ENVIRONMENTAL ASSESSMENT

PREDATOR DAMAGE MANAGEMENT IN SOUTHERN IDAHO

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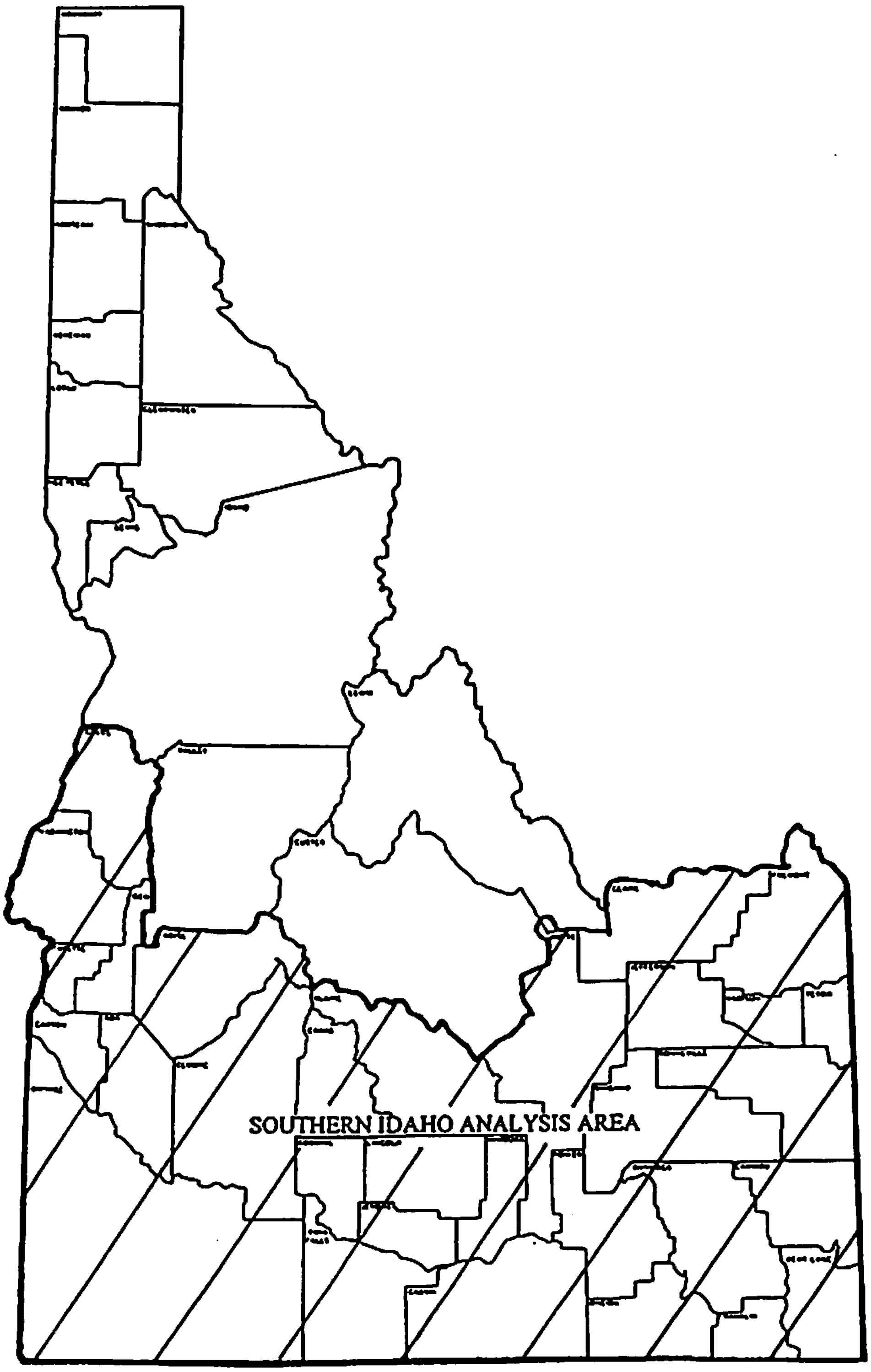

Figure 1.1 Southern Idaho Analysis Area.

CHAPTER 1. PURPOSE AND NEED FOR ACTION

1.0 Introduction

In the last hundred years, broad-scale changes in land use patterns have occurred as human populations have increased and spread across North America. One of the most significant changes has been the large-scale conversion of natural landscapes to agricultural and urban environments. As humans encroach on wild habitats, they compete with wildlife for space and other resources, which increases the potential for conflicts. In addition, some species of wildlife have adapted and thrived in the presence of people, while others have not. This in combination with today's economic pressures and heightened awareness of environmental issues has increased the complexity of wildlife management and specifically wildlife damage management. Concurrent with this growth and change is a movement by some segments of the public to completely protect all wildlife from harm, which can create localized conflicts with resource managers and owners experiencing problems with wildlife. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program has expertise in resolving conflicts between people and wildlife and has been directed by Congress to reduce damage caused by wildlife. The USDA Animal Damage Control Programmatic Final Environmental Impact Statement (EIS) (USDA 1994) summarized the relationship wildlife values and wildlife damage as follows:

> "*Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife is generally 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 value 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.*"

Wildlife damage management is the science of reducing damage or other problems caused by wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 1990, 1992, Berryman 1991). APHIS WS[1] is the Federal agency directed by law and authorized by Congress to protect American resources and human health and safety from damage associated with wildlife (Animal Damage Control Act of March 2, 1931, as amended (46 Stat. 1486; 7 U.S.C. 426-426c) and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (Public law 100-102, Dec. 22, 1987, Stat. 1329-1331; 7 U.S.C. 426c). To fulfill this Congressional direction, WS conducts activities to prevent or reduce wildlife damage or threats of damage to agricultural, industrial and natural resources, property, and human health and safety. Work could be conducted on private and public lands and in cooperation with Federal, State and local agencies, private organizations, and individuals. Wildlife damage management is not conducted to punish offending animals but to prevent or reduce damage.

WS is a cooperatively-funded, service-oriented program that provides assistance to requesting public and private entities. WS responds to requests for assistance when valued resources are lost, damaged, or threatened by wildlife. Responses can be in the form of technical assistance or direct damage management. The degree of WS involvement varies, depending on the complexity of the wildlife problem. WS activities are conducted in accordance with applicable Federal, State, and local laws; cooperative agreements, agreements for control, Memoranda of Understanding (MOU), and other applicable documents. These documents establish the need for the requested work, legal authorities allowing the requested work, and the responsibilities of WS and its cooperators.
WS' mission, developed through a strategic planning process, is: 1) *"To provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety."*

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[1] On August 1, 1997, the Animal Damage Control program was officially renamed "Wildlife Services."

WS' Policy Manual[2] reflects this mission and provides guidance for engaging in wildlife damage management through:

- Training of wildlife damage management professionals;
- Development and improvement of strategies to reduce losses and threats to humans from wildlife;
- Collection, evaluation, and dissemination of management information;
- Informing and educating the public on how to reduce wildlife damage;
- Providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989).

WS uses an Integrated Wildlife Damage Management (IWDM) approach to resolve wildlife-related conflicts. In short, IWDM seeks to prevent, reduce, or stop wildlife damage by integrating a combination of methods sequentially or concurrently. These methods may include alteration of cultural practices, habitat manipulation, or behavioral modification of the offending species. Implementation of IWDM may also require the relocation or lethal control of specific offending animals or the reduction of the local populations by lethal means. WS uses the Decision Model (Slate et al. 1992) to determine how IWDM will be conducted. This approach allows IWDM strategies to be customized for each wildlife/human conflict that is encountered by WS personnel.

Normally, according to the APHIS procedures implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions considered in this analysis could each be afforded a Categorical Exclusion (CE) (7 CFR 372.5(c)). APHIS Implementing Regulations also provide that all technical assistance and monitoring activities conducted by WS are categorically excluded (7 CFR 372.5(c)) (60 Federal Register 6,000, 6,003 (1995)). To evaluate and determine if any potentially significant or cumulative impacts from WS' current and planned damage management program might occur, this Environmental Assessment (EA) has been prepared and documents the analysis. This analysis relies on existing data contained in published documents and the programmatic EIS (USDA 1994) to which this EA is tiered.

Purpose

In 1996 the WS program prepared an EA which addressed the need to conduct predator damage management and the potential impacts of various alternatives for responding to predator damage problems in southern Idaho. Since that time, the WS program has periodically reviewed and compared that analysis with more current program monitoring information to determine whether the original Finding of No Significant Impact (FONSI) was still appropriate. All of these reviews have in fact suggested that WS predator damage management activities in southern Idaho continue to have no significant adverse environmental impacts. In the period of time since the last formal review occurred (in 1999), however, a number of new issues have been raised that were not addressed in the original 1996 EA or any subsequent reviews. The primary purpose of this EA is to address these more recently identified issues and concerns, and too once again assess the potential impacts of various program alternatives, based on the most recent monitoring information available. This review will make use of WS program data from Fiscal Years (FY) 1999-2001, and will also consider new scientific information that has become available since the 1996 EA was completed.

This EA analyzes planned and future predator damage management related to the protection of livestock, poultry, apiaries, and designated wildlife species, and to protect human safety, on public and private lands within the designated Southern Idaho analysis area. The analysis area encompasses approximately 31 million acres in southern Idaho, including all lands within Ada, Adams, Bannock, Bear Lake, Bingham, Blaine, Boise, Bonneville, Butte, Camas, Canyon, Caribou, Cassia, Clark, Elmore, Franklin, Fremont, Gem, Gooding, Jefferson, Jerome, Lincoln, Madison, Minidoka, Oneida, Owyhee, Payette, Power, Teton, Twin Falls, and Washington counties, as well as the small portion of Custer and Lemhi counties encompassed by the Little Lost River drainage (Figure 1.1, page ii). WS has agreements to work on about 15.2 million acres within the analysis area. Of that area, WS activities were conducted on only about 8.2 million acres, or about 27% of the analysis area in FY 01 (Management Information

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[2] The WS Policy Manual provides WS personnel guidance in the form of program directives. Information contained in the WS Policy Manual and its associated directives has been used throughout this document, but has not been cited in the text or referenced in Appendix A.

System (MIS) 2001). The analysis area encompasses Federal lands under the administration of the Forest Service, Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (FWS), and Department of Defense, as well as Tribal, State, county and private lands. In many cases, WS spends only a few hours in a specific location trying to resolve a particular problem

Within the analysis area, cattle and domestic sheep are permitted to graze on Federal lands throughout the year, with most livestock grazing on National Forest System lands in the summer, and on BLM administered lands in the spring, fall and winter. Much of the livestock protected by WS grazes on some combination of National Forest System, BLM, State Endowment and private lands.

1.1 Need for Action

The need for action is based on the necessity for a program to protect livestock, poultry, apiaries, wildlife, and public health and safety. WS has been authorized and directed by Congress to provide this service (Animal Damage Control Act of March 2, 1931, as amended; Agricultural and Related Agencies Development Appropriation Act of 1988). In a 1992 District Court decision (U. S. District Court of Utah, Civil No. 92-C-0052A, Southern Utah Wilderness Alliance et al. *vs.* Thompson, H. et al., Forest Supervisor), the court ruled that, "*. . . the agency need not show that a certain level of damage is occurring before it implements an ADC program.*" The court further ruled that, "*Hence, to establish need for an ADC, the forest supervisors need only show that damage from predators is threatened.*" WS accepts this standard as appropriate for establishing need in the analysis area.

1.1.1 Summary of the Proposed Action.

The proposed action is to continue allowing WS use of the full range of wildlife damage management methods currently authorized and according to Federal, State and local laws, for protection of livestock and designated wildlife species, and to expand these activities to include additional protection of designated or potentially designated wildlife species. The methods used in conducting these activities would include a variety of frightening devices, calling and shooting, aerial hunting, denning, traps, snares, trained dogs, the Livestock Protection Collar (LPC), M-44s for control of coyotes (*Canis latrans*) and red fox (*Vulpes vulpes*), and DRC-1339 for control of common ravens (*Corvus corax*) and black-billed magpies (*Pica pica*). Wildlife species for which expanded predator control activities may be initiated include the northern Idaho ground squirrel (*Spermophilus brunneus brunneus*), a Federally listed threatened species which is preyed upon by badgers (*Taxidea taxus*) and other predators; the southern Idaho ground squirrel (*S. brunneus endemicus*), which is not yet a Federally listed species, but whose populations are also low and thought to be affected by predation; and sage grouse (*Centrocercus urophasianus*) and sharp-tailed grouse (*Tympanuchus phasianellus*), whose populations are in decline across much of the western U.S. Livestock producers would still be provided with information and training on the use of nonlethal methods. Work Plans would be developed and reviewed annually to address specific activities and restrictions required to safely conduct wildlife damage management on public lands, including State Endowment lands. WS would be authorized to initiate corrective and/or preventive damage management in response to resource owner or wildlife agency requests using lethal and/or nonlethal methods permitted under Federal and State laws and in accordance with local work plans. (See Chapter 3 for a more detailed description of the current program and the proposed action.)

1.1.2 Wildlife Damage Management to Protect Livestock.

Contribution of Livestock to Idaho's Economy

Idaho agriculture generated about $3.39 billion in cash receipts in 2000 (Idaho Agricultural Statistics Service (IASS) 2001) and is ranked Idaho's 2nd leading industry, exceeded only by manufacturing (Idaho Department of Commerce 2001). Livestock production, primarily cattle and sheep, is one of the most significant agricultural products and industries, and accounted for about 48% of all agricultural cash receipts in 2000 (IASS 2001).

Livestock production contributes significantly to the economy of the counties and communities in southern Idaho. In 2000, about 85% of the cattle and 90% of the sheep in the State were produced in the analysis area (Table 1.1). Livestock inventories vary throughout the year, but January 2001 livestock inventory for counties in the analysis area included about 1.97 million cattle and calves and 275,000 sheep and lambs, valued at about $1.68 billion (IASS 2001).

Table 1.1
Livestock Inventories by County in the Analysis Area

	2001		2001	
Counties in Southern Idaho Analysis Area	January 1, Sheep and Lamb Inventory	% of Total Idaho Inventory Per County	January 1, Cattle and Calf Inventory	% of Total Idaho Inventory Per County
Ada	2,000	0.73 %	70,000	3.55 %
Adams	*		20,000	1.01 %
Bannock	**		23,500	1.99 %
Bear Lake	4,000	1.45 %	28,000	1.42 %
Blaine	28,000	10.18 %	20,000	1.01 %
Bonneville	5,500	2.00 %	45,000	2.28 %
Boise	*		3,700	0.18 %
Butte	10,500	3.82 %	21,000	1.06 %
Camas	***		8,000	0.41 %
Canyon	19,000	6.91 %	123,000	6.24 %
Caribou	8,000	2.91 %	26,000	1.32 %
Cassia	14,000	5.09 %	169,000	8.57 %
Clark	6,500	2.36 %	13,000	0.65 %
Elmore	*		142,000	7.21 %
Franklin	1,500	0.55 %	39,500	2.01 %
Fremont	22,500	8.18 %	20,500	1.04 %
Gem	*		31,500	1.60 %
Gooding	22,000	8.0 %	163,000	8.27 %
Jefferson	15,500	5.64 %	69,000	3.50 %
Jerome	5,000	1.82 %	170,000	8.63 %
Lincoln	***		36,000	1.83 %
Madison	**		18,000	0.91 %
Minidoka	33,000	12.00 %	39,000	1.98 %
Oneida	**		21,000	1.07 %
Owyhee	8,500	3.09 %	110,000	5.58 %
Payette	1,100	0.40 %	55,000	2.79 %
Power	2,000	0.73 %	34,000	1.72 %
Teton	**		13,000	0.65 %
Twin Falls	15,000	5.45 %	124,000	6.29 %
Washington	17,200	6.25 %	43,500	2.21 %
Southern Idaho	247,500[1]	90.00 %[1]	1,699,200	86.26 %
Total Idaho	275,000		1,970,000	

* Subtotals for Adams, Boise, Elmore, and Gem, not available because they would disclose individual operations.
** Combined Total for Bannock, Oneida, Madison and Teton is 2,500.
*** Combined Total for Camas and Lincoln is 4,200.
[1] This figure does not contain data from Adams, Boise, Elmore, and Gem Counties.

Scope of Livestock Losses

Cattle and calves are most vulnerable to predation at calving time and less vulnerable as they get older and larger (Shaw 1977, 1981, Horstman and Gunson 1982). Because calving occurs at lower elevations in late winter and early spring, vulnerability of cattle to mountain lions (*Felis concolor*), black bears (*Ursus americanus)* grizzly bears, (*U. horribilis*) and gray wolves (*Canis lupus*) is reduced. Calves remain vulnerable to these predators during the spring through autumn if they are grazed in higher elevation areas that typically represent more suitable habitats for mountain lions, bears and wolves. Sheep and lambs remain vulnerable to predation throughout the year, particularly from coyotes, and to mountain lions, bears and wolves whenever they spend time in habitats of these species (Henne 1977, Nass 1977, 1980, Tigner and Larson 1977, O'Gara et al. 1983, Shaw 1987). Domestic dogs are also responsible for significant predation on sheep and lambs throughout the year (IASS 2001). Lambs are sometimes vulnerable to red fox predation in the spring, primarily at the lower elevations.

Bears and mountain lions (Mysterud 1977, Shaw 1987) are occasionally responsible for catastrophic incidents or large losses of sheep and lambs, sometimes called "surplus killing" when only selected tissues or parts are consumed or the carcasses are not fed on at all. Bears or mountain lions may also frighten an entire flock of sheep as they attack, resulting in a mass stampede. This sometimes results in many animals suffocating as they pile up on top of each other in a confined area, such as along thick willow growth in the bottom of a drainage or in corrals or night pens. Examples in the southern Idaho analysis area include 2 incidents on the Boise National Forest in 1996, one in which a black bear caused a pileup which killed 343 sheep and lambs, and another where a black bear caused a pileup that resulted in the death of 108 sheep. In the summer of 2000, a mountain lion caused a pileup on the Payette National Forest that resulted in the death of 71 sheep and lambs. (Partial damage compensation claims were filed with the Idaho Department of Fish and Game (IDFG) in all three of these examples, as provided for under Idaho Code 36-1109.)

Many studies have shown that coyotes inflict high predation rates on livestock. Coyotes accounted for 93% of all predator-killed lambs and ewes on nine sheep bands in shed lambing operations in southern Idaho and did not feed on 25% of the kills (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).

Table 1.2 presents data compiled by the IASS (2001) which quantifies Idaho sheep and lamb predation losses by species responsible, and the dollar value of those losses, for the years 1998 through 2000. The portion of these statewide losses occurring in the analysis area was calculated based on the fact that 90% of the sheep occur in the analysis area (Table 1.1). The total number of these losses confirmed by WS is also provided in Table 1.2. Predator losses accounted for an average of 32.6% of the total death loss reported during these three years, with the remaining 67.4% attributable to weather, disease, poisonous plants, lambing complications, old age, theft, other, and unknown causes (IASS 2001).

Table 1.2
Sheep and Lamb Losses: by Cause, Idaho, 1998-00 1/

Cause of Death	Sheep						Lambs						Value of All Sheep and Lambs 3/4/5/ $1,000		
	Head			Percent of Total Loss 2/			Head			Percent of Total Loss 2/					
	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000
Coyote..............	2,500	1,700	2,000	25.0	17.0	20.0	8,700	7,700	7,900	29.0	23.3	24.7	1,193	930	1,025
Dog..................	200	500	300	2.0	5.0	3.0	300	600	1,000	1.0	1.8	3.1	53	109	135
Bear.................	500	400	300	5.0	4.0	3.0	600	500	600	2.0	1.5	1.9	117	89	93
Cougar..............	300	200	200	3.0	2.0	2.0	900	400	400	3.0	1.2	1.3	128	59	62
Fox..................	0	0	0	0.0	0.0	0.0	200	300	300	0.7	0.9	0.9	21	30	31
Other 6/..............	0	0	100	0.0	0.0	1.0	100	300	800	0.3	0.9	2.5	11	30	93
Unknown Predator............	0	0	100	0.0	0.0	1.0	200	200	300	0.7	0.6	0.9	21	20	41
Total Idaho Predator Losses	3,500	2,800	3,000	35.0	28.0	30.0	11,000	10,000	11,300	36.7	30.3	35.3	1,544	1,267	1,480
Analysis Area Predator Losses	3,150	2,520	2,700				9,900	9,000	10,170				1,390	1,140	1,332
Confirmed by WS in Analysis Area	196	150	264	6.2	6.0	9.7	513	552	516	5.2	6.1	5.1			

1/Includes lamb deaths before docking of 16,000 in 1998, 17,000 in 1999, and 17,000 in 2000.
2/ Percentages may not add due to rounding.
3/ Based on average beginning year and end of year value of head: 1998-$106.50, 1999-$99.00, 2000-$103.50.
4/ Rounded to nearest 1,000 dollars.
5/Dollar values were rounded to add to total.
6/ Includes bobcats, eagle and wolves.

Table 1.3 presents the most recent data compiled by the National Agricultural Statistics Service (NASS) on Idaho cattle and calf death losses due to predators (NASS 2001a). The portion of these Statewide losses occurring in the analysis area was calculated based on the fact that approximately 86% of the cattle are present in the analysis area. Predation accounted for 3.6% of the total death loss for calves in 2000 (estimated 1,962 calves in the analysis area), and 0.8% of the total death loss of adult cattle (estimated 256 adult cattle in the analysis area). Value of cattle and calves killed by predators in the analysis area in 2000, based on average 2000 prices of $706.00 per cow and $274.80 per calf (NASS 2001b), was estimated at about $674,489.

Table 1.3
Idaho Cattle and Calf Death Losses to Predators, 2000

Cause Of Death	Cattle	% of Total Predation	Calves	% of Total Predation
Coyotes	100	33.33 %	1,600	69.57 %
Dogs	0	0.00 %	100	4.34 %
Mountain Lion/Bobcats	100	33.33 %	300	13.04 %
Other Predators	100	33.33 %	300	13.04 %
Total Predator Losses	300		2,300	
Predator Losses in Analysis Area	259		1,984	

Note: Totals do not add up due to rounding.

Connolly (1992a) determined that only a fraction of the total predation attributable to coyotes is reported to or confirmed by WS. Connolly also suggested that the fraction of actual losses typically confirmed by WS could be expected to be between 5-20% (Connolly 1992b). WS employees do not try to find every head of livestock reported to be killed by predators, but rather are investigating to verify whether or not predation has occurred, and if so, what species is responsible. In the analysis area, WS confirmed about 5-10% of the sheep and lambs reported to be killed by predators between 1998 and 2000.

Table 1.4
Southern Idaho Analysis Area Confirmed Losses FY01

Species	Lambs	Sheep	Cattle	Calves	Fowl	Pets/ Guard Animals	Commercial Game Animals	Dollar Value
Coyotes	358	67	2	159	100	9	0	$69,060
Black Bear	8	5	0	0	0	0	0	$2,200
Mt. Lion	10	2	0	5	0	0	0	$2,320
Fox	22	0	0	0	272	5	500	$6,652
Bobcat	3	0	0	0	0	0	6	$320
Raccoon	0	0	0	0	7	0	0	$205
Skunk	0	0	0	0	0	0	80	$200
Badger	2	0	0	0	0	0	0	$200
Dog	25	75	0	22	0	0	1	$20,026
Cat (Feral)	0	0	0	0	25	0	0	$100
Wolf	0	42	0	2	0	1	0	12,000
Golden Eagle	1	0	0	0	0	0	0	$100
Raven	4	0	0	0	0	0	0	$400
Total	433	191	2	188	404	15	587	$113,783

Table 1.4 provides information on the livestock and poultry in the analysis area confirmed killed by WS as predator losses in FY 01 (MIS 2001). This information represents only a small percentage of the total losses, but does provide information on what types of predator losses occurred in the analysis area.

Although it is impossible to accurately determine the amount of livestock saved from predation by WS, it can be estimated. Scientific studies reveal that in areas without some level of predator damage management, losses of adult sheep and lambs to predators can be as high as 8.4% and 29.3%, respectively (Henne 1975, Munoz 1977, O'Gara et al. 1983) as compared to areas with control at about 0.5 and 4.3, respectively (USDI 1979). Predation on livestock can have a significant economic impact on livestock producers. Without effective damage control efforts to protect livestock, research suggests that predation losses would be higher (Nass 1977, 1980, Howard and Shaw 1978, Howard and Booth 1981, O'Gara et al. 1983).

1.1.3 Wildlife Damage Management to Protect Wildlife.

Cote and Sutherland (1996) reviewed and analyzed the results of 20 published studies where predator removal had been undertaken to assess its effects on bird populations. Their analysis suggested that removing predators consistently had a large, positive effect on hatching success and significantly increased autumn densities of the target bird species. Their analysis also suggested that predator removal did not consistently result in increased breeding populations in the year following predator control. They speculated that this might be due to the action of density-dependance on avian populations, but noted that this has yet to be documented and deserves further research. They further suggested the possibility that predator removal does in fact increase breeding populations, but the increased breeding birds emigrate out of the area into nearby areas where population monitoring may not be occurring.

Sage Grouse and Sharp-tailed Grouse

Sage grouse populations have declined throughout southern Idaho and much of the western U.S. over the last several decades due to a variety of environmental factors (Connelly and Braun 1997). Sharp-tailed grouse populations have shown some increase in parts of southeast Idaho in recent years, but their populations in southern Idaho and much of the western U.S. are much lower than historic levels. Sage grouse populations occupying habitats that are highly fragmented or in poor ecological condition may exhibit relatively low nest success, low juvenile recruitment, and poor adult survival that may be related to increased predation (Gregg 1991). Populations of some of the most important prairie grouse predators have increased dramatically over the last 100 years (see analysis related to coyote, red fox, and raven populations in Chapter 4), and even in areas of good habitat, predator populations can be so abundant that habitat alone may not suffice to allow grouse populations to increase (Bergerud 1988). Schroeder and Baydack (2001) suggested that as habitats become more fragmented and populations of prairie grouse become more threatened, it becomes more important to consider predator control as a potential management tool. Because damaged sagebrush habitats may take 15-30 years to recover, a predator management strategy that effectively increases nest success and juvenile survival may be useful in offsetting some of the negative effects of poor habitat. This approach might also allow a more rapid recovery of grouse populations following habitat recovery. After 3 years of monitoring the movement, survival and reproduction of reintroduced sharp-tailed grouse in northeastern Nevada, Coates and Delehanty (2001) recommended that future reintroductions of sharp-tailed grouse be preceded by 2 months of predator control to increase survival of released birds. In a survey of U.S. public attitudes regarding predators and their management to enhance avian recruitment, Messmer et al. (1999) found that given information suggesting predators are among the threats to a declining bird population, the public generally supported using predator control for the protection of bird populations.

Batterson and Morse (1948) documented heavy predation on sage grouse nests in northeastern Oregon and concluded that the greatest single limiting factor for sage grouse populations was nest predation by ravens. Magpies, American crows (*Corvus brachyrhynchos*), coyotes and badgers were also documented as nest predators, but of much less importance than ravens. The authors initiated a raven control program and subsequently documented a 51% nesting success rate in their treatment area versus a 6% nesting success rate in an area where no ravens were removed. The authors also believed that raven predation on chicks up to 10 days old accounted for the greatest predatory loss of chicks in their study areas. They considered raven control an essential element of sage grouse management.

Keister and Willis (1986) suggested that the major factor in determining sage grouse population levels in their study area in southeastern Oregon was loss of nests and chicks during the first 3 weeks after hatching. Coyotes and ravens were suspected as the primary nest predators. A coyote removal project was implemented on their study area, and sage grouse productivity increased dramatically from 0.13 chicks/hen to 2.45 chicks/hen in just 3 years. Willis et al. (1993) analyzed data on sage grouse and predator populations, weather, and habitat from an area of Oregon that had some of the best sage grouse habitat in the state. The only meaningful relationship they found was a significant negative correlation between coyote abundance and the number of sage grouse chicks produced per hen. They concluded that fluctuation in predator abundance was probably the single most important factor affecting annual productivity of sage grouse in their study area. Presnall and Wood (1953) documented an example illustrating the potential of coyotes as predators on sage grouse. In tracking a coyote approximately 5 miles to its den in northern Colorado, they found evidence along the way that the coyote had killed three adult sage grouse and destroyed a sage grouse nest. Examination of the stomach contents from an adult female coyote removed the next day revealed parts of an adult sage hen plus six whole newly-hatched sage grouse chicks. The area around the den was littered with sage grouse bones and feathers. No other prey remains were found around the den, and it appeared that the pups had been raised largely upon sage grouse.

In southern Idaho, nesting success is not necessarily believed to be a limiting factor for sage grouse (J. Connelly, IDFG, pers. comm., 2001), but low chick survival during the first 2-3 weeks after hatching has been identified as a potentially limiting factor. Burkepile et al. (2001) radio-marked 31 chicks from 13 broods in 1999 and 44 chicks from 15 broods in 2000. Survival estimates for 1999 and 2000 were only 15% and 18%, respectively. Predators were responsible for 90% of the mortality in 1999 and 100% of the mortality in 2000. Red fox were believed to be one of the primary chick predators, but predation was also confirmed by unidentified avian and other mammalian predators as well. Bunnell and Flinders (1999) also documented significant predation by red fox on sage grouse in their study area in Utah, and recently revised sage grouse management guidelines (Connelly et al. 2000) suggest that red fox populations should be discouraged in sage grouse habitats. To the extent that red fox, coyotes, ravens and other predators which prey on chicks are also preying on eggs, reducing the populations of these predators from sage grouse nesting and early brood-rearing areas has the potential to benefit both nesting success and chick survival.

In April, 2000, WS participated in a pilot project in the Curlew Valley area of southeastern Idaho to help assess potential benefits of predator control for the protection of sage grouse. Artificial sage grouse nests were deployed in an approximately 32 mi^2 treatment area and a similar non-treatment area to assess relative predation rates prior to predator removal. Predation rates on artificial nests were similar in both areas prior to initiation of predator removal. After 4 weeks of predator removal in the treatment area (targeting ravens, coyotes, red fox, and badgers), relative predation rates were once again measured via artificial nests in both areas. In the predator removal area, only 28% of the artificial nests were destroyed in one week, but in the non-treatment area, 98% of all the artificial nests were destroyed by predators. Although this preliminary study did not assess actual sage grouse nesting success or chick survival, the results suggest that there could be potential benefit to sage grouse through predator control.

Ring-Necked Pheasants and Turkeys

Dumke and Pils (1973) reported that ring-necked pheasant (*Phasianus colchicus*) hens were especially prone to predation during their nest incubation period. Trautman et al. (1974) examined the effects of predator removal on pheasant populations in South Dakota by monitoring pheasant populations in similar 100 mi^2 areas with and without predator control. They examined two variations of predator removal, one targeting only red fox for 5 years, and the other targeting badger, raccoon (*Procyon lotor*), striped skunks (*Mephitus mephitus*) and red fox for 5 years. They found pheasant densities were 19% and 132% higher in predator removal areas than in non-removal areas during fox removal and multiple predator species removal, respectively. Chesness et al. (1968) examined the effects of predator removal on pheasant populations in paired treatment and non-treatment areas in Minnesota over 3 years by targeting primarily nest predators, including skunks, raccoons, and crows. They reported a 36% hatching success in predator removal areas versus a 16% hatching success in non-removal areas, as well as higher clutch sizes and chick production in predator removal areas. Nohrenberg (1999) investigated the effects of limited predator removal on pheasant populations on his study areas in southern Idaho and found consistently higher pheasant survival and productivity in predator removal areas as compared to similar non-removal areas.

Thomas (1989) and Speake (1985) reported that predators were responsible for more than 40% of nest failures of wild turkeys (*Meleagris gallopavo*) in New Hampshire and Alabama, respectively. Everret et al. (1980) reported that predators destroyed 7 of 8 nests on his study area in northern Alabama. Lewis (1973) and Speake et al. (1985) reported that predation was also the leading cause of mortality in turkey poults, and Kurzejeski et al. (1987) reported in a radio-telemetry study that predation was the leading cause of mortality in hens. Wakeling (1991) reported that the leading natural cause of mortality among older turkeys was coyote predation, with the highest mortality rate for adult females occurring in winter. Other researchers report that hen predation is also high in spring when hens are nesting and caring for poults (Speake et al. 1985, Kurzejeski et al. 1987, Wakeling 1991). Williams et al. (1980) reported a 59% hatching success for turkeys prior to a predator poisoning campaign, versus a 72% hatching success following a predator poisoning campaign.

Waterfowl

In a study of waterfowl nesting success in Canada, researchers found that eggs in most nests were lost to predators such as red foxes, coyotes, striped skunks, raccoons, Franklin's ground squirrels (*S. franklinii*), badgers, black-billed magpies and American crows (Johnson et al. 1988). Cowardin et al. (1985) determined that predation was by far the most important cause of nest failure in mallards (*Anas platyrhynchos*) on their study area. Various studies have shown the skunk and raccoon to be a major waterfowl nest predator resulting in poor nesting success (Keith 1961, Urban 1970, Bandy 1965). On the Sterling Wildlife Management area in southern Idaho, striped skunks, red fox and black-billed magpies were documented as common predators of nesting ducks, with magpie predation identified as the most significant factor limiting waterfowl production (Gazda and Connelly 1993).

In documenting an extensive study of the effects of red fox predation on waterfowl in North Dakota (Sargeant et al. 1984), the authors concluded that reducing high levels of predation was necessary to increase waterfowl production. Balser et al. (1968) determined that predator damage management resulted in 60% greater production in waterfowl in areas with damage management as compared to areas without damage management. He also recommended that when conducting predator damage management, the entire complex of potential predators should be targeted or compensatory predation may occur by a species not under control, a phenomena also observed by Greenwood (1986). Rohwer et al. (1997) documented a 52% nesting success for upland nesting ducks in an area receiving predator control, versus only a 6% nesting success in a similar non-treatment area. Garrettson and Rohwer (2001) likewise documented dramatically higher duck nesting success in areas where predators were removed during the nesting season as compared to areas where no predators were removed, and noted that the annual nature of predator removal allowed for greater management flexibility than most habitat management efforts.

Northern and Southern Idaho Ground Squirrel

The U.S. Fish and Wildlife Service designated the northern Idaho ground squirrel as a Federally listed threatened species in May, 2000 (50 CFR 17.11(h)). There are fewer than 15 surviving populations of this species left in the world, with most comprised of less than 50 individuals, and some with less than 10 individuals. Most of these few remaining populations occur in Adams County. In October, 2001, the FWS also determined that the southern Idaho ground squirrel warrants protection under the Endangered Species Act, but is precluded from listing by other priorities. The southern Idaho ground squirrel currently exists in only a few locations in Gem, Payette, and Washington Counties. A 1999 survey of known historic population sites for the southern Idaho ground squirrel revealed only 53 sites occupied, with most of these sites containing fewer than 20 individuals. Although predation by raptors, badgers, and other species is a normal part of life for ground squirrels, at current population levels any predation could potentially eliminate an entire population. Badger predation is a particularly significant problem, because ground squirrels have no safe refuge from the badgers' highly effective digging behavior. Badgers prey on nursing young, especially just before their first emergence above ground, and also dig out many burrows just after seasonal emergence (Yensen and Sherman 1997). With so few of these ground squirrels left, loss of even a single population should be avoided. Predator control is considered essential for the successful reestablishment and recovery of these species (E. Yensen, Albertson College, pers. comm., 2001).

Deer and Pronghorn Antelope

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, Bartush 1978, USDI 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 show that coyote predation had a significant influence on white-tailed deer (*O. virginianus*), black-tailed deer (*O. hemionus columbianus*), pronghorn antelope and bighorn sheep (*Ovis canadensis*) populations.

Mackie et al. (1976) documented high winter loss of mule deer (*O. hemionus*) to coyote predation in north-central Montana and stated that coyotes were the cause of most overwinter deer mortalities. Teer et al. (1991) documented that coyote diets contain nearly 90% deer during May and June. They concluded from work done at the Welder Wildlife Refuge, Texas that coyotes take a large portion of the fawns each year during the first few weeks of life. Remains of 4 to 8 week old fawns were also common in coyote scats (feces) in studies from Steele (1969), Cook et al. (1971), Holle (1977), Litvaitis (1978), Litvaitis and Shaw (1980). Mule deer fawn survival was significantly increased and more consistent inside a predator-free enclosure in Arizona (LeCount 1977, Smith and LeCount 1976). Hamlin et al. (1984) observed that a minimum of 90% summer mortality of fawns was a result of coyote predation. Trainer et al. (1981) reported that heavy mortality of mule deer fawns during early summer and late autumn and winter was limiting the ability of the population to maintain or increase itself. Their study concluded that predation, primarily by coyotes, was the major cause for low fawn survival on Steens Mountain in Oregon. Other authors observed that coyotes were responsible for most of fawn mortality during the first few weeks of life (Knowlton 1964, White 1967).

Guthery and Beasom (1977) demonstrated that after coyote damage management, deer fawn production was more than 70% greater after the first year, and 43% greater after the second year in their southern Texas study area. Another Texas study (Beasom 1974a, 1974b) found that predators were responsible for 74% and 61% of the fawn mortality for two consecutive years. Stout (1982) increased deer production on three areas in Oklahoma by 262%, 92% and 167% the first summer following coyote damage management, an average increase of 154% for the three areas. 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 88% to 97% of the mortality. Knowlton and Stoddart (1992) reviewed deer productivity data from the Welder Wildlife Refuge following coyote reduction. Deer densities tripled compared with those outside the enclosure, but without harvest management, ultimately returned to original densities due primarily to malnutrition and parasitism.

Jones (1949) believed that coyote predation was the main limiting factor of pronghorn antelope in Texas. A six-year radio telemetry study of pronghorn antelope in western Utah showed that 83% of all fawn mortality was attributed to predators (Beale and Smith 1973). In Arizona, Arrington and Edwards (1951) showed that intensive coyote damage management was followed by an increase in pronghorn antelope to the point where antelope were once again huntable, whereas on areas without coyote damage management this increase was not noted. Similar observations of improved pronghorn antelope fawn survival and population increase following damage management have been reported by Riter (1941), Udy (1953) and Smith et al. (1986). Major losses of pronghorn antelope fawns to predators have been reported from additional radio telemetry studies (Beale 1978, Barrett 1978, Bodie 1978, Von Gunten 1978, Hailey 1979, and Tucker and Garner 1980).

Coyote damage management on Anderson Mesa, Arizona increased the herd from 115 animals to 350 in three years, and peaking at 481 animals in 1971 (Neff et al. 1985). After coyote damage management was stopped, the pronghorn fawn survival dropped to only 14 and 7 fawns per 100 does in 1973 and 1979, respectively. Initiation of another coyote damage management program began with the reduction of an estimated 22% of the coyote population in 1981, 28% in 1982, and 29% in 1983. Pronghorn antelope populations on Anderson Mesa, during 1983, showed a population of 1008 antelope, exceeding 1000 animals for the first time since 1960. Fawn production increased from a low of 7 fawns per 100 does in

1979 to 69 and 67 fawns per 100 does in 1982 and 1983, respectively. After a five-year study, Neff and Woolsey (1979, 1980) determined that coyote predation on pronghorn antelope fawns was the primary factor causing fawn mortality and low pronghorn densities on Anderson Mesa, Arizona. Smith et al. (1986) noted that controlling coyote predation on pronghorn fawns could result in 100% annual increases in population size, and that coyote removal was a cost-effective strategy in pronghorn antelope management.

Clearly, under some circumstances, predator damage management can be an important tool in maintaining specific wildlife management objectives. When, if ever, predator damage management is undertaken in the analysis area specifically for these purposes, is a decision that would be made by the appropriate State or Federal wildlife management agency.

1.1.4 Wildlife Damage Management to Protect Public Safety.

The IDFG has lead responsibility for responding to complaints of black bears or mountain lions causing a nuisance or public safety concern (IDFG 1988). WS provides assistance in responding to these types of incidents when requests are received from the IDFG. Within the analysis area, human interactions with bears and mountain lions could occur wherever habitat or food sources overlap with human activities. Bears and mountain lions may pose a potential threat when they habituate to urban or residential locations, or recreation areas such as campgrounds or picnic areas. The IDFG responds to most such instances by live capturing bears in culvert traps and relocating them.

Although rare, mountain lion attacks on humans in the western U.S. and Canada have increased markedly in the last two decades, primarily due to increased lion populations and human use of lion habitats (Beier 1992). No lion-caused fatalities have been documented in Idaho, but recent fatal attacks in California and Colorado emphasize the need for awareness. During the FY 99 - FY 01 analysis period, WS responded to one incident involving a black bear and a total of nine incidents involving mountain lions where these species were perceived as posing a threat to public safety.

Coyotes sometimes create human safety threats when they spend time on airport runways. Although there have not yet been any reported incidents of coyotes actually being struck by departing or landing aircraft in the analysis area, such incidents have occurred at airports in other states. WS has responded to a number of requests from airports in Idaho where the presence of coyotes on the runway was considered a potential public safety hazard.

1.2 Relationship of This Environmental Assessment to Other Environmental Documents

1.2.1 WS Programmatic EIS.

WS has issued a final EIS and Record of Decision on the National APHIS-WS program (USDA 1994). The Record of Decision for the programmatic EIS was published on March 7, 1995. This EA will be tiered to that EIS.

1.2.2 National Forest Land Management Plans (LRMPs).

The National Forest Management Act requires that each National Forest prepare a Land Management Plan for guiding long range management and direction. The decision made from this document would need to be consistent with the Forest Plans for the Boise, Caribou-Targhee, Payette, Salmon-Challis, and Sawtooth National Forests, as well as the LRMP for the Curlew National Grassland. The Boise, Payette, and Sawtooth National Forests are currently revising their Forest Plans, but all three of these revised Forest Plans contain similar guidance specifying that wildlife damage management activities be conducted in compliance with WS' EA and Decision for conducting predator damage management in southern Idaho. The Caribou-Targhee National Forest's current Forest Plan likewise stipulates that predator control activities will be conducted as prescribed in WS EA's and Decisions regarding predator damage management, and further stipulates that the predator damage management program on the Caribou-Targhee

National Forest will be dynamic and responsive to change. Guidance in the Challis Forest Plan stipulates that predator damage management would be allowed on grazing allotments where a need is demonstrated.

1.2.3 BLM Resource Management Plans (RMPs).

The BLM currently uses RMPs to guide management on lands they administer. RMPs generally replace older land use plans known as management framework plans. Any decision made as a result of this EA process will be consistent with guidance in these RMPs regarding WS activities. If change in an RMP is deemed appropriate by BLM and WS to better facilitate accomplishment of the respective agency missions, amendment of an RMP may be considered.

1.2.4 Final EIS on The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho.

The entire southern Idaho analysis area falls within the nonessential experimental population areas identified for Central Idaho and Yellowstone National Park. The Final Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho EIS and 50 CFR 17.84 provide basic guidance on when, where, and how wolf damage management would be conducted. Additional, more specific guidance may be provided by the FWS through development or revision of specific policies regarding management of depredating wolves. Any decision made as a result of this EA process would be consistent with FWS guidance.

1.2.5 IDFG Management Plans.

The IDFG Wildlife Depredation Plan clarifies the legal roles and responsibilities of the IDFG and other agencies regarding wildlife damage management. Specific management plans for black bear, mountain lion, and furbearers outline management goals and objectives for these species. Any decision made as a result of this EA process would be consistent with guidance in these plans.

1.2.6 Grizzly Bear Contingency Plan for the Targhee National Forest.

This plan addresses when and how management of nuisance grizzly bears would occur on the Caribou-Targhee National Forest and defines agency roles and responsibilities. Any decision made as a result of this EA process would be consistent with guidance in the contingency plan.

1.3 Decision to be Made

Based on agency relationships, MOUs and legislative mandates, WS is the lead agency for this EA, and therefore responsible for the scope, content and decisions made. The Forest Service and BLM, along with the IDFG, Idaho State Department of Agriculture (ISDA), and Idaho Department of Lands (IDL), had input during preparation of the EA to ensure an interdisciplinary approach in compliance with NEPA and agency mandates, policies and regulations.

Based on the scope of this EA, the decisions to be made are:

- Should wildlife damage management as currently implemented be continued in the analysis area (the no action alternative)?
- If not, how should WS fulfill their legislative mandate and responsibilities in the analysis area?
- Might the proposal have significant impacts requiring preparation of an EIS?

1.4 Scope of This Environmental Assessment

1.4.1 Actions Analyzed.

This EA evaluates wildlife damage management activities to protect livestock, apiaries, poultry, or other property, and/or designated wildlife species (as determined by IDFG or FWS) from predation by coyotes, black bears, mountain lions, grizzly bears, red fox, bobcats (*Felis rufus*), badgers, gray wolves, raccoons, striped skunks, feral and free-ranging dogs, feral and free-ranging cats, American crows, common ravens, and/or black-billed magpies. This EA will also analyze activities to protect public safety from black bears, mountain lions and coyotes. Protection of other agricultural resources and other program activities has been addressed or will be addressed in other NEPA documents.

1.4.2 Wildlife Species Potentially Protected by WS.

IDFG has previously requested WS assistance to protect nesting waterfowl from predation by skunks, raccoons, feral house cats, red fox, coyotes, common ravens and black-billed magpies; ring-necked pheasants from predation by feral house cats, striped skunks, and red fox; sage grouse from predation by ravens, coyotes, red fox, badgers, and feral cats; and wild turkeys, white-tailed deer and mule deer from coyote predation. Also, the FWS has requested assistance in the past to protect endangered whooping cranes (*Grus americana*) from coyote and red fox predation at Grays Lake National Wildlife Refuge, and to protect the northern Idaho ground squirrel from badger, red fox and coyote predation. If the IDFG or FWS identify additional species in need of protection, a determination will be made on a case-by-case basis as to whether additional NEPA analysis would be needed.

1.4.3 American Indian Lands and Tribes.

Presently, no tribes have Cooperative Agreements with WS for conducting wildlife damage management activities. If a tribe enters into a Cooperative Agreement, this EA will be supplemented pursuant to NEPA if deemed necessary.

1.4.4 Period for Which This EA is Valid.

This EA will remain valid until WS and other appropriate agencies determine that new needs for action, changed conditions or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document will be supplemented pursuant to NEPA. Review of the EA will be conducted each year at the time of the annual planning process by WS and cooperating agencies to ensure that the EA is complete and appropriate.

1.4.5 Site Specificity.

This EA addresses the potential impacts of predator damage management on all lands under Cooperative Agreement, Agreement for Control or WS Annual Work Plans in the Southern Idaho Analysis Area. These lands are under the jurisdiction of the Forest Service, BLM, FWS, Department of Defense, State, County, municipal and private ownership. It also addresses the potential impacts of predator damage management on areas where additional agreements may be signed in the foreseeable future. Because the proposed action is to reduce wildlife damage and because the program's goals and directives are to provide service when requested, within the constraints of available funding and workforce, it is conceivable that additional wildlife damage management efforts (beyond current levels) could occur. Although some individuals have questioned the appropriateness of preparing an EA for an area as large as 30 million acres, this approach likely provides a better analysis of cumulative impacts than preparing multiple EAs covering smaller zones within the analysis area.

WS can sometimes predict the location and types of needs, damage and risks based on historical records or previous damage problems, and take action to prevent or reduce the likelihood of further damage. WS cannot, however, predict specifically where most wildlife damage problems will always occur, nor predict the exact locations where control tools or methods might be employed. Decisions regarding where and when to employ specific control tools are made on a case-by-case basis according to the standard WS Decision Model (Slate et al. 1992). (See Chapter 3 for a description of the WS Decision Model and its application.) The standard WS Decision Model will be the site-specific procedure for individual actions carried out by WS in the analysis area.

1.4.6 Summary of Public Involvement.

When WS prepared a similar EA in 1996, issues related to the proposed action were initially identified through a multiagency process involving WS, the Forest Service, BLM, IDFG, ISDA, and IDL. A public involvement letter outlining the issues, objectives, preliminary alternatives and a summary of the need for action, was sent to about 500 individuals or organizations who had identified an interest in WS issues. Notice of the proposed action and availability of the scoping letter were placed in the 4 major newspapers within the analysis area. Responses from the public reflected a wide range of opinions, both supporting and opposing the proposal. This EA and supporting documentation addresses all the issues that were identified during the 1996 EA process, as well as additional issues raised by the public and cooperating agencies since that time.

1.4.7 Results of Public Review of the Draft EA.

Any additions or revisions deemed necessary after reviewing public comments on this EA will be handled either through revision of this EA or by addressing specific public comments in conjunction with the written decision document.

1.5 Authority and Compliance

1.5.1 Authority of Federal[3] and State Agencies in Wildlife Damage Management in Idaho.

WS Legislative Mandate

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 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 its 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 mandate of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

[3] A more detailed discussion of WS' legal authorities and key legislation pertinent to wildlife damage management can be found in Chapter 1 of WS' programmatic EIS (USDA 1994).

"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."

Idaho State Animal Damage Control (ADC) Board

Establishment of the Idaho State ADC Board was provided for under Idaho Code 25-128. The Board is composed of the Chairman of the State Board of Sheep Commissioners, a representative of the Idaho Cattle Association, the Director of the ISDA, the Director of the IDFG, and the Chairmen of the 5 ADC Districts in the State of Idaho. The Board is charged with coordinating and giving general direction to, "*Programs to prevent and control damage or conflicts on federal, state, or other public or private lands caused by predatory animals, rodents, or birds injurious to animal husbandry, agriculture, horticulture, forestry, wildlife and human health or safety . . .*"

Under the provisions of a MOU between the State ADC Board and the APHIS-WS program, WS cooperates with the Board in carrying out wildlife damage management in Idaho.

Idaho Department of Fish and Game

In Idaho, management of black bear, mountain lion and furbearer species is the responsibility of the IDFG. However, under the current MOU between WS and the State ADC Board, WS has been given the responsibility to respond to livestock damage caused by black bear, mountain lion, red fox and bobcat. Idaho Code 36-1109 states that "Prevention of depredation shall be a priority management objective of the department (IDFG), and it is the obligation of landowners to take all reasonable steps to prevent property loss from black bears or mountain lions or to mitigate damage by such." This statute further provides for monetary compensation to landowners suffering livestock depredations from black bear or mountain lion, or when black bears damage berries or honey on private land. Damage must be confirmed by WS, and there is a $1000 deductible per occurrence.

Under Idaho Code 36-1107, the Director of IDFG may authorize landowners or lessees to take any protected wildlife species causing damage to property. This law also authorizes livestock owners or their employees to take black bears or mountain lions that are molesting livestock, without the need for any special permit or authorization.

Idaho State Department of Agriculture

Under the provisions of Idaho Code 22-103(24), the Director of the ISDA is authorized, "*To take all steps that are deemed necessary to prevent and control damage or conflicts on federal, state, or other public or private lands caused by predatory animals, rodents, or birds, including threatened or endangered wildlife within the state of Idaho as are established by federal or state law, federal or state regulation, or county ordinance, that are injurious to animal husbandry, agriculture, horticulture, forestry, wildlife and human health and safety.*" Under Idaho Code 22-102A, the ISDA is also responsible for issuance of private aerial hunting permits for predator damage management. This function is handled for the ISDA through the State ADC Board.

U.S. Forest Service and Bureau of Land Management

The Forest Service and BLM have the responsibility to manage the resources of Federal lands for multiple uses including livestock grazing, timber production, recreation and wildlife habitat, while recognizing the State's authority to manage wildlife populations. Both the Forest Service and BLM recognize the importance of reducing wildlife damage on lands and resources under their jurisdiction, as integrated with their multiple use responsibilities. For these reasons, both agencies have entered into MOUs with WS to facilitate a cooperative relationship. Copies of these MOUs are available by contacting the WS State Director's office at 9134 W. Blackeagle Drive, Boise, Idaho 83709.

1.5.2 Compliance With Federal Laws.

WS consults and cooperates with other Federal and State agencies as appropriate to ensure that all WS activities are carried out in compliance with all applicable Federal laws.

National Environmental Policy Act

All Federal actions are subject to NEPA (Public Law 91-190, 42 U.S.C. 4321 et seq.). WS follows the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500 et seq.), USDA (7 CFR 1b), and the APHIS Implementing Guidelines (7 CFR 372) as a part of the decision-making process. These laws, regulations, and guidelines generally outline five broad types of activities to be accomplished as part of any project: public involvement, analysis, documentation, implementation, and monitoring. NEPA also sets forth the requirement that all major Federal actions be evaluated in terms of their potential significant impact on the quality of the human environment for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. Federal activities affecting the physical and biological environment are regulated, in part, by CEQ through regulations in Title 40, Code of Federal Regulations, Parts 1500-1508. In accordance with CEQ and USDA regulations, APHIS Guidelines Concerning Implementation of NEPA Procedures, as published in the Federal Register (44 CFR 50381-50384) provide guidance to APHIS regarding the NEPA process.

Pursuant to NEPA and CEQ regulations, this EA documents the analysis of a proposed Federal action's impact, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse impacts, and serves as a decision-aiding mechanism to ensure that the policies and goals of NEPA are infused into Federal agency actions. An EA is prepared by integrating as many of the natural and social sciences as may be warranted based on the potential effects of the proposed action. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

Endangered Species Act (ESA)

Under the ESA, all Federal agencies are charged with a responsibility to conserve endangered and threatened species and to utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with the FWS to utilize the expertise of the FWS 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 or threatened species . . .* " (Sec.7(a)(2)). WS conducts formal Section 7 Consultations with the FWS at the National level and informal consultations with the FWS at the local level as appropriate.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act provides the FWS regulatory authority to protect migratory birds. The law prohibits any "take" of these species, except as permitted by the FWS. The WS program receives annual authorization from the FWS to take migratory birds that are causing damage problems.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All pesticide products used by WS in the analysis area are registered with and regulated by the EPA and the ISDA. All WS use of pesticides is carried out in compliance with labeling requirements.

National Historical Preservation Act (NHPA) of 1966, as amended

The NHPA requires Federal agencies to: 1) evaluate the effects of any Federal undertaking on cultural resources, 2) consult with the State Historical Society 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 resources in areas of these Federal undertakings. In conjunction with preparation of this EA, WS consulted with the Idaho State Historical Society and received that office's concurrence that WS' proposed activities would be unlikely to have any adverse effects on cultural, archeological, or historic resources. WS also sought input from the Shoshone-Bannock Tribes and the Shoshone-Paiute Tribes, but none of the Tribes in the analysis area identified any cultural or other concerns relating to WS current or proposed program. In most cases, wildlife damage management has little potential to cause adverse effects to sensitive cultural resources. The areas where wildlife damage management would be conducted are small and pose minimal ground disturbance. In addition, any WS activities conducted on tribal lands would only be conducted at the request of the tribe and after appropriate authorizing documents were signed.

Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Environmental Justice (EJ) is a movement promoting 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. Fair treatment implies that no person or group of people should endure a disproportionate share of the negative environmental impacts resulting either directly or indirectly from the activities conducted to execute this country's domestic and foreign policies or programs. EJ 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.

All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to ensure EJ. WS personnel use wildlife damage management methods as selectively and environmentally conscientiously as possible. All pesticide products used by WS are regulated by the EPA through FIFRA, by the ISDA, and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used following label directions, they are selective to target individuals or populations and such use has negligible impacts on the environment (USDA 1994, Appendix P). The WS operational program, analyzed in this document, 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 or low-income persons or populations.

Executive Order 13045 - Protection of Children from Environmental Health and Safety Risks

Children may suffer disproportionately from environmental health and safety risks, including their developmental physical and mental status, for many reasons. Because WS makes it a high priority to identify and assess environmental health and safety risks, WS has considered the impacts that alternatives analyzed in this EA might have on children. All WS predator damage management is conducted using only legally available and approved damage management methods where it is highly unlikely that children would be adversely affected.

1.6 A Preview of the Remaining Chapters in This EA

The remainder of this EA is composed of 3 additional Chapters and 2 Appendices. Chapter 2 identifies and discusses the issues and affected environment. Chapter 3 contains a description of each alternative, alternatives not considered in detail, mitigation and standard operating procedures. Chapter 4 analyzes the environmental impacts associated with each of the alternatives considered in detail.

CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

2.0 Introduction

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), issues that were used to develop mitigation measures and standard operating procedures, and issues that will not be considered in detail, with brief discussion of those issues. Also included are a list of issues identified and addressed in the 1996 EA and Decision on Predator Damage Management in Southern Idaho, but for which explanations will not be repeated in this document. Pertinent portions of the affected environment will be included in this chapter in the discussion of the issues. Additional affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4 and the description of the current program (the "no action" alternative) in Chapter 3.

2.1 Issues Analyzed in Detail in Chapter 4

The following primary issues were identified with input from other Federal and State agencies and members of the public:

Issue 1. Cumulative impacts on viability of wildlife populations.

- Potential for WS take of predators to negatively impact harvest of predators by private trappers and hunters.
- Potential for WS predator removal to affect biodiversity.

Issue 2. Effectiveness and selectivity of damage management methods.

- Potential for WS methods to take nontarget animals.
- Need for a wide variety of damage management methods.
- Criteria for deciding what methods will be used.
- Use of "preventive" damage management work.

Issue 3. Risks posed by damage management methods to the public and domestic pets

Issue 4. Concern about WS impacts on Threatened and Endangered (T/E) species and other species of special concern.

Issue 5. Cost-effectiveness of WS activities.

Issue 6. Concerns about aerial hunting activities.

- Disturbance of nontarget wildlife through aerial hunting activities.
- Potential environmental effects related to aircraft accidents.

2.2 Issues Considered in Developing Mitigation and Standard Operating Procedures

2.2.1 Wildlife Damage Management in Special Management Areas on Federal Lands.

A number of different types of areas exist on Federal lands within the analysis area which currently have a special designation and/or require special management consideration. These include Wilderness Areas (WAs) or Primitive Areas (PAs), Wilderness Study Areas (WSAs), Research Natural Areas (RNAs), Areas of Critical Environmental Concern (ACECs), a National Recreation Area (NRA), a National Conservation Area, and a National monument. The special management required for these different areas varies considerably by designation and land administrator, and is governed by different legal mandates.

WAs or PAs areas are areas that have been designated by Congress to be managed for the preservation of wilderness values. These areas are currently located on Forest Service lands, but existing WSAs on BLM lands could be officially designated in the future.

WS has conducted some wildlife damage management in special management areas in the past. Recreationists and others interested in special management areas (particularly WAs) may consider these activities to be an invasion of solitude that may adversely affect the aesthetic quality of the wilderness experience.

WS wildlife damage management is conducted (and is proposed to continue in the future) in WAs only in limited instances, when and where a specific need is identified, only when allowed under the provisions of the specific WA designation, and only after consultation with the responsible land management agency. WS activities in special management areas have historically been, and are expected to continue to be a minor part of the overall WS program. Standard operating procedures for conducting predator damage management in WAs and WSAs are listed at the end of Chapter 3.

BLM Special Management Areas

WSAs. WSAs have been studied for their potential to qualify as WAs and are currently awaiting Congressional designation. These are primarily BLM lands and are managed in accordance with the BLM's WSA Handbook H-8550-1 in a manner that does not diminish their wilderness value (BLM 1995). This interim management allows for continuation of most prior (non-land disturbing) activities and does not preclude wildlife damage management. The only WSA where wildlife damage management has recently occurred is the Jarbidge WSA. WS activities in this area are conducted infrequently, and only for corrective damage management using methods that are species-selective (i.e., aerial hunting or calling and shooting). Aerial hunting in WSAs must receive prior approval of the BLM State Director.

RNAs. RNAs are Federal lands managed for the protection of unusual, scientific, or natural characteristics for research and education. BLM policy does not automatically exclude wildlife damage management within these areas, but WS activities are restricted to corrective damage management only. Limited corrective damage management work occurs on the Idaho National Environmental Engineering Laboratory, which is classified as an RNA.

ACECs. ACECs are BLM lands for which special management is deemed necessary. However, it should be noted that the legal mandate for designation and management of ACECs comes from the Federal Land Policy and Management Act (FLPMA) and is considerably different than either RNAs or WAs. FLPMA defines an ACEC as an area "*within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards.*" ACECs can be and are designated for a wide variety of special management situations ranging from maintaining near pristine scenic quality to the management of a hazardous waste dump. ACECs can be and are often designated for multiple uses. ACEC designation does not, by itself, preclude wildlife damage management, instead, the individual management prescriptions developed and presented within a given ACEC management plan determine what is allowable.

National Monuments. The boundaries of the Craters of the Moon National Monument were expanded in November, 2000 from 54,440 acres to approximately 700,000 acres. Most of the expanded area involved lands managed by the BLM prior to expansion of the Monument. With the newly expanded Monument boundaries, the National Park Service now manages those portions of the Monument containing exposed lava flows, while the BLM retains management authority for lands adjacent to the lava flows that are still used for grazing. WS activities for protection of livestock will still occur on these lands, subject to similar guidelines as were being followed prior to expansion of the Monument.

National Conservation Areas. The Snake River Birds of Prey National Conservation Area (NCA) was established by Congress in 1993 to recognize and perpetuate the area's wildlife values. It is the only NCA in Idaho. Grazing and predator damage management activities were specifically provided for in the Snake River Birds of Prey NCA authorizing legislation. WS activities for protection of livestock are conducted on the NCA as prescribed in the Annual Work Plan for conducting predator damage management in the BLM's Lower Snake River District. Aerial hunting activities are restricted between March 1 and July 1in the NCA to reduce any likelihood of potential effects to nesting raptors.

2.2.2 Animal Welfare and Humaneness of Methods Used by WS.

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. The issue of humaneness has two aspects in relation to the proposed action.

1. Animal welfare organizations are concerned that some methods used to manage wildlife damage expose animals to unnecessary pain and suffering. Research suggests that with some methods, such as restraint in foothold 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 5 minutes as those restrained in traps (USDA 1994). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness.

2. Humaneness, as perceived by the livestock industry and pet owners, requires that domestic animals be protected from predators because humans have bred 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 1994). Predators frequently do not kill larger prey animals quickly, and will often begin feeding on them while they are alive and still conscious (Wade and Bowns 1982).

Thus, the decision-making process involves tradeoffs between the above two aspects of humaneness. An objective analysis of this issue must consider not only the welfare of a wild animal caught in a foothold trap, but also the welfare of the domestic animals that may continue to be maimed and killed if the foothold trap were not being used. The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology, funding, and a limited workforce.

WS has improved the selectivity of control tools through research and development of trap pan tension devices, break-away snares, and the LPC, and is striving to bring additional new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some methods are used in those situations when some non-lethal damage management methods are not practical or effective. WS personnel are experienced and professional in their use of management methods so that they are as humane as practically possible. Mitigation measures/standard operating procedures relative to this issue are listed in Chapter 3.

2.2.3 The Public's Concern About use of Pesticides.

Much of the public's concern over the use of toxicants for predator damage management is based on an erroneous perception that WS uses non-selective, outdated chemical methodologies. In reality, however, the pesticide products currently used by WS have a high degree of selectivity and are registered for specific uses by the EPA. WS use of registered pesticides is regulated by the EPA through the FIFRA, by MOU's with other agencies, and by WS directives. In addition, APHIS conducted a thorough risk assessment that concluded chemicals used according to label directions are selective for target individuals or populations, and that such use has negligible impacts on the environment (USDA 1994, Appendix P).

2.3 Other Issues Identified and Addressed in the 1996 EA and Decision

In addition to the 6 primary issues identified for in-depth analysis in Chapter 4 of this EA, a number of other issues were identified in the 1996 EA and Decision on Predator Damage Management in Southern Idaho. These issues were briefly addressed in Chapter 2 of the 1996 EA or in the corresponding July 22, 1996 Decision document. For those issues where the responses in the 1996 documents remain substantially the same, those explanations will not be repeated in this document, but all those explanations are hereby incorporated by reference from both the April 1996 EA and the corresponding Decision signed on July 22, 1996. Issues in this category are listed below:

1. Livestock losses are a cost of doing business and some minimum threshold of loss should be considered.
2. Wildlife damage management should be totally user-funded, with no tax-dollar support.
3. Appropriateness of manipulating wildlife for the benefit of hunters or recreation.
4. Appropriateness of using rancher-supplied data to quantify livestock losses.
5. Relocation (rather than killing) of problem wildlife.
6. WS work on private versus public lands.
7. Rancher responsibility to protect their own livestock through use of husbandry methods.
8. Qualifications of WS personnel.
9. Appropriateness of WS, rather than Forest Service or BLM, preparing this NEPA document.
10. Potential for WS take of predators to result in population increases of rodents and rabbits, which might lead to increased agricultural damage.
11. Need for public awareness and education.
12. Protected status of some predator species versus a less protected status for some game birds and mammals.
13. Need to conduct monitoring to assess efficacy of mitigation measures.
14. Bounty payments to private hunters and trappers instead of government predator control.
15. Appropriateness of preventive control for reducing coyote predation on livestock.
16. Appropriateness of citing literature regarding studies conducted outside of Idaho.

2.4 Additional Issues Identified Since the 1996 EA and Decision, or for Which Additional Information has Become Available, but Which Will Not be Addressed in Detail in Chapter 4

2.4.1 Potential for lethal predator control to actually cause increased coyote populations and increased predation because of compensatory reproduction.

Assessing the effect of damage management programs on coyote populations requires an understanding of the mechanisms and behaviors involved in regulating coyote demographic processes (Knowlton et al. 1999). Coyotes are territorial with territories spaced contiguously across the landscape like pieces of a puzzle, and coyotes are territorial year-round residents, living in summer where they can survive in winter (Weaver 1979, Gantz 1990, Shivik et al. 1996). Hence, territory density remains relatively constant (Knowlton et al. 1999) with each territory maintained and controlled by a dominant pair of coyotes (alpha pair), with associated coyotes, including pups (beta coyotes) (Gese et al. 1996a, 1996b). Populations also include transient and dispersing individuals. In addition, coyotes are monestrous with only the dominant breeding pair typically producing a single litter per territory each spring (Kennelly and Johns 1976); beta females may also produce offspring, but this rarely occurs (Gese et al. 1996a). Because stable populations require that on average breeding adults only recruit enough surviving offspring into the breeding population to replace themselves, normally less than 10% of the young from a given pair of coyotes need to survive and reproduce to maintain the population (Knowlton et al. 1999). The other 90% die, disperse, or fail to reproduce.

Available food, especially in winter (Weaver 1979, Gese et al. 1996a), is often considered the major factor regulating coyote abundance (Gier 1968, Clark 1972), mediated through social dominance and territoriality (Knowlton and Stoddart 1983, Gese et al. 1988, 1989, Knowlton and Gese 1995, Windberg 1995). Some researchers believe food abundance regulates coyote numbers by influencing reproduction, survival, dispersal, space-use patterns, and territorial density (Gier 1968, Knowlton 1972, Todd et al. 1981, Todd and Keith 1983, Mills and Knowlton 1991, Gese et al. 1996a). In contrast, Crabtree and Sheldon (1999) have suggested that litter size at birth (among coyotes) appears relatively invariant with respect to changes in prey abundance, and that litter size at birth appears largely unaffected by levels of human exploitation. Connolly and Longhurst (1975) demonstrated that coyote populations in exploited and unexploited populations do not increase at significantly different rates and that an area will only support a population to its carrying capacity.

Dispersal of "surplus" young coyotes is the main factor that keeps coyote populations distributed throughout their habitat. Such dispersal of subdominant animals removes surplus animals from higher density areas and repopulates areas where artificial reductions have occurred. Several studies (Connolly et al. 1976, Gese and Grothe 1995, Conner 1995, Shivik 1995, Sacks 1996, Shivik et al. 1996, Gese 1999) investigated the predatory behavior of coyotes and determined that the more dominant (alpha) animals (adult breeding pairs) were the ones that initiated and killed most of the prey items. Concerns that coyote removal activities might just exacerbate predation on livestock appear to be unfounded since the removal of local territorial (dominant, breeding adult) coyotes actually removes the individuals that are most likely to kill livestock and generally results in the immigration of subdominant coyotes that are less likely to prey on livestock.

2.4.2 Appropriateness of preparing an EA (instead of an EIS) for such a large area, rather than preparing multiple EAs for smaller, more site-specific areas.

Federal agencies have the discretion to determine the geographic scope of their NEPA analyses (*Kleppe v. Sierra Club,* 427 U.S. 390, 414 (1976)) and WS has determined that preparation of this EA to address predator control activities in southern Idaho is appropriate. If in fact a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA covering the entire southern Idaho analysis area may provide a better analysis than multiple EA's covering smaller zones within the analysis area. A more detailed and more site-specific level of analysis would not substantially improve the decision-making process, and pursuing a more site-specific and more detailed analysis might even be considered inconsistent with NEPA's emphasis on reducing unnecessary paperwork (Eccleston 1995).

2.4.3 Concerns that the Proposed Action may be "highly controversial" and its effects may be "highly uncertain," both of which would require that an EIS be prepared.

The failure of any particular special interest group to agree with every act of a Federal agency does not create a controversy, and NEPA does not require the courts to resolve disagreements among various scientists as to the methodology used by an agency to carry out its mission (Marsh v. Oregon Natural Resource Council, 490 U.S. 360, 378 (1989)). As was noted in the 1996 FONSI: "The effects on the quality of the human environment are not highly controversial. Although there is some opposition to predator control, this action is not highly controversial in terms of size, nature, or effect." If in fact a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared.

2.4.4 Immunocontraceptives or sterilization should be used instead of lethal predator control.

Contraceptive measures for mammals can be grouped into four categories: surgical sterilization, oral contraception, hormone implantation, and immunocontraception (the use of contraceptive vaccines). These techniques would require that each individual animal receive either single, multiple, or possibly daily treatment to successfully prevent conception. The use of oral contraception, hormone implantation, or immunocontraception would be subject to approval by Federal and State regulatory agencies.

These methods were not analyzed in detail in the EA because: (1) surgical sterilization would require that each animal be captured and sterilization conducted by licensed veterinarians and would therefore be extremely labor intensive and expensive; and (2) there are not currently any Federally or State approved chemosterilants available for operational use in predator control.

Bromley and Gese (2001a, 2001b) conducted studies to determine if surgically sterilized coyotes would maintain territorially and pair bond behavior characteristics of intact coyotes, and if predation rates by sterilized coyote pairs would decrease. Their results suggested that behaviorally, sterile coyote pairs appeared to be no different than intact pairs except for predation rates on lambs. Reproductively intact coyote packs were 6 times more likely to prey on sheep than were sterilized packs (Bromley and Gese 2001b). They believed this occurred because sterile packs did not have to provision pups and food demands were lower. Therefore, sterilization could be an effective method to reduce lamb predation if enough alpha (breeding) pairs could be captured and sterilized. During Bromley and Gese's (2001a, 2001b) studies: (1) they captured as many coyotes as possible from all packs on their study area, (2) they controlled coyote exploitation (mortality) on their study area and survival rates for coyotes were similar to those reported for mostly unexploited coyote populations, unlike most other areas, and (3) they concluded a more effective and economical method of sterilizing resident coyotes was needed to make this a practical management tool on a larger scale (Bromley and Gese 2001b).

As alternative methods of delivering sterilants are developed, sterilization may prove to be a more practical tool in some circumstances (DeLiberto et al. 1998). Reduction of local populations could conceivably be achieved through natural mortality combined with reduced fecundity. No predators would be killed directly with this method, however, and treated predators could continue to cause damage. Populations of dispersing predators would probably be unaffected.

Potential environmental concerns with chemical sterilization would still need to be addressed, including safety of genetically engineered vaccines to humans and other wildlife. At this time, chemical sterilization is controversial among wildlife biologists and many others. In any event, no contraceptive agents or methods are currently registered and are thus not legal for use or practical for use on predators in most areas. Should any become registered in the future, WS could consider them among the methods to be used in their program. Any additional NEPA analyses deemed necessary at that time would be conducted. The use of contraceptives is not realistic at this point, since effective and legal methods of delivering contraceptives to predators are not yet available for operational use.

2.4.5 Impacts of predator removal on the public's aesthetic enjoyment of predators.

Wildlife is generally regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Some members of the public have expressed concerns that predator damage management could result in the loss of aesthetic benefits to the public, resource owners, or local residents. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful.

WS predator damage management activities occur on a relatively limited portion of the total area in southern Idaho, and the portion of various predator species' populations removed through WS predator damage management activities is typically low (see Chapter 4). In localized areas where WS does remove some portion of the predator population, dispersal of predators from adjacent areas typically contributes to repopulation of the area within a few weeks to a year, depending on the level of predator removal and predator population levels in nearby areas. Most of the species potentially affected by WS predator control activities are relatively abundant, but are not commonly observed because of their secretive and largely nocturnal behavior. The likelihood of getting to see or hear a predator in some localized areas could be temporarily reduced as a result of WS predator control activities, but because there is already a low likelihood of seeing a predator, this temporary local reduction in public viewing opportunity would not likely be noticeable in most cases. Impacts on overall populations would be relatively low under any of the alternatives being considered in this EA, and opportunities to view, hear, or see evidence of predators would still be available under any of the alternatives being considered. The potential minor reduction in local opportunity to view predators must be weighed against the potential economic harm suffered by livestock owners or others affected by predator damage, if predator control were not implemented.

2.4.6 Potential effects of human activity (associated with predator control efforts) on wildlife.

Some members of the public have expressed concerns that the mere presence of WS personnel in the field during the spring months has the potential to cause harmful disturbance to wildlife, and could potentially cause deer or antelope fawns to be separated from their mothers, or might cause sage grouse to abandon their lek sites. Professional wildlife biologists with the IDFG believe there is no basis for this speculation, and have even found that sheep camps established for several days in the middle of sage grouse leks have not resulted in permanent abandonment of leks (S. Huffaker, IDFG Wildlife Bureau Chief, letter to M. Collinge, WS State Director, September 25, 2001).

Some members of the public have even suggested that the mere presence of WS personnel in the field could actually cause increased predation on sage grouse or other bird species, because predators might see the birds as they flush from their nests (in response to human activity) and then go directly to the nest site to prey on eggs or chicks. MacIvor et al. (1990) specifically examined whether nest monitoring and other research activities influenced rates of red fox predation on both natural and artificial piping plover nests, and concluded that even daily monitoring of nests was unlikely to result in any increased risk of predation. WS employees rarely encounter sage grouse or other bird species on their nests, and it is unlikely that a brief one-time disturbance would cause a bird to permanently abandon its nest or lead to increased predation risk. But even if every nesting bird disturbed by a WS employee actually abandoned its nest or had it's nest destroyed by a predator, these encounters occur so rarely that they would be inconsequential in terms of impacts on local populations. Deer and antelope fawns are likewise rarely encountered during WS activities, and abandonment of fawns has never been documented in response to WS or IDFG field activities. Based on vast field experience, IDFG finds no basis for this speculation or concern (S. Huffaker, IDFG Wildlife Bureau Chief, letter to M. Collinge, WS State Director, September 25, 2001).

2.4.7 Concerns that the killing of wildlife represents "irreparable harm."

Some members of the public have suggested that the killing of any wildlife represents irreparable harm. Although an individual predator or multiple predators in a specific area may be killed through WS predator control activities, this does not in any way irreparably harm the continued existence of these species. Idaho's historic and current populations of big game animals, game birds, furbearers and unprotected predators, which annually sustain harvests of thousands of animals, are obvious testimony to the fact that the killing of wildlife does not cause irreparable harm. Populations of some of these species are in fact much higher today than they were several decades ago (e.g., elk (*Cervus elaphus*), mountain lions, red fox), in spite of liberal hunting seasons and the killing of hundreds or thousands of these animals annually. The legislated mission of the IDFG is to preserve, protect, and perpetuate all the wildlife of the State. The IDFG would never allow any activity that would cause irreparable harm to the wildlife resource of the State, and IDFG strongly disagrees that the killing of wildlife represents irreparable harm (S. Huffaker, IDFG Wildlife Bureau Chief, letter to M. Collinge, WS State Director, September 25, 2001).

2.4.8 Concerns that WS employees might unknowingly trespass onto private lands or across State boundary lines, either on the ground or during aerial hunting activities.

WS is well aware that it is sometimes difficult to determine land ownership in some areas, and WS field employees make diligent efforts to ensure that they do not enter properties where they do not have permission. Landowners who request assistance from WS typically provide WS representatives with very specific information not only about the property boundaries of their own land, but about the boundaries of neighboring lands as well. WS aerial hunting activities are typically conducted with the aerial crew in radio contact with a WS representative on the ground who knows the property boundaries of the area being worked.

2.4.9 Direct, indirect, and cumulative impacts of proposed activities on soils, water quality, watersheds, wildlife, including T/E species and other special status species), native vegetation, and recreation.

Potential impacts of predator control activities on wildlife and recreation are addressed in detail in Chapter 4. Potential impacts of WS predator control activities on T/E species have been addressed through formal and informal Section 7 Consultation with the FWS. Potential impacts on soils, water, watersheds, and native vegetation would be expected to be minimal, and are addressed here. The Idaho WS program coordinates its predator damage management activities with the U.S. Forest Service, BLM, FWS, and the IDFG to help ensure there are no significant direct, indirect or cumulative impacts to any resources managed by these agencies. WS predator damage management may often involve such activities as driving a pickup truck on a road, riding a horse through forests or rangelands, or digging a shallow excavation to conceal a foothold trap, but these activities would not reasonably be expected to have any significant adverse impacts on soils, water, watersheds, or native vegetation. If predator damage management activities are conducted in situations where local travel may be difficult due to muddy road conditions, WS field employees exercise conservative judgement to mitigate any potential damage to roads or roadside vegetation. In some cases this may mean delaying travel through certain areas until road conditions improve, or using alternate means of transportation such as horses. WS employees are also cognizant of the threat of noxious weeds to rangelands and watersheds, and exercise routine preventive measures to reduce the likelihood of spreading noxious weeds (e.g., using weed-free feeds for horses when appropriate, and routine checking and clearing of vehicle bumpers and undercarriage for any weeds or other vegetation).

2.4.10 Criteria for determining which predator species would be targeted for removal efforts to benefit sage grouse nest success and chick survival.

Since predation on sage grouse nests does not appear to be a major problem with sage grouse recruitment in southern Idaho (J. Connelly, IDFG, pers. comm., 2001), there wouldn't necessarily be a major benefit in targeting predators that prey only on sage grouse nests. But many of the predators that prey on sage grouse chicks and adults also prey on sage grouse eggs. A logical criteria for targeting potential sage grouse predators then, would be to target those predators that prey on both eggs *and* chicks. To the extent that some of those predators preying on chicks also prey to some degree on sage grouse nests, removal of those predators could provide that much more additional benefit to sage grouse recruitment by increasing nest success as well as chick survival. Those species that have been documented as likely predators on sage grouse eggs and chicks, and which occur in southern Idaho, include ravens, coyotes, red fox, badgers, and bobcats.

Various species of ground squirrels have been documented to prey on sage grouse nests in several western states, but there is no evidence of significant, if any, ground squirrel predation on sage grouse nests in Idaho, and ground squirrels have not been implicated as likely predators of sage grouse chicks. Ground squirrels would therefore not be targeted during predator control efforts to protect sage grouse.

2.4.11 Potential for removal of coyotes and badgers, which are predators of ground squirrels, to actually exacerbate predation on sage grouse nests, if ground squirrels are one of the primary sage grouse nest predators in Idaho.

Patterson (1952) reported that ground squirrels were one of the primary predators on sage grouse nests in his study areas in Wyoming, and his work is most often cited as evidence that ground squirrels may be significant predators on sage grouse nests. Patterson presented little direct evidence, but suggested that Richardson's (*S. richardsonii*) and thirteen-lined ground squirrels (*S. tridecemlineatus*) were the primary nest predators. However, Sargeant et al. (1987), in trying to determine whether or not these same 2 species of ground squirrels were predators on duck nests, found no evidence whatsoever that Richardson's or thirteen-lined ground squirrels would prey on duck eggs. When they exposed mallard and blue-winged teal (*Anas discors*) eggs to wild, free-ranging Franklin's, Richardson's, and thirteen-lined ground squirrels, they found that the larger Franklin's ground squirrels preyed on these eggs almost 97% of the time, but the smaller Richardson's and thirteen-lined ground squirrel species never once preyed on these eggs. Using motion-activated cameras concealed at sage grouse nests in his Wyoming study area, Holloran (1999) documented visits to sage grouse nests by Richardson's and thirteen-lined ground squirrels, but they were never implicated as nest predators.

There is apparently little, if any, evidence to suggest that ground squirrels prey on sage grouse nests in Idaho, or if they do, that it is of sufficient magnitude to be detrimental to sage grouse. Results of artificial nest monitoring conducted by WS at several sites in southern Idaho have suggested that ravens, coyotes, red fox and badgers might all be potential predators on sage grouse nests, but there has been no evidence whatsoever during this monitoring to suggest predation by ground squirrels. This is consistent with the observations of a graduate student studying sage grouse in Owyhee county in the spring of 2001, who reportedly documented nest predation by ravens, coyotes, badgers, and a bobcat, but no nest predation by ground squirrels.

In situations where populations of a primary prey species fluctuate, grouse numbers can be influenced by the effects that prey densities may have on the predators' foraging behavior (Schroeder and Baydack 2001). If a coyote or badger, for example, has to hunt longer and harder to find prey, there may be an increased likelihood that they would find and prey on sage grouse nests or chicks. If primary prey species such as ground squirrels were abundant and readily obtainable, however, there may be a reduced likelihood of predation on sage grouse nests and chicks. Removal of some portion of local populations of coyotes and badgers would not be expected to increase any likelihood of ground squirrel predation on sage grouse nests, but it could be expected to reduce the likelihood of coyote or badger predation on sage grouse.

2.4.12 Appropriateness of using artificial nests to assess relative differences in predation rates between areas receiving predator control for protection of sage grouse, and other similar areas with no predator control.

There are potential biases associated with the use of artificial nests (Willebrand and Marcstrom 1988, Wilson et. al. 1998, King et al. 1999) which may reduce their usefulness as indicators of actual nest predation, and artificial nest monitoring will not be used to infer predation rates on actual sage grouse nests. Artificial nest monitoring has been widely used, however, to provide useful information regarding relative trends in rates of predation (Wilson et al. 1998, Fleming and Giuliano 2001). Artificial nest monitoring can also help identify what species of predators may be preying on nests, through examination of egg shell remains, tracks, or other evidence left at the nest site (Rearden 1951, Hernandez et al. 1997a), the use of motion-activated cameras (Hernandez et al. 1997b), or by concealing foothold traps next to the nests (Balser et al. 1968).

Cooper and Ginnett (2000) recognized that artificial nests did not necessarily reflect predation rates on natural nests, but they employed artificial nest monitoring to determine the relative effect of a specific management practice on predation rates across different treatment areas. Lynch (1972) employed artificial nest monitoring alone, and Balser et al. (1968) and Schranck (1972) employed artificial nest monitoring in conjunction with monitoring of actual nests to help assess relative differences in waterfowl nesting success between areas with and without predator control. Chesness et al. (1968) used a similar approach in assessing the benefits of predator control to pheasant nesting success. Lawrence (1982) removed mammalian predators from an experimental treatment area in the range of the Attwater's prairie-chicken (*Tympanuchus cupido attwateri*), then subsequently employed artificial nest monitoring to assess the relative differences in predation between the treatment area and a comparable non-treatment area. He documented significantly higher artificial nest success in the treatment area, and at the same time documented an 82% success rate for actual prairie chicken nests in the treatment area versus a 33% success rate in the area where predators were not removed. WS and IDFG personnel documented a 72% success rate for artificial sage grouse nests in an area that received predator removal for 4 weeks, versus only a 2% success rate in a comparable area with no predator control (APHIS WS, unpublished data).

Regardless of any similarities or differences between artificial nests and actual sage grouse nests, as long as all artificial nests are deployed and monitored similarly, they can provide a useful index to relative rates of predation between areas with and without predator control.

2.4.13 In the proposed study regarding effects of predator control on sage grouse recruitment (see description of Proposed Action in Chapter 3), the areas receiving predator control should be as similar as possible to the areas which will not be subjected to predator control, in order to make valid comparisons.

It would be difficult to identify multiple study sites that were identical in all respects, but the proposed treatment and non-treatment areas identified by IDFG are believed to be reasonably similar. To account for potential differences in these areas, a cross-over study design will be used (Ratti and Garton 1994), which will involve switching treatment and non-treatment areas after a 2-3 year period. The study design, developed by the IDFG with input from WS and scientists from the University of Idaho and Utah State University, will allow an objective assessment of the effects of predator control on sage grouse populations occupying a representative spectrum of sage grouse habitats in southern Idaho.

2.4.14 Concerns that the proposed sage grouse/predator control research or other predator control activities may interfere with other, ongoing scientific research projects.

All WS activities, whether on public or private lands, are conducted only on a request basis and are coordinated with the land management agency or land owner/manager. The land management agency or landowner is typically aware of any ongoing or proposed research and all activities are coordinated to reduce or eliminate interference. Additionally, WS involvement in any research or predator control projects requested by IDFG would be coordinated with Department personnel to ensure that there were no potential conflicts with any ongoing or proposed research projects.

2.4.15 Potential for the killing of predators during the spring months to result in litters of coyotes, red fox and badgers becoming orphaned.

When WS conducts aerial hunting activities during the April-June period, aerial hunting crews will sometimes kill one or both of a pair of coyotes that likely have a den of pups in the vicinity. WS field personnel typically search both from the air and on the ground in a concerted effort to locate the den in these cases in order to dispatch the pups, typically through the use of EPA-registered den fumigant gas cartridges. If the den cannot be located, pups may sometimes be fed and cared for by one or more members of a social group of coyotes associated with that den (Bekoff and Wells 1980). There are likely some cases where the killing of coyotes, red fox, or other predators may result in the orphaning of young animals that are still dependent on parental care. The only way to totally avoid this circumstance would be to refrain from conducting any predator removal efforts during this period of time. Unfortunately, this is also the period during which some of the most serious predation problems occur, such as coyotes killing young lambs to feed their pups (Till and Knowlton 1983), or high levels of predation on sage grouse chicks during their vulnerable first 2-3 weeks after hatching (Burkepile et al. 2001).

It is unfortunate that dependent young may occasionally be orphaned during predator damage management activities, but to keep things in perspective, it is important to consider the amount of suffering and death that occurs in the absence of predator removal as well. Predators by definition kill and eat prey, which does not ordinarily represent a problem unless this behavior conflicts with human interests. But regardless of whether predation creates conflicts with human interests, prey species are typically subjected to pain and suffering when preyed upon by predators. Death in nature is notoriously harsh (Howard 1986), and it would be purely speculative to infer whether the fate of any potentially orphaned predators would be any more or less harsh if their parents had not been killed through predator control activities. To the extent that predator control removes animals that would otherwise continue to kill or injure prey animals, the overall level of pain and suffering may be reduced.

2.4.16 Nonlethal taste aversion techniques should be considered as an alternative to lethal predator control for protection of sage grouse.

Avery et al. (1995) evaluated the use of methiocarb (i.e., mesurol) treated eggs as an aversive conditioning measure to reduce raven predation on California least tern (*Sterna antillarum browni*) eggs, and concluded that this could be a feasible method of protecting this species from raven predation. California least terns are a colonial nesting species, with nesting colonies typically involving high densities of birds in relatively small areas. This made it relatively easy to ensure that most ravens in the local area were exposed to treated egg baits prior to initiation of nesting by least terns. Sage grouse, on the other hand, are highly dispersed nesters, and occur at relatively low densities over expansive nesting habitats. Avery et al. (1995) found that if a raven consumed a number of mesurol-treated egg baits and began developing a taste aversion, but then consumed an untreated egg (which did not make the raven ill), that predation would resume. In order for this aversive conditioning approach to be effective, it would be important that: 1) treated egg baits be very similar in appearance to sage grouse eggs, 2) that treated egg baits be widely distributed and maintained in adequate quantities throughout the treatment area so as to ensure exposure, and 3) that ravens or other predators not have an opportunity to eat any untreated sage grouse eggs, which would likely begin negating any aversion that may have been established. Even if it were possible to obtain enough eggs that were similar enough in appearance to sage grouse eggs, and to distribute them widely enough and in great enough quantities to ensure bait consumption, it would still be impossible to prevent predators from finding and "testing" actual sage grouse eggs.

But the primary reason for not implementing this approach as an alternative to lethal control is that even if predators could be successfully conditioned not to consume sage grouse eggs, it would do nothing to prevent predation on sage grouse chicks, which appears to be a much more significant problem than nest predation. (See discussion in Chapter 1 at 1.1.3.)

2.4.17 The new Western Association of Fish and Wildlife Agencies (WAFWA) Sage Grouse Management Guidelines suggest that predator control for protection of sage grouse should be implemented only if nest success is less than 25% or survival of adult hens is less than 45%. Since nesting success and adult hen survival in Idaho are both above these thresholds, why is predator control being considered for protection of sage grouse?

Although the WAFWA sage grouse management guidelines (Connelly et al. 2000) address the issue of nesting success and adult hen survival in relation to the need for predator control, they do not address the appropriateness of predator control when there is low chick survival. There has been very little information available on this subject until recently. Results of studies conducted in 1999 and 2000 in Idaho suggested that survival rates for sage grouse chicks were only 15% and 18%, respectively, and that predators were responsible for 90-100% of the mortality (Burkepile et al. 2001). Although most sage grouse management plans suggest indirect management of grouse-predator relationships through manipulation of habitats, Schroeder and Baydack (2001) have suggested that managers should consider predator control as a management option and evaluate its viability through experimentation. (See additional discussion of this issue in Chapter 1, at 1.1.3.)

2.5 Additional Issues not Considered Because They are Outside the Scope of this Analysis

1. How the WS program is funded.
2. The Act of March 2, 1931 should be repealed.
3. Appropriateness of livestock grazing on public lands.
4. Appropriateness of fees for public lands grazing.
5. Riparian damage caused by livestock grazing.
6. WS services should not be provided to property owners who restrict public access to their lands.
7. Impacts of grazing, fires, and noxious weeds on sage grouse habitat.
8. Wolf reintroduction.
9. WS has no formal appeals process.

10. Road closures to the public restrict access to private trappers.
11. Habitat management should be studied as a way to increase sage grouse populations.
12. Human overpopulation.
13. Impacts of non-WS related disturbances such as development of water sources, livestock grazing and herding, agricultural activities, hiking, fishing, horseback riding, and sightseeing activities.
14. Reduction or elimination of sage grouse hunting seasons should be considered as an alternative to reducing predator populations for protection of sage grouse.

CHAPTER 3: ALTERNATIVES

3.0 Introduction

This chapter consists of four parts: 1) an introduction, 2) description of the alternatives considered and analyzed in detail, including the Proposed Action (Alternative 2), 3) a description of alternatives considered but eliminated from detailed study, and 4) a discussion of mitigating measures and standard operating procedures. Six alternatives have been identified, developed, and analyzed in detail, and an additional four alternatives were considered but not analyzed in detail. The six alternatives analyzed in detail are:

1) **Alternative 1.** **Continue the Current Southern Idaho Analysis Area Program (No Action).** This alternative consists of the current program of technical assistance and operational Integrated Wildlife Damage Management (IWDM) by WS on Federal, State, county and private lands under Cooperative Agreement, Agreement for Control, and WS Annual Work Plans.

2) **Alternative 2.** **Current Program (as described in Alternative 1) Plus Expanded Wildlife Protection Activities (Proposed Action).**

3) **Alternative 3.** **A Corrective Only Wildlife Damage Management Program (No Preventive Control).**

4) **Alternative 4.** **A Wildlife Damage Management Program with Only Mechanical Methods (No Use of any Chemical Methods).**

5) **Alternative 5.** **Technical Assistance Program.** Under this alternative, WS would not conduct wildlife damage management in the analysis area. The entire program would consist of only technical assistance.

6) **Alternative 6.** **No WS Wildlife Damage Management in the Analysis Areas.** This alternative would terminate the Federal wildlife damage management program within the analysis area.

3.1 Description of the Alternatives

3.1.1 Alternative 1. Continue the Current Southern Idaho Analysis Area Program: (No Action).

The No Action alternative is a procedural NEPA requirement (40 CFR 1502.14(d)), is a viable and reasonable alternative that could be selected, and serves as a baseline for comparison with the other alternatives. The No Action Alternative, as defined here, is consistent with CEQ's definition (CEQ 1981).

Overview

The No Action alternative would continue the current WS program in the analysis area. The current program is a collection of cooperative programs with other Federal, State and local agencies, and private individuals and associations to protect primarily livestock, poultry and public safety (described in Chapter 1). WS personnel in the analysis area conduct technical assistance, and corrective (in response to current loss or hazard) and preventive (in response to historical loss) predator damage management on BLM, Forest Service, State, county and private lands under Memoranda of Understanding, Cooperative Agreements, Annual Work Plans, and *Agreements for Control on Private Property*. All wildlife damage management is based on interagency relationships, which require close coordination and cooperation because of overlapping authorities, policies, regulations and legal mandates.

On Federal lands, WS Work Plans describe the wildlife damage management that would occur. During the WS annual planning and review process with the BLM, Forest Service, IDFG, and IDL, plans and maps would be discussed which describe and delineate where wildlife damage management would be conducted and which methods will be used. Before management is conducted on private lands, *Agreements for Control on Private Property* are signed with the landowner or administrator that describe the methods to be used and the species to be managed. Management is directed toward individual problem animals (i.e., in the case of mountain lions, bears, or certain coyote or wolf damage problems) or localized populations in the problem area (i.e., in the case of some coyote damage complaints), depending on the circumstances.

Integrated Wildlife Damage Management (IWDM)

During more than 70 years of resolving wildlife damage problems, WS has considered, developed, and used numerous methods of managing damage problems. These efforts have involved the 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. The WS Program applies IWDM, also commonly known as Integrated Pest Management, to reduce damage through the WS Decision Model (discussed on page 3-4).

The philosophy behind IWDM is to implement effective management techniques in a cost-effective manner while minimizing the potentially harmful effects to 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. In selecting management techniques for specific damage situations consideration is given to:

- Species responsible
- Amount of the damage
- Geographic extent of damage
- Duration and frequency of the damage
- Prevention of future damage (lethal and nonlethal techniques)

Cost is also considered, but cost considerations may sometimes be outweighed by overriding environmental, legal, public health and safety, animal welfare, or other concerns.

The IWDM Strategies Authorized for Use by WS Personnel in the Analysis Area Consist of:

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

Direct Control Assistance (activities conducted or supervised by WS personnel): Direct control assistance is implemented when the problem cannot be practically resolved through technical assistance and when Cooperative Agreements provide for WS 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 WS personnel are often required to effectively resolve problems, especially if restricted use pesticides are proposed, or the problem is complex enough to require the direct supervision or involvement of a wildlife professional. WS personnel consider the biology and behavior of the damaging species and other factors using the WS Decision Model (Slate et al. 1992). The recommended strategy may include any combination of preventive and corrective actions that could be implemented by the requester, WS or other agencies, as appropriate. In the case of localized lethal control, the U.S. General Accounting Office (GAO 1990) has concluded that according to available research, these efforts have been effective in reducing predator damage. Two strategies are available:

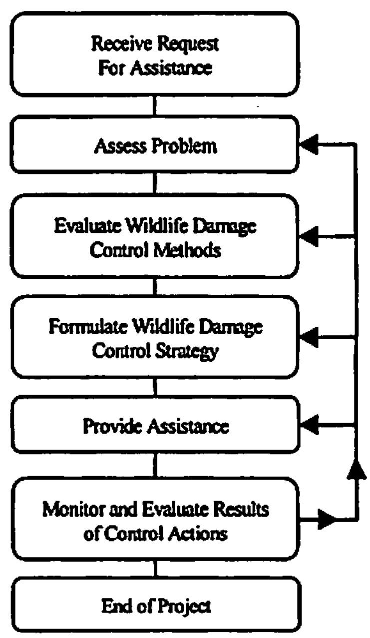
1. **Corrective Damage Management** Corrective damage management is applying wildlife damage management to stop or reduce current losses. As requested and appropriate, WS personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. For example, in areas where verified and documented lamb depredation is occurring, WS personnel may provide information about guarding dogs, fencing or husbandry techniques, and/or conduct operational damage management to stop the losses.

2. **Preventive Damage Management.** Preventive damage management is applying wildlife damage management strategies before damage occurs, based on historical damage problems and data. The rationale for conducting preventive control to reduce coyote damage differs little in principle from holding controlled hunts for deer or elk in certain areas where agricultural damage has been a historic problem. By reducing the number of deer near agricultural fields, or the number of coyotes near a herd of sheep, the likelihood of damage is reduced.

Shelton and Klindt (1974) documented a strong correlation between coyote densities and levels of sheep loss in Texas, and Robel et al. (1981) found a similar correlation in Kansas. In southeastern Idaho, Stoddart and Griffiths (1986) documented an increase followed by a decrease in lamb losses as coyote populations rose and fell. Gantz (1990) concluded that late winter removal of territorial coyotes from mountain grazing allotments would reduce predation on sheep grazing on those allotments the following summer. Wagner (1997) likewise confirmed that late winter removal of coyotes on grazing allotments in Utah and Idaho was effective in reducing sheep losses even though the coyotes were removed 3-6 months prior to the arrival of sheep on the allotments.

For preventive damage management on Federal lands, historical loss areas are reviewed and discussed with representatives of the land management agencies during the Annual Work Plan process to identify areas where preventive wildlife damage management may be planned. Maps delineating the current year's planned control areas are available for public review at the appropriate Federal office. In addition, when conducting wildlife damage management on Federal lands, WS must receive a request from the livestock owner or individual that has experienced the damage.

Figure 3.1
APHIS WS Decision Model



WS Decision Making

The WS EIS (USDA 1994, Chapter 2, pp. 23-34 and Appendix N) describes the procedures used by WS personnel to determine management strategies or methods applied to specific damage problems.

As depicted in the Decision Model (Figure 3.1), consideration is given to the following factors before selecting or recommending wildlife damage management 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 (the cost of control may be a secondary concern because of overriding environmental, health and legal considerations)

The WS decision making process is a procedure for evaluating and responding to damage complaints. WS personnel are frequently contacted only after requesters have tried nonlethal methods and found them to be inadequate for reducing damage to an acceptable level. WS personnel evaluate the appropriateness of strategies, and methods are evaluated in the context of their availability (legal and administrative) and suitability based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are formed into a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for management is ended. Appendix N in WS' programmatic EIS (USDA 1994) provides detailed examples of how the WS Decision Model is implemented for coyote predation to sheep on public and private lands.

On most ranches, predator damage may occur whenever vulnerable livestock are present, because no cost-effective method or combination of methods that permanently stops or prevents coyote predation are available. When damage continues intermittently over time, the Wildlife Specialist and rancher monitor and reevaluate the situation frequently. 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.

Wildlife Damage Management Methods Authorized for Use or Recommended in the Analysis Area

Mechanical Management Methods

1. **Livestock producer practices** consist primarily of nonlethal preventive methods such as animal husbandry, habitat modification, and animal behavior modification. Livestock husbandry and other management techniques are implemented by the livestock producer. Producers are encouraged to use these methods, based on the level of risk, need, and practicality. Idaho WS personnel cooperate with the WS Livestock Guarding Dog Specialist to maintain a current file of guarding dog suppliers and to offer technical assistance to producers. Over 75% of the sheep operations in Idaho having over 1000 head of sheep employed the use of guard dogs in 1994 (R. Tratz, IASS, pers. comm.,1996). Livestock producer practices recommended by WS may include:

- Animal husbandry, which generally includes modifications in the level of care or attention given to livestock which may vary depending on the class, age and size of the livestock. Animal husbandry practices include but are not limited to techniques such as livestock guarding dogs, herders, shed lambing, carcass removal, night penning, etc.

- Habitat modification alters habitats to attract or repel certain wildlife species, or to separate livestock from predators. Habitat modification practices would be encouraged when practical, based on the type and extent of the livestock operation. For example, on private lands, clearing brushy or wooded areas in or adjacent to lambing or calving pastures may be appropriate to reduce available cover for predators.

- Animal behavior modification refers to tactics that alter the behavior of wildlife and reduce predation. Animal behavior modification could be scare tactics or fencing to deter or repel animals that cause loss or damage to livestock or property. Some but not all devices used to accomplish this are[1]:

- Predator-proof fences
- Electronic guards (siren strobe-light devices)
- Propane exploders
- Pyrotechnics

2. **Foothold traps** can be effectively used to capture a variety of mammals, but are used most often within the analysis area to capture coyotes and red fox. Two primary advantages of the foothold trap are that they can be set under a wide variety of conditions, and that pan-tension devices can be used to reduce the incidence of capturing smaller nontarget animals. Effective trap placement and use of appropriate lures by trained personnel also contribute greatly to the foothold trap's selectivity. An additional advantage is that foothold traps can allow for the on-site release of some nontarget animals, and the relocation and release of animals such as wolves.

Disadvantages include the difficulty of keeping traps operational during rain, snow, or freezing weather. In addition, they lack selectivity where nontarget species are of a similar or heavier weight than the target species. The use of foothold traps is more labor-intensive than some methods, but they are indispensable in resolving some depredation problems. In FY 01, 327 coyotes (8% of the analysis area take) and 71 red fox (27% of the analysis area take) were captured in foothold traps.

3. **Cage traps**, typically constructed of wire mesh, are sometimes used or recommended to capture smaller animals like raccoons or skunks. Larger cage traps constructed of sections of culvert pipe are sometimes use to capture black bears or grizzly bears. Cage traps pose minimal risk to humans, pets and other nontargets, and they allow for on-site release or relocation of animals, but they cannot be used effectively to capture warier species such as coyotes or wolves.

4. **Snares**, like traps, may be used as either lethal or live-capture devices. Snares may be used wherever a target animal moves through a restricted area (i.e., crawl holes under fences, trails through vegetation, etc.). They are easier to keep operational during periods of inclement weather than are foothold traps. Snares set to catch an animal by the neck can be a lethal use of the device, whereas snares positioned to capture the animal around the body or leg can be a live-capture method. Careful attention to details in placement of snares and the use of a "stop" on the cable can also allow for live capture of neck-snared animals. Spring-activated foot snares are sometimes used to capture depredating mountain lion or bears.

5. **Ground shooting** is highly selective for target species and may involve the use of spotlights, decoy dogs and predator calling. Removal of one or two specific animals by shooting in the problem area can sometimes provide immediate relief from a predation problem. Shooting is often tried as one of the first lethal control options because it offers the potential of solving a problem more quickly and selectively than some other options, but it does not always work. Shooting may sometimes be one of the only control options available if other factors preclude the setting of equipment.

6. **Hunting dogs** are essential to the successful tracking and capture of problem black bears and mountain lions. Dogs are also trained and used for coyote damage management to alleviate livestock depredation (Rowley and Rowley 1987, Coolahan 1990). Trained dogs are used primarily to find coyotes and dens, and to pursue or decoy problem animals.

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[1]Scare devices will often only produce the desired result for a short time period until wildlife individuals become accustomed to the disturbance (Pfeifer and Goos 1982; Conover 1982).

7. **Denning** is the practice of finding coyote or red fox dens and eliminating the young, adults, or both to stop ongoing predation or prevent future depredation on livestock. Till and Knowlton (1983) documented denning's cost-effectiveness and high degree of efficacy in resolving predation problems due to coyotes killing lambs in the spring. Coyote and red fox depredations on livestock often increase in the spring and early summer due to the increased food requirements for rearing and feeding litters of pups. Removal of pups will often stop depredations even if the adults are not taken. When adults are taken and the den site is known, the pups are usually killed to prevent their starvation. Pups are typically euthanized in the den through use of a registered gas fumigant cartridge. (See discussion of gas cartridge under **Chemical Management Methods**).

8. **Aerial hunting** typically involves the shooting of coyotes or red fox from fixed-winged aircraft or helicopters, and is used on all lands where authorized and determined appropriate. Aerial hunting consists of visually sighting target animals in the problem area and shooting them with a shotgun from the aircraft. Shooting typically results in a relatively quick and humane death. Local depredation problems can often be resolved quickly through aerial hunting. Cain et al. (1972) rated aerial hunting as "very good" in effectiveness for problem solving, safety, and lack of adverse environmental impacts. Smith et al. (1986) cited cost-effectiveness and efficacy as benefits of aerial hunting for protection of pronghorn antelope from coyote predation. Connolly and O'Gara (1987) documented that at least 55% of the coyotes taken by aerial hunting in their study area were confirmed sheep-killing coyotes. Wagner and Conover (1999) documented that aerial hunting conducted on mountainous summer grazing allotments during the late winter months was effective in reducing sheep losses the following summer, and that it also reduced the need to deploy equipment such as foothold traps and snares, which are less selective than aerial hunting.

Good visibility is required for effective and safe aerial hunting operations and relatively clear and stable weather conditions are necessary. Summer conditions limit the effectiveness of aerial hunting as heat reduces coyote activity, and visibility is greatly hampered by vegetative ground cover. High temperatures, which reduce air density, affect low-level flight safety and may further restrict aerial hunting activities.

Aerial hunting is one of the most important coyote control methods available to WS in the analysis area. In FY 01, 2,799 coyotes (66% of the analysis area take) were taken by this method. Approximately 88% of the fixed-wing aerial hunting hours (and 72% of the coyotes taken by this method) were for corrective control, with the remainder being for preventive control purposes. Approximately 42% of the helicopter aerial hunting hours (and 35% of the coyotes taken by this method) were for preventive control, with the remainder being for corrective control.

Chemical Management Methods

All chemicals used by WS are registered under FIFRA and administered by the EPA and the IDA. All WS field personnel in the analysis area are certified as pesticide applicators by the IDA. No chemicals are used on public or private lands without prior consultation with the land management agency or property owner/manager. The chemical methods used and/or currently authorized for use in the analysis area are:

1. **Sodium cyanide** is used in the M-44 device. The M-44 is a spring-activated ejector device developed specifically for coyote damage management (EPA Reg. No. 56228-15). The M-44 consists of a capsule holder wrapped in an absorbent material, an ejector mechanism, a capsule containing about 0.9 grams of a powdered sodium cyanide mixture and an inert biological marker, and a 5-7 inch hollow stake. To set an M-44, a good location is found, the hollow stake is driven into the ground, and the ejector unit is cocked and fastened into the stake by a slip ring. The wrapped capsule holder containing the cyanide capsule is then screwed onto the ejector unit and a bait is applied to the capsule holder. An individual warning sign is placed within 25 feet to alert others of the device's presence, and area warning signs are placed at commonly used access points to the area. A canid attracted to the bait will bite and try to pick up the baited capsule holder. When the M-44 is pulled, the spring-activated plunger propels cyanide into the animal's mouth, resulting in a quick death. Coyotes killed by M-44s present no secondary poisoning risks to other animals that may scavenge on the coyote's carcass (USDA 1994, Appendix P, pp. 269-271).

The M-44 can be used very effectively during winter and early spring months when foothold traps are more difficult to keep functional, and M-44s are typically more selective for target species than foothold traps. They may also be more economical as a control tool, because they do not have to be monitored as often as traps or snares.

The M-44 is very selective for canids because of the attractants used and the unique requirement that the device be triggered by pulling straight up on it. Connolly (1988), in an analysis of M-44 use by the Idaho WS program from 1975-1986, documented a 99% selectivity rate for target species. Dogs are susceptible to M-44s, and discretion must be used when setting M-44s in areas that may be frequented by dogs. The 26 EPA use restrictions also preclude use of the M-44 in areas where it may pose a danger to T/E species. In FY 01, 260 coyotes (6% of the analysis area take) and 39 red fox (15% of the analysis area take) were taken with M-44s. No nontarget animals were taken by M-44s in FY 01.

M-44s are used for corrective and preventive damage management on private lands where authorized by landowner agreement and on State and Federal lands where authorized by Work Plans. Most M-44 use typically occurs on private lands; limited use occurs on BLM lands, and no M-44s have been used on any National Forest lands within the past 3 years. M-44 use on BLM or Forest Service lands would occur only after prior project-by-project consultation with the responsible land management agency at the local level. WS personnel comply with the EPA label and 26 use restrictions (see USDA 1994, Appendix Q, pp. 9-12).

2. The gas cartridge is registered as a fumigant by the EPA (EPA Reg. No. 56228-21) and is used in conjunction with denning operations in the analysis area. When ignited, the cartridge burns in the den of an animal and produces large amounts of carbon monoxide, a colorless, odorless, tasteless, poisonous gas. The combination of carbon monoxide exposure and oxygen depletion kills the pups in the den. This technique is used on private and public lands in the analysis area, where livestock killing can be attributed to food procurement for young. In FY 01 in the analysis area, 34 dens were fumigated using 65 gas cartridges.

3. The LPC, developed for protection of sheep from coyote predation, is registered with the EPA (EPA Reg. No. 56228-22) and the ISDA for use in Idaho only by trained and certified WS employees. The LPC consists of 2 rubber reservoirs, each of which contains 15 ml. of a 1% solution of sodium fluoroacetate (Compound 1080). The collar has velcro straps for attachment around the neck of the sheep, with the reservoirs fitting on the throat just behind the jaw. Coyotes typically attack sheep by biting them on the throat and holding on until the animal suffocates or stops struggling. Coyotes that attack collared sheep generally puncture the collar with their teeth (about 75% of the time) and receive a lethal oral dose of the toxicant. In this usage, there are no significant secondary hazards (USDA 1994, Appendix P, pp. 273-277).

Label restrictions limit use of the LPC to fenced pastures; it cannot be used on open rangelands. Use of the LPC typically involves establishment of a "target flock" of 50-100 animals, 20-30 of which would be collared lambs. These animals would be exposed in a high risk pasture where coyote attacks have occurred. Other (uncollared) sheep would be moved to a safe area or penned until a coyote attacks a collared animal and punctures a collar, and predation stops.

The outstanding advantage of the LPC is its selectivity in eliminating only those individual coyotes that are responsible for killing sheep. Disadvantages include the limited applicability of this technique, death of collared livestock that are attacked, the logistics of having to collar and monitor the collared sheep, and the management efforts required to protect livestock other than the target flock (Connolly et al. 1978, Burns et al. 1988). From an efficacy standpoint, use of the LPC is best justified in areas with a high frequency of predation (at least one kill per week).

Sodium fluoroacetate has been a subject of wide research in the United States and elsewhere and has been widely used as a toxicant for pest management programs in many countries. Fluoroacetic acid and related chemicals occur naturally in plants in many parts of the world and are not readily absorbed through intact skin (Atzert 1971). Sodium fluoroacetate is discriminatingly toxic to predators, being many times more lethal to them than to most nontarget species (Atzert 1971, Connolly and Burns 1990). A detailed risk assessment for use of sodium fluoroacetate in the LPC is provided in Appendix P of USDA (1994).

The LPC has received only limited use in Idaho by WS since it was first registered for use in the State in 1999, but it remains a potentially valuable tool in certain circumstances. LPCs were used on a total of 4 properties in the southern Idaho analysis area during the 1999-2001 analysis period.

4. **DRC-1339** (3-chloro-4-methylbenenamine hydrochloride) is a slow acting avian toxicant that is rapidly metabolized and/or excreted. Because of the rapid metabolism of DRC-1339 in the body, it poses little risk of secondary poisoning to nontarget animals (Cunningham et al. 1979, Schafer 1981, Knittle et al. 1990). This compound is also unique because of its relatively high toxicity to most pest birds but low-to-moderate toxicity to most raptors and almost no toxicity to mammals (DeCino et al. 1966, Palmore 1978, Schafer 1984).

DRC-1339 is registered with the EPA (EPA Reg. No. 56228-29) to control crows, ravens and magpies that prey on newborn livestock or on the eggs or young of wildlife species needing special protection. The DRC-1339 is incorporated into either whole egg or small meat baits (Larsen and Dietrich 1970). The use of egg baits to deliver DRC-1339 further reduces any likelihood of potential risk to hawks or eagles since these species do not typically prey on eggs. The feeding habits of the target species are observed before placing any treated baits in an area to reduce the risks to nontarget animals. Corvids (ravens, crow, magpies) are opportunistic feeders and by determining when and where the birds are feeding, the baits can be found more quickly and easily, thereby reducing the risks to nontarget animals. Selective damage management can be applied because corvids learn to exploit a readily available food source and they will continue to focus on that source until the availability declines.

5. **Chemical Immobilization/Euthanasia** are registered chemicals authorized for immobilization and euthanasia by WS. Selected Idaho WS personnel have received training in the safe use of authorized immobilization/euthanasia chemicals and are certified by WS. This training involves hands-on application of state-of-the-art techniques and chemicals.

Telazol™, Ketaset™, and Capture-All 5 are the immobilizing agents used by WS, and are approved by the Food and Drug Administration (FDA). Telazol, Ketaset, and Capture-All 5 are rapid acting, nonnarcotic, nonbarbiturate injectable anesthetic agents, having a wide margin of safety. All three drugs produce unconsciousness known as "dissociative" which in general terms means reflexes needed to sustain life (breathing, coughing, swallowing, etc.) are not affected by the drugs. These agents are used to immobilize live-trapped animals for relocation or administered before euthanasia. They may also be used in tranquilizer darts fired from a helicopter to capture depredating gray wolves. As other drugs are approved by the FDA and WS, they could be incorporated into the program within the analysis area.

Telazol is a combination of equal parts of tiletamine hydrochloride and zolazepam hydrochloride. The product is generally supplied sterile in vials, each containing 500 mg of active drug, and when dissolved in sterile water has a pH of 2.2 to 2.8. Telazol produces a state of unconsciousness in which protective reflexes, such as coughing and swallowing, are maintained during anesthesia. Schobert (1987) listed the dosage rates for many wild and exotic animals. Before using Telazol, the size, age, temperament, and health of the animal are considered. Following a deep intramuscular injection of Telazol, onset of anesthetic effect usually occurs within 5 to 12 minutes. Muscle relaxation is optimum for about the first 20 to 25 minutes after the administration, and then diminishes. Recovery varies with the age and physical condition of the animal and the dose of Telazol administered, but usually requires several hours.

Ketaset is supplied as a slightly acidic solution (pH 3.5 to 5.5) for intramuscular injection. Ketaset also produces a state of unconsciousness that interrupts association pathways to the brain and allows for the maintenance of the protective reflexes, such as coughing, breathing, swallowing, and eye blinking. Ketaset is detoxified by the liver and excreted by the kidney. Following administration of recommended doses, animals become immobilized in about 5 minutes with anesthesia lasting from 30 to 45 minutes. Depending on dosage, recovery may be as quick as 4 to 5 hours or may take as long as 24 hours; recovery is generally smooth and uneventful.

Xylazine is a sedative which produces a transitory hypertension followed by prolonged hypotension, and respiratory depression. Recommended dosages are administered through intramuscular injection allowing the animal to become immobilized in about 5 minutes and lasting from 30 to 45 minutes.

Capture-All 5 is a combination of Ketaset and Xylazine, and is regulated by the FDA as an investigational new animal drug. The drug is available, through licensed veterinarians, to individuals sufficiently trained in the use of immobilization agents. Capture-All 5 is administered by intramuscular injection; it requires no mixing, and has a relatively long shelf life without refrigeration, all of which make it ideal for the sedation of various species.

Potassium chloride, a common laboratory chemical, is injected by WS personnel as a euthanizing agent after an animal has been anesthetized.

3.1.2 Alternative 2. Current Program (as described in Alternative 1) Plus Expanded Activities for Protection of Designated Wildlife Species (Proposed Action).

Under this alternative, WS involvement in activities to protect certain wildlife species from predation would potentially be expanded. One area of expansion would be predator control activities conducted to increase sage grouse nesting success and chick survival. As discussed in Chapter 1, there is strong evidence to suggest that in some circumstances, predation may be one of the primary factors influencing sage grouse populations. In order to help assess whether predator control might be beneficial in efforts to increase sage grouse populations, WS would cooperate in a study with the IDFG by conducting predator removal activities in selected experimental "treatment" areas. If results of this study suggested that predator control efforts could help improve sage grouse recruitment, then predator control might conceivably be integrated into ongoing sage grouse management efforts under certain circumstances.

Beginning in March, 2002, WS would conduct predator removal efforts in each of 3 or 4 75-100 mi^2 experimental treatment areas in southern Idaho. Avian and mammalian predators believed to be potentially impacting sage grouse nesting success and chick survival (ravens and potentially magpies and crows, as well as red fox, coyotes and badgers) would be removed from these areas for up to 15 weeks between February 1 and June 30 during each year of the study. Magpies and crows have not been implicated as sage grouse nest or chick predators to the extent that ravens have, and control efforts would not be specifically targeted at magpies and crows. But the DRC-1339 treated egg baits exposed for raven control would also kill magpies and crows if consumed by those species, and magpies or crows killed with DRC-1339 egg baits would be considered target animals. Bobcats have also been implicated as sage grouse nest and chick predators, but because bobcat densities are typically much lower than densities of other predators being targeted (see discussion on various species populations in Chapter 4), they do not likely present as much of a threat to sage grouse. Bobcats would not be specifically targeted, but any bobcats captured incidental to other control efforts in the treatment areas would be considered target animals and would be killed.

The methods used in conducting these predator control efforts might potentially include any of the methods discussed under the description of the Current Program, with the exception of the LPC. Monitoring data would be collected not only in these 3-4 experimental treatment areas, but also in 3-4 similar "non-treatment" areas to assess relative differences in sage grouse recruitment and predator populations in treatment versus non-treatment areas. After 2-3 years of treatment and monitoring, predator removal on treatment areas would be suspended for 1-2 years, but monitoring data would still be collected in all treatment and non-treatment areas during this interval. When monitoring data suggested that predator populations in the first set of treatment areas had returned to pre-treatment levels (probably after only 1 year), then predator removal efforts would commence once again for another 2-3 year period, only this time the areas that received predator control during the first 2-3 years of the study would now become the non-treatment areas, while the non-treatment areas from the first 2-3 years of the study would now receive predator control. This cross-over study design would help mitigate any potential biases in the data that might be related to differences in the study areas.

The duration of predator control efforts in each of the sage grouse study treatment areas would probably be a maximum of no more than 15 weeks each spring, but would likely be less than that amount of time. Control efforts would be terminated sooner if catch-per-unit-effort data suggests adequate levels of control have been achieved. In the case of control efforts targeting mammalian predators, control efforts would be terminated when catch-per-unit-effort dropped to less than 1 target predator per 500 device nights (i.e., if only 1 target predator was captured while maintaining a combined total of 50 traps and snares in a 75-100 mi^2 treatment area for 10 days, then control efforts would be terminated). Raven control efforts would likewise be terminated prior to the end of a 15-week treatment period if egg-bait consumption dropped off to no more than one egg-bait station destroyed over 200 exposure days (i.e., if only one egg bait were consumed while maintaining 50 egg bait stations for 4 days, control efforts for ravens would be terminated). An egg-bait station would consist of 1-3 egg baits, and would be considered destroyed if 1 or more eggs were missing or fed upon. Both of these catch-per-unit-effort criteria assume that access and weather conditions would not be significantly influencing the catch-per-unit-effort.

WS monitoring of predator population levels or relative predation rates (as reflected through artificial nest monitoring or other types of surveys) would involve benign activities which would not reasonably be expected to have any significant environmental impacts. Monitoring efforts would involve no additional take of any predators (beyond what would be occurring during planned predator control activities), and would consist primarily of collecting prescribed data on physical evidence of the presence of predators (i.e., visual sightings, tracks, scats, etc.). WS has determined that these types of routine monitoring activities are categorically excluded from any requirement for NEPA analysis (7 CFR 372.5(c)(1)). IDFG monitoring of sage grouse and/or predator populations represents a State, rather than a Federal action, and would therefore not be subject to NEPA analysis.

The areas that would receive predator control for protection of sage grouse over the course of the above-described study may potentially include portions of the Cow Creek and Sheep Creek drainages in Owyhee County, portions of the Shoshone Basin and Brown's Bench areas of Twin Falls County, portions of the Little Lost River drainage in Butte, Custer and Lemhi Counties, portions of the Birch Creek drainage in Clark and Lemhi Counties, and portions of the Curlew Valley area in Oneida County. Other locations may be considered over the course of the proposed study depending on unforseen and/or uncontrollable factors (e.g., wild fire destruction of habitat within proposed areas, input from State-sponsored local sage grouse working groups, administrative restrictions imposed by private landowners or public land management agencies, new T/E species listings, etc.) The analyses of potential impacts associated with predator control activities conducted in these or other potentially identified areas would be expected to be similar, and are discussed in Chapter 4.

Another area of potentially expanded predator control activities may be efforts to help protect northern and/or southern Idaho ground squirrels from predation. These efforts would target primarily badgers, but also any coyotes or red fox in the vicinity of sites where the U.S. Fish and Wildlife Service has requested WS to conduct predator control for protection of these species. These activities may potentially occur at times between April-August each year on a total of as many as 25 dispersed sites of 6-8 mi^2 each where remnant populations of these species still exist in Adams County (for the northern Idaho ground squirrel) and in the low rolling hills and valleys along the Payette River in Gem, Payette and Washington Counties (for the southern Idaho ground squirrel). The actual size of each site inhabited by these ground squirrels is typically no more than several acres, but predation management efforts would potentially occur on lands within about a 1.5 mile radius of each site. Rationale for the size of treatment areas for ground squirrel protection is based on documented territory size for badgers ranging from about 0.65 mi^2 (Messick and Hornocker 1981) up to about 2.25 mi^2 (Lindzey 1978) and documented daily movements outside of territories of up to 1.3 miles (Lindzey 1978).

3.1.3 Alternative 3. A Corrective Only Wildlife Damage Management Program (No Preventive Wildlife Damage Management).

This alternative would only provide for wildlife damage management in places where predation on livestock or wildlife are presently occurring. Incumbent in this alternative is WS verification of the loss and the species responsible. Producers could still implement any legal non-lethal and/or lethal methods they determine to be practical and effective. Lethal control by WS would be limited to an area near the loss to maintain the integrity of the corrective only situation. The full variety of mechanical and chemical control methods described for Alternative 1 would be available, once losses have occurred and are verified by WS.

3.1.4 Alternative 4. A Wildlife Damage Management Program with Only Mechanical Methods (No Use of Chemical Methods).

This alternative would only provide for wildlife damage management with only the mechanical methods described for Alternative 1. These include livestock producer methods, such as animal husbandry, habitat modification, and animal behavior modification. Producers would be encouraged to use these methods, based on the level of risk, need, and practicality. WS personnel would conduct wildlife damage management through the use of leg-hold and cage traps, neck and foot snares, ground shooting, aerial hunting, denning (without the use of gas cartridges), and by using hunting dogs where signed *Agreements for Control on Private Property* are in place, or on Federal lands according to the provisions of WS Work Plans. For technical assistance requests, cage traps could be recommended or distributed to the requester for use in resolving problems caused by small mammals.

WS would not use sodium cyanide (in the M-44), the gas cartridge, the LPC, DRC-1339, or any immobilizing or euthanizing agents under this alternative.

3.1.5 Alternative 5. Technical Assistance Program.

Under this alternative, WS would eliminate operational wildlife damage management in the analysis area. The entire WS program would consist of technical assistance only, with WS making recommendations when requested. However, private landowners, contractors, or others could conduct their own wildlife damage management on Federal, State, county and private lands under the provisions of Idaho Code 36-1107.

This "technical assistance only" alternative would place the immediate burden of operational control work on State agencies, individuals and livestock producers. Individuals experiencing wildlife damage would, independently or with WS recommendations, carry out and fund control activities. Individual producers could implement wildlife damage management as part of the cost of doing business, or a State agency could assume a more active role in providing operational wildlife damage management. If Alternative 5 was selected, WS could not direct how a State agency or individuals would implement wildlife damage management. Some agencies or individuals may choose not to take action to resolve wildlife damage. Other situations may warrant the use of legally available management methods because of public demands, mandates, or individual preference. Damage management methods and devices could be applied by people with little or no training and experience, and with no professional oversight or monitoring for effectiveness. This in turn 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 non-target animals.

3.1.6 Alternative 6. No WS Wildlife Damage Management in the Analysis Area.

This alternative would terminate all WS or any other Federal program for wildlife damage management (operational and technical assistance) on all land classes within the analysis area. However, State and county agencies, and private individuals could conduct wildlife damage management. WS would not be available to provide technical assistance or make recommendations to livestock producers. In some cases, control methods applied by non-agency personnel could be used contrary to their intended or legal use, or more than what is recommended or necessary. A "no control" alternative was analyzed by the FWS (USDI 1979) and was dismissed as an invalid alternative. However, due to interest in this option, an analysis of this alternative has been included. A "no control" alternative was evaluated in USDA (1994).

3.2 Alternatives Considered but Not Analyzed in Detail, with Rationale

Several alternatives were considered but not analyzed in detail. These were:

3.2.1 Compensation for Wildlife Damage Losses.

The Compensation alternative would direct all WS program efforts and resources toward the verification of losses from predators, and providing monetary compensation to the affected producers. WS assistance would not include any direct control nor would technical assistance or nonlethal methods be available.

This option is not currently available to WS because WS is charged by law to protect American agricultural and natural resources (Animal Damage Control Act of 1931, and Rural Development, Agricultural and Related Agencies Appropriation Act of 1988). Analysis of this alternative in WS' programmatic EIS (USDA 1994) indicates that it has many drawbacks:

- It would require larger expenditures of money and workforce to investigate and validate all losses, and determine and administer appropriate compensation.
- Compensation would most likely be below full market value. It is difficult to make timely responses to all requests to assess and confirm losses, and many losses could not be verified.
- Compensation would give little incentive to livestock owners to limit predation through improved animal husbandry practices and other management strategies.
- Not all ranchers would rely completely on a compensation program and unregulated lethal control of predators would most likely continue as permitted by state law.
- Congress has not appropriated funds to compensate for predation or other wildlife damage to agricultural products.

3.2.2 The Humane Society of the United States (HSUS) Alternative.

The HSUS at one point proposed an alternative that would have required: 1) "*permittees evidence sustained and ongoing use of nonlethal/husbandry techniques aimed at preventing or reducing predation prior to receiving the services of the WS Program*"; 2) "*employees of the WS Program 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 and/or nonlethal controls have failed to keep livestock losses below an acceptable level*"; and 4) "*establish higher levels of acceptable loss levels on public lands than for private lands.*"

The 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 management problems. In addition, WS is charged by law to protect American agriculture, despite the cost of control. Further, in the Southern Utah Wilderness Society, The Wilderness Society et al. v. Hugh Thompson et al. U.S. Forest Service (United States District Court of Utah, 1993) the court clearly stated that, "*The agency need not show that a certain level of damage is occurring before it implements an ADC program . . . Hence, to establish need for an ADC, the forest supervisors need only show that damage from predators is threatened.*" In other words, it is not necessary to establish a criterion, such as percentage of loss of a herd to justify the need for predator control. The alternatives selected for detailed analysis in this EA include many 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 WS.

3.2.3 Provide Economic Incentives for Herd Protection.

Providing economic incentives for herd protection alternative would direct all WS program efforts and resources toward the verification of herd protection methods, and providing monetary compensation to the producers. WS services would not include any direct control nor would technical assistance or nonlethal methods be available.

This option is not currently available because WS is mandated to protect American agricultural and natural resources (Animal Damage Control Act of 1931, as amended; and the Rural Development, Agricultural and Related Agencies Appropriation Act 1988).

- It would require larger expenditures of money and workforce to investigate and validate all protective methods, and to determine and administer appropriate incentive payments.
- Making prompt responses to all requests to assess and confirm herd protection would be difficult, and many losses could occur when and if the protection methods failed to adequately protect the livestock.
- Not all ranchers would rely completely on a herd protection/incentive program and unregulated lethal control of predators would most likely continue as permitted by State law.
- Congress has not appropriated funds to compensate livestock producers for herd protection or other wildlife damage to agricultural products.

3.2.4 No Predator Control Within any Wilderness or Proposed Wilderness.

Under the current and proposed WS programs (Alternatives 1 and 2), the amount of predator damage control that would occur in wilderness areas is so minor that the effects of either of those alternatives would not likely be significantly different from the effects of a "No Control in Wilderness Areas" alternative. The minor amount of predator damage control work that is conducted by WS in wilderness or proposed wilderness areas conforms to legislative and policy guidelines as administered by the responsible land management agency. WS and the land management agency meet annually to review work plans that delineate what, when, why and where wildlife damage management would be conducted. Mitigations specific to this issue are listed in the table at the end of Chapter 3.

3.2.5 Management Techniques Not Considered for Use in the Integrated Wildlife Damage Management Strategy, with Rationale.

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, Horn 1983, Burns and Connolly 1980, 1985). In addition, lithium chloride is not currently registered as a predacide by the EPA or IDA, and therefore cannot legally be used or recommended for this purpose.

3.3 Standard Operating Procedures For Wildlife Damage Management Techniques

3.3.1 Mitigation in Standard Operating Procedures.

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current WS program, nationwide and in Idaho, uses many such mitigation measures and these are discussed in detail in Chapter 5 of WS' programmatic EIS (USDA

1994). The following mitigation measures (Table 3.1) apply to some or all of the alternatives, as indicated in the columns on the right hand side of the chart. Mitigation measures for alternatives 5 and 6 are listed together since these alternatives are so similar.

Table 3.1

Mitigation Measures/Standard Operating Procedures	1	2	3	4	5/6
Activities in Wilderness and Special Management Areas (BLM and National Forest System Lands)					
Wildlife damage management would follow guidelines as specified in WS Work Plans.	X	X	X	X	
Vehicle access would be limited only to existing roads unless otherwise authorized by the land management agency.	X	X	X	X	
Wildlife damage management would not be conducted without prior (at least annual) consultation with the land management agency.	X	X	X	X	
Wildlife damage management would be conducted only when and where a need exists.	X	X	X	X	
No aerial hunting would be conducted in any wilderness areas.	X	X	X	X	X
No toxicants would be used in any wilderness or other special management areas.	X	X	X	X	X
No preventive control work would be conducted in any wilderness area.	X	X	X	X	X
Should any of BLM's existing WSAs be officially designated as Wilderness Areas in the future, wildlife damage management would be performed in accordance with BLM Wilderness Management Policy (BLM 1981)	X	X	X	X	
Animal welfare and humaneness of methods used by WS					
Research would continue to improve the selectivity and humaneness of management devices.	X	X	X	X	
Pan-tension devices would be used to reduce the incidence of nontarget animal capture in foothold traps and leg snares.	X	X	X	X	
Breakaway snares have been developed and implemented into the program. (Breakaway snares are designed to break open and release with tension exerted by larger nontarget animals such as deer, antelope and livestock.)	X	X	X	X	
Chemical immobilization/euthanasia procedures that do not cause pain are used.	X	X	X		
Traps and snares would be checked at intervals consistent with State of Idaho regulations.	X	X	X	X	
Safety concerns regarding WS' use of toxicants, traps and snares					
All pesticides are registered with the EPA and ISDA.	X	X	X		
EPA-approved label directions are followed by WS employees.	X	X	X		
The WS Decision Model is designed to identify the most appropriate wildlife damage management strategies and their impacts.	X	X	X	X	

Table 3.1					
Mitigation Measures/Standard Operating Procedures	1	2	3	4	5/6
WS employees that use pesticides are trained to use each specific material and are certified to use pesticides under EPA approved certification programs.	X	X	X		
WS employees who use pesticides participate in continuing education programs to keep abreast of developments and to maintain their certifications.	X	X	X		
Traps and snares would be placed so that captured animals would not be readily visible from any designated recreation road or trail shown on Forest Transportation Maps, or from Federal, State, or county roads.	X	X	X	X	
Warning signs would be posted on main roads and/or trails leading into any areas where traps, snares or M-44s were being used. These signs would be removed at the end of the control period.	X	X	X	X	
In addition to area warning signs, individual warning signs would be placed within 25 feet of each M-44 device.	X	X	X		
No M-44 devices would be used on any public lands during the regular upland bird hunting seasons.	X	X	X	X	X
No traps, snares, or M-44s would be allowed within ½ mile of any residence, community, or developed recreation site, unless requested by the owner of a privately-owned property or an official from the appropriate land management agency.	X	X	X	X	
Concerns about impacts of WS' activities on threatened and endangered species and other species of special concern					
WS has consulted with the FWS regarding the nationwide program and would continue to implement all applicable measures identified by the FWS to ensure protection of T/E species.	X	X	X	X	
All cage (culvert) traps and foot snares set for black bears in areas occupied by grizzly bears would be checked at least daily.	X	X	X	X	
Neck snares would not be used for coyotes, black bears or mountain lions in areas occupied by grizzly bears.	X	X	X	X	
All foothold traps larger than #3 Soft-Catch would be checked at least daily in areas identified by the FWS as "occupied gray wolf range".	X	X	X	X	
M-44s would not be used in areas identified by FWS as documented gray wolf territories.	X	X	X	X	
No non-breakaway neck snares would be used in occupied gray wolf range unless they were set specifically to take a wolf as a target species.	X	X	X	X	
WS would initiate informal consultation with FWS within at least 5 days following any incidental take of a gray wolf.	X	X	X	X	

Table 3.1					
Mitigation Measures/Standard Operating Procedures	1	2	3	4	5/6
Only WS personnel trained in wolf identification would be used as aerial gunners in areas where gray wolves may be encountered.	X	X	X	X	
The LPC would not be used in areas identified by the FWS as occupied gray wolf or grizzly bear areas without prior approval from the FWS.		X	X		
No foothold traps or snares would be set within 30 feet of any exposed bait or animal carcass (except when attempting to catch black bears or mountain lions) to preclude capture of bald eagles or other raptors.	X	X	X	X	
Foothold traps or snares set near exposed baits to capture black bears or mountain lions would incorporate tension devices to preclude capture of bald eagles and other nontarget species.	X	X	X	X	
WS personnel would contact cooperating agencies to determine bald eagle nest and roost locations in areas where WS activities are proposed.	X	X	X	X	
If bald eagles are encountered during aerial gunning operations, the aircraft would leave the immediate vicinity as soon as possible.	X	X	X	X	
Potential hazards to wolverines on National Forest lands would be minimized by restricting use of foothold traps on forest lands to summer months, when wolverines are less responsive to the scents used as attractants.	X	X	X	X	
If wintering big game or wild horses are encountered during aerial hunting operations and begin reacting to the aircraft, the aircraft would leave the area.	X	X	X	X	
Only coyotes, red fox and depredating gray wolves would ordinarily be taken by WS during aerial hunting operations.	X	X	X	X	
Bear and mountain lion damage management would be restricted to offending individuals.	X	X	X	X	
When practical, WS would work with IDFG to facilitate removal of depredating black bears and mountain lions by licensed sport hunters during the legal sport hunting seasons.	X	X	X	X	
The use of non-lethal methods such as guard dogs, scare devices, llamas, and other methods which may become available, would be encouraged when appropriate.	X	X	X	X	X
The appropriate land manager and the FWS would be notified as soon as possible, and always within at least 5 days, if a gray wolf is caught or killed.	X	X	X	X	

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.0 Introduction

This section analyzes the environmental consequences using Alternative 1 (the current program) as the baseline for comparison with the other alternatives to determine if the real or potential impacts are greater, lesser or similar. Table 4.4 (at the end of Chapter 4) summarizes a comparison of the issues and impacts of each alternative.

The following resource values within the analysis area (soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber and range, and cultural, archeological, and historic resources) would not be significantly impacted by any of the alternatives analyzed. These resources will not be analyzed further.

Social and Recreational Concerns: Social and recreational concerns are discussed throughout the document as they relate to issues raised during public involvement, and they are discussed throughout the WS programmatic EIS (USDA 1994).

Target and Nontarget Wildlife Species: Cumulative impacts to potentially affected wildlife species are addressed in detail under sections 4.1.1 and 4.1.2.

Cumulative and Unavoidable Impacts: Cumulative and unavoidable impacts are discussed in relationship to each of the key wildlife species and the environmental impacts are analyzed in this chapter. This EA recognizes that the total annual removal of individual animals from wildlife populations by all causes is the cumulative mortality. It is not anticipated that the proposed action will result in any adverse cumulative impacts to threatened or endangered species populations, or to WAs or WSAs.

Irreversible and Irretrievable Commitments of Resources: Other than relatively minor uses of fuels for motor vehicles and electrical energy for office maintenance, there are no irreversible or irretrievable commitments of resources. Based on these estimates, the analysis area program produces negligible impacts on the supply of fossil fuels and electrical energy.

ISSUES ANALYZED IN DETAIL

4.1 Cumulative Impacts on Viability of Wildlife Populations

Analysis of this issue will be limited primarily to those species most often taken during WS' predator damage management activities. This includes coyotes, red fox, striped skunks, badgers, raccoons, bobcats, black bears, and mountain lions. Although WS has only occasionally targeted badgers, ravens, magpies or crows for lethal control in the past, an increased amount of control would be directed at these species under the proposed action, and potential impacts to these species' populations will be addressed as well.

The analysis for magnitude of impact on these species' populations generally follows the process described in the WS programmatic EIS (USDA 1994, Chapter 4). Magnitude is described in the EIS as "*... a measure of the number of animals killed in relation to their abundance.*" Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. When population estimates are used to make a quantitative determination, conservative estimates are used to better ensure that impacts of predator removal are adequately assessed.

4.1.1 Alternative 1. Continue the Current Program: (No Action).

Coyote Population Information

Determinations of absolute densities for coyote populations are frequently limited to educated guesses (Knowlton 1972). The cost of studies to accurately determine absolute coyote densities over large areas would be prohibitive (Connolly 1992b) and would not appear to be warranted for this EA given the coyote's relative abundance. WS' take of coyotes per hour of aerial hunting effort, however, may represent some of the best information available on the relative abundance of coyotes in southern Idaho. For purposes of this analysis, data on WS' take of coyotes per hour of aerial hunting effort was compiled from historical program records (Figure 4.1). Minor year-to-year variation in this index may be attributable to differences in aerial hunting conditions (i.e., in years with more snow cover, the average number of coyotes taken per hour might be higher than in years with less snow cover). The same type of aircraft and hunting methods have been used throughout this period.

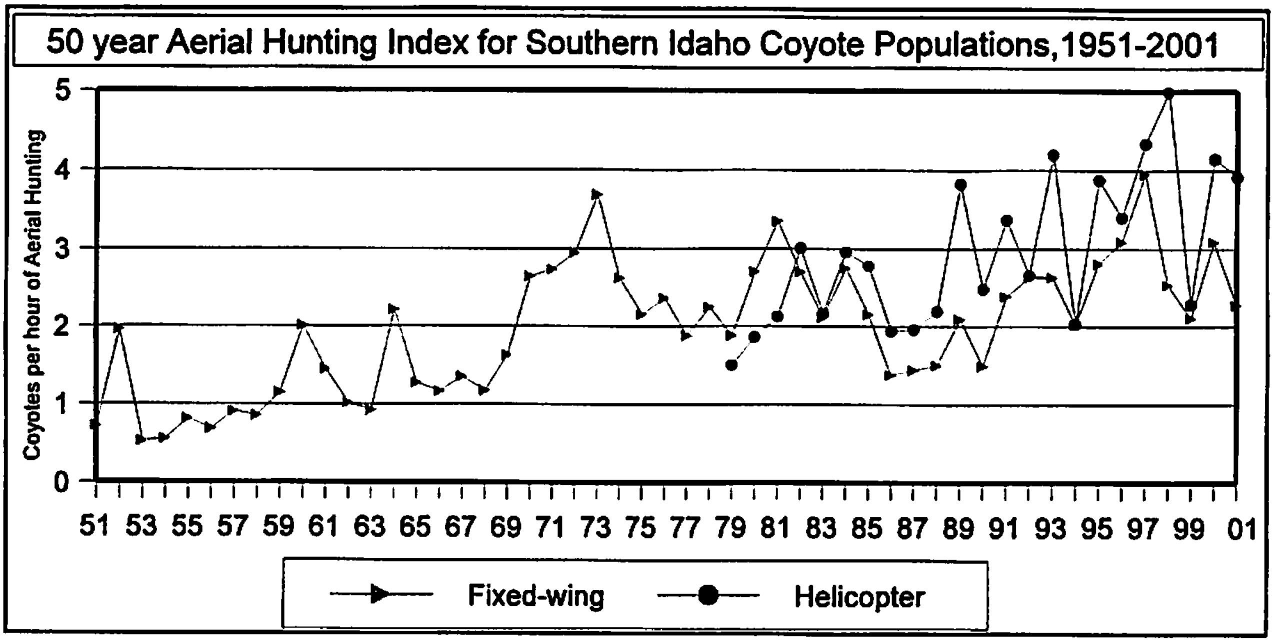

Figure 4.1

The primary value of this information is in viewing it over time as a relative indicator of coyote abundance. Coyote abundance in the analysis area appears to be somewhat cyclical. This is consistent with the conclusion of Stoddart (1984) that coyote densities in an area of southeast Idaho appeared to increase and decrease in response to changes in blacktail jackrabbit abundance. The data in Figure 4.1 also suggest that southern Idaho coyote densities are significantly higher today than they were back in the '50s and '60s when toxicants were used extensively to reduce coyote populations. Coyote populations in southern Idaho appear to be stable to increasing.

Coyotes are highly mobile animals with home ranges (territories) that vary by sex and age of the animal and season of the year (Pyrah 1984, Althoff 1978, Todd and Keith 1976). Coyote population densities will vary depending on the time of year, food abundance, and habitat. In reviewing a series of studies where coyote abundance was assessed, Knowlton (1972) concluded that coyote densities may range as high as 5-6/mi^2 under extremely favorable conditions, with 0.5-1.0/mi^2 seemingly realistic over much of their range. Davison (1980) reported that coyote densities were 0.7/mi^2 in an area of Butte County in southeastern Idaho. Clark (1972) conducted a study of coyotes in the Curlew valley area of southeastern Idaho and northern Utah. Coyotes in this study area were subject to significant predator damage control efforts as well as heavy private fur harvesting efforts. Clark's five year average population density, which included an apparent nine year low, was estimated at 0.63/mi^2.

In some areas of southern Idaho, coyote densities are probably much higher than the 0.5-1.0/mi^2 range discussed above. During a 1-week period in April of 1993, in response to a severe depredation problem, WS removed 56 coyotes from an approximately 15/mi^2 area near Jump Creek and Poison Creek in southwest Idaho, suggesting a minimum density of around 3.7 coyotes per square mile (Bangerter 1993). This take of coyotes was during the lowest seasonal density (immediately prior to whelping) and does not account for coyotes that likely remained in the area after the conclusion of WS's efforts. A minimum density estimate was obtained similarly on the Soda Springs Ranger District of the Caribou National Forest in 1978, when 307 coyotes were removed from an approximately 300 square mile area during winter aerial hunting operations, suggesting a minimum winter density of about 1 coyote per square mile (USDI 1978).

Based on a review of the information cited above, coyote densities for purposes of this assessment will be estimated conservatively at 0.6/mi^2 throughout the analysis area. The 48,570 mi^2 analysis area would then hold an estimated population of about 29,100 coyotes.

Coyote Population Impact Analysis

During FY 99-01, WS took an average 4,336 coyotes annually in the analysis area, or about 15% of the estimated population. The average private trapper harvest in the analysis area for the 1997-98, 1998-99, and 1999-2000 seasons was about 1,119 coyotes, and the average annual private aerial hunting take of coyotes from 1998-2000 in the analysis area has been about 123 coyotes. In addition to this take, IDFG has contracted with private trappers to conduct predator control on certain State Wildlife Management Areas and pheasant release sites, and a total of 93 coyotes were removed during these efforts in 2001. Sport hunting undoubtedly accounts for an additional number of coyotes taken every year, but numbers on this take are not available. For purposes of this analysis, we will assume that the harvest by sport hunters equals the harvest by private trappers. The combined annual coyote take then probably averages about 6,790 coyotes in the analysis area, or about 23% of the estimated population. Although coyote densities in small localized areas may be temporarily reduced through WS' control actions, immigration of coyotes from surrounding areas eventually repopulates these areas. Henke (1992) noted that in his study area, coyote density returned to pre-removal levels within 3 months following removal efforts. In a study by Gese (1998) the alpha pair was lost and within a few weeks the territory had been taken over by individuals from a neighboring pack.

A population model developed by Pitt et al. (2001) assessed the impact of removing a set proportion of the coyote population in one year and then allowing the population to recover (pulse removal). In the model, all populations recovered within 1 year when <60% of the population was removed. The population recovered within 5 years when 60-90% of the population was removed. Pitt et al. (2001) stated that natural populations would recover in less time than in the model because, in the model, territories remained even at low densities, animals were not allowed to move out of their territories to mate, and animals were not allowed to move in from surrounding areas (no immigration). The model also did not allow for a reduction in natural mortality rates at low population densities. Pitt et al. (2001) also evaluated the impact of removing a set proportion of the population every year for 50 years (sustained removal). When the removal rate was <60% of the population, the population size was the same as for an unexploited population. However, there was a shift in population structure. For example, the population with 50% removal had fewer transient animals, a younger age structure, and higher reproduction. Sustained removal rates of >70% of the population resulted in removal of the entire population after 7 years, but the authors acknowledged that annual removal of 70% of the population would become increasingly difficult at low densities. Because of the model limitations described above for pulse removal, natural populations are probably able to withstand greater levels of harvest than indicated by Pitt et al. (2001). An earlier model developed by Connolly and Longhurst (1975), and revisited by Connolly (1995) suggested that coyotes could withstand an annual removal of 70% of their numbers and still maintain a viable population. Evaluating the data using standards established in USDA (1994), removal of 23% of the coyote population in the analysis area would result in cumulative impacts of only a low magnitude. This conclusion is consistent with the U.S. General Accounting Office (GAO 1990) assessment regarding WS' impacts on coyote populations in the western U.S.

Red Fox Population Information

Red fox are the most common and well-known species in the genus *Vulpes* and are the most widely distributed nonspecific predators in the world (Voigt 1987). Foxes are regarded as nuisance predators in many regions, preying on wildlife and livestock, and have become notorious in many areas of the world as carriers of diseases (Ables 1969, Andrews et al. 1973, Tabel et al. 1974, Tullar et al. 1976, Pils and Martin 1978, Sargeant 1978, Voigt 1987, Allen and Sargeant 1993). Because of its importance to humans, it has been the subject of much study during the last 20 years. Investigations have revealed that red fox are extremely adaptive with much diversity in their behavior and habitats. Voigt and Earle (1983) and Gese et al. (1996a) showed that red foxes avoided coyotes but coexisted in the same area and habitats.

The density of red fox populations is difficult to determine because of the species secretive and elusive nature. However, the red fox has a high reproductive rate and dispersal capacity similar to coyotes, and can withstand high mortality within the population (Allen and Sargeant 1993, Voigt 1987, Voigt and MacDonald 1984, Harris 1979, Pils and Martin 1978, Storm et al. 1976, Andrews et al. 1973, and Phillips and Mech 1970). Storm et al. (1976) stated that 95% of the females (43.6% were less than 1 year old) bred successfully in a population in Illinois and Iowa. Rowlands and Parkes (1935) and Creed (1960) reported that male red fox breed in their first year. Litter sizes averaged about 4.7 for 13 research studies and litters with as many as 14 and 17 offspring have been reported (Storm et al. 1976, Voigt 1987). Ables (1969) and Sheldon (1950) reported that more than one female was observed at the den and suggested that red fox have "helpers" at the den, a phenomena observed in coyotes and other canids. Reported red fox population densities have been as high as over $50/mi^2$ (Harris 1977, MacDonald and Newdick 1982, Harris and Rayner 1986) where food was abundant. Ontario population densities are estimated at 2.6 $animals/mi^2$ (Voigt 1987), and Sargeant (1972) reported 1 fox den/3 mi^2. For purposes of this analysis, we will conservatively estimate red fox densities at $0.3/mi^2$ throughout the analysis area. This would equate to a total population in the analysis area of about 14,570 red fox.

Red fox dispersal serves to replace and equalize fox densities over large areas and over a wide range of population densities. Annual harvests in localized areas in one or more years will likely have little impact on the overall population in subsequent years, but may reduce localized predation (Allen and Sargeant 1993). Phillips (1970) stated that fox populations are resilient and in order for fox control operations by trapping to be successful, pressure on the population must be almost continuous. Phillips (1970) and Voigt (1987) further stated that habitat destruction that reduces prey numbers, water and cover will affect fox populations to a greater extent than a short-term over harvest. Red fox social structure and population dynamics are similar to that for coyote, and red fox populations are likely to exhibit the same resilience to harvest as that modeled for coyotes above (Pitt et al. 2001).

Red fox were uncommon in Idaho in the early 1900s, but their populations apparently began increasing and expanding around 1960 (Fichter and Williams 1967), and they have been relatively abundant in southern Idaho for the last several decades. Their populations are believed to be stable to increasing (IDFG 2001a). Concerns have been expressed by sportsmen and some legislators that high red fox populations may be having a detrimental impact on pheasant populations, and these factors presumably entered into the decision by the Idaho Fish and Game Commission to institute the current year-round hunting and trapping season for red fox across most of southern Idaho. Increases in red fox populations and their potential impacts on sage grouse were also considered and addressed in recently revised sage grouse management guidelines (Connelly et al. 2000), which now include a recommendation that red fox populations should be discouraged in sage grouse habitat.

Red Fox Population Impact Analysis

During FY 99-01, WS took an average of 222 red fox annually in the analysis area, or less than 2% of the estimated population. IDFG furbearer harvest statistics suggest an average of 1,736 red fox harvested annually by fur trappers within the analysis area over the 1998-2000 reporting period. As with coyotes, sport hunting undoubtedly accounts for an additional number of fox taken every year, but numbers on this take are not available. For purposes of this analysis, we will assume that the harvest by sport hunters equals the harvest by private trappers. IDFG has also contracted with private trappers to conduct predator control on certain State Wildlife Management Areas and pheasant release sites, and a total of 154 red fox were removed during these efforts in 2001. The combined annual red fox take then probably averages about 3,850 in the analysis area, or about 27% of the estimated population. Because the allowable harvest level cited for red fox is 70% of the total population (USDA 1994), a 27% level of harvest would be considered a cumulative impact of a low magnitude..

Black Bear Population Information

The age structure of bear populations is one indicator of population health. Because bears are relatively long-lived animals, bears in the older age classes should be found in a healthy population. If a population is overexploited, the older aged bears will not be present or will be in low proportions (IDFG 1998).

In Idaho, female black bears generally reach reproductive maturity at 4 years of age. Following a 7-8 month gestation (about 220 days), they produce an average of 1.5-1.8 cubs per female. Lightly hunted areas in Idaho have a high ratio of adults to subadults (70:30), a high percentage of adult males (35%), and a median age of 7.5 years. Data collected from heavily hunted populations showed adult:subadult ratios at 40:60, fewer adult males (21%), and a median age of 2.5-3.5 years (IDFG 1998).

IDFG has estimated the statewide black bear population at about 25,000 animals (USDA 1994). For purposes of this analysis, we will be more conservative and assume an estimated statewide population of 20,000 black bears. About 30% of the annual black bear harvest occurs in the analysis area, which would indicate an estimated population of about 6000 black bears in the analysis area (J. Beecham, IDFG, pers. comm., 1995).

Black Bear Population Impact Analysis

Current black bear harvest, whether by hunting, IDFG, WS, livestock producers or other causes, is not causing a decline in bear populations, and black bear populations in Idaho appear to be stable (J. Unsworth, IDFG, pers. comm., 2002). During the 1998-2000 hunting seasons, sport hunters removed an average of 492 bear per year from the analysis area, while WS took an average of 6 bears/year during FY 99-01. WS' take amounted to less than 0.1% of the total estimated population, while the total known kill averaged about 8% of the estimated population. The allowable harvest level cited for black bears in USDA (1994) is 20% of the population. IDFG biologists feel that a harvest level of 10% would be more appropriate for Idaho (J. Beecham, IDFG, pers. comm., 1996). While the impact of WS' take of black bears would be considered very low, the qualitative assessment of the cumulative impact would be considered moderate. It should be noted that although WS took a very small proportion of the black bear in relationship to the total population, the effort is important in resolving black bear damage problems and meeting black bear damage management goals.

Mountain Lion Population Information

Mountain lions inhabit many habitat types from desert to alpine environments, indicating a wide range of adaptability. They are closely associated with deer and elk because of their dependence upon these species 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 but most births occur during late spring and summer following about a 90 day gestation period (Ashman et al. 1983, Seidernsticker et al. 1973, Robinette et al. 1961). One to six offspring per litter is possible, with an average of two to three young per litter.

Mountain lion density is related closely to prey availability and the social tolerance for other mountain lions. Prey availability is directly related to prey habitat quality that directly influences mountain lion nutritional health, and reproductive and mortality rates. Studies indicate that as available prey increases, so do lion populations, but because mountain lions are territorial animals, the rate of population increase tends to decrease as lion density increases. As lion population density increases, mortality rates from intra specific fighting and cannibalism also increase, and/or lions disperse into unoccupied or less densely occupied habitat. The relationship of the mountain lion to its prey and to other lions is why their densities do not reach levels observed in a number of other wildlife species (ODFW 1993).

Mountain lion densities in other states, based on a variety of population estimating techniques, range from a low of about 1/100 mi^2. to a high of 24/100 mi^2. (Johnson and Strickland 1992). An average density estimate for the western states was 7.5/100 mi^2. (Johnson and Strickland, 1992). Specific mountain lion population estimates for the southern Idaho analysis area are not available, but IDFG harvest data suggests that Idaho's mountain lion population has increased dramatically in number and distribution over the last 10 years (IDFG 2001b). Annual sport harvest of mountain lions in Idaho is typically among the highest of any state in the western U.S. (J. Rachael, IDFG, pers. comm., 2002), so it is probably reasonable to infer that mountain lion densities in Idaho are at least as high as the 7.5/100 mi^2 average density estimate suggested by Johnson and Strickland (1992). But for purposes of our analysis of cumulative impacts, we will conservatively estimate mountain lion densities in the southern Idaho analysis area at only 5 lions/100 mi^2, which would equate to a population of about 2,428 lions in the 48,570 mi^2 analysis area.

Mountain Lion Population Impact Analysis

Mountain lion populations can sustain relatively moderate to heavy losses of adults and still maintain viable populations. Robinette et al. (1977) reported an annual mortality of 32% in Utah, while Ashman et al. (1983) noted a sustained annual mortality of at least 30% in Nevada. Ashman et al. (1983) believed that under "moderate to heavy exploitation (30%-50%)" mountain lion populations on their study area had the recruitment (reproduction and immigration) capability to rapidly replace annual losses. The allowable annual harvest level for mountain lion cited by the USDA (1994) is 30% of the population.

The average annual sport harvest for the 1997-98, 1998-99, and 1999-2000 seasons in the analysis area was about 237 animals per year. The average take by WS during the FY 99-01 period was only about 2 mountain lions each year, yielding an average annual cumulative take of 239 lions, or about 10% of the total estimated population in the analysis area. These figures are well within the parameters for a determination of low magnitude of impact as determined by USDA (1994).

Bobcat Population Information

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). Reported bobcat densities, as summarized by McCord and Cardoza (1982), have ranged between 0.1-7.0/mi^2. They may live up to 14 years, but annual mortality is as high as 47% (Rolley 1985). Analysis of Idaho bobcat harvest data suggests that populations are healthy and productive, and that current harvest levels are not detrimental to bobcat populations (IDFG 2001a). Knick (1990) estimated that bobcat densities on his study area in southeastern Idaho ranged from .35/mi^2 during a period of high jackrabbit densities, to about 0.04/mi^2 during a period of low jackrabbit densities. Bailey (1974) estimated bobcat densities in the same area to average about .14/mi^2. Given IDFG's assessment that bobcat populations in Idaho are healthy and productive, we will conservatively estimate bobcat densities at 0.1/mi^2 in the analysis area, or about 4,857 animals.

Bobcat Population Impact Analysis

IDFG furbearer harvest statistics for the 1997-98, 1998-99, and 1999-2000 seasons suggest an average annual harvest of 480 bobcats from the analysis area. WS took an average of 5 bobcats each year during the FY 99-01 analysis period. The total known annual take therefore averages about 486 bobcats per year in the analysis area, or about 10% of the estimated population. The allowable harvest for bobcats cited in USDA (1994) is 20% of the total population, and a harvest level of less than 15% is considered a low magnitude of impact.

Raccoon Population Information

Raccoons are one of the most omnivorous of animals, feeding on carrion, garbage, birds, mammals, insects, crayfish, mussels, a wide variety of grains, various fruits, other plant materials, and most or all foods prepared for human or animal consumption (Sanderson 1987).

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 big an area the raccoons are using. Twichell and Dill (1949) reported one of the highest densities, with 100 raccoons removed from winter tree dens on 101 acres of a waterfowl refuge in Missouri. 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, Rivest and Bergerson 1981). Specific estimates of raccoon densities are not available for southern Idaho, but the IDFG believes that current populations are either stable or increasing (IDFG 2001a).

Raccoon Population Impact Analysis

In the 1997-98, 1998-99, and 1999-2000 seasons, private trappers harvested an average of 506 raccoons per year from the analysis area. WS took an average of 20 raccoons during predator control efforts each year in the analysis area during the FY 99-01 analysis period. IDFG contracted with private trappers in 2001 to conduct predator control on certain State Wildlife Management Areas and pheasant release sites, and a total of 130 raccoons were removed during these efforts in the analysis area. Total known raccoon harvest from the analysis area therefore probably averages approximately 656 raccoons per year.

Because raccoon populations are judged to be stable or increasing in spite of the present level of overall harvest, the qualitative determination of the cumulative impacts on raccoon populations would be of low magnitude.

Badger Population Information

Under the current program, WS occasionally takes badgers as a target species, but they are more often captured as a nontarget species when attempting to capture coyotes in foothold traps. The badger is classified as a furbearer within the state of Idaho but there is no closed season. They are relatively abundant throughout many areas of southern Idaho, as evidenced by their frequently sighted diggings and the presence of road-killed animals along highways.

Little is known about badger densities other than a few intensely studied populations. Lindzey (1971) estimated that Curlew Valley on the Utah-Idaho border supported 1 badger/mi^2. Messick and Hornocker (1981) believed that the Snake River Birds of Prey Natural Area and adjacent lands in southwestern Idaho supported badger densities of up to 13/mi^2. For purposes of this analysis we will conservatively estimate the badger density to be 1.0/mi^2 across the analysis area, or a total estimated populations of about 48,570 badgers.

Badger Population Impact Analysis

Badger populations can safely sustain an annual harvest rate of 30-40% annually (Boddicker 1980). IDFG furbearer harvest data for the 1997-98, 1998-99 and 1999-2000 seasons suggests private trappers harvest an average of 138 badgers annually from the analysis area. WS removed an average of 54 badgers per year from the analysis area during the FY 99-01 reporting period. Therefore, the average annual known take of badgers within the analysis area was about 192 badgers, or less than 0.1% of the estimated population. Because this is substantially less than the allowable harvest level, and because badger populations in Idaho appear to be stable (IDFG 2001a), cumulative impacts are likely of low magnitude.

Striped Skunk Population Information

The striped skunk is the most common member of the *Mustelidae* family. Striped skunks have increased their geographical range in North America with the clearing of forests, however there is no well-defined land type that can be classified as skunk habitat (Rosatte 1987). Striped skunks are capable of living in a variety of environments, including agricultural lands and in urban areas.

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, Rosatte and Gunson 1984). Skunk densities reported in the literature range 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, including type of habitat, food availability, disease, season of the year, and geographic area (Storm and Tzilkowski 1982). Specific population density estimates for striped skunks in Idaho are not available. For purposes of this analysis, we will conservatively estimate skunk densities at 0.5/mi^2 throughout the analysis area, for an estimated population of about 24,285 animals.

Striped Skunk Population Impact Analysis

Skunk populations can reportedly sustain a 60% annual harvest level indefinitely (Boddicker 1980). IDFG furbearer harvest data from the 1997-98, 1998-99, and 1999-2000 seasons suggests an average annual harvest of 414 skunks per year by private trappers in the analysis area. WS personnel took an average of 49 skunks per year during predator control efforts in the analysis area in the FY 99-01 reporting period. IDFG contracted with private trappers to conduct predator control on certain State Wildlife Management Areas and pheasant release sites in 2001, and a total of 301 striped skunks were removed during these efforts. The total annual harvest of skunks in the analysis area is probably about 764 animals, or about 3% of the total estimated population. Because this level of harvest is substantially less than the sustainable harvest level, cumulative impacts are likely of a low magnitude.

Common Raven Populations and Impacts Analysis

Ravens are generally a resident species, but some wandering and local migration occurs with immature and non-breeding birds (Goodwin 1986). Typical clutch size is between 3 - 7 eggs. Immature birds which have left their parents form loose-knit flocks with non-breeding adults. Knight and Call (1981) summarized a number of studies on raven territories and home ranges in the western U.S. Nesting territories ranged in size from 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. Steenhof et al. (1993) reported on the increase in density of nesting ravens along a section of high-tension power line constructed in 1980 in southern Idaho. One nest was recorded in 1981 in the first year after construction of the power line, increasing to 9 nests in 1982, 39 nests in 1983, and increasing to a total of 81 nests in 1987. Numbers of nesting ravens in surrounding areas did not decline during this period of time, suggesting the increase in nesting density was due to population increase rather than immigration. Information on actual raven densities in the analysis area is not available, but population trend information is available from Breeding Bird Surveys and Christmas Bird Counts. Breeding Bird Survey data maintained by the FWS for the period of 1968-2000 suggests that raven populations in Idaho are increasing (Figure 4.2) (Sauer et al. 2001).

WS has removed an average of 46 ravens annually during predator damage control operations in the analysis area during FY 99-01, and there has been no known other take of ravens during this period of time. Given that raven populations appear to be increasing, it can be assumed that current WS impacts on the raven population are of a low magnitude.

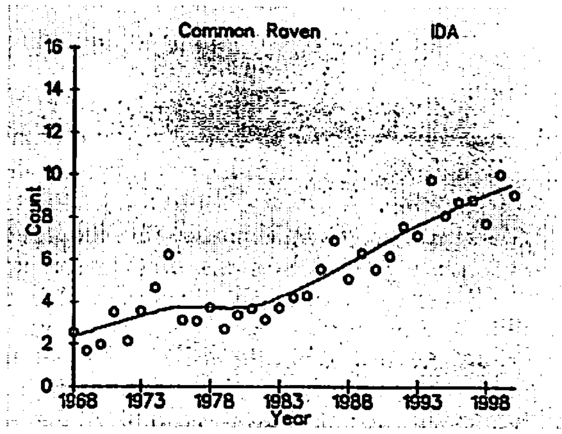

Figure 4.2 Common Raven population trend data from FWS Breeding Bird Surveys.

Black-billed Magpie Populations and Impact Analysis

Like ravens, magpies are omnivorous and very opportunistic in their feeding habits (Hall 1994). In Idaho, Gazda and Connelly (1993) confirmed that magpie predation was the single most important factor limiting waterfowl nesting success on their study area. Farmers growing alfalfa for seed in southern Idaho have also confirmed that magpies are a significant problem when they prey on valuable leaf-cutter bees. The bees are raised as pollinators for alfalfa seed crops, and magpies can cause significant economic damage as they feed on the pupae emerging from the bee boards housed near the alfalfa fields.

The black-billed magpie is common throughout Idaho, and analysis of Breeding Bird Survey data suggests that for the last 10 years, magpie populations in Idaho have been stable (Figure 4.3, Sauer et al. 2001). Audubon Christmas Bird Count data suggests that magpies are much more abundant than ravens in Idaho, with a mean of 92.83 magpies seen per 100 observer hours, versus only 6.47 ravens seen per 100 hours. Specific population estimates for magpies in Idaho are not available, but Gazda and Connelly (1993) documented a nesting density of 35 active magpie nests per square mile on the Sterling Wildlife Management Area in southeastern Idaho. Magpie populations are apparently healthy enough, and the problems they cause great enough, that the FWS has established a "standing depredation order" for magpies. Under this regulation (50 CFR 21.43), no Federal permit is required by anyone to take magpies if they are committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance.

WS typically takes few magpies during predator damage control operations in the analysis area, (FY 99-01 average of about 44/year). IDFG contracted with private trappers in 2001 to conduct predator removal at selected State Wildlife Management Areas and pheasant release sites, and a total of 1,105 magpies were removed during these efforts. Because magpies are relatively abundant and because their populations appear to be stable in spite of the liberal take allowed, continued removal of magpies at current levels would likely result in only a low magnitude of impact.

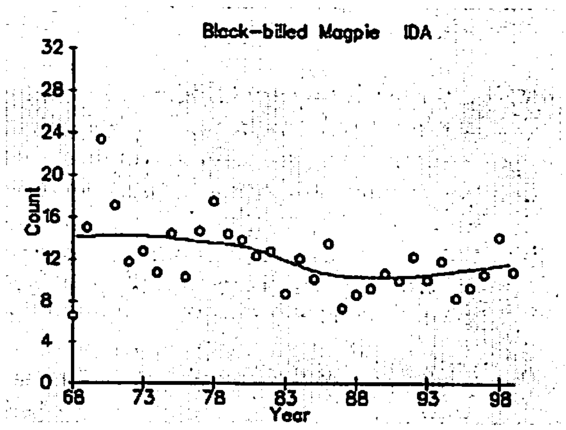

Figure 4.3 Black-billed magpie population trend data from FWS Breeding Bird Surveys.

American Crow Populations and Impact Analysis

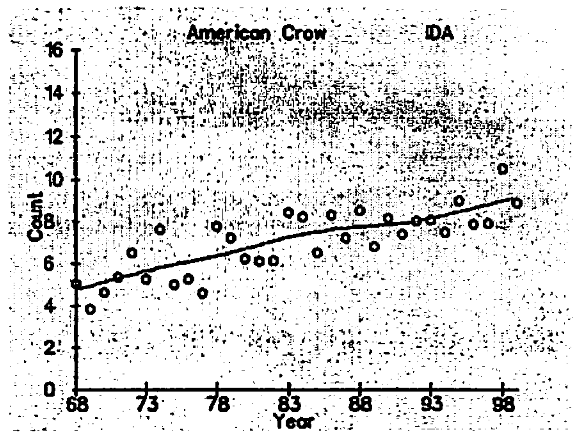

Figure 4.4 American crow population trend data from FWS Breeding Bird Surveys

Crows are rarely targeted for control by WS under the current program (FY 99-01 average of only about 2/year), but because they may occasionally be taken during raven control efforts using DRC-1339 treated egg baits, potential impacts on their populations will be assessed. Like magpies and ravens, crows are omnivorous and eat a wide variety of foods and readily adapt to new food sources. Clutch size ranges between 4-6 eggs.

Breeding Bird Survey data suggests that crow numbers are increasing in Idaho (Figure 4.4) (Sauer et al. 2001). Counts from Breeding Bird Surveys indicate population levels similar to those for ravens. Crow populations are healthy enough and the problems they cause great enough that the FWS has included crows in the same standing depredation order that was established for magpies (50 CFR 21.43). In addition, the FWS has historically and currently authorizes a fairly liberal 4-month hunting season on crows in Idaho. Because crow populations appear to be increasing in spite of the liberal take allowed, current levels of harvest would be expected to result in only a low magnitude of impact.

4.1.2 Alternative 2. <u>Expanded Wildlife Protection Activities (Proposed Action).</u>

Under Alternative 2, the current program would be expanded to potentially include additional efforts to protect sage grouse, sharp-tailed grouse, and northern and southern Idaho ground squirrels. This would be expected to result in additional take of coyotes, red fox, badgers, ravens, and possibly crows and magpies, beyond the levels assessed in Alternative 1.

Potential Impacts on Coyote and Red Fox Populations

Because of the similarities in population dynamics and acceptable harvest rates between red fox and coyotes, the discussion on impacts to these species will be combined. Using the density estimates discussed in Alternative 1, each 100 mi^2 grouse protection site would be expected to contain approximately 60 coyotes and 30 red fox. Based on consultations with biologists experienced with predator removal efforts (F. Knowlton, National Wildlife Research Center, pers. comm., 2002), we estimate a maximum removal rate of approximately 75% (45 coyotes and 23 red fox from each 100 mi^2 treatment area). If more coyotes and red fox than this were removed from any one treatment area, that would suggest densities in the treatment areas were higher than the conservative estimates of 0.6 coyotes/mi^2 and 0.3 red fox/mi^2 used in the analysis for Alternative 1. Although a 75% removal rate exceeds the maximum 70% level recommended for long-term sustainable harvest, limiting the size of treatment areas to 100 mi^2 ensures that coyotes and red fox from adjacent areas would soon begin contributing to repopulation of treatment areas. The Pitt et al. (2001) model for coyote populations predicts that for pulse removal, coyote populations sustaining 75% harvest levels are conservatively estimated to recover in <4 years with no immigration from external sources. Taking immigration into account, coyote and red fox populations would be expected to recover within 1-2 years after control efforts are terminated. In an unpublished study by E. M. Gese (USDA Predator Ecology Center, pers. comm., 1996), a Colorado coyote population in a 340 km^2 area was reduced approximately 50% by January aerial hunting (based on scent station indices and density estimates). Territory size, pack size, and density estimates had returned to pretreatment levels within 4-5 months. Resilience to harvest and population recovery rates are likely to be similar for red fox.

Cumulative impacts on coyote and red fox populations under Alternative 2 would be slightly higher than under Alternative 1, but would still be of a low magnitude. Even if the maximum estimated take of coyotes and red fox on each 100 mi^2 treatment area were double what is being predicted (i.e., a total of 90 coyotes and 45 red fox from each treatment area) and the number of treatment areas was increased from 3 to as many as 10, this additional level of removal would still only represent a 26% level of harvest for coyotes and a 30% level of harvest for red fox in the analysis area, both of which are well below the allowable 70% harvest level.

Additional take of coyotes or red fox during efforts to protect northern or southern Idaho ground squirrels would not be expected to exceed more than 50 coyotes or 30 red fox annually, and would probably be much less than this amount. This relatively small amount of additional take would not represent any significant change in the above analysis of impacts.

Potential Impacts on Badger Populations

The proposed treatment sites for protection of sage grouse and ground squirrels are all considered badger habitat, and the conservative density estimate of 1 badger/mi^2 will be applied to assess site-specific and cumulative impacts for this analysis. Each 100 mi^2 sage grouse protection site would be expected to contain approximately 100 badgers, and each ground squirrel protection site would contain an estimated 6-8 badgers. While a variety of methods might potentially be employed to take coyotes and red fox (i.e., calling and shooting, aerial hunting, foothold traps, snares, M-44s), badgers are primarily taken by trapping or snaring. Badger territory size and daily movements by badgers are much less than for coyotes, which reduces the likelihood that any individual badger would be exposed to traps or snares within the treatment area, as compared to coyotes. These factors contribute to an expectation that a lower proportion of the badger population would be harvested from each treatment area than would be achieved for either coyotes or red fox. Realistically, probably no more than a 50% level of harvest would be achieved, but for purposes of this analysis, we will assume 75% of the badger population would be removed, or about 75 badgers per 100 mi^2 treatment site. While this level of take exceeds the recommended maximum of 40% for a long-term sustainable harvest (Boddicker 1980), this level of harvest would not be sustained for more than 2-3 years in any one sage grouse study area. The unharvested portion of the badger population in each treatment area would continue to reproduce and immigration of badgers from adjacent areas would also contribute to repopulation of treatment areas.

Badger removal for protection of northern or southern Idaho ground squirrels may conceivably occur annually, but would occur only on relatively small (6-8 mi^2) areas. If badger removal efforts occurred annually in ground squirrel protection areas, badger densities would be expected to remain at lower levels within these relatively small treatment areas. But if badger removal efforts were not conducted annually at these sites, immigration alone would likely lead to return of badger densities to pretreatment levels within one to several years, because of the relatively small size of the areas. .

Cumulative impacts to badger populations would be slightly higher under Alternative 2 than under Alternative 1, but would still be of a low magnitude. Even if 100% of the estimated badger population were removed from as many as ten 100 mi^2 sage grouse study treatment areas and as many as 50 ground squirrel protection sites, that level of removal would still represent a cumulative impact of less than a 5% level of harvest. Since the recommended sustainable level of harvest is 40%, a 5% harvest level would be considered a low magnitude of impact.

Potential Impacts on Raven, Crow and Magpie Populations

The following considerations apply in a qualitative assessment of the potential cumulative impacts associated with the additional level of take anticipated for these species under Alternative 2:

1) Ravens, crows and magpies would be targeted on only a minor portion of the analysis area. Only 3 or 4 treatment sites per year are being proposed, but even if the number of 100 mi^2 treatment sites were

increased to as many as 10 each year (for a total of 1000 mi²), this would still represent only about 2% of the lands within the analysis area. 2) As discussed in the analysis for Alternative 1, the populations for all 3 of these species are relatively high, and the available long-term population trend data suggests their populations are stable to increasing. 3) All 3 of these avian species can travel freely across great distances, which contributes greatly to their ability to repopulate vacated territories in treated areas. 4) Removal efforts would occur during a relatively limited time frame (no more than about 15 weeks each spring), and non-territorial and dispersing birds from adjacent areas would be expected to begin moving into the vacated territories of the treatment areas within a short period of time.

Predation management efforts would not be conducted in the 100 mi^2 treatment areas with the goal of eliminating all corvids or other predators, but rather to temporarily reduce their numbers to a point where they would be unlikely to have a detrimental impact on sage grouse nesting success and chick survival. But even if the goal was to actually remove all corvids from all treatment areas, and that goal was somehow achieved (which is not realistic), this additional level of take would still not be expected to have more than a low magnitude of cumulative impact, given the factors discussed above.

4.1.3 Alternative 3. No Preventive Control.

Total numbers of coyotes taken by WS would decrease slightly under this alternative, and impacts to coyote populations would be reduced to some degree. But because WS' take of coyotes under the current program results in only a low level of impact, the impacts on coyote populations resulting from implementation of a "no preventive control" alternative would not likely differ significantly from the impacts of the current program. Impacts on other species would likewise not be expected to differ significantly from impacts of the current program.

4.1.4 Alternative 4. No Use of Chemical Methods.

Alternative 4 would not allow for use of M-44s, LPCs, or DRC-1339 in predator damage control operations within the analysis area. While M-44s and LPCs are at times important in resolving specific damage problems, the overall numbers of coyotes taken by these methods would be low in comparison to the take of animals by methods such as aerial hunting. Since DRC-1339 would not be available under this alternative, raven control for protection of livestock or wildlife species would be much less effective and fewer ravens would be taken in response to damage complaints. Use of other methods would likely have to be increased to make up for the loss of chemical control methods. While this might result in decreased cost-effectiveness and reduced effectiveness in resolving predation problems, it would not likely result in any impacts to wildlife populations that differed significantly from the impacts of the current program.

4.1.5 Alternative 5. Technical Assistance Program, and Alternative 6. No Federal WS Program.

Because neither of these alternatives would provide for any operational WS activities, there would be no WS impacts on the viability of any wildlife populations. There would likely be increased impacts on some wildlife populations, particularly coyotes, from other sources, to address damage problems. This could take the form of increased private aerial hunting or other control efforts by individual livestock producers, and/or the establishment of organized State, county, or private predator damage control programs. Because WS's current activities result in such a low magnitude of impact on the viability of wildlife populations, it is not expected that these other compensatory forms of wildlife damage control would result in significantly different impacts.

4.2 Concerns About Effectiveness and Selectivity of Wildlife Damage Management Methods

Chapter 3 included discussion about the relative effectiveness and selectivity of the various methods used by WS and that discussion will not be repeated here. Under the current program, all methods are used as selectively and humanely as practically possible, in conformance with the WS Decision Model (Slate et al. 1992) and WS Program Directives. The selectivity of each method is based, in part, on the application of the method and the skill of the WS employee, and the direction provided by WS Directives and policies. The humaneness of each method is based on the perception of the pain or anxiety caused by the method. How each method is perceived often differs, depending on the person's familiarity and perception of the issue as discussed in Chapter 2.

The selectivity and humaneness of each alternative is based on the methods employed under that alternative. WS personnel are trained in the use of each method and are certified by the IDA as pesticide applicators for each pesticide that is used during damage management activities. Effectiveness of the various methods may vary widely depending on local circumstances at the time of application. Some methods may be more or less effective or applicable depending on weather conditions, time of year, biological considerations, economic considerations, legal and administrative restrictions, or other factors. Because these various factors may at times preclude use of certain methods, it is important to maintain the widest possible selection of control tools to most effectively resolve wildlife damage problems.

4.2.1 Alternative 1. Continue the Current Southern Idaho Analysis Area Program (No Action).

Several of the methods employed under the current program are typically 100% selective for target species. These methods include aerial hunting, shooting from the ground, and denning. Cage trapping may take a few nontarget animals, but these animals can typically be released unharmed. DRC-1339 for controlling depredating ravens, magpies and crows is very selective for the target species because prebaiting and baiting procedures ensure that nontarget species are unlikely to be exposed to the baits. If by some remote chance a nontarget mammal were exposed to DRC-1339 meat or egg baits, risks are very low because of the product's low toxicity to mammals (DeCino et al. 1966, Schafer 1981).

The LPC was designed to specifically target coyotes which attack the throat of sheep or goats. Other predators, including dogs, that have attacked collared sheep by the throat have succumbed to the toxicant. There are no significant secondary hazards associated with the use of LPCs (USDA 1994, Appendix P, pp. 273-277).

While the methods discussed above are typically near 100% selective in killing only the target species, other methods such as foothold traps, snares, and M-44s are somewhat less selective. Table 4.1 shows the FY 1999-2001 cumulative number of target and nontarget animals killed in the analysis area by these methods, and their selectivity expressed as the average percent of target animals taken by each method. WS' use of foothold traps would be more humane, and the number of nontargets killed would be lower, if traps could be monitored at least daily. Unfortunately, the amount of territory that each WS Specialist is responsible for, and the number of requests for assistance is such that WS personnel are typically not able to monitor traps every day.

Table 4.1
Selectivity of Foothold Traps, Snares and M-44's as Used by WS in the Southern Idaho Analysis Area FY 1999-2001, by Method

Species	Traps[1]	Snares[1,2]	M-44's
Targets			
Coyote	812	211	547
Red Fox	208	75	129
Badger	95	3	0
Raccoon	25	8	0
Skunk	26	1	0
Dog	8	2	1
Black Bear	0	9	0
Bobcat	7	1	0
Raven	5	0	0
Mountain Lion	1	4	0
Cat, Feral	4	0	0
Porcupine	1	0	0
3-Year Total	1,192	314	677
Non-Targets			
Badger	41	6	0
Skunk	30	1	1
Porcupine	8	2	0
Feral Cat	3	0	0
Deer	3	0	0
Dog	0	0	2
Bobcat	1	1	0
Raccoon	1	1	0
Rabbit	1	0	0
3-Year Total	88	11	3
% Selectivity	93%	96%	99%

[1] These figures refer only to lethal take of animals caught in foothold traps and snares. Non-target animals caught and released are not included in these totals.
[2] These figures refer primarily to animals caught in neck snares,

WS' trap-checking interval is more often closer to 3-4 days than it is to every 24 hours. WS uses foothold traps with either offset jaws or rubber-padded jaws to reduce injuries, and WS' use of pan-tension devices makes use of foothold traps much more selective. Pan-tension devices increase the amount of weight required to set off the trap, and they are effective in significantly reducing the likelihood of capturing smaller nontarget species such as jackrabbits or kit fox (Turkowski et al. 1984, Phillips and Gruver 1996). They are always used by WS unless their use would preclude capture of the intended target species. WS personnel often try to reduce the need for setting traps or snares by trying to first remove problem animals by shooting. If shooting is unsuccessful or not feasible, then equipment must be placed to try and resolve the problem. Nontarget animals captured in traps or snares are released whenever it is judged that they would survive after release.

As used by WS in the analysis area, snares provide a similar level of selectivity for target species as achieved with foothold traps. Spring-activated leg snares set for bears or mountain lions are typically 100% selective for the target species, but neck snares are less selective. The selectivity of snares is largely a function of how and where they are set. Breakaway snares are used to provide for the release of hoofed mammals that might get accidentally caught by the leg.

As for any potential risks to nontarget birds of prey such as red-tailed hawks (*Buteo jamaicensis*), ferruginous hawks (*Buteo regalis*), or golden eagles (*Aquila chrysaetos*), the damage management methods being used and the way they are used preclude this as a concern. WS policy and Idaho State law require that traps not be set any closer than 30 feet from exposed carcasses, and this essentially eliminates the likelihood of catching nontarget raptors in traps. Potential risk to raptors associated with the use of the bird toxicant DRC-1339 is reduced by exposing the product in egg baits, since hawks and eagles do not ordinarily feed on eggs. If any eagles are observed in the vicinity where DRC-1339 use is planned for predation management, baiting operations are delayed until eagles leave the vicinity, or baits are visually monitored during the entire time they are exposed to ensure that no nontarget animals consume any baits. The risk assessment in USDA (1994) concluded that use patterns for DRC-1339 egg and meat baits precluded any probable risk to nontarget species.

Use of livestock guarding dogs by sheep producers has been proven effective in preventing at least some predation losses (Green 1987), and use of guard dogs is generally perceived as a selective form of nonlethal control. But use of guard dogs may also involve deaths of target and nontarget animals. Timm and Schmidt (1989) documented that guard dogs in their study regularly killed deer fawns, and anecdotal evidence from WS field personnel and livestock producers suggests that guard dogs sometimes kill coyote and red fox pups as well as deer fawns and elk calves. Llamas have also been advocated as effective livestock guarding animals (Franklin and Powell 1994), but some degree of nontarget hazard may likewise exist from the use of llamas for this purpose. Llamas are sometimes carriers of paratuberculosis (Johne's disease) which may be transmissible to native ungulates or domestic livestock (Wildlife Management Institute 1995). This disease involves a chronic wasting of the intestinal tract and associated lymphoid tissues, and there is no known cure.

4.2.2 Alternative 2. Expanded Wildlife Protection Activities (Proposed Action).

Analysis under this alternative would be similar to the analysis under Alternative 1 because the tools used in this alternative would be no different than the tools used in Alternative 1. However, expanding predation management activities could potentially increase the total exposure of traps, snares, and possibly M-44s, so there could be a potential for a slight increase in the number of nontarget animals taken.

4.2.3 Alternative 3. No Preventive Control.

Under Alternative 3, WS would still be able to respond with all the methods included under Alternative 1, but would not be authorized to employ any of these methods under a lethal preventive control strategy. Wagner and Conover (1999) concluded that the need for use of traps, snares, and M-44's for corrective control was lower on sites with preventive aerial hunting than sites without preventive aerial hunting.

Foothold traps, snares and M-44s have a greater risk of capturing a nontarget species than aerial hunting. Therefore, risks to non-target species would probably be slightly increased under this alternative.

WS would likely be less effective at reducing coyote predation on summer sheep grazing areas without the option of winter time helicopter aerial hunting. In a study by Wagner and Conover (1999), sheep and lamb losses were lower on sites with preventive aerial hunting than on similar sites without preventive aerial hunting. Decreased effectiveness is related to the logistics of just getting to these areas and having to use less effective coyote removal methods during the summer months. Gantz (1990) noted that the coyotes most likely to kill sheep are the ones raising pups (Till and Knowlton 1983), and that late winter aerial hunting of coyotes on summer sheep grazing allotments removes coyotes that otherwise likely would have produced pups. By conducting preventive control in late winter, the likelihood of transient coyotes reoccupying vacated territories and establishing their own territories in time to produce pups is greatly reduced. Gantz (1990) concluded that late winter aerial hunting of coyotes on summer sheep range was an effective method to reduce coyote predation.

By restricting corrective control to the immediate vicinity of predation losses, WS would be unable to effectively resolve some depredation problems. Till (1992), for instance, found that depredating coyotes traveled an average of 2 miles and as far as 6 miles from their den site to the sheep flocks where they were killing lambs.

4.2.4 Alternative 4. No Use of Chemical Methods.

This alternative would preclude use of the M-44 and the LPC for controlling coyote predation, both of which are more selective than either foothold traps or snares. Use of traps and snares would likely have to increase, so overall selectivity would probably be slightly reduced. The bird toxicant DRC-1339 is the most effective method available for controlling ravens, magpies and crows, but his product would not be available under Alternative 4. While cage trapping and shooting could still be used to take these species, these methods are less effective and more costly. The WS Decision Model would still be used to determine the most appropriate method(s) to be used, but without the use of chemicals the available options and overall effectiveness would be reduced. Producer implemented nonlethal methods would remain unchanged.

4.2.5 Alternative 5. Technical Assistance Only and Alternative 6. - No Federal WS Program.

Neither of these alternatives would involve use of any control methods by WS, so concerns about effectiveness and selectivity of methods used by WS are not relevant. Some type of wildlife damage management would most likely be implemented by livestock producers or private predator control programs, however, and these activities could involve methods that were less selective than WS' activities. Damage management efforts by individuals with limited training and experience would be less likely to take offending individual animals and more likely to take nontarget species.

4.3 Concerns about Risks Posed by Wildlife Damage Management Methods to the Public and Domestic Pets

Wildlife damage management activities conducted by WS in the analysis area are directed by WS Directives, Cooperative Agreements, MOU and Federal and State laws. Effects on public health and safety include potential benefits caused by WS fostering a safer environment and potential negative effects that might result from the exposure of the public to wildlife damage management methods. WS uses chemical and non-chemical methods that are appropriate to reduce or minimize a variety of wildlife damage problems and WS personnel are aware of the potential risks to nontarget species and humans. The use of toxicants by WS in all instances is regulated by the EPA through the FIFRA, by State law, and by WS Directives. Along with effectiveness, cost, and social acceptability, risk is an important criterion for selection of an appropriate damage management strategy. Determination of potential risks to nontarget animals, the public, and WS personnel is thus an important prerequisite for successful application of the IWDM approach. Based on a thorough Risk Assessment, (USDA 1994, Appendix P) APHIS concluded that, when WS program methods are used in accordance with Directives, policies and laws, and when chemicals are used in accordance with label directions, they are selective for target individuals or populations, and such use has negligible impacts on the environment.

4.3.1 Alternative 1. Current Program (No Action).

WS implements an analysis area-wide program of wildlife damage management based on an IWDM approach described in Chapter 3 of this EA. Based on the risk assessment from USDA, Appendix P (1994) the environmental and human health and safety risks associated with WS's wildlife damage management are low. The greatest risks to human health and safety from WS's use of chemical methods are incurred by the WS Specialists who use these methods. Likewise, the greatest risk to human health and safety from WS' use of mechanical control methods are incurred by the WS Specialists who use methods such as aerial hunting. During the FY 99 through FY 01 analysis period, there were no reported injuries to WS personnel or members of the public related to WS' use of any chemical or mechanical control methods. Mitigation measures that address safety concerns about WS's use of toxicants, traps and snares are listed at the end of Chapter 3.

Of the non-chemical wildlife damage management methods used by WS, foothold traps and neck snares pose the greatest risk to nontarget species. However, domestic pets that may be captured in these devices and accompanied by humans can be released unharmed. WS limits the use of foothold traps and snares on public lands during bird hunting seasons, and warning signs are always posted in those few areas where these devices are set on public or private lands.

Of the chemical methods currently used for predator control by WS, M-44s and LPCs are the only methods that may present some degree of risk to the public or free roaming dogs. As discussed in Chapter 3, this risk is mitigated by limiting most M-44 use to private lands (where public access is limited), by not placing M-44s on public lands during the regular bird hunting seasons or any other times when exposure to the public or pets is probable, and by placing warning signs in the general area and adjacent to each M-44 device whenever M-44s are used.

The LPC was designed to specifically target coyotes which attack the throat of sheep or goats. Other predators, including dogs, that have attacked collared sheep by the throat have succumbed to the toxicant. Domestic dogs could also be susceptible to poisoning if they scavenged on a 1080-contaminated carcass of a sheep that has been killed by coyotes. The likelihood of this occurrence would be low because LPCs would be used only within fenced pastures, primarily on private lands, and the carcass of any dead sheep would be removed in conjunction with the regular monitoring requirements for use of the collar. Risk would also be reduced because of the tendency of scavengers to feed preferentially in the area of the thoracic cavity and the hind portion of the carcass, while the 1080 contamination would be limited primarily to the wool on the sheep's neck. The risk assessment in USDA (1994 Appendix P) concluded that use of the LPC would pose little likelihood of a dog being poisoned.

4.3.2 Alternative 2. Expanded Wildlife Protection Activities (Proposed Action).

Alternative 2 would involve using all the same tools and methods as the Current Program, but there would be additional use of some of these methods in those specific areas where WS would be conducting predator control for protection of sage grouse, northern or southern Idaho ground squirrels, or other species. Increased use of foothold traps, snares, and M-44s could increase potential risks to the public and domestic pets in some areas, but risks would still be low because of standard practices employed to reduce any potential risks. (See Standard Operating Procedures at the end of Chapter 3.)

4.3.3 Alternative 3. No Preventive Control.

Alternative 3 would also involve using all the same tools and methods as the Current Program, but they would not be used in any preventive control actions. In the absence of preventive aerial hunting, WS would likely have to increase the use of traps, snares and M-44s, all of which are less selective than aerial hunting. This could slightly increase risks to public and pets, but risks would still be low because of standard practices employed to reduce any potential risks.

4.3.4 Alternative 4. No Use of Chemical Methods.

The analysis would be similar to the analysis for Alternative 1 for the mechanical methods, although potential risks associated with use of mechanical methods would probably increase slightly, since there would have to be increased use of traps and snares to make up for the loss of M-44s. Overall level of risk to domestic dogs and public safety might be reduced slightly because there would be no risk associated with M-44 use.

4.3.5 Alternative 5. Technical Assistance Program and Alternative 6 - No Federal WS Program.

Both of these alternatives would result in no Federal operational wildlife damage management program in the analysis area, therefore the use of methods would be at the discretion of individuals or agencies that conduct the activity. The low risks associated with Federal use of wildlife damage management methods would be nonexistent under this alternative. WS would make recommendations under Alternative 5, but implementation of the recommendation would be by some other entity. However, increased use of the same methods by less skilled trappers or livestock producers, and greatly reduced restrictions on how wildlife damage management is conducted may result in an increased risk to the public. No program would be available for the protection of aviation safety, and IDFG would not have access to WS Specialists in the event of black bear or mountain lion threats to human safety. This Alternative would likely result in increased risks to public health and safety over those identified in Alternative 1.

4.4 Concerns About Potential Impacts on T/E Species and Other Species of Special Concern

4.4.1 Alternative 1. Current Program (No Action).

WS has previously entered into formal and informal Section 7 consultation with the FWS regarding the potential impacts of the current program on the gray wolf, grizzly bear, bald eagle, peregrine falcon, and whooping crane, and the FWS has concurred with WS' assessment that none of WS' predator damage management activities are likely to adversely affect any of these species. WS has also entered into formal consultation with the FWS at the Regional level, and informal consultation at the local level regarding potential impacts of predator damage management activities on the Canada lynx. During the interim period while those consultations are pending, WS been operating under a set of "Interim Policy Guidelines for Canada Lynx", to ensure that WS activities do not result in any irreversible or irretrievable commitment of resources under Section 7(d) of the Endangered Species Act. These guidelines provide for restrictions on certain control tools and methods in lynx habitat to reduce the likelihood of any adverse impacts to lynx (i.e., no use of neck snares or M-44s for coyote control in lynx habitat, and no use of attractants likely to attract feline species to trap sets). Mitigation measures to address concerns about impacts to threatened or endangered species are discussed in the list of standard operating procedures at the end of Chapter 3.

WS has also determined that none of the currently used predator control methods or associated activities have the potential to affect any listed plants, fish or mollusks.

Although Federal agencies are not required to consult with the FWS regarding the potential impacts of their activities on sensitive or candidate species, WS has considered the potential impacts of predation management activities on wolverines (*Gulo luscus*), fisher (*Martes pennanti*) and kit fox (*Vulpes macrotis*) that may occur in some portions of the analysis area. WS rarely conducts predation management activities in habitats occupied by these species, and a review of WS program records for the last 50 years showed that none of these species have ever been taken by WS in the analysis area. Pan tension devices on foothold traps reduce the already low likelihood that a kit fox might inadvertently be captured, but use of pan tension devices has only been a standard operating procedure for WS for about the last 10 years, and no kit fox were reported captured prior to that time. The likelihood of any potential adverse impacts to wolverines, fisher, or kit fox is considered very low.

4.4.2 Alternative 2. Expanded Wildlife Protection Activities (Proposed Action).

WS has entered into informal Section 7 Consultation with the FWS at the local level regarding potential impacts of the proposed action on any listed species. Additional actions proposed under this alternative would be implemented to protect designated or potentially designated T/E species or other species of special concern, such as the northern Idaho ground squirrel, southern Idaho ground squirrel, sage grouse or sharp-tailed grouse. There would be no additional risks to any T/E species because all the same precautionary measures would be adhered to as in Alternative 1. Any decision made regarding implementation of the proposed action would be consistent with FWS determinations about any measures deemed necessary to ensure there would be no adverse impacts to any listed species.

4.4.3 Alternative 3. No Preventive Control.

Analysis is similar to that for Alternative 1. WS would likely have to increase it's use of traps, snares and M-44s in the absence of preventive aerial hunting. The likelihood of accidentally taking a wolf might therefore be slightly higher under this alternative. Risks to wolves would still be low, however, because of the mitigation measures used when setting foothold traps or snares in areas considered "occupied gray wolf range" (see measures listed at end of Chapter 3).

4.4.4 Alternative 4. No Use of Chemical Methods.

Neither M-44s or the LPC, both of which are more selective than either foothold traps or snares, could be used under this alternative. WS would likely have to increase reliance on use of foothold traps and snares if chemical methods were not available. The likelihood of accidentally taking a wolf might therefore be slightly higher under this alternative. Risks to wolves would still be low, however, because of the mitigation measures used when setting foothold traps or snares in areas considered "occupied gray wolf range" (see measures listed at end of Chapter 3). DRC-1339 would not be used for controlling raven depredation problems, but his would not be expected to change any likelihood of risk to any T/E species, since use patterns for this product preclude any risk of potential adverse impacts to T/E species.

4.4.5 Alternative 5. Technical Assistance Program and Alternative 6 - No Federal WS Program.

There would be no operational WS activities under either of these alternatives, and hence no risks to threatened or endangered species from WS. Some type of wildlife damage management would most likely be implemented by livestock producers or private predator control programs, however, and these activities could pose greater risks to endangered species than WS' activities. Damage management efforts by individuals with limited training and experience would be more likely to take nontarget species, including T/E species. Without the Federal assistance available from WS, some livestock producers may be motivated to consider use of more economical forms of control than those practiced by WS. Illegal use of toxicants represents one of the cheapest forms of predator removal, but it also presents the greatest environmental risks. Risks to T/E species would probably be greater under Alternatives 5 and 6 than for any other alternative.

4.5 Cost-effectiveness of WS Activities

NEPA does not require preparation of a specific benefit-cost analysis, and consideration of this issue is not essential to making a reasoned choice among the alternatives being considered. Cost effectiveness of predator damage management activities has been identified as an issue of concern by both WS and the public, however, and information on this issue will be analyzed in the following discussion.

4.5.1 Alternative 1. Current Program (No Action).

A benefit-cost analysis of predator control activities as conducted back in the decades of widespread toxicant use would likely suggest a much higher benefit per unit cost than predator damage management as currently practiced. Computer simulation modeling of various coyote control options suggests that, in general, control programs employing toxicants provide the greatest net economic benefits (Gum et al. 1978). Cain et al. (1972) noted that toxicants were "conspicuously effective and economical" for predator control, but that they were also generally less selective. Although the widespread use of toxicants that occurred in past decades throughout the western U.S. was a very cheap and effective way to keep predator numbers and predation losses low, there were strong societal concerns about some of the environmental impacts. Our social value system has essentially established limits on how cost-effectively wildlife damage management can be conducted. As restrictions on use of control methods increase, cost-effectiveness is reduced (Connolly 1981).

Collinge and Maycock (1997) assessed the cost-effectiveness of predator control efforts to protect sheep in southern Idaho. Their conservative estimate of the benefit-cost ratio for WS predator damage management was approximately 3:1 for overall efforts to protect sheep, while their estimates of the benefit-cost ratio for aerial hunting efforts alone ranged from approximately 5:1 to 7:1. This range of benefit-cost ratios falls generally within the range of those discussed by other authors as well. Estimates of benefit-cost ratios for government predator control efforts to protect sheep in the western U.S. have ranged from 7:1 (Connolly 1981) to 2.4:1 (USDA 1994). Thompson (1976) suggested a 3.9:1 benefit-cost ratio for predator control efforts with trapping as the primary control tool in California, and Pearson and Caroline (1981) estimated a benefit-cost ratio of 4.5:1 for predator control during a one-year analysis period in Texas. Bodenchuk et al. (2001) estimated a 3:1 benefit-cost ratio for all WS predation management efforts to protect livestock in the western U.S., but this ratio rose to approximately 12:1 when considering the ripple effect of predator losses on local communities. A recent review by the U.S. General Accounting Office (GAO) concluded that all of the available, credible analyses on the cost-effectiveness of WS wildlife damage management activities suggest that benefits exceed costs (GAO 2001).

Hoff (1999) estimated the cost per incremental duckling produced by predator removal versus habitat improvement. (Incremental duckling production was defined as the number of ducklings hatched on treatment sites minus the expected production in the absence of treatment..) His estimates suggested that each additional duckling produced through predator removal cost approximately $4, while each additional duckling produced through habitat improvement cost approximately $321. Delta Waterfowl (1999), a waterfowl conservation and research organization, has conducted extensive research on the potential benefits of predator management to waterfowl, including economic analyses. Their research suggests that predator control for protection of nesting waterfowl could be applied at a cost of less than $1/acre, whereas habitat improvement strategies ranged from $50/acre up to as much as $50,000/acre.

4.5.2 Alternative 2. Expanded Wildlife Protection Activities (Proposed Action).

Assessing a benefit-cost ratio for efforts to protect game species from predation could be approached by comparing the costs of predation management to the value of species saved. Smith et al. (1986) used this approach to determine that coyote removal by aerial hunting was a cost-effective method of increasing antelope populations in their study area in Arizona. In the case of T/E species, their value has been judged "incalculable" (*Tennessee Valley Authority vs Hill*, US Supreme Court 1978), making it more difficult to specifically quantify the cost effectiveness of efforts to restore or protect these species. Although economic values have not been assessed for northern Idaho ground squirrels or declining populations of sage grouse, given the high social value of T/E species and other species of special concern, it would not be unreasonable to anticipate a positive benefit-cost ratio for efforts to enhance these species' populations through predation management. Assessment of actual costs and estimated benefits would be included as part of the monitoring effort associated with both of these proposed activities.

4.5.3 Alternative 3. No Preventive Control.

Under this alternative, WS' costs might be lower, but cost-effectiveness would likely be lower than for Alternative 1, and producers' losses from predation would likely be higher. There may be a decrease in WS ability to address all requests for assistance with predation problems. In a study by Wagner and Conover (1999) there were 2 direct economic benefits associated with preventive aerial hunting: (1) a reduction in lamb losses to coyote predation, and (2) a reduction in the hours required for corrective predation management. Using the median difference between treated and untreated sites in estimated lamb losses to coyote predation, preventive aerial hunting resulted in a savings of 17.5 lambs/area as compared to untreated areas, which equated to a 2.1:1 benefit-cost ratio. Wagner and Conover (1999) stated that their calculations of a 2.1:1 benefit:cost ratio were conservative in that they did not include cost of travel time. The cost of corrective damage management may be higher for large areas or areas with limited vehicle access. Additionally, with current work loads, WS personnel are often unable to promptly address all requests for WS assistance, and time saved on one area with aerial hunting can be spent assisting other producers. Packham (1973) documented the results from studies done on 4 different areas in southern Idaho. His data suggested that for every additional dollar spent for helicopter work to remove coyotes on the 4 study areas, an average of $5.20 worth of sheep and lambs were saved.

A similar benefit-cost ratio seemed apparent when comparing increased helicopter aerial hunting on the Caribou National Forest in the winter of 1994-95 with the reduced level of coyote predation on sheep in the summer of 1995. By spending an additional $16,500 in cooperator-supplied dollars for helicopter work in the winter of 1994-95, losses to coyote predation were about $89,000 lower than they had been the previous summer. Numbers of sheep present were similar during both summers. This suggests that for every additional dollar spent by sheep producers for preventive control, they saved $5.40 worth of sheep and lambs (Collinge and Maycock 1997).

If preventive aerial hunting is one of the most cost-effective components of the current program, then the overall benefit-cost ratio for Alternative 3 (with no preventive control) would probably be lower than for Alternative 1.

4.5.4 Alternative 4. No Use of Chemical Methods.

Cost-effectiveness would likely be lower under this alternative than under the current program. Wildlife damage problems can most effectively be resolved when the largest variety of control methods are available to choose from for each particular damage situation. M-44s, a chemical method that would be precluded under this alternative, are one of the cheapest control tools to use because they require relatively little maintenance as compared to traps or snares.

LPC costs are similar to those of other labor-intensive methods. WS costs for material for this program are minimal. WS purchased an initial supply of LPCs and would lose this investment if this alternative is selected. Producers are currently paying to replace each collar lost or punctured on their property. Although used infrequently, use of LPCs does allow WS to be more effective in resolving predation problems, and their loss would probably result in a slight decrease in cost-effectiveness of the program. DRC-1339 is a highly effective, selective and relatively inexpensive tool for dealing with raven depredation problems, and loss of this method would definitely decrease the program's cost effectiveness in dealing with raven problems.

4.5.5 Alternative 5. Technical Assistance Program.

Costs to implement this alternative would be much lower than the current program. Numbers of WS 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. No monies would be spent for aerial hunting or other operational activities. Program costs would probably decrease by at least two-thirds. Livestock owners would likely have to absorb the cost of hiring private control agents or doing the work themselves. Losses to predators would probably increase substantially, and some sheep operations would probably not be able to afford to stay in business.

4.5.6 Alternative 6. No Federal WS Program.

The economic effects of implementing this alternative would be similar to implementation of Alternative 5 with regard to impacts on livestock producers. No Federal funds would be expended on WS, so cost-effectiveness of the Federal program would not be an applicable issue.

4.6 Concerns about Aerial Hunting Activities

Several environmental and/or animal protection organizations have expressed concerns about the potential effects of WS' low level flights on non-target wildlife, public land and users, and the environment (i.e., potential for fuel spills and fires associated with aircraft crashes).

4.6.1 Alternative 1. Current Program (No Action).

Potential Effects to Wildlife

Although aerial hunting flights are conducted in many portions of the analysis area for protection of livestock each year, the actual duration of aerial hunting flights is typically very brief on a per-unit basis. During FY01, the total acreage of lands under agreement that WS worked on in the analysis area was approximately 8.2 million acres. A combined total of approximately 963 aerial hunting hours were flown on portions of these lands, which works out to an average of only about 2 seconds of aerial hunting time per acre for the whole year. In actual practice, aerial hunting crews hunt for relatively brief periods of time in any one specific location before moving on to other areas where aerial hunting has been requested.

IDFG annually conducts wintering big game survey flights by helicopter. Survey flights require flying close enough and for long enough that observers can accurately count and identify sex of the animals present. IDFG has monitored this situation to determine whether these flights may be negatively impacting those animals being surveyed. They have found no evidence to suggest that this short-term disturbance creates any significant negative impacts to these animals (J. Rachael, IDFG, pers. comm., 2002).

Under the terms of the MOU between IDFG and the Idaho State WS Board, WS and IDFG consult and cooperate to identify areas that may be of concern for wintering big game species. WS avoids flying in these areas, and if big game herds are encountered in other areas, flight crews move away if the animals are reacting to the aircraft. Likewise, if WS aircraft encounter any wild horse herds, the aircraft moves away if the animals are reacting to the aircraft.

Deer and antelope fawns are preyed upon by coyotes during the spring and summer months, and deer and antelope undergo stress during the winter months in trying to elude capture by coyotes, particularly in deep snow conditions. To the extent that aerial hunting removes coyotes which might otherwise stress or kill deer, antelope or other species, the benefits to these species from aerial hunting may outweigh any potential adverse impacts.

USDI (1995) reviewed a number of studies that looked at various wildlife species and the effects of aircraft overflights. 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 shown 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, however, it appears that the more serious potential impacts occur when overflights are *chronic* (i.e., they occur daily or more often over long periods of time). Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. WS aerial hunting operations typically occur in relatively remote rangeland areas where tree cover is at most scattered to allow for visibility of target animals from the air.

Some examples of species or species groups that have been studied with regard to this issue and WS' determination of potential impacts from aerial hunting overflights are as follows:

- **Colonial Waterbirds.** Kushlan (1979) reported that low level (390 feet followed by a second flight at 200 feet) 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. WS aircraft are unlikely to be flown over such species in Idaho because most aerial hunting occurs in upland areas, rather than riparian or marshy areas. Even if an overflight of a nesting colony occurred, it would be unlikely to cause any harmful disturbance.

- **Greater Snow Geese.** Belanger and Bedard (1989, 1990) observed responses of greater snow geese (*Chen caerulescens atlantica*) to man-induced disturbance on a sanctuary area and estimated the energetic cost of such disturbance. They observed that disturbance rates exceeding two per hour reduced goose use of the sanctuary by 50% the following day. They also observed that about 40% of the disturbances caused interruptions in feeding that would require an estimated 32% increase in nighttime feeding to compensate for the energy lost. They concluded that overflights of sanctuary areas should be strictly regulated to avoid adverse impacts. WS aerial hunting flights rarely, if ever, occur over wetland areas and in no way would involve chronic or repeated flights over such areas. Thus, disturbance of migrating snow geese or any other waterfowl should be minimal to nonexistent.

- **Mule Deer.** Krausman et al. (1986) reported that only three 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. The authors believed that the deer may have been accustomed to overflights because the study area was near an interstate highway which was followed frequently by aircraft. Mule deer are frequently seen from WS aircraft and are sometimes temporarily disturbed as evidenced by their running and avoidance behavior. However, it is apparent that adverse effects from this type of disturbance are minimal. WS aerial hunting personnel frequently observe deer and antelope standing apparently undisturbed beneath or just off to one side of the aircraft.

- **Raptors.** Andersen et al. (1989) conducted low-level helicopter overflights directly at 35 red-tailed hawk 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 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 five species of hawks, two 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. These studies indicate that overflights by WS aircraft should have no significant adverse impacts on nesting raptors.

Other Potential Environmental Effects from Aerial Hunting

The following discussion relates to concerns about the potential for aircraft accidents (associated with WS' aerial hunting operations) to cause catastrophic ground fires and pollution as a result of spilled fuel and oil.

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

- **Major Ground or Forest Fires.** Mr. Wiemeyer stated he had no recollection of any major fires caused by any government aircraft since he has been in his position beginning in 1987. In addition, there are no reports of fires caused by WS aircraft in Idaho or any other state. The period of greatest fire danger typically occurs during the summer months, but WS ordinarily conducts few, if any, aerial hunting operations during the summer months.

- **Fuel Spills and Environmental Hazard from Aviation Accidents.** The NTSB stated that aviation fuel is extremely volatile and will evaporate within a few hours or less to the point that even its odor cannot be detected (N. Wiemeyer, NTSB, pers. comm., 2000). Jet A fuel also does not pose a large environmental problem if spilled. This is because Jet A is a straight chained hydrocarbon with little benzene present and microbes would quickly break-down any spill by aerobic action (J. Kuhn, Montana Department of Environmental Quality, pers. comm., 2001). The quantities potentially involved in aircraft used by WS are relatively small (52 gallon maximum in a fixed-wing aircraft and 91 gallon maximum in the helicopters used by WS), and during much of each flight the amount of fuel on board would be considerably less than these maximum amounts.. In some cases, not all of the fuel would be spilled. Thus, there should be little environmental hazard from unignited fuel spills.

- **Oil and Other Fluid Spills.** For privately owned aircraft, the aircraft owner or his/her insurance company is responsible for clean-up of spilled oils and other fluids if required by the owner or manager of the property on which the accident occurred. In the case of BLM, Forest Service, and National Park Service lands, the land managing agency generally requires soil to be decontaminated or removed and properly disposed. With the size of aircraft used by WS, the quantities of oil capable of being spilled in any accident are small (i.e., 6-8 quarts maximum for reciprocating (piston) engines and 3-5 quarts for turbine engines) and insignificant with respect to the potential for environmental damage. Aircraft used by WS are single engine models, so the greatest potential amount of oil that could be spilled in one accident would be about 8 quarts.

- **Petroleum Biodegradation.** Petroleum products degrade through volatilization and bacterial action, particularly when exposed to oxygen (EPA 2000). Thus, small quantity oil spills on surface soils can be expected to biodegrade readily. Even in subsurface contamination situations involving underground storage facilities which would generally be expected to involve larger quantities than would ever be involved in a small aircraft accident, EPA guidelines provide for "natural attenuation" or volatilization and biodegradation in some situations to mitigate environmental hazards (EPA 2000). Thus, even where oil spills in small aircraft accidents are not cleaned up, the oil does not persist in the environment or persists in such small quantities that there is no problem. Also, WS' accidents generally would occur in remote areas away from human habitation and drinking water supplies. Thus, the risk to drinking water appears to be exceedingly low or nonexistent.

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

WS' aircraft accidents have never harmed anyone other than the individuals actually occupying the aircraft. The impacts to those employees that were injured or killed in aircraft accidents are certainly significant from their individual perspectives. But there has been no impact to overall public health and safety in regards to any injuries or harm to any other persons, or to any recreational activities, let alone a *significant* impact.

4.6.2 Alternative 2. Current Program Plus Expanded Wildlife Protection Activities (Proposed Action).

Analysis is the same as for Alternative 1.

4.6.3 Alternative 3. No Preventive Control.

Analysis is similar to Alternative 1. Aerial hunting is used as a preventive and corrective control technique, but most (>75%) of the total aerial hunting hours flown by WS in Idaho are typically for corrective control. If preventive aerial hunting were discontinued, there would likely need to be more corrective aerial hunting hours flown in response to the increased depredations that would occur in the absence of preventive aerial hunting. Overall aerial hunting hours may be reduced slightly under this alternative. However, in Idaho, private individuals are issued permits by the State which authorize them to conduct aerial hunting operations, and it is possible that increased preventive aerial hunting would be conducted by private aerial hunters in response to the lack of preventive aerial hunting by WS.

4.6.4 Alternative 4. No Use of Chemical Methods.

Analysis is the same as for Alternative 1.

4.6.5 Alternative 5. Technical Assistance Program and Alternative 6 - No Federal WS Program.

There would be no operational WS activities under either of these alternatives, and hence no need for WS to use aircraft. However, private sector aerial predator hunting activities would probably increase and/or some sort of state aerial hunting program could conceivably be implemented. Private aerial hunting programs may not have access to the same specialized resources and training as WS personnel and the risks associated with private aerial hunting may be greater than for a Federal program.

4.7 Summary of Anticipated Impacts

Table 4.2 presents a relative comparison of the anticipated impacts of each of the 6 alternatives as they relate to each of the 6 major issues identified in Chapter 2.

Table 4.2
Relative Comparison of Anticipated Impacts From Alternatives

Issues/Impacts	Alternative 1 Current Program	Alternative 2 Proposed Action	Alternative 3 No Preventive Control	Alternative 4 No Use of Chemicals	Alternative 5 Technical Assistance Only	Alternative 6 No Federal Program
Cumulative impacts on Wildlife Populations	Low to moderate	Low to moderate	Low to moderate	Low to moderate	Low to moderate	Low to moderate
Effectiveness and selectivity of methods	Good effectiveness and selectivity	Good effectiveness and selectivity	Slightly lower selectivity and effectiveness than Alt. 1 & 2	Lower effectiveness and selectivity than Alt. 1 or 2	Probably lower than Alt. 1-4	Probably lower than Alt. 1-4
Risks to public and pets	Low risks	Similar risk to Alt. 1	Slightly higher risk than Alt. 1 & 2	Slightly lower risk than Alt. 1 & 2	Probably greater risks than Alt. 1-4	Probably greater risks than Alt. 1-4
Impacts to T/E species	Low risks	Low risks, benefits to some species	Similar risk to Alt. 1	Probably similar risks to Alt. 1	Probably greater risks than Alt. 1-4	Probably greater risks than Alt. 1-4
Cost effectiveness	Good	Good	Lower than Alt 1 or 2	Lower than Alt. 1 or 2	Difficult to judge	Not applicable
Aerial hunting concerns	Low risks	Similar risk to Alt. 1	Lower risks than Alt. 1 & 2	Similar risk as Alt. 1	Similar to greater risks than Alt. 1	Similar to greater risks than Alt. 1

APPENDIX A

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APPENDIX B

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