIONALE

2.3.1 [redacted] Impact on Biodiversity. No [redacted] wildlife management program in Nevada is conducted with the purpose of eradicating a wildlife population. [redacted] 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). [redacted] operates on a relatively small percentage of the land area of Nevada and [redacted] take is only a small proportion of the total population of any species as analyzed in Chapter 4.

2.3.2 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. About 77% (MIS 1998) of predation occurs to 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.

2.3.3 Livestock Losses Should Be an Accepted Cost of Doing Business. [redacted] 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, [redacted] has the legal direction to respond to requests for wildlife damage management, and it is WS policy to aid each requester to minimize losses. [redacted] uses the Decision Model discussed in Chapter 3 to determine an appropriate strategy.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie NF, et al., the United States District Court of Utah denied the plaintiffs' motion for preliminary injunction. In part, the court found that a forest supervisor need only show that damage from predators

is threatened to establish a need for wildlife damage management (Civil No. 92-C-0052A January 20, 1993).

2.3.4 No Wildlife Damage Management at Taxpayer Expense, Wildlife Damage Management Should Be Fee Based. [redacted] 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. [redacted] was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Funding for [redacted] 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 [redacted] 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.

2.3.5 American Indian and 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 affects to sensitive historical and cultural resources. In consideration of cultural and archeological interests, though, [redacted] solicited input from the Nevada State Historic Preservation Office. Their response to [redacted] was that wildlife damage management activities would have negligible impacts to historic properties in Nevada.

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 [redacted] 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 [redacted]. However, in consideration of Nevada's Native Americans, [redacted] has included all of the recognized Tribes in Nevada on the mailing list for this EA to solicit their comments.

2.3.6 Impacts on the Natural Environment Not Considered. [redacted] PDM activities have been evaluated for their impacts on several other natural environmental factors. The FEIS (USDA 1997) concluded that impacts on air quality from the methods used by the [redacted] are considered negligible. In addition, the proposed action does not include construction or discharge of pollutants into waterways and, therefore, would not impact water quality or require compliance with related regulations or Executive Orders. The proposed action would cause only very minimal ground disturbance and, therefore, impact soils and vegetation insignificantly.

CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

[redacted] 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 [redacted] 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). Of the 13 courses of action, the following six alternatives are relevant to [redacted] and were considered in this process. Many of these alternatives were also considered by the seven [redacted] and two USFS wildlife damage management EAs (USFS 1991, 1992, [redacted] 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 "No Action" alternative as defined by the Council on Environmental Quality for ongoing Programs. This alternative would allow the current program to continue under seven different EAs.

3.1.2 Alternative 2 - No Federal [redacted] PDM. This alternative consists of no Federal PDM.

3.1.3 Alternative 3 - Non-lethal Management Only. Under this alternative, [redacted] 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 [redacted] 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." This is the Proposed Action as described in Chapter 1 and would be a continuance of the current program under one EA.

3.1.6 Alternative 6 - Expanded Federal PDM Program. This alternative would include the current program plus increased PDM activities throughout Nevada.

3.2 DESCRIPTION OF THE ALTERNATIVES

3.2.1 Alternative 1 - Continue the Current Federal PDM Program

The "No Action" alternative is a procedural NEPA requirement (40 CFR 1502.14(d), and is a viable and reasonable alternative that could be selected. It will serve as a baseline for comparison with the other alternatives. In this EA, the "No Action" alternative is consistent with CEQ's definition and is equivalent to the current program which it will be referred to as.

Under the current program, most of the requests for PDM come from livestock operators (i.e., private resource owners) associated with both private and public lands. While the majority of the livestock owners are based on private land, many of them graze their livestock on public lands for some portion of the year and, thus, encounter depredation on public lands. Many of the livestock owners also graze their livestock on lands which adjoin public lands and experience depredation which originates from the public lands. Livestock owners are given PDM assistance from [redacted] within the fiscal constraints of the program.

[redacted] 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, several of the requests come for public entities such as the County Sheriff. Occasionally, a land management agency will request [redacted] assistance. PDM provided by [redacted] personnel can be done on public, private, state, Indian, 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 activities on public lands is defined specifically in AWPs and reflect descriptions, restrictions, and mitigative measures which are found within the nine separate [redacted] and USFS EAs. The issues, alternatives, and mitigating items from these EAs have been reviewed, examined, and incorporated, as appropriate, into this EA. The nine EAs and their accompanying "Findings of No Significant Impact" represent nine separate and individual processes of analysis for possible environmental impacts of the current program. These EAs resulted in nine separate and individual determinations of no significant impact and the authority to work on the respective [redacted] and NFs. The [redacted] and NFs covered by these EAs were:

1) [redacted]
2) [redacted]
3) [redacted]
4) [redacted]
5) [redacted]
6) [redacted]
7) [redacted]
8) Humboldt NF
9) Toiyabe NF

WS has MOUs with [redacted], 1995, and USFS, 1998, to cover PDM activities on the lands these agencies manage. All anticipated [redacted] activities on USFS and [redacted] lands are outlined in [redacted] AWPs. [redacted] produces an AWP for each specific [redacted] and USFS NF annually. Coordination meetings are held yearly between [redacted] 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 [redacted] or USFS. Requests for control work on [redacted] 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 [redacted] and USFS lands. [redacted] signed an MOU with [redacted] 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 [redacted] to conduct PDM for the wildlife species managed by NDOW and USFWS.

During work planning meetings, [redacted] provides information on proposed actions to the cooperating agencies ([redacted], USFS, NDOW). [redacted] and USFS are responsible for reviewing the proposed actions to assess their compatibility with established [redacted] 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 [redacted] proposed action and established land use plans exists, further discussions are initiated to establish what mitigation 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 [redacted] and all adopted measures from the EA are considered part of the AWP.

Planned Control Areas. Planned control areas are areas where [redacted] 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 [redacted] Districts. [redacted] is divided into three management Districts - Reno, Ely, and Elko. 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.

Reno District. The Reno District is comprised of [redacted] Counties.

From December through February (winter), requests for assistance in depredation control 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 [redacted]; the private lands and [redacted] winter allotments in the [redacted] portion of the Reno District; the [redacted] winter allotments; and the [redacted] private ranches.

During March, April and May (spring), most direct control work is done to prevent depredation on lambing ranges. All legal methods are used as needed and appropriate. The areas of concentrated effort include: [redacted] on the Toiyabe NF sheep allotments; [redacted] sheep allotments; the area [redacted]; 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 depredation control 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: [redacted] sheep allotments); and the Humboldt and Toiyabe NFs sheep allotments.

During the months of September, October and November (fall), sporadic predator control work is performed for sheep protection. The need for control work 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 [redacted] area.

Ely District. The Ely District encompasses [redacted] Counties and parts of [redacted] Counties.

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 it's selectivity, accessability, 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, direct control work to protect sheep is provided at higher elevations in [redacted] 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.

Elko District. The Elko District is comprised of parts of [redacted] Counties.

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 [redacted] lands that include the south end of [redacted] County in [redacted], [redacted], and [redacted] and [redacted]

[redacted] allotments. Work is also concentrated in southwest [redacted] County in the [redacted] allotment ([redacted]) and [redacted] in western [redacted] County.

During summer, the majority of direct PDM is done on the Humboldt NF in [redacted] County: [redacted]. Some control work is also done in northern [redacted] County on [redacted] 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. Control work is provided to protect sheep in [redacted] on the [redacted] sheep allotment and in eastern [redacted]t and eastern [redacted] 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, [redacted] 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. [redacted] notifies the cooperating agency as soon as practicable 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). 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 [redacted].

During more than 70 years of resolving wildlife damage problems, [redacted] has considered, developed, and used numerous methods of managing damage problems (USDA 1997, 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 judgement of trained personnel. [redacted] applies IWDM, commonly known as Integrated Pest Management (ADC Directive 2.105), to reduce damage through the WS Decision Model (Slate et. al. 1992) described in the FEIS (USDA 1997).

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 nontarget 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 [redacted] personnel to determine management strategies or methods applied to specific damage problems (USDA 1997) . 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 nontarget 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 [redacted] Decision Making Process. The WS decision making process is a standardized procedure for evaluating and responding to damage complaints. [redacted] 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. [redacted] 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 ([redacted] 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).

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 [redacted] 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 [redacted] Employs

- **Technical Assistance Recommendations** (implementation is the responsibility of the requestor). [redacted] 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 [redacted] 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 [redacted] 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 [redacted] personnel). Direct control assistance is implemented when the problem cannot effectively be resolved through technical assistance and when Cooperative Agreements provide for [redacted] 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 [redacted] 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 a wildlife professional. [redacted] 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, [redacted], or other agency, as appropriate. Two strategies are used by [redacted].

  - **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, [redacted] 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, [redacted] 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. [redacted] must receive a request from the resource owner or individual that is experiencing the damage on federal lands. Proactive PDM cannot be conducted in [redacted].

  - **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, [redacted] 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, [redacted] 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, [redacted] receives requests for assistance from and may enter into cooperative agreements with private landowners, livestock managers, Tribal land managers for the [redacted], and other Tribes, cooperating counties, [redacted], 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 is given in Appendix B. Most PDM methods have recognized strengths and weaknesses relative to each specific predator damage situation. [redacted] 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. [redacted] conducts direct control activities on private lands only where signed *Agreements For Control On Private Property* have been executed. [redacted] 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 producer 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 judgement on their effectiveness and practicality (ADC 1992). In addition, 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 [redacted] 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 the livestock protection collar. 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 [redacted] PDM

This alternative would consist of no Federal involvement in PDM in Nevada. Neither direct operational management nor technical assistance would be provided from [redacted]. Information on future

developments in nonlethal and lethal management techniques that culminate from WS's research branch would not be available to producers or resource owners. Under this alternative, wildlife damage conflicts would be handled by the Nevada State program, [redacted] and [redacted], private resource owners and managers, private contractors, or other government agencies. It is probable that many PDM methods would be used unsafely and improperly such as the illegal use of pesticides simply out of frustration by resource owners over the inability to reduce damage losses to a tolerable level. This alternative is discussed in detail in the FEIS (USDA 1997).

3.2.3 Alternative 3 - Nonlethal Management Only

This alternative would allow [redacted] 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). [redacted] would also loan equipment used for nonlethal control. Information and training on lethal control methods would not be provided by [redacted]. [redacted] would only be authorized to assist in lethal predator control activities when control work is necessary for public safety. Lethal PDM methods and control devices could be applied by persons with little or no training or experience. The use of inexperienced or untrained personnel could require more effort and cost to achieve the same level of problem resolution, and could cause harm to the environment, including a higher take of nontarget animals. As discussed in 3.2.2, many PDM methods could be used improperly because of the frustration of resource owners.

3.2.4 Alternative 4 - Nonlethal Required before Lethal Control

This alternative would require that: 1) permittees or landowners show evidence of sustained and ongoing use of nonlethal or husbandry techniques aimed at preventing or reducing predation, prior to receiving the services of [redacted]; 2) employees of [redacted] use or recommend appropriate nonlethal techniques in response to a confirmed damage situation prior to using lethal metods; 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 FEIS (USDA 1997). Producers would still have the option of implementing lethal control measures on their own and [redacted] would continue to recommend lethal control when and where appropriate.

3.2.5 Alternative 5 - Modified Current Program, the "Proposed Alternative"

This alternative is similar to the current program alternative. It would include the WS Decision Model and AWPs described earlier under the current program alternative. It is essentially the current program alternative described in the FEIS (USDA 1997). This modified alternative also incorporates all substantiated issues and mitigation measures found in the nine Federal EAs (see the description of the current program alternative above). The difference between this modified alternative and the current program is that the proposed action alternative would provide for one consistent statewide plan to replace the nine different plans that derive from the nine different Federal EAs. This plan would provide more consistent interagency interaction, with all affected agencies having oversight at the State level. This alternative would also allow [redacted] to be more consistent with program delivery because personnel would not have to be cognizant of the varying policies and mitigation measures for conducting PDM on

different lands. For example, a [redacted] Specialist could work on three [redacted] and be responsible for knowing three different sets of policies governing the conduct of PDM.

3.2.6 Alternative 6 - Expanded Federal PDM Program

This alternative is similar to the proposed action, but would increase PDM efforts statewide in a more aggressive program using all legal methods including the Livestock Protection Collar (LPC), if and when approved by NDOA for use in Nevada. Both lethal and nonlethal methods and proactive preventative management strategies would be allowed, while adhering to applicable state and federal laws and regulations. Proactive preventative control efforts would be increased in areas where losses to predators have historically occurred or where an imminent threat of current losses would logically occur to livestock scheduled to enter the area shortly. [redacted] would provide livestock owners with assistance, information and training concerning the use and effectiveness of both lethal and nonlethal PDM methods. [redacted] would employ nonlethal PDM methods whenever practical and would recommend such control methods to livestock producers. This alternative would include an increase in PDM activities in urban areas. However, this alternative would be contingent upon increased program funding and staffing.

3.2.7 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 [redacted] would conduct PDM.

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

Summary of Predator Damage Management Methods which Could be Authorized						
Management Method	**Alternative 1** Current Program	**Alternative 2** No Federal Program [1]	**Alternative 3** Nonlethal	**Alternative 4** Nonlethal then Lethal	**Alternative 5** Proposed Action	**Alternative 6** Expanded Program
Nonlethal	✔	No	✔	✔	✔	✔
Animal Husbandry	✔	No	✔	✔	✔	✔
Foot Snares	✔	No	✔	✔	✔	✔
Preventative	✔	No	✔	✔	✔	✔
Traps	✔	No	✔	✔	✔	✔
Lethal	✔	No	No	✔	✔	✔
Aerial Hunting	✔	No	No	✔	✔	✔
Calling/Shooting	✔	No	No	✔	✔	✔
Denning	✔	No	No	✔	✔	✔
Dogs	✔	No	No	✔	✔	✔
Foot Snares	✔	No	No	✔	✔	✔
LPC[2]	No	No	No	No[3]	No[3]	✔
M-44s	✔	No	No	✔	✔	✔
Neck Snares	✔	No	No	✔	✔	✔
Traps	✔	No	No	✔	✔	✔

1 Except for M-44's and LPCs, these methods could be used by private individuals or their agents.
2 The LPC (Livestock Protection Collar) could be used if and when the NDOA approves it's use; currently the LPC is not registered in Nevada.
3 The use of the LPC would not likely be used under these alternatives because it is not registered in Nevada. However, the LPC, if registered could be used under Alternative 4 and 5.

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

PDM Methods by Land Jurisdiction							
Management Method	Private	State	[redacted]	[redacted]	USFS NF	USFS Wilderness[4]	Tribal Other Federal Land
Nonlethal	✔	✔	✔	✔	✔	✔	✔
Animal Husbandry	✔	✔	✔	✔	✔	✔	✔
Foot Snares	✔	✔	✔	✔	✔	✔	✔
Preventative	✔	✔	✔	No	✔	✔	✔
Traps	✔	✔	✔	✔	✔	✔	✔
Lethal	✔	✔	✔	✔	✔	✔	✔
Aerial Hunting	✔	✔	✔	✔	✔	No	✔
Calling/Shooting	✔	✔	✔	✔	✔	✔	✔
Denning	✔	✔	✔	No	✔[3]	✔[5]	✔
Dogs	✔	✔	✔	✔	✔	✔	✔
Foot Snares	✔	✔	✔	✔	✔	✔	✔
LPC	✔	No	No[1]	No	✔[3]	No	Possible
M-44s	✔	✔	✔	✔	✔[3]	✔[5]	✔
Neck Snares	✔	✔	✔	✔	✔	✔	✔
Traps	✔	✔	✔	✔	✔	✔	✔

1 Because of label restrictions, it is unlikely that LPCs would be usable on [redacted] Lands.
2 [redacted] - [redacted] PDM activities are subject to [redacted].
3 Regional forester must pre-approve pesticide use per USFS Manual, May 4 ,1995 Sect. 2151, but rely on [redacted] expertise per Sect. 2650.3
4 Regional Forester must pre-approve PDM in Wilderness per USFS Manual May 4, 1995 Sect. 2323, but again rely on [redacted] expertise
5 Could only be used for federal T&E species protection, if it were requested by a management agency.

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, [redacted] 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).

- 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 uncompensated. 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. [redacted] 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.

- [redacted] 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 [redacted] 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 [redacted] in detail because:

- [redacted] opposes eradication of any native wildlife species;

- NDOW, USFWS, [redacted], 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 [redacted] 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, [redacted] would consider suppression of the local population or groups of the offending species, if appropriate.

It is not realistic, practical, or allowable under present [redacted] policy to consider large-scale population suppression as the basis of [redacted]. Typically, [redacted] 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 The Humane Society of the United States (HSUS) Alternative

HSUS has proposed an alternative that requires: 1) "permittees evidence sustained and ongoing use of nonlethal/husbandry techniques aimed at preventing or reducing predation prior to receiving the services of [redacted]"; 2) "[redacted] employees use or recommend as a priority the use of appropriate nonlethal techniques in response to a confirmed damage situation"; 3) "lethal techniques are limited to calling and shooting and ground shooting, and used as a last resort when use of husbandry or other nonlethal controls have failed to keep livestock losses below an acceptable level"; and 4) "establish higher levels of acceptable loss thresholds on public lands than for private lands".

The major components of this proposed alternative by the HSUS have been analyzed in detail in the alternatives contained in this EA and through court rulings. The HSUS alternative would not allow for a full range of IWDM techniques to resolve wildlife damage. In addition, [redacted] is charged by law to protect American agriculture, despite the cost of control. Further, in the case Southern Utah Wilderness Society et al. v. Hugh Thompson et al. U.S. Forest Service (Civil No. 92-C-0052A 1993), the court clearly stated that, "The agency need not show that a certain level of damage is occurring before it implements a *WS* Program. . . . Hence, to establish need for *WS* , the forest supervisors need only show that damage from predators is threatened." Thus, judicial precedence was set and found that it is not necessary to establish a criterion, such as percentage of loss of a herd to justify the need for PDM provided by *WS*. Proactive and reactive control actions are therefore justified by a reasonable determination that damage by predators is threatened. The alternatives selected for detailed analysis in this EA encompass a reasonable range as required by NEPA and include some of the suggestions in the HSUS proposal, and it is believed that inclusion of this alternative would not contribute new information or options for consideration and analysis that are not already being considered and available in IWDM as used by [redacted].

3.3.5 Mountain Lion Sport Harvest Alternative

An alternative to offer sport harvest of mountain lions where control is required, prior to [redacted] 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 ([redacted] 1995).

3.3.6 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,

Johnson 1984). In addition, lithium chloride is currently unregistered by EPA or NDOA, and therefore cannot be used or recommended for this purpose.

3.4 MITIGATION AND STANDARD OPERATING PROCEDURES FOR WILDLIFE DAMAGE MANAGEMENT TECHNIQUES

Mitigation measures are any aspects of an action that serve to prevent, reduce, or compensate for negative impacts that otherwise might result from that action. The current program, nationwide and in Nevada, uses many such mitigation measures. The mitigation measures are discussed in detail in Chapter 5 of the FEIS (USDA 1997). The key mitigating measures are incorporated into all alternatives as applicable, except the no federal program alternative (Alternative 2). Most mitigation measures are instituted to abate specific issues while some are more general and relate to the overall program. Mitigation measures include those recommended or required by regulatory agencies such as EPA and these are listed where appropriate. Additionally, specific mitigation measures to protect resources such as T&E species that are managed by [redacted] cooperating agencies ([redacted], USFS, [redacted], [redacted]) are included in the lists below.

3.4.1 Mitigation in Standard Operating Procedures (SOPs)

- [redacted] activities are consistent with WS mitigation measures, and comply with guidance established from USFS LRMPs, and [redacted] and [redacted].

- National MOUs with the [redacted] and USFS delineate expectations for PDM on public lands administered by these agencies. [redacted] AWPS are developed in coordination with [redacted] and USFS NFs. AWPs detail activities, target species, and mitigation measures 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.

- [redacted] coordinates with Tribal officials 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 [redacted] Mitigation Measures Specific to the Issues

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

3.4.2.1 Effects on Target Predator Species Populations

- PDM is directed toward localized 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.

- [redacted] Specialists use specific trap types, lures, and placements that are most conducive for capturing the target animal.

- [redacted] 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). [redacted] provides data on total take of target animal numbers to [redacted], USFS and [redacted] during annual coordination meetings.

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

- [redacted] currently has agreements for PDM on less than 31% of the land area of Nevada and generally conducts PDM activities on less than 21% of the land area in any one year, and therefore, has no impact on target predator species on at least 79% of the land area in Nevada.

3.4.2.2 Effects on Nontarget Species Populations, Including T&E Species

- [redacted] personnel are highly experienced and trained to select the most appropriate method(s) for taking problem animals with little impact on nontarget 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 nontarget animals such as scavenging birds.

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

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

- Nontarget animals captured in leghold traps or foot snares are released at the capture site unless it is determined by [redacted] Specialists that the animal is not capable of self maintenance.

- [redacted] Specialists use specific trap types, lures and placements that are conducive to capturing the target animal, while minimizing potential impact on nontarget species.

- [redacted] personnel work with research programs to continue to improve the selectivity of management devices.

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

- [redacted] has adopted and implemented all reasonable and prudent alternatives to protect T&E species that were identified by USFWS in their 1992 Biological Opinion (USDA 1997) during WS's nationwide program consultation and determined to be applicable to [redacted]. In addition, [redacted] conducted a site specific informal consultation on March 5, 1998 with USFWS for PDM activities. [redacted] has adopted the recommendations made by USFWS to protect the desert tortoise and the Southwest willow flycatcher.

- A primary T&E species of concern covered by the formal consultation that occurs in Nevada is the bald eagle. Mitigation measures 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 eagle. Cause of death, injury, or illness, if known, would be provided to those offices.
    - If a bald eagle is incidentally taken from the Southwest population, use of the control method will be halted immediately, and WS will reinitiate consultation.
    - Leghold traps (except those used to trap mountain lions) shall be placed a minimum of 30 feet from above-ground bait sets.
    - When bald eagles are in the immediate vicinity of a proposed wildlife damage management Program, WS personnel will 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.

- [redacted] 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

- AWPs provided by [redacted] to [redacted] and USFS and associated maps provided by [redacted] 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, 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 [redacted] 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. [redacted] employees will comply with each pesticide's directions and labeling, and EPA and NDOA rules and regulations.

- [redacted] 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. [redacted] 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 [redacted] 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 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. If the LPC is approved for use and registered in Nevada, similar warning signs to those used for the M-44

would be placed at major access points to alert people that the LPC is being used in that particular location.

3.4.2.6 Effectiveness of [redacted]

- 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 SMAs

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

- WS personnel follow guidelines as specified in [redacted] 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.

- [redacted] would conduct PDM in accordance with and for the areas specified in [redacted] 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 with the LRMPs and [redacted].

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

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

- Should any of [redacted] existing [redacted] be officially designated as [redacted] in the future, wildlife damage management would be performed in accordance with [redacted] and the enacting legislation.

- Should any of [redacted] existing [redacted] be officially dropped as a [redacted], PDM would follow standard procedures for public lands and as specified in the AWP.

- In [redacted], [redacted] work is limited to actions allowed in [redacted] which currently states:

[redacted]

[redacted]

3.4.2.8 Indirect and Cumulative Impacts

- [redacted] personnel consult with [redacted], USFWS, USFS, NDOW, and other appropriate agencies regarding program impacts. Frequent contacts are made with [redacted] and USFS when conducting PDM on public lands administered by these agencies. [redacted] 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.

- [redacted] 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.

- [redacted] 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. [redacted] consults with cultural resource specialists from [redacted] 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 mitigation measures.

3.4.2.9 Cost Effectiveness

- The cost effectiveness of different PDM methods and actions will be used to assist [redacted] 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 CONSEQUENCES IMPACTS ANALYZED

The environmental consequences of each alternative is 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 resources are not discussed in this EA analysis because their impacts 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 will be used to make a selection of the most appropriate alternative for [redacted] PDM activities in Nevada that will meet the purpose and the need of the program as identified in Chapter 1.

4.2.1 Alternative 1 - Continue the Current Federal PDM Program

The methods that would be used to take target predators under the current program are the same as those that have been used in recent years by [redacted]. The methods used 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) where they are fully assessed.

4.2.1.1 Effects on Target Predator Populations

[redacted] 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, [redacted] or [redacted], 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 striped skunk. Most other target predators are taken by [redacted] only on an occasional basis. All target species taken in FY 98 by [redacted] on all land classes in each county are presented in Table 5. Of the take, coyotes represented 86%, ravens 13%, and all others 1%.

Table 5. The target predators taken in FY 98 by [redacted] on all land classes including Private, [redacted], USFS, [redacted], [redacted], Tribal, State, County, and Municipal (MIS 1998).

Target Predator Species Taken by [redacted] in FY 98									
County	**Coyote**	**Common Raven**	**Mountain Lion**	**Striped Skunk**	**Feral Dog**	**Bobcat**	**Black Bear**	**Feral Cat**	**Total**
[redacted]	-	-	-	-		-	-	-	0
[redacted]	103	28	-	-	-	-	-	-	131
[redacted]	-	-	-	1	-	-	-	-	1
[redacted]	70	-	2	-	-	-	1	-	73
[redacted]	1,139	330*	5	-	-	2	-	-	1,476
[redacted]	65	-	-	-	-	-	-	-	65
[redacted]	170	-	4	-	-	-	-	-	174
[redacted]	768	350*	1	-	9	-	-	-	1,128
[redacted]	293	482**	-	-	-	-	-	-	775
[redacted]	108	-	-	-	-	-	-	-	108
[redacted]	218	3	6	-	-	-	-	-	227
[redacted]	7	-	-	-	-	-	-	-	7
[redacted]	76	90*	-	-	-	-	-	-	166
[redacted]	200	95	-	-	-	-	-	-	295
[redacted]	-	-	-	-	-	-	-	-	0
[redacted]	290	171*	3	1	-	-	1	1	467
[redacted]	508	13*	9	8	-	-	-	-	538
Total	4,015	1,562	30	10	9	2	2	1	5,631

* The ravens taken in these counties were estimated at 50% of the number of DRC-1339 treated egg baits placed by [redacted]. In [redacted], 1 raven taken by shooting was in the total. The ravens taken in [redacted] were all shot.
** [redacted] employees in [redacted] estimated the number of ravens taken with DRC-1339 treated eggs (450, a 34% success). The number of ravens taken was not adjusted in this County only. In addition to those estimated to be taken with egg baits, 32 were shot.

For comparison and cumulative impacts analysis, the furbearers taken in the 1997-98 Nevada fur season are compiled in Table 6 (NDOW 1998b). Fur harvest reflects the value of the fur, the relative abundance of the species, and the number of sportsmen involved in harvesting. Numbers from the 1979-80 season are given for purposes of comparison because these numbers give a representative figure of the harvest pressure that the furbearers can withstand without diminishing the population. The harvest pressure during the 1979-80 season was much greater because of the high value of fur and, thus, the higher number of sportsmen in the field.

Table 6. Furbearers taken in the 1997-98 fur season as reported by NDOW (1998b) with take from the 1979-80 fur season as a comparison.

Furbearers Harvested in Nevada during the 1997-1998 Season											
County	**Coyote**	**Bobcat**	**Gray Fox**	**Kit Fox**	**Badger**	**Striped Skunk**	**Spotted Skunk**	**Mink**	**Weasel**	**Raccoon**	**Ringtail**
[redacted]	-	3	8	-	-	-	-	-	-	4	-
[redacted]	66	62	11	38	1	-	-	-	-	-	-
[redacted]	75	83	68	18	1	-	-	-	-	-	6
[redacted]	36	18	34	-	-	-	-	54	-	6	-
[redacted]	949	115	8	-	11	6	-	11	-	6	-
[redacted]	31	3	3	1	-	-	-	-	-	-	-
[redacted]	36	58	11	-	-	-	-	-	-	-	1
[redacted]	204	34	-	32	-	-	-	-	-	-	-
[redacted]	6	160	20	22	7	-	-	-	-	-	-
[redacted]	108	324	191	28	1	10	1	-	-	-	1
[redacted]	8	21	34	7	3	11	-	15	-	17	-
[redacted]	75	20	56	50	-	-	-	-	-	-	1
[redacted]	78	178	64	13	-	-	1	-	-	-	1
[redacted]	324	204	14	68	14	-	3	-	1	-	-
[redacted]	10	4	-	-	3	-	-	-	-	-	-
[redacted]	210	281	4	17	17	-	-	-	-	29	-
[redacted]	11	137	39	4	-	-	-	-	-	-	-
Total	2,227	1,705	565	298	58	30	5	80	1	62	10
1979-80 Take	16,229	5,513	2,119	2,306	1,033	396*		185	25	129	80

* striped and spotted skunks were not separated in 1979-80

Coyote Population Impact Analysis. 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 [redacted] personnel. These types of estimates of carnivore populations are based on a 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 [redacted] 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 (NDOW 1998b). The [redacted] Districts ([redacted] 1993a and 1993b) reported

coyote populations to be increasing. 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 is 109,895 square miles in size. Most all of the State is 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, is (in rounded figures) 55,000 to 110,000 at any one time (Table 7).

Table 7. Cumulative coyote kill in Nevada for [redacted] and private harvest for FY 98.

	Using Low Coyote Population Estimate	Using High Coyote Population Estimate
Est. Population	55,000	110,000
ADC Kill	4,015	4,015
Other Take (Kill)	2,227	2,227
Total Kill	6,242	6,242
ADC Kill - % of Population	7%	4%
Other Kill - % of Population	4%	2%
Total Kill - % of Population	11%	6%

Coyotes were responsible for almost $170,000 in reported or verified damage to livestock, crops, and pets (MIS 1998). During CY 1997 (MIS 1998), 7,348 livestock were reported to have been killed by coyotes by [redacted] cooperators. In FY 98, [redacted] removed a total of 4,015 coyotes statewide in response to their damage on nearly 15 million acres under agreement (MIS 1998)[7]. Of this total, [redacted] removed 52% of the coyotes from private lands, 40% from [redacted] lands, 5 % from USFS lands, and 3 % from other nonprivate lands. Under the current program, the number of coyotes removed by [redacted] yearly would likely be similar to the take in FY 98.

Private coyote take may legally occur at any time since there is no closed season or bag limit. 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 for the 1997-98 fur harvest season was 2,227 (NDOW 1998b). The [redacted] coyote kill for Nevada in FY 98 was 4,015 (MIS 1998). These data indicate the total number of coyotes taken (killed) in Nevada was about 6,242 during 1997-98. Based on our range of estimates of the coyote population in Nevada (55,000 to 110,000), cumulative take was between 6 and 11% of the population (Table 7). Therefore, annual recruitment would quickly replenish the population.

7 The Idaho WS Program removed 8 coyotes in Nevada from USFS lands which are included in Nevada take.

Connolly and Longhurst (1975) determined that, “if 75% of the coyotes are killed each year, the population would be exterminated in slightly over 50 years.” The authors further stated that their “model suggests that coyotes through compensatory reproduction can withstand an annual control level of 70%.” To further demonstrate the coyote's recruitment (reproduction and immigration) ability, the authors stated that if 75% control occurred for 20 years, coyote populations would regain pre-control densities by the end of the fifth year after control was terminated. Furthermore, immigration, not considered in the Connolly and Longhurst model can result in rapid occupancy of vacant territories (Windberg and Knowlton 1988). 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). Connolly (1978) noted that coyotes have survived and even thrived in spite of early century efforts to exterminate them. Based on this information, [redacted] impact on the coyote population in Nevada, even with possible under-reporting of "Other Harvest", will not affect the general coyote population because the "Total Take" of coyotes in the area is currently no more than 11% of the estimated population. Evaluating the data using standards established in USDA (1997) to determine the magnitude to which total harvest impacts the species, a cumulative harvest of less than 75% of the *allowable harvest level* of 70% of the population of coyotes results in a determination of "low magnitude." Thus, a “low magnitude” impact rating is achieved if no more than 52.5% of the population is taken per year. Based on the above analysis, the expected cumulative harvest rate of 6% to 11% of the coyote population in Nevada is well within the “low magnitude” criteria. The analysis further suggests annual coyote take could *conservatively* be increased by a factor of 4 to 8 before the low magnitude rating is exceeded or a factor of 6 to 11 before the 70% allowable harvest level would be reached. Additional supporting evidence that cumulative take is below a sustainable harvest level in the state as a whole is offered by furbearer population trend indices that indicate stable to slight increases in coyote numbers (NDOW 1998b). Therefore, it is reasonable to conclude that cumulative impacts on coyote populations in general within Nevada are not substantial and would remain so even if [redacted] lethal coyote damage management efforts were increased several fold.

The [redacted] Districts’s and the Toiyabe NF’s EAs on PDM all reported that average coyote take was far below the level that would jeopardize coyote population numbers ([redacted] 1994b, 1994c, USFS 1992). [redacted] District ([redacted] 1994a), Humboldt NF (USFS 1991), and USDA (1997) similarly concluded that [redacted] take does not have a significant effect on coyote population trends either annually or cumulatively.

In all likelihood, the population impacts shown by this analysis are greater than the actual impacts because conservative population estimates were used in Table 7. This is because [redacted] has agreements on less than 31% of the land area of Nevada (MIS 1998). In FY 98, the actual area of properties where coyotes were taken was less than 15 million acres of agreements or 21% of the land area in Nevada. It should also be noted that not all of a property under agreement is necessarily worked because PDM is generally directed to areas of loss and not the entire property. In addition, 52% of the coyotes taken in Nevada came from private lands, even though private lands constitute only about 12% of lands in Nevada. Therefore, coyote populations on more than 79% of the lands in Nevada were not impacted by [redacted] in FY 98 (MIS 1998).

Common Raven Population Impact Analysis. Data from the Breeding Bird Survey show a steady increase in breeding numbers of common ravens nationwide between 1966 and 1994. The annual index approximately doubled in that time period (Sauer et al. 1997). The index for Nevada showed a 3.4% per year average increase over that time period with a 3.3%/year decrease from 1966-79, a 4.3%/year increase from 1980-1994, and a 6.9% increase from 1986-1996 (Sauer et al. 1997). A relative density distribution map from Breeding Bird Survey data for summer gives a relative abundance of 11-30 ravens per count (0.2 mi^2) for most of the eastern part of Nevada and 4-10 for the western third. A winter distribution map from Christmas Bird Count data shows the average ravens per count at 3-10 for the northern half of Nevada and 10-30 for the southern half (Sauer et al. 1997). For the past several years, [redacted] has taken ravens and no ill-effects have been seen in trend information from either the Breeding Bird Survey and Audubon Christmas Count data. In EAs prior to this, [redacted] take of ravens was considered minor and of no consequence to the total population ([redacted] 1993a, 1994b). These data clearly indicate that ravens are common in Nevada and that human caused mortality has not resulted in any declines in common raven numbers since 1980 in the nation or in the State.

In FY 98, [redacted] recorded 610 ravens taken statewide in response to their damage from just over 77,000 acres under agreement (MIS 1998). However, [redacted] personnel only estimated the number of ravens taken with DRC-1339 treated egg baits in [redacted] County. In [redacted] County, 450 ravens were estimated[8] to be taken with 1,327 treated eggs placed, a 34% success rate. An additional 1,904 DRC-1339 treated eggs were placed in other counties Statewide. The number of ravens taken with these eggs was probably between 25%-50% of the number of baits placed. For the purposes of being conservative, a 50% success rate will be used to estimate the number of ravens taken statewide, or an estimated 952 additional ravens taken with DRC-1339 treated egg baits. Therefore, the total ravens taken by [redacted] would have been 1,562. Of this total, [redacted] removed 95% from private lands and 5% from [redacted] lands.

Knight and Call (1981) summarized a number of studies on common raven territories and home ranges in the west. Nesting territories ranged in size from 3.62 mi^2 to 15.7 mi^2 in Wyoming and Oregon and home ranges varied from 2.53 mi^2 to 3 - 6 mi^2 in Utah and Oregon. Linz et al. (1990) found nest densities of one/1.7 mi^2 in their [redacted], California study.

Although raven population numbers are not precisely known and densities vary somewhat throughout Nevada, current raven densities based on the Breeding Bird Survey in Nevada could conservatively be estimated at about 1/2-3 mi^2 . This is equal to half or a third of the density for nesting ravens in California, assuming each nest had 2 adults and non-breeders were not present. This density would give a conservative estimated range of 37,000-55,000 for Nevada. This means that [redacted] took about 3-4% of the population in FY 98 with a take of 1,562. Based on these

8 Estimated numbers come from taking the average number of ravens using an area each day for three days prior to treatment and subtracting those seen each day for two days after treatment. This estimate is normally impractical to obtain because it requires [redacted] personnel to be present for several days prior to and after treatment. The success rate of DRC-1339 treated egg baits is not known, but the number of treated baits used does give a relative index of the number of ravens possibly taken. It could be assumed that about ¼-½ of the baits will kill one raven. Success is compounded by the fact the ravens can potentially take several baits in the treated area before succumbing because DRC-1339 can take up to 48 hours before it kills the raven. In addition, each raven must consume enough of the egg to get a lethal dose of DRC-1339. If other foods are available, a raven may not consume enough of a treated egg to have a lethal effect.

percentages, annual indexes in Nevada, and average clutch size, this clearly represents an insignificant effect on the raven population. Take could probably increase several-fold before a significant impact on the raven population would be seen.

Under the current program, the annual removal of ravens by [redacted] would likely be similar to numbers taken in FY 98. However, the number of ravens taken would likely increase if [redacted] is contracted to control ravens for the protection of the desert tortoise, sage grouse, sharp-tailed grouse (*Tympanuchus phasianellus*), or other sensitive species in Nevada.

Mountain Lion Population Impact Analysis. Various studies on mountain lion population dynamics provide insights into harvest levels that can be sustained by populations. The allowable annual harvest level for mountain lion populations, determined by the USDA (1997) was 30%. 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. Logan et al. (1996) determined the rate of increase in a New Mexico study varied from 8-11% in an unhunted, uncontrolled mountain lion population 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. It also 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%.

A population of 1,500-2,000 was estimated in 1988 and the population was considered to be increasing (USDA 1997). NDOW currently estimates the mountain lion population in excess of 3,000 (S. Stiver, NDOW, pers. comm. 1999) which is suitable for impacts analysis (Table 8). This represents about 3 mountain lions per 100 mi^2 or more in Nevada, which is well within the low range of density estimates.

Table 8. Cumulative mountain lion kill in Nevada for [redacted] and private harvest for FY 98.

	Mtn. Lion Population Estimate
Est. Population	3,000
ADC Kill	30
Other Take (Kill)	234
Total Kill	264
ADC Kill - % of Population	1%
Other Kill - % of Population	8%
Total Kill - % of Population	9%

In response to the 171 damage occurrences in FY 98 (MIS 1998) and the over $50,000 damage, [redacted] killed 30 mountain lions in Nevada in FY 98 (MIS 1998) on 930,000 acres of property under agreement. Of those killed, 16 were taken on [redacted] land, 10 on private, 3 on USFS, and 1 on other nonprivate. The greatest number of mountain lions anticipated to be taken

in any one year by [redacted] in the future should be no more than 75 (57 were taken in CY 1991). In 1997-98, the sport harvest of mountain lions in Nevada was 234, total depredation take was 20 for CY 1997[9] and no "other" known mortality such as highway kills, capture mortality, and illegal take was reported (NDOW 1998a). For the purposes of the analysis, though, [redacted] take of 30 for FY 98 will be used. Thus, cumulative take would have been 264 in 1997-98. This take represents a 9% take on the overall mountain lion population (Table 8). 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 1997-98 season was about 194 ((234 * 70%) + 30) or 6% 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 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).

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 (figure 2) 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 [redacted] has not had a cumulative impact on the mountain lion population in Nevada.

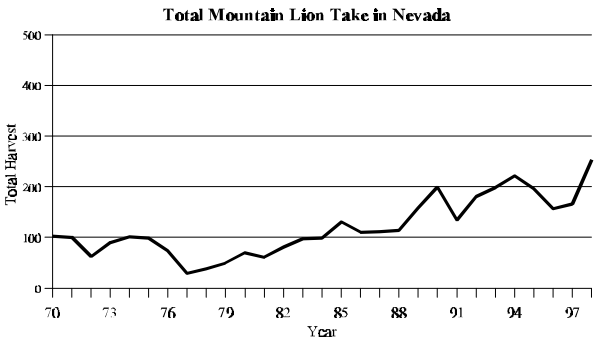

Figure 2. Annual total mountain lion harvest (sport and [redacted]) in Nevada from 1969-70 through 1997-98.

[redacted] proposes to continue to take mountain lions on a case-by-case basis on public and private lands in Nevada as long as the management authority, [redacted], requests it. [redacted] (1999a) has a mountain lion conflict protocol that they follow for damage situations.

The current program will not have long term effects on the mountain lion population due to the cumulative take from sport hunting and depredation because the harvest is being closely monitored by NDOW (USFS 1991, [redacted] 1994a). This should assure that cumulative impacts on the lion population are within those desired by the State. It is a built-in mitigation measure of the current program which assures that [redacted] will not have a significant impact on the quality of the human environment as a result of the take of mountain lions. In fact, none of the alternatives would have long term effects on the mountain lion population.

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

9 For CY 1997, only 20 lions were taken by [redacted] which was reported to NDOW and used in their reports. However, [redacted] took 30 lions in FY 98 which will be used for the analysis.

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.

[redacted] killed 10 striped skunks as target animals in FY 98. An additional 1 was killed as a nontarget, for a total [redacted] kill of 11. Private harvest in Nevada was 30 (NDOW 1998b). Thus, cumulative known take was 41. An allowable harvest level has not been determined for striped skunks (USDA 1997). However, the cumulative take was less than 0.1% of the conservatively estimated population. This is intuitively believed to be of low impact. It is anticipated that [redacted] 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, [redacted] took 9 target feral dogs in FY 98 from 1 site (MIS 1998). The 9 dogs were taken at the request of a County Sheriff's Office as a result of damage. However, 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 kill of dogs by [redacted] 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 are 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 to increasing (NDOW 1998b), so this estimate is probably very conservative. [redacted] kill in Nevada during FY 98 was 2 target and no nontargets. Private trapper and hunter harvest totaled 1,705 (NDOW 1998b). The total kill was 1,707 bobcats or 9% of the population. USDA (1997) reported an allowable harvest level for bobcat populations of 20%. Therefore, total harvest could increase more than twofold without having an effect on the population. [redacted] kill was less than 1% of total take in Nevada in FY 98 and has been at a relatively low level over the last 5 years. Thus, [redacted] kill 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 [redacted] 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 [redacted] activities were expanded considerably.

Raccoon Population Impact Analysis. Raccoons 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 1972, 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. [redacted] has not killed a target or nontarget raccoon over the last 7 years (MIS 1992-1998). However, 40 live traps were loaned out in FY 98 for people, primarily in urban areas, so damage problems do exist. Fur harvesters took 62 in 1997-98 (NDOW 1998b). [redacted] take has not been a part of total raccoon mortality except through technical assistance.

If the raccoon population was still considered to be only 3,000, which is very conservative, the cumulative take of 62 was only about 2% of the population or 4% 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 [redacted] raccoon take would continue to be a low percentage of total take, even if [redacted] PDM activities were doubled or tripled. However, take could increase, if [redacted] was contracted to provide an urban specialist where their populations 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 [redacted] 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 10 damage requests in FY 98, no badgers were killed as target animals. In FY 97, though, 2 badgers were killed as targets (MIS 1997) on 20,000 acres of land under agreement. Badgers are more often taken by [redacted] as nontarget species incidental to PDM activities. In FY 98, 11 badgers were killed as nontargets (MIS 1998). Badger populations can safely sustain an annual harvest rate of 30-40% annually (Boddicker 1980) or about 33,000 in Nevada. NDOW reported 58 badger harvested statewide in 1997-98 (NDOW 1998b) while [redacted] killed 11 in FY 98 for a total of 69. This 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 1998b), cumulative impacts are very low in magnitude.

Black bear Population Impact Analysis. Black bear numbers are low and primarily limited to suitable habitat in western [redacted] Counties along the eastern slope of the [redacted]. Black bear numbers have been increasing, but are low in number. An estimated population number is 300 (S. Stiver, NDOW, pers. comm. 1999).

[redacted] killed 2 black bear in response to the 13 damage requests from 1,600 acres under agreement in FY 98 (MIS 1998). NDOW took 17 bears in CY 1998 in response to 98 requests for assistance. Of these, 2 were killed, and 5 bears were killed by vehicles (C. Lackey, NDOW, pers. comm. 1999). No other take was reported for bear since Nevada does not have a hunting season for them. Since the black bear population is estimated to be 300, [redacted] take represents less than 1% of the population. The cumulative take of 9 black bear represents a 3%

take. USDA (1997) reported an allowable harvest level of 20% for black bear. Therefore, [redacted] impacts on the black bear population in Nevada is insignificant and could increase several-fold before an impact were probable. [redacted] has decision authority over the take and disposition of all black bears in Nevada and, therefore, [redacted] only responds to [redacted] 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, [redacted] impact on the population has a built-in mitigation measure to assure that [redacted] has a low cumulative impact.

Feral Cat Impact Analysis. Feral cats are fairly common in Nevada. In response to the 9 complaints received that involved feral cats, [redacted] killed 1. 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. [redacted] may be contracted in the future to control feral cats for the protection of the Palmer's chipmunk *(Tamias palmeri)*, a sensitive species in [redacted] ([redacted] 1999). Cats have been cited as having an impact on this species ([redacted] 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. However, the effect 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 [redacted] is comparably minor to the number killed by animal control and humane organizations in Nevada each year.

Kit Fox Population Impact Analysis. [redacted] rarely takes kit fox in PDM activities because few complaints are ever received for them. [redacted] received a human health and safety complaint for an airport from [redacted] in FY 98 (MIS 1998). In response to this complaint, a target kit fox was live trapped at the airport and released outside the security-fenced area. Therefore, no take was involved. [redacted] has not killed a target kit fox from FY 92 - FY 98 (MIS 1992-1998). This represents the fact that [redacted] has management authority for kit fox PDM in Nevada and requestors are referred to them. [redacted] did take a nontarget kit fox in FY 98 (MIS 1996-1998). Private harvest was 298 statewide in 1997-98 (NDOW 1998b). 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 cumulative take of 299 kit fox in Nevada is less than 1% of their projected population which is clearly insignificant to the overall population. Therefore, if [redacted] were requested by [redacted] 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. [redacted] rarely takes gray fox in PDM, reflecting [redacted] authority for their management. [redacted] has not taken a target gray fox over the last several years (MIS 1992-1998). The last nontarget gray fox killed by [redacted] was in FY 96 (MIS 1996-1998). Private harvest was 565 statewide in 1997-98 (NDOW 1998b). 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 ⅔ 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 cumulative take of 565 in Nevada was about 4% of that level which is clearly insignificant to gray fox populations. [redacted] did not have any impact on them in FY 98. If [redacted] were requested by [redacted] 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. [redacted] rarely receives complaints for red fox because [redacted] has management authority for them in Nevada. [redacted] has not take any target red fox in Nevada from FY 92-FY 98 (MIS 1992-1998). [redacted] did take 1 red fox in FY 98 as a nontarget. NDOW did not report red fox taken in the State in 1997-98 (NDOW 1998b). 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) of the total population or 1,540 per year. Therefore, [redacted] take is clearly insignificant (<0.1%) and could increase significantly before an impact on the population were realized.

Other Target 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 none have been taken as target or nontargets from FY 92-FY 98 (MIS 1992-1998). [redacted] 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 [redacted] exclude these species because of their size and weight. All of these species are at moderate levels locally within their range in the State. Fur harvesters took 80 mink, 1 weasel, 5 spotted skunks, and 10 ringtail during the 1997-98 season (NDOW 1998b). Even with minimal take by [redacted], these populations are highly unlikely to be cumulatively impacted by [redacted] PDM efforts. Therefore, unless a significant project takes place that involves the take of a large number of one of these species (more than 50), [redacted] will not analyze population impacts.

4.2.1.2 Effects on Nontarget Species Populations, Including T&E Species

Nontarget Species Taken Unintentionally While Conducting PDM. Mitigation measures to avoid nontarget impacts were described in section 3.4.2.2. Those mitigation measures have also insured that nontarget take in Nevada remains at relatively low levels. Nontarget species taken in Nevada in FY 98 were recorded as unintentional targets and nontargets. Unintentional targets are listed on the agreement as target species but are taken unintentionally during efforts to take other target species. Nontargets are not listed as target species on the agreement and are taken unintentionally during efforts to take target species.

Unintentional target and nontarget animals killed by [redacted] during PDM activities in FY 98 included 11 badgers, 3 feral or free-roaming dogs, 1 kit fox, 1 red fox, and 1 striped skunk (MIS 1998). During the 5 years prior to this, bobcat, gray fox, porcupine (*Erethizon dorsatum*), black-tailed jackrabbit *(Lepus californicus*), cottontail (*Sylvilagus spp.*), and mule deer (*Odocoileus*

hemionus) were also taken accidentally in PDM activities (MIS 1993-97). No more than one or a few of these species were taken and impacts to these species would be considered light. Thus far, impacts to nontarget species have been minimal.

Nontarget 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 nontargets, was not significant. In fact, evidence exists that small carnivore abundance typically increases in areas where coyote populations have been reduced (Robinson 1961, Nunley 1977). Thus, current PDM activities in Nevada are more likely to be beneficial to these smaller predators. 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 nontarget take by [redacted] 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.

Consideration of Impacts to T&E Species in Nevada. Mitigation measures to avoid T&E impacts were described in section 3.4.2.2. Those measures should assure that the proposed action would minimize impacts on T&E species. In addition, [redacted] consulted with USFWS and NDOW to corroborate that [redacted] PDM activities pose minimal potential impacts to T&E species. Both agencies concluded that under current mitigation listed below, none of the T&E species in Nevada would be affected by PDM. Of the Federal and State listed species occurring in Nevada, it was determined to do a biological assessment for the terrestrial vertebrate species. Because PDM methods will not likely affect water, Nevada's T&E fish species were not considered. Since [redacted] PDM will not modify or impact habitat, T&E plants were also not considered.

American peregrine falcon *(Falco peregrinus anatum)* - Federal/State listed
Bald eagle - Federal/State listed
Desert tortoise - Federal/State listed
Southwestern willow flycatcher (*Empidonax traillii extimus*)* - Federal/State listed
Spotted Bat (*Euderma maculata*) - State listed
* not currently federally listed for Nevada, but it is present in Clark County

Both USFWS (letter dated 4/23/98 from Ecological Services) and NDOW (letter dated 6/24/98)concurred with [redacted] that for all PDM methods currently used, none would impact the T&E species of Nevada, if mitigation measures as given below were followed.

The USFWS 1992 Biological Opinion on the national WS program listed the following species as likely to be adversely affected by some aspect of the program (USDA 1997). An analysis of the potential effects on these species may be found in Appendix P of the FEIS (USDA 1997):

Bald Eagle. The [redacted] program does not use the pesticide of concern to the USFWS (above ground use of strychnine). Bald eagles are generalized predators/scavengers primarily adapted to edges of aquatic habitats. They primarily feed on fish (taken both alive and as carrion), waterfowl, mammalian carrion, and small birds and mammals. The risk of

lead poisoning, caused by eagles ingesting lead in predator carcasses killed by shooting, was discussed with the USFWS. [redacted] in Nevada uses steel shot in all aerial hunting operations. Carcasses of predators killed with high-powered rifles normally do not retain the lead bullet. Mitigative measures are used for methods that could adversely effect bald eagles such as leghold traps being placed at least 30 feet from carcasses because the carcass could lure them to the site. Based on an evaluation and discussion with the USFWS and NDOW, [redacted] has concluded that implementation of the proposed action will not likely affect the bald eagle.

American Peregrine Falcon. In the 1992 Biological Opinion, USFWS was concerned with the above-ground use of strychnine, a pesticide commonly used for rodents. However, strychnine is no longer registered for above-ground uses and [redacted] PDM does not include strychnine, the pesticide USFWS considers a concern relative to the peregrine falcon. The peregrine falcon is a specialized predatory raptor that feeds almost exclusively on birds captured in flight. Based on [redacted] evaluation and a review of the relevant section of the USFWS 1992 Biological Opinion (USDA 1997), [redacted] has concluded that implementation of its proposed action will likely not adversely affect the peregrine falcon.

Desert Tortoise. The desert tortoise is widely distributed throughout the Mojave and Colorado deserts from below sea level to 4130 feet or higher. It is most common in desert scrub, desert wash, and Joshua tree habitats, but occurs in almost every desert habitat except the most precipitous slopes. In the USFWS Biological Opinion, two reasonable and prudent measures are given to minimize take of the desert tortoise associated with PDM: 1) the use of gas cartridges within the occupied habitats of the desert tortoise will be limited to qualified individuals who have been trained to distinguish dens and burrows of target species from those of nontarget species which is also stated on the label; and 2) all vehicles will be confined to roadways in tortoise habitat and ATV use will be minimized as much as possible. [redacted] will not use gas cartridges in desert tortoise habitat unless it is coordinated with USFWS. The cartridges will only be used in active coyote dens. [redacted] activity will be limited as much as possible in designated desert tortoise habitat and vehicles, excluding ATVs, will stay on designated roads with drivers on the alert for tortoises on the roadway. Under the proposed alternative, additional work in these areas is considered. The USFWS Biological Opinion considered PDM, such as the removal of coyotes and ravens, a positive impact for the tortoises. [redacted] has determined that current program activities are not likely to affect the desert tortoise and [redacted] determined that the proposed mitigation, that [redacted] would remove depredating predators from the management areas, was not expected to create additional impacts ([redacted] 1998). On the other hand, control of predators, especially the raven, could have positive impacts on this species by reducing predation rates. If [redacted] is requested to conduct PDM on [redacted] lands for the protection of the tortoise, [redacted] would be responsible for complying with NEPA. If [redacted] were requested by any non-federal agency or organization to conduct PDM for tortoise protection, this EA would cover those actions.

Southwestern Willow Flycatcher. [redacted] is currently not conducting PDM in the areas known to have southwestern willow flycatchers, but is anticipating the potential for such. None of the methods used in PDM is likely to adversely affect the flycatcher. However,

raven, feral cat, and other small predator control in their nesting areas could have a positive impact on this species and help in their recovery.

Spotted Bat. The spotted bat is the only species, in addition to federally listed species, listed by the State of Nevada. It is insectivorous, inhabits arid areas, and is fairly solitary. It is found throughout Nevada. It was concluded by NDOW that [redacted] PDM activities would affect this species or its habitat because of behavior, and habitat and roost preference.

Impacts on Wildlife Species Populations Caused by Low-level Flights during Aerial Hunting. [redacted] 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, [redacted] avoids horses and wildlife seen during aerial operations and presents little disturbance to them. 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. [redacted] can use aerial hunting to control coyotes and ravens under a permit from [redacted] 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 98, 67 hours of helicopter and 1,427 hours of fixed-wing airplane hunting were expended. [redacted] conducted PDM activities on areas only under agreement. Of the hours, [redacted] flew 48% on [redacted] lands, 47% on private lands, 4% on USFS lands, and 1% on other lands. Though [redacted] 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 amount of time spent on the different classes of lands was 9 min/mi^2 flying for private lands, 7 min/mi^2 for USFS lands, 2 min/mi^2 for [redacted] lands, and 6 min/mi^2 for other lands in FY 98 (MIS 1998). Thus, the average amount of time during any given year that [redacted] spends on a given property is minimal.

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. [redacted] aerial hunting operations occur in relatively remote rangeland areas where tree cover is at most scattered to allow for visibility of target animals from the air. In addition, [redacted] 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. 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. 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.

A stated concern with the [redacted] 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 1996 Biennial Wild horse and Burros population estimate ([redacted] 1997) for Nevada nonprivate lands is:

Wild Horses:	[redacted] lands - 22,173	Forest Service - 746
Wild Burros:	[redacted] lands - 1,894	Forest Service - 13

In Nevada, wild horses and burros are found throughout the state ([redacted] 1992). The majority of the wild horses are located on the public lands administered by the [redacted] Districts. [redacted] has the highest population of burros in Nevada. [redacted] has designated 100 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. [redacted] has set the "appropriate management level" for Nevada wild horse and burro at 14,430 ([redacted] 1997). However, Nevada's wild horse and burro population is currently at 24,067. [redacted] recognizes that Nevada has an excess population of wild horse and burros of almost 10,000 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, [redacted] 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, [redacted] frequently flies in the vicinity of livestock with young. The aircraft activity has shown to produce little or no effect on these animals. [redacted] often cooperates with [redacted] in surveying horse herds in [redacted] County from fixed-wing aircraft with little or no observed effect on the horses during surveys ([redacted], [redacted], pers. comm. 1999). In addition to horses, wildlife species associated with the area inhabited by the livestock are also seen commonly. It is [redacted] practice to avoid disturbing any nontarget 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 [redacted] in round-ups, the small fixed-wing aircraft that are used by [redacted] have little notable effect on either wild burros or wild horses. Frequently the wild horses in the proximity of the hunt area are seen to totally ignore the fixed-wing's aerial hunting activities, even to the point of not getting up from a reclining position. Because [redacted] is in active search of coyotes, which are significantly smaller than most wild horses, the presence of larger nontarget 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. [redacted] pilots respond quickly to such situations and remove the aircraft from causing any further effect on the animal by leaving the immediate area. Because these "disturbances" are accidental and of a singular nature, and not persistent or repetitive, they do not constitute "harassment".

[redacted] has actively used fixed-wing aircraft for aerial hunting in areas inhabited by wildlife, and wild horses and burros for years. 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 [redacted] aerial hunting low-level flights should not cause any significant adverse impacts to nontarget wildlife populations including raptors, big game, and wild horses.

4.2.1.3 Humaneness

Humaneness is discussed and assessed in the FEIS (USDA 1997) and in sections 3.4.2.3 and 2.2.2 of this EA. The WS program on a national level has evolved toward using more selective control techniques that reduce unnecessary pain and death. Under this alternative all legal PDM methods would be used and are described in appendix B. However, some of the methods that would be used under this alternative are viewed by some persons as inhumane. Despite standard operating procedures and mitigation designed to maximize the humaneness of traps and snares, the perceived stress and trauma associated with being held in leghold traps or snares until the [redacted] specialist arrives at the site to dispatch the animal, or, as in the case of an unharmed nontarget, release it, is unacceptable to some persons. Other PDM methods used to take target animals, such as shooting and the M-44, result in a relatively humane death because the animals die instantly or become unconscious and die within seconds to a few minutes.

On the other hand, some people feel that it is inhumane to allow predation to take place, especially for domestic animals, pets and livestock. Domestic animals suffer when killed by predators. If PDM under the current program was selected, fewer domestic animals would suffer from injuries caused by depredations. Thus, a balance of sorts between the two aspects of humaneness might be achieved under the proposed action.

[redacted] personnel are professional and experienced in their use of PDM methods and make every effort to maximize humaneness under the current constraints of technology. Therefore, under the current program, [redacted] has the least impacts possible with regards to the issue of humaneness.

4.2.1.4 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. [redacted] is aware that most concerns of recreationists about PDM centers around the perceived impacts on hunting, photography, wildlife viewing, and pet safety. The issue was discussed in section 2.2.4 and mitigation measures were addressed in 3.4.2.4. Thus far, [redacted] has not had a significant effect on recreational opportunities on public lands.

Game and non-game wildlife populations are not significantly impacted by [redacted] take on public lands (Table 9) 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 [redacted] has worked. [redacted] activities do not significantly impact animal populations, it does not remove a significant number of any one species. In fact, [redacted] activities could bolster particular populations of wildlife such as PDM focused for the protection of T&E species, thereby increasing opportunities as discussed in section 1.1.3.

Table 9. The number of target predators taken by [redacted] on [redacted] and USFS lands.

All Target Predators Taken on USFS and [redacted] Lands by [redacted]										
Species	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Humboldt NF	Toiyabe NF	Total
Bobcat	0	0	0	0	0	0	0	2	0	2
Coyote	206	99	280	524	0	61	421	150	65	1,806
Lion	4	0	3	9	0	0	1	1	2	20
Raven	205	0	0	1	0	0	0	0	0	206
Total	415	99	283	534	0	61	422	153	67	2,034

On Federal lands, [redacted] 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 [redacted] does not set equipment within a ¼ mile of these areas. Furthermore, upland game and other high-use hunting areas are delineated by [redacted], USFS, or [redacted], and if [redacted] works on them, control equipment is removed a week or more prior to the hunting season. [redacted] 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 [redacted] 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, [redacted] reduces conflicts with recreationists due to inherent features of PDM. [redacted] conducts PDM on public lands almost entirely for grazing allotments with sheep and cattle. 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 [redacted] Specialists do not have access to these public lands because of these limitations. In addition, [redacted] currently averages only 2 and 7 minutes of flight time per square mile on [redacted] and USFS lands, respectively. Most recreationists are totally unaware of the PDM actions and the quality of the outdoor experience is not disrupted. Thus, [redacted] avoids significant effects on recreation and nonconsumptive uses.

4.2.1.5 Impacts on Public Safety and the Environment

[redacted] 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). This assessment included potential risks to WS employees, the public, and nontarget animals. While some of the materials and methods used by [redacted] have the potential to represent a threat to health and safety if used improperly, problems associated with

their mis-use have rarely occurred. 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 [redacted] 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. [redacted] coordinates with cooperators or landowners about where and when PDM methods are to be used, thereby decreasing the likelihood of conflicts with the public. The issue of safety was discussed in 2.2.5 and mitigation measures were addressed in section 3.4.2.5.

[redacted] PDM activities are also not likely to negatively effect 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.

4.2.1.6 Effectiveness of [redacted]

The effectiveness of the [redacted] program can be defined in many ways such as the economic losses reduced for agriculture and property, the number of incidences of public health and safety decreased, and natural resources protected. The FEIS (USDA 1997) concluded that avoided losses for sheep and lambs were 2.4 times the cost of PDM nationwide for WS.

Effectiveness can also be defined in terms of how well [redacted] Specialists stop or reduce damage to an acceptable level for the cooperator. In resolving a conflict situation, the Specialist must be able to complete PDM expeditiously using legal methods in a humane fashion as possible within the limitations of current technology while having the least impacts on nontarget animals and the environment. The U.S. Government Accounting Office (1990) concluded that WS was not impacting target predator populations or the environment including the public. They gave the agency an overall rating of being fairly effective. Many of the details concerning the issue of effectiveness were discussed in the FEIS (USDA 1997) where the current program was concluded to be the most effective because the PDM was being conducted professionally.

Another method to determine effectiveness is customer satisfaction. An independent group within APHIS conducted a cooperator survey and found that the majority of people assisted by WS were satisfied with the results (APHIS 1994).

Lastly, the effectiveness analysis includes costs of the program to the public, states, and other jurisdictions, and direct and indirect impacts, including costs of impacts on the environment. The current program alternative was compared with the other alternatives in the ADC FEIS and was concluded to be the most effective of the alternatives considered (USDA 1997). However, the ADC FEIS did not analyze an expanded program alternative in detail, though.

4.2.1.7 Impacts on SMAs

[redacted] recognizes that some persons interested in SMAs may feel that any PDM activities in these areas adversely affect their aesthetic and natural qualities, value, and the ecosystem. [redacted] abides by the laws, regulations, and policies such as the Wilderness Act as enacted by the U.S. Congress to minimize any effect on the public, but conducts PDM as allowed to reduce damage in the SMAs. Many SMAs have had grazing long before being designated as such and PDM has been conducted on many of these. However, [redacted] conducts PDM on only a few SMA grazing allotments for the protection of livestock. The current program alternative does not have a significant impact on [redacted], or recreation areas, and USFS WAs or specially designated areas (SDAs) such as campgrounds, research natural areas, and trailheads. [redacted] complies with WS guidelines and policies when conducting PDM in these areas. Current laws and regulations allow the public and [redacted] to conduct PDM activities in SMAs under certain limitations.

Sections 2.2.7 and 3.4.2.7 discuss the issue of [redacted] PDM activity in SMAs such as WAs and [redacted] and mitigation measures to ensure no effects in SMAs. PDM is only conducted in designated WAs or [redacted] when allowed by the legislation that designated the WA, or under regulations and policies developed by USFS or [redacted] for PDM in these areas. PDM in SMAs is only a very minor component of the current program. Currently, private individuals using firearms and trail hounds can sport hunt or conduct PDM in most WAs and [redacted]. These activities are not restricted and are allowed by [redacted], USFS, or [redacted] regulations. To impose special restrictions on PDM for professional [redacted] personnel involving similar types of methods in SMAs would be arbitrary and inconsistent with legislation.

[redacted]. [redacted] follows [redacted], or as revised, and the MOU between [redacted] and WS. [redacted] would follow [redacted] policies for [redacted] should the need to work these areas arise. WS proposed activities on lands under wilderness review ([redacted]) do not conflict with [redacted] management objectives as set forth in the [redacted]. Proposed [redacted] AWPs are presented for review by [redacted] during the work planning process to ensure that areas of conflict do not exist. Therefore, [redacted] 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 [redacted] and the [redacted] 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 98, [redacted] did work on a few [redacted] with grazing allotments in response to predation of livestock (MIS 1998). However,

[redacted] has not worked on any [redacted] for the past several years (MIS 1992-1998). A list of PDM methods used in [redacted] are given in Table 4.

USFS SMAs. [redacted] 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 [redacted] PDM plans are reviewed by USFS during the work planning process to ensure that areas of conflict do not exist. Therefore, [redacted] 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, and it would not impair the wilderness designation by Congress. In FY 98, [redacted] did not work on any WAs. In FY 97, [redacted] took 2 mountain lions with trailing hounds on WAs. The lions had killed 3 and 7 lambs on property away from the WAs. Hounds were released at the kill sites and pursued the trails of the predating lions into WAs where they were taken. These were the only SDAs where [redacted] conducted PDM in the last few years on USFS lands. A list of PDM methods used in USFS WAs are given in Table 4.

Other SMAs. The ADC FEIS (USDA 1997) did not specifically address areas such as "Areas of Critical Environmental Concern" (ACECs), SDAs, and other types of SMAs. ACECs and SDAs 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 [redacted] 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 [redacted] 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.

4.2.1.8 Indirect and Cumulative Impacts

Indirect impacts of PDM include economic contributions to the local economy, and possible species composition changes. Indirect impacts associated with economic contributions to the local economy were described in the FEIS (USDA 1997). The current program was found to have the largest positive impact on the local economy when compared with the other alternatives, but an expanded program alternative was not included in that analysis. Another indirect impact, and also a cumulative impact, is the potential for species composition changes which is discussed below.

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 the past, present, and reasonably foreseeable future action, regardless of who undertakes such other actions. Based on [redacted] impact on target animal populations (MIS 1998), combined with other harvest (NDOW 1998a and

b), cumulative impacts are determined to be minimal. The FEIS (USDA 1997) also concluded that no significant cumulative impacts were identified or expected under the current program. Other than these impacts, concern has been raised regarding the indirect, cumulative impacts of predator control on the ecological balance of different ecosystems and on other species, primarily their prey.

Effects of Predator Removal on Prey Populations. [redacted] takes several species of predators in Nevada as discussed in 4.2.2.1, but [redacted] conducts most PDM for the coyote (about 86% of the total predators removed through PDM). Since [redacted] deals predominantly with coyotes, much of the following information is given for their affects on prey species.

Some people have expressed a concern that reducing predators might result in an 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 activities have no adverse impacts to populations of rodents and lagomorphs." The FEIS did not specifically deal with this issue (USDA 1997).

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 ($\leq$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

[redacted] conducts PDM on only 21% of the land area of Nevada where predators are taken, and kills a low cumulative percentage (6-11%) of Nevada's population of coyotes, indicates that PDM has a minimal effect on the overall ecosystems in Nevada. 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. Since [redacted] only conducts PDM on about 21% of the land area of Nevada in any one year, it is unlikely that effects on prey populations would be significant, except in isolated instances and where PDM was focused to benefit the prey species. Other neighboring WS State Programs such as California, Utah, and Oregon do PDM for the protection and enhancement of T&E, sensitive and big game species. Many of these projects have shown success such as greater sandhill crane production in Oregon (USFWS 1994a). Unless [redacted] were specifically requested by a management agency to conduct PDM for species enhancement, the current program has little effect on prey species populations in Nevada.

4.2.1.9 Cost Effectiveness

It is not possible to accurately determine the number of livestock saved from predators by [redacted], since that number represents losses that were avoided and, thus, the loss never occurred. Using the best information available, the FEIS concluded that benefits, in terms of avoided sheep and lamb losses plus price benefits to consumers, are 2.4 times the cost of providing PDM services for sheep protection in the 16 western states (USDA 1997). It is likely that other resources would provide similar cost-to-benefit ratios. Variables that would change the cost-to-benefit ratio of a PDM program include: local market values for livestock; age, class and type of livestock preyed upon; management practices; geographic and demographic differences; local laws, regulations, and [redacted] polices; and the skill and experience of the individual [redacted] specialist responding to the damage request. Cost effectiveness of human safety and wildlife protection cannot be easily determined since they are difficult, if not impossible, to quantify.

Connolly (1981) examined the issue of cost effectiveness of federal PDM 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 FEIS stated that "Cost effectiveness is not, nor should it be, the primary goal of the program" (USDA 1997). Additional constraints, such as environmental protection, land management goals, and others, are considered whenever a request for assistance is received (USDA 1997). These constraints increase the cost of the program while not necessarily increasing its effectiveness, yet they are a vital part of the [redacted] program. Regardless of the above constraints, the cost effectiveness of the current program is estimated to be high in Nevada with a positive cost-to-benefit ratio. Thus, the economy of Nevada probably benefits from the [redacted] program.

4.2.2 Alternative 2 - No Federal [redacted] PDM

This alternative was discussed in 3.2.2. It does not comply with WS's direction from Congress to provide wildlife damage assistance. However, this alternative was considered in detail in the ADC FEIS (USDA 1997) and found to have the potential for significant impacts on target and nontarget 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 a State portion of [redacted] under the guidance of [redacted] and [redacted]. Therefore, the impacts that were described in the FEIS for this alternative (USDA 1997) would not be quite the same. The impacts under the no federal [redacted] 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 individuals efforts conducting PDM on their own would increase. Many of these individuals would probably be untrained and unlicenced 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 the greatest potential for significant negative impacts on the environment.

4.2.2.1 Effects on Target Predator Populations

Under this alternative, the federal portion of [redacted] 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 the State portion of [redacted] under [redacted] and [redacted] would probably still provide some level of PDM, but without federal supervision. These efforts to reduce or prevent depredations would probably result in about he similar effects as those of the proposed action depending on the level of effort expended by [redacted]

and [redacted] and by 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 effected significantly by implementation of this alternative. However, the hypothetically use of illegal chemical toxicants caused by frustration as described in 4.2.2 could lead to unknown, but potentially significant, impacts on carnivore populations.

4.2.2.2 Effects on Nontarget Species Populations, Including T&E Species

Under the no federal program alternative in the FEIS (USDA 1997), more nontarget animals would be affected. Under the no federal [redacted] alternative, the federal portion of [redacted] would have no impacts on nontarget or T&E species, or impacts to wildlife from low-level flights during aerial hunting. [redacted] and [redacted] would probably still provide some level of professional direct control assistance with PDM, but without federal supervision, and would continue to take minimal numbers of nontargets, proportionate to the decreased efforts. However, 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 nontarget wildlife than the under the current program. Similar to [redacted] PDM, private individuals could trap coyotes and unprotected predators year-round. However, private individuals would not be restricted to mitigation measures such as [redacted] 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 nontargets could be greater under this alternative. As described in 4.2.2, the hypothetical use of chemical toxicants could impact nontarget 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 [redacted] and pilots experienced at low-level flying. Even if [redacted] 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 Humaneness of Control Techniques

Under this alternative, the federal portion of [redacted] would not employ methods viewed by some persons as inhumane and, thus, have no program effect on humaneness. [redacted] and [redacted] 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. State [redacted] personnel, though, would no longer receive training from federal sources, nor would the program benefit from federal research focused on improved humaneness, selectivity, and non-lethal methods. However, private individuals, who are no longer provided professional assistance from [redacted] 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 nontarget 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 nontarget animals. Greater take and suffering of nontarget

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 partly for other reasons. [redacted] is accountable to public input and humane interest groups often focus their attention and opposition on PDM activities employed by [redacted]. PDM methods used by private individuals may be more 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 [redacted] 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). 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.

4.2.2.4 Effects on Recreation

The federal portion of [redacted] would not impact hunting and nonconsumptive uses with the no federal program alternative. [redacted] and [redacted] would probably provide some level of direct control assistance with PDM. The State portion of [redacted] 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 nontarget 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 [redacted], and therefore, recreationists would be effected minimally with this PDM method. Even if [redacted] 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 [redacted] 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 Impacts on Public Safety and the Environment

The federal portion of [redacted] would have no effect on public safety, the environment, or "environmental justice and executive order 12898" issues under this alternative. [redacted] and [redacted] 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 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 unlicenced individuals using PDM methods and toxicants, legal and illegal. As discussed in section 4.2.2.1, it is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which 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 [redacted] 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, the federal portion of [redacted] would not be able to respond to predator complaints involving human health and safety. The State portion of [redacted] could respond to complaints within reasonable proximity of their duty stations. However, it is unlikely that the State [redacted] would be able to respond to all of predator complaints involving human health and safety. 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 Effectiveness of [redacted]

The loss of the federal component of the cooperative program would reduce the program's workforce by approximately half, eliminate three aircraft, and reduce the area receiving PDM services. Predator damage to resources and human health and safety would increase proportionately. For example, sheep losses could be expected to be 4 times higher than under the current program alternative in those areas that no longer received PDM services. Therefore, the effectiveness of the no federal program alternative would be comparatively less than the current program (USDA 1997).

4.2.2.7 Impacts on SMAs

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 effect 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

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) 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 nontarget 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 [redacted] operational activities; 2) [redacted] and [redacted] 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 21% 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.

4.2.2.9 Cost Effectiveness

Federal funds would not be expended for [redacted] services. The federal program currently provides much of the supplies for PDM and supervision of the cooperative program. [redacted] and [redacted] 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). 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, based on current research (USDA 1997). Indirect consumer and producer impacts could be expected to be substantially higher. The State portion of [redacted] would reduce monetary losses, but the cost effectiveness under this alternative is estimated to be lower than under the current program alternative.

4.2.3 Alternative 3 - Non-lethal 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 [redacted]. Both technical assistance and direct control would be provided in the context of a modified IWDM that administratively constrains [redacted] personnel to use nonlethal strategies to resolve wildlife damage problems (methods allowed in Table 3). [redacted] would only be authorized to conduct lethal control activities in cases of threats to human health and safety. 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 Effects on Target Predator Populations

Under this alternative [redacted] 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, [redacted] would have no impact on target predator species populations directly under this alternative. As under Alternative 2, [redacted] and [redacted] 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.

4.2.3.2 Effects on Nontarget Species Populations, Including T&E Species

Alternative 3 would not allow [redacted] to conduct direct operational PDM. Therefore, [redacted] would not have any direct impact on nontarget or T&E species. [redacted] 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 nontarget 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 [redacted] not providing quality PDM and the compensatory actions of private individuals. Presumably, many service recipients would become frustrated with [redacted] 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 [redacted], but could be by the private sector or [redacted]. Even if [redacted] 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 Humaneness of Control Techniques

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 [redacted] 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.

4.2.3.4 Effects on Recreation

[redacted] 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 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 [redacted] under this alternative. Since lethal controls would no longer be used, except minimally to for predator complaints involving human health and safety, [redacted] would not have an effect on public safety. [redacted] and [redacted], 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 more adverse effects on public safety and the environment as discussed in 4.2.2.5. [redacted] nonlethal PDM activities would not be likely to have a negative effect on the public concerning "environmental justice and executive order 12898" issues. [redacted] 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.

4.2.3.6 Effectiveness of [redacted]

This alternative would not be consistent with the WS Decision Model (Slate et al. 1992) which provides a mechanism for selecting the most effective methods that would be appropriate to the individual damage situation. Thus, livestock and property losses would likely be higher than the current program alternative since no lethal control by [redacted] would be allowed. [redacted], in many damage situations, would not be considered the most "professional" source of PDM because [redacted] would be limited to one facet of PDM, the nonlethal control techniques. Nonlethal control is not always effective as the sole management method because it does not always address the factors necessary to resolve the depredation problem. For example, denning, a preventive lethal control technique, was found to be effective in stopping predation by coyotes in certain situations (Till 1992). Since [redacted] would not be able to provide customer satisfaction, producers could opt to use lethal control methods themselves. The use of lethal PDM methods has greater likelihood, as has been discussed under Alternative 2, for adverse impacts and a lesser

probability of success. Therefore, [redacted] effectiveness under this alternative would likely be close to that described under the no federal [redacted] PDM alternative.

4.2.3.7 Impacts on 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 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 losses are expected to be higher (USDA 1997) 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 nontarget 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.

4.2.3.9 Cost Effectiveness

Livestock losses would be greater than in the current program (USDA 1997). Direct federal costs to implement this alternative would be lower than the current program. The number of [redacted] 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. Losses to predators would probably increase substantially, and some sheep operations would probably not be able to stay in business.

4.2.4 Alternative 4 - Nonlethal Required before Lethal Control

This alternative could affect [redacted] 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 Effects on Target Predator Populations

Under this alternative, [redacted] take of target predator species would probably be somewhat less than that of the proposed action because lethal actions by [redacted] would be restricted to

situations where the requestor or, possibly, [redacted] had attempted nonlethal controls without success. No proactive lethal control actions would be taken by [redacted]. For many individual damage situations, this alternative would be similar to the current program because many producers, prior to contacting [redacted], have attempted one or more nonlethal methods such as predator resistant fencing without success, or have considered them and found them to be impractical in their particular situations. Without [redacted] 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 effected 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 [redacted] 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. Therefore, the effects on target species populations would probably be insignificant, similar to that described under the current program alternative.

4.2.4.2 Effects on Nontarget Species Populations, Including T&E Species

The nonlethal before lethal control alternative would not consistently allow [redacted] to respond to wildlife threats quickly or adequately. If cooperators were not satisfied by corrective control operations by [redacted], 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) and WS Directive 2.101, which addresses [redacted] policy for applying IWDM. Under this alternative, [redacted] take of nontarget animals would probably be a little less than that of the current program because no preventive lethal control actions would be taken by [redacted]. Mitigation measures to avoid T&E impacts were described in Chapter 3 and they would insure that adverse impacts are not likely to occur to T&E species by implementing Alternative 4. Aerial hunting activities would be less, but minimal impacts would occur as described in section 4.2.1.2.

4.2.4.3 Humaneness of Control Techniques

The amount of suffering by target and nontarget wildlife under this alternative would likely be less than under the proposed action since proactive preventive control activity by [redacted] would not be allowed. However, some private individuals would increase their use of leghold traps, snares, and shooting for preventive control activities and where [redacted] 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 [redacted] could not be implemented until after the onset of depredation.

4.2.4.4 Effects on Recreation

[redacted] would minimally effect 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 [redacted] might seem unresponsive. This could have significant adverse effects on recreationists as discussed for Alternatives 2 and 3. However, the effects on recreation would probably be less than these alternatives, but more than the effects discussed for Alternative 1.

4.2.4.5 Impacts on Public Safety and the Environment

[redacted] would not have an adverse effect on public safety, the environment, or the public concerning "environmental justice and executive order 12898." [redacted] 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. 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). Because [redacted] could not necessarily resolve problems in a timely manner, some cooperators would resort to tactics described in section 4.2.2.5. Effects under this alternative would be greater than the current program alternative, but less than the non-lethal alternative.

4.2.4.6 Effectiveness of [redacted]

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, [redacted] always considers if nonlethal methods would be effective before contemplating the use of lethal methods. Therefore, this alternative would be less effective than the current program, but more effective than the no federal program alternative. In addition, as discussed under the no federal program alternative, cooperators may choose to resolve the problems lethally prior to contacting [redacted] because of this stipulation. The application of lethal PDM methods by inexperienced applicators could result in impacts similar to those, but to a lesser degree, discussed in the no federal program alternative.

4.2.4.7 Impacts on 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 Indirect and Cumulative Impacts

The nonlethal before lethal alternative would have somewhat lower positive indirect impacts on the economy (USDA 1997) than that under the current program, but more than under the nonlethal alternative. Cumulative impacts would be expected to be greater than the current program, since individuals who find this alternative less effective would be more likely to implement their own control actions. 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.

4.2.4.9 Cost Effectiveness

The cost effectiveness of using nonlethal methods would be low in situations where they are not effective and resource losses are allowed to continue. Therefore, the cost effectiveness of the nonlethal before lethal methods alternative would be lower than the current program alternative, but higher than the nonlethal methods only alternative.

4.2.5 Alternative 5 - Modified Current Program, the "Proposed Alternative"

This alternative would be almost identical to Alternative 1 with the exception that the nine EAs currently used to address PDM on public lands would be replaced by this EA. This EA would provide for a more uniform approach to PDM throughout Nevada.

4.2.5.1 Effects on Target Predator Populations

The effects on target species populations would be nearly identical to those of the current program alternative, Alternative 1, since the program would be essentially the same, and not expanded. The only notable difference would be a slight increase in target take on public lands resulting because a wider arsenal of PDM methods could be implemented as deemed necessary by the [redacted] Specialists. Greater consistency of policies for public lands would allow more diversity in PDM application.

4.2.5.2 Effects on Nontarget Species Populations, Including T&E Species

The effects on nontarget species would be similar to those described for the current program alternative since methods and mitigation would be similar. The only difference under this alternative would be that [redacted] Specialists would have a more consistent selection of PDM techniques to use since policies for their use would be more consistent across land boundaries.

4.2.5.3 Humaneness of Control Techniques

The humaneness of control techniques would be similar to the current program because no new methods are proposed under this alternative. However, [redacted] Specialists would be less likely

to be restricted from their choice of the appropriate PDM methods for each damage situation because the use of PDM techniques would be more consistent throughout Nevada on all land classes.

4.2.5.4 Effects on Recreation

Impacts on recreation such as hunting and non-consumptive uses would be similar to the current program since the PDM strategy would be similar. Mitigation developed to protect recreation resources under the current program would be similarly implemented. Under this alternative, though, [redacted] would have consistent policies throughout the State which would allow better response, especially for some public lands where [redacted] was bound by unreasonable restrictions that were actually more limiting on [redacted] professionals then on the general public.

4.2.5.5 Impacts on Public Safety and the Environment

Impacts on public safety and environment would not be different than the current program since mitigation measures to protect the public and environment would be the same as under the current program. Under this alternative, [redacted] would be allowed to have more uniform policies throughout Nevada and would allow [redacted] to use PDM methods in areas where they may not have been used before. However, even considering this, [redacted] would have minimal, if any, effects on public safety and the same positive effects as far as protecting public safety from predators of concern.

4.2.5.6 Effectiveness of [redacted]

[redacted] would likely be slightly more effective under this alternative than under the current program because service delivery would be more uniform throughout the State. [redacted] would likely reduce losses and other damages caused by predators even further than under the current alternative since [redacted] would be responsible for making decisions regarding PDM on public lands as outlined in the MOUs with [redacted] and USFS. The increased efficiency of this alternative may make it somewhat more responsive to the needs of the service recipients and, thus, customer satisfaction would be higher. Lastly, PDM would be more efficient and, consequently, the direct and indirect costs of PDM would be lowered.

4.2.5.7 Impacts on SMAs

Impacts on SMAs would be similar to the current program since protective mitigation is in place to avoid significant impacts on all SMAs. [redacted] would abide by all laws, regulations, rules, and policies for the use of different PDM methods in SMAs. [redacted] would receive input and advice from [redacted] and USFS for the AWP regarding PDM in SMAs, especially for concerns where the proposed PDM might possibly represent a conflict with [redacted] and LRMPs.

4.2.5.8 Indirect and Cumulative Impacts

The indirect and cumulative impacts would be similar to those under the current program, since the scope and magnitude of the program would not change substantially, and target take would not

increase substantially. [redacted] would provide a more uniform service throughout Nevada, and therefore, would have slightly more positive effects, in terms of indirect impacts, than under the current program alternative.

4.2.5.9 Cost Effectiveness

The cost effectiveness may be slightly higher than that under the current program since this alternative would allow for more streamlined management and a more effective program. However, the differences would only be subtle.

4.2.6 Alternative 6 - Expanded Federal PDM Program

This alternative would allow for the expansion of the current [redacted] program statewide including additional manpower for both rural and urban programs. All available, legal methods would be allowed following regulations and policies. In addition to these, the LPC could be used if and when it became legally available for use in Nevada.

Livestock Protection Collar. The LPC would potentially be added as a control tool under the expanded program alternative. The LPC was approved for use May 4, 1990 by EPA and is currently registered for use under APHIS registrations or individual state registrations in several western states. Presently, the LPC is not registered for use in Nevada. If or when the LPC becomes available for use, the [redacted] specialists using the LPC would first be trained and certified by USDA personnel in a course approved by the NDOA. As with all pesticides, [redacted] would follow all label instructions. The LPC is fully assessed in the ADC FEIS. Appendix B contains a description of the LPC. No significant impacts would result from the use of the LPC in the [redacted] program. The LPC would probably only be used in very limited situations where conditions are ideal for their use. No use on federal lands is expected. Because the LPC is ideal for use in only a few particular situations, few LPCs would be used annually. The LPC could be used under Alternative 4 and 5, if it is registered in Nevada and there were an adequate need.

4.2.6.1 Effects on Target Predator Populations

Under an expanded program, [redacted] would potentially work on additional public lands which are not currently covered in AWPs or cooperative agreements, and could expand on to other land classes. [redacted] could also work for more extended time periods to resolve predation problems and increase preventive control for historic problem areas as permitted by Federal and state laws and regulations within the confines of funding. On public lands, the requests would come from grazing permittees to resolve predation complaints and, to a minor extent, from the land management agencies to resolve human health and safety situations involving predators. If the expanded program involved an increase in funding and staffing, it is likely that more target animals would be removed.

Although more coyotes would possibly be removed under this alternative, impacts would still not be notable on coyote numbers since all coordination and mitigation used under the current program would be in place. For example, if take by [redacted] were tripled (12,045) which would require at least 3 times the workforce of the current program, cumulative take would still be below the allowable harvest level (33%) for a conservatively estimated population (55,000). The FEIS

(USDA 1997) contains a more detailed discussion of maximum harvest levels allowed for coyotes before significant population impacts would occur.

Assuming a speculative increase in coyote removal of 30-50% in localized areas, reduced coyote numbers and population reproductive responses would be temporary and would terminate following the cessation of intensive control. Fur takers could experience localized short term reduction in coyote populations available for harvest (USDA 1997).

An expanded program would not significantly impact other target predators. As discussed in 4.2.1.1, the number of individual animals removed by [redacted] has been minimal and take could easily be increase several-fold for most species without reaching the allowable harvest level that would impact the overall population. The take of depredating bears and mountain lions would continue to be permitted by the [redacted] and would not be expected to increase substantially.

4.2.6.2 Effects on Nontarget Species Populations, Including T&E Species

[redacted] impacts on nontarget animals have been below 1% of its take of target animals (MIS 1998) and have not impacted any wildlife populations. Under this alternative, it can be assumed that the nontarget take would remain below 1% of total target take. Although the total numbers of nontarget animals taken would likely increase, no significant adverse effect on nontarget species populations would be seen. [redacted] has had no adverse impacts on T&E species, and this would also be expected with an expanded program since all precautionary mitigation and standard practices would continue. [redacted] could have positive impacts on these species by reducing predators preying on them. Aerial hunting activities would likely increase, but still with no significant effect on wildlife and wild equines.

4.2.6.3 Humaneness of Control Techniques

The humaneness of control techniques would not change under an expanded program. [redacted] would continue to use selective and humane techniques. More animals would be taken with PDM methods viewed by some as inhumane, but less livestock would suffer from injuries from predator attacks. Therefore, the balance between the two aspects of humaneness would still hold true as for Alternatives 1 and 5.

4.2.6.4 Effects on Recreation

An increase in [redacted] take would not significantly impact recreation. The discussions in sections 4.2.1.4 and 4.2.6.1 are applicable to this issue. Under this alternative, [redacted] would increase efforts to protect livestock on public lands. However, impacts would still be similar to Alternatives 1 and 6 because of the areas worked and the primary timing of PDM activity.

4.2.6.5 Impacts on Public Safety and the Environment

Impacts on public safety and the environment from toxicants under an expanded program could be higher than the current program alternative due to an increased potential for exposure, but would still be expected to be minimal, if any, because [redacted] personnel are trained and certified to use certain PDM techniques, must adhere to policies, regulations, and labels, and are considered professionals in the area of wildlife damage management. Some [redacted] control methods may

pose potential hazards to employees and the public if improperly used. However, the health risk to the public is low because [redacted] methods are used in areas where public access is limited, or where such use poses low risk due to [redacted] standard operating procedures. Additionally, warning signs are posted to alert the public when such devices are present. Similar to Alternative 1, the activities of the [redacted] are not likely to negatively effect the public in terms of "Environmental Justice" and Executive Order 12898. A more widespread [redacted] program would inherently have the highest positive effects for being able to respond quickly to incidences where predators are an identified public health risk.

4.2.6.6 Effectiveness of [redacted]

An expanded program would be more effective in terms of losses prevented than any of the other alternatives considered. More effort could be put into preventative control which would prevent losses before they occurred. To some extent, local predator populations and individual predators that prey on sheep would be more effectively removed since [redacted] would have a more consistent PDM program throughout Nevada on all land classes. Customer satisfaction would rise accordingly since their losses would be lower. In addition, as discussed for the other issues under this alternative, [redacted] would still have minimal effects on the environment.

4.2.6.7 Impacts on SMAs

Compared to the current program alternative, no increased impacts would be expected under an expanded program, since [redacted] would still coordinate activities with USFS and [redacted], and comply with policy and regulatory provisions for SMAs. Even if the [redacted] program were expanded, it would probably not entail much greater efforts in these areas, especially areas with high public use.

4.2.6.8 Indirect and Cumulative Impacts

Since the effectiveness of the program is likely to be higher under an expanded program, a more positive indirect impact on local economies would also be expected. Cumulative impacts on target species populations would be higher than those under the current program since an increase in target animal take could be expected. Cumulative impacts would still not be significant since [redacted] would coordinate all take with wildlife management agencies. However, [redacted] could have positive impacts on T&E and sensitive species from additional PDM protection programs. The effects on other wildlife species would be comparatively similar to those described for Alternative 1, but locally slightly more positive or negative depending on the species and their population status with regard to their carrying capacity.

4.2.6.9 Cost Effectiveness

Expanding the program would increase operational costs, but resource losses would be reduced or prevented more than that described under the current program alternative. Presumably the cost effectiveness of this alternative would be similar to the current program alternative if the cost-to-benefit ratio remains linear. The FEIS (USDA 1997) reported a 1:2.4 cost-to-benefit ratio for dollars expended compared with losses avoided in a PDM program to protect sheep and lambs and savings could be similar in an expanded program.

4.3 SUMMARY AND CONCLUSION

The current program, the modified program, and expanded program alternatives provide the lowest overall negative environmental consequences combined with the highest positive effects (program effectiveness and cost effectiveness), and are therefore the preferred alternatives (Table 10).

The environmental impacts of implementing PDM correspond with those raised and discussed in detail in Chapter 4 of the FEIS (USDA 1997) and those listed in the [redacted] & USFS EAs. 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 others associated with past, present, and reasonably foreseeable future actions, as described in the ADC FEIS (USDA 1997), will not result in cumulatively significant environmental impacts. Monitoring the impacts of the program on the populations of both target and nontarget 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 FIFRA.

This EA will remain valid until [redacted] and other appropriate agencies determine that new actions or new alternatives having substantially different environmental effects must be analyzed. Change in environmental policies, the scope of the project, or other issues may trigger the need for additional NEPA compliance. This EA will be reviewed periodically for its continued validity.

Table 10. A summary of the environmental consequences of each program alternative relative to each issue.

A Relative Comparison of the Overall Effects on Species and Issues as Related to the Alternatives							
Issue No.	**Issues/ [redacted] Impacts**	**Alternative 1** Current Program	**Alternative 2** No Federal Program	**Alternative 3** Nonlethal	**Alternative 4** Nonlethal before Lethal	**Alternative 5** Preferred Modified	**Alternative 6** Expanded Program
1	Coyote	0	0	0	0	0	0
	Common Raven	0	0	0	0	0	0
	Mountain Lion	0	0	0	0	0	0
	Striped Skunk	0	0	0	0	0	0
	Other	0	-	0	0	0	0
2	Non-target Species	0	- -	- -	-	0	0
	T/E Species	0	-	-	0	0	0
	Aerial Hunting	0	0	0	0	0	0
3	Humaneness	-/+	-	-	-/+	-/+	-/+
4	Recreation	0	-	0	0	0	0
5	Public safety	-/+	- -	- -/+	-/+	-/+	-/++
6	Effectiveness	+	-	-	0	+	+ +
7	Sp. Mgmt. Areas	0	- -	- -	-	0	0
8	Indirect Impacts	+	-	-	0	+	+
	Cumulative Impact	0	- -	- -	-	0	0
	Prey Impacts	-/0/+	- -/0	- -/0	-/0/+	-/0/+	-/0/++
9	Cost Effectiveness	+	-	-	0	+	+

Summery ratings for impacts are: "- -" = High Negative; "-" = Low Negative; "0" = None; "+" = Low Positive; and "++" = High positive.
Note: While a control action or removal might have a negative effect on that individual animal or issue, removing the individual predator could also have a positive effect on it's prey species.

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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 [redacted] in wildlife damage management. Control strategies are based on applied Integrated Wildlife Damage Management (IWDM) principles. WS and [redacted] 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 outlined in the 1997 WS Final Environmental Impact Statement (FEIS), Chapter 2. 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 [redacted].

- 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 (Nixilite), 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 [redacted] 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. [redacted] may recommend alteration of human behavior to resolve potential conflicts between humans and wildlife. For example, [redacted] 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 [redacted] 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 [redacted] 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.

[redacted] 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 [redacted] procedures. Only properly trained [redacted] 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 [redacted] 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. [redacted] 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 [redacted].

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 [redacted] supervision.

Sodium fluoroacetate, or Compound 1080, is currently used for coyote control only in the livestock protection collar (LPC). The LPC, attached to the neck of a sheep or goat, dispenses the toxicant when punctured by an attacking coyote. Though approved for use by the U.S. Environmental Protection Agency in 1990, the LPC is not currently approved for use in Nevada by the Nevada Division of Agriculture.