Pre-Decisional

ENVIRONMENTAL ASSESSMENT (EA)
for
PREDATOR DAMAGE MANAGEMENT
IN WESTERN WYOMING

including the counties of
Big Horn, Carbon, Fremont, Hot Springs, Lincoln, Park,
Sublette, Sweetwater, Teton, Uinta and Washakie

Prepared by:

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)
ANIMAL AND PLANT HEALTH INSPECTION SERVICE (APHIS)
ANIMAL DAMAGE CONTROL (ADC)

In Cooperation With:

UNITED STATES DEPARTMENT OF AGRICULTURE
U.S. FOREST SERVICE
Ashley National Forest
Big Horn National Forest
Bridger-Teton National Forest
Caribou National Forest
Medicine Bow National Forest
Shoshone National Forest
Targhee National Forest
Wasatch-Cache National Forest
[illegible]
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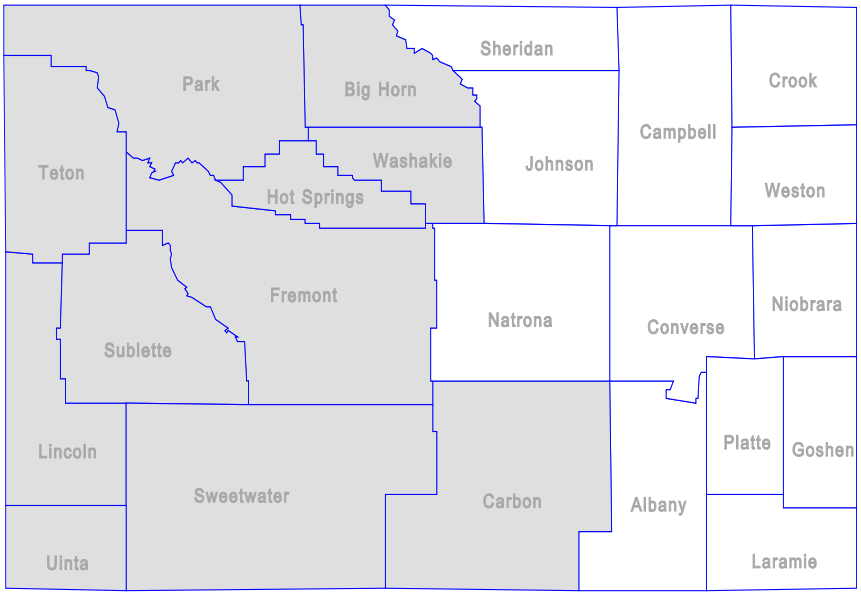
Rawlins District
Rock Springs District
Worland District
[illegible]
[illegible]
[illegible] YOMING STATE LANDS AND INVESTMENTS (WSLI)


Sheridan
Park
Big Horn
Crook
Campbell
Teton
Washakie
Johnson
Weston
Hot Springs
Fremont
Natrona
Converse
Niobrara
Sublette
Platte
Goshen
Lincoln
Sweetwater
Carbon
Albany
Uinta
Laramie

Pre-Decisional

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ACRONYMS

ACEC	Area of Critical Environmental Concern
ADC	Animal Damage Control
ADM	Animal Damage Management
APHIS	Animal and Plant Health Inspection Service
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DEQ	Department of Environmental quality
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FLPMA	Federal Land Management and Policy Act
FY	Fiscal Year
HSUS	Humane Society of the United States
IGBC	Interagency Grizzly Bear Committee
IWDM	Integrated Wildlife Damage Management
LPC	Livestock Protection Collar
LRMP	Land and Resource Management Plans
MIS	Management Information System
MFP	Management Framework Plan
MOU	Memorandum of Understanding
NADA	New Animal Drug Application
NASS	National Agricultural Statistical Service
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NHPA	National Historical Preservation Act
NPS	National Park Service
PA	Primitive Area
RNA	Research Natural Area
ROD	Record of Decision
RMP	Resource Management Plan
RNA	Research Natural Areas
SOP	Standard Operating Procedure
T&E	Threatened and Endangered Species
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
WA	Wilderness Area
WAS	Wyoming Agricultural Statistics Service
WDA	Wyoming Department of Agriculture
WGFD	Wyoming Game and Fish Department
WS	Wyoming Statutes
WSA	Wilderness Study Area
WSLI	Wyoming State Lands and Investments
WSR	Wild and Scenic River

1.0 CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with wildlife which increases the potential for conflicting human-wildlife interactions. In addition, segments of the public strive for protection for all wildlife; this protection can create localized conflicts between human and wildlife activities. The *Animal Damage Control Program Final Environmental Impact Statement* (EIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way (USDA 1994):

> *"Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife generally is regarded as providing economic, recreational and aesthetic benefits . . . , and the mere knowledge that wildlife exists is a positive benefit to many people. However, . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and 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 alleviation of damage or other problems caused by or related to the presence of wildlife in specific areas or situations. APHIS/Animal Damage Control (ADC) is the Federal program authorized and charged by law with managing a program to reduce human/wildlife conflicts. Given the Congressional directive, efficacy of the program will be evaluated as an issue rather than a need for the program. To fulfill the Congressional direction, the purpose of wildlife damage management is to prevent or minimize damage to the protected resources. Therefore, wildlife damage management is not necessarily based on punishing offending animals but as one means of reducing damage. Individual situations are evaluated through use of the ADC Decision Model (Slate et al. 1992) described in USDA (1994: 2-23 to 2-36). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated. The need for action is derived from the specific threats to the resources and the available methods for responding to those threats.

Normally, according to the USDA/APHIS procedures implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions can be categorically excluded (7CFR 372.5(c), 60 Fed Reg. 6,000-6,003, 1995). This environmental assessment (EA) has been prepared to evaluate and determine if any potentially significant impacts to the human environment are present from the proposed program in the western Wyoming analysis area. Prevention or control of wildlife damage, which often includes removal of the animals responsible for the damage, is an essential and responsible part of wildlife management and is recognized as an integral component of wildlife management (The Wildlife Society 1992). This analysis relies mainly on existing data contained in published documents and the ADC programmatic EIS (USDA 1994) which is hereby incorporated into this document by reference. Any predator damage management conducted by ADC in the analysis area would be undertaken in compliance with relevant laws, regulations, policies, orders and procedures.

ADC Program

ADC's mission is to provide leadership in wildlife damage management for the protection of America's agricultural, industrial and natural resources, and safeguard public health and safety. This is accomplished through:

- Close cooperation with other Federal and State agencies;
- Training of wildlife damage management professionals;
- Development and improvement of strategies to reduce losses and threats to the public from wildlife;
- Collection, evaluation and distribution of information on wildlife damage management;
- Cooperative wildlife damage management programs;

- Informing and educating the public on how to reduce wildlife damage and;
- Providing data and a source for limited-use management materials and equipment, including pesticides. (USDA 1989)

ADC is cooperatively funded from Federal, State, county, municipal and private funds and service oriented to reduce human/wildlife conflicts. The ADC program strives to develop and utilize wildlife damage management strategies that are environmentally, socially, and biologically sound. Before any wildlife damage management is conducted, *Agreements for Control* must be signed between ADC and the land owner/administrator for private lands and *ADC Work Plans* must be in place for public lands. ADC cooperates with land and wildlife management agencies, as requested, to effectively and efficiently resolve wildlife damage problems.

1.1 Purpose

This EA evaluates ways by which the Wyoming ADC program's responsibility can be carried out within the analysis area to reduce predator damage. The EA analyzes planned and future predator damage management related to the protection of livestock, apiaries, property, wildlife, and public health and safety on private and public lands in the analysis area. The area encompassed by the EA is about 36 million acres. ADC has agreements to conduct damage management on about 22 million acres (63%) of the analysis area. However, ADC does not typically conduct damage management on the entire area under agreement during any given year. For example, in FY 1995 ADC worked on about 18 million acres within the analysis area, or about 50% of the analysis area (MIS 1995). The analysis area includes Federal lands under the jurisdiction of the U.S. Forest Service (forest Service), Bureau of Land Management (BLM), National Park Service (NPS) and U.S. Fish and Wildlife Service (USFWS), and State, county, municipal and private lands.

Within the analysis area, cattle and sheep are permitted to graze on Federal lands under the jurisdiction of the Forest Service and BLM throughout the year in some capacity. Forest Service grazing permits generally permit grazing from mid-June to mid-October. Some BLM grazing permits allow grazing at any month of the year. In October, some sheep are typically moved from Forest Service grazing allotments to the checkerboard or lease lands (land twenty miles north and south of the land awarded to the railroad; now owned by private individuals that formed a grazing board along with the Union Pacific railroad in Carbon, Lincoln, Sweetwater, and Uinta counties).

This EA constitutes the required NEPA document for all ADC predator damage management in the analysis area. ADC conducts predator damage management on three BLM Districts (Rawlins, Rock Springs and Worland); these activities are evaluated in existing BLM EAs (BLM 1994a, 1994b, 1994c). Of the eight National Forests that administer National Forest System lands within the analysis area, the Wyoming ADC Program conducts varying degrees of predator damage management on the Bridger-Teton, Big Horn, Shoshone, and Medicine Bow National Forests. The Idaho ADC Program conducts predator damage management on the Targhee and Caribou National Forests and environmental analysis of those actions has been conducted in the Southern Idaho Predator Damage Management EA (USDA 1996a). The Utah ADC Program conducts predator damage management on the Wasatch-Cache and Ashley National Forests and environmental analysis of those actions has been conducted in the Northern Utah Wildlife Damage Management EA (USDA 1996b). EAs are in place on the Bridger-Teton and Big Horn Forests (Forest Service 1990a, 1993). This document would replace existing Forest Service and BLM predator damage management EAs within the analysis area after a Decision is reached. No predator damage management has been requested on NPS or USFWS lands to protect livestock, apiaries, property, wildlife, or to safeguard public health and safety.

Currently, there are 713 private and non-private Agreements for Control signed by landowners/administrators in Big Horn, Carbon, Fremont, Hot Springs, Lincoln, Park, Sublette, Sweetwater, Washakie, and Uinta Counties that participate in the current cooperative ADC program. The analysis area also encompasses one non-cooperating county (Teton) where there is no organized wildlife damage management program. Wildlife damage is handled through private self-help actions without Federal funding. ADC occasionally provides service to individual ranchers on a case-by-case basis as funding and workforce constraints allow. Sublette County also does not have a formal funding agreement with ADC, however, ADC does conduct some predator damage management there. These actions are primarily to protect sheep for producers headquartered in cooperating counties who have summer ranges in Sublette County and have requested that their brand inspection fees be utilized in this way.

1.2 NEED FOR ACTION

The need for action is based on the necessity for a program to protect livestock, property, apiaries, wildlife, and public health and safety against predator damage. ADC has been authorized and directed by Congress to provide this service (Animal Damage Control Act of 1931, as amended (46 Stat. 1486; 7 U.S.C. 426-426c), Rural Development, Agriculture, and Related Agencies Appropriation Act of 1988). In a recent District Court decision (U.S. District Court of Utah 1993, 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*." ADC accepts these standards as appropriate for establishing need in the analysis area.

1.2.1 Summary of Proposed Action

The proposed action is to implement a program in the analysis area for the protection of livestock, property, apiaries, wildlife and safeguard public health and safety against predator damage. Currently, predator damage management occurs on Federal lands administered by the BLM and Forest Service, State lands administered by the Wyoming State Land Office (WSLI), and on county, municipal and private lands. A fully Integrated Wildlife Damage Management (IWDM) approach would be implemented which allows for the use of all legal techniques and methods, used singly or in combination, to meet the demonstrated needs. Livestock producers and others would be provided with information and training regarding the use of effective animal husbandry methods and nonlethal techniques to reduce predation when requested. Lethal methods used by ADC would include calling and shooting, aerial hunting, neck snares, M-44s, Livestock Protection Collar (LPC), denning, trained dogs, DRC-1339, euthanizing chemicals and the gas cartridges. Non-lethal methods used by ADC would include cage traps, leghold traps, foot snares, visual and auditory scare devices, and pyrotechnics. When requested and appropriate, predator damage management would be conducted on Forest Service and BLM lands, other Federal lands, and county lands where Work Plans or other comparable documents are in place, and on State and private lands where there are signed *Agreements for Control*. No predator damage management would be conducted in areas receiving high levels of public use, or those with legal or policy restrictions, unless requested and coordinated with the responsible agency. An ADC Work Plan would be cooperatively developed with each National Forest, each BLM District, or American Indian Tribes (if requested) within the analysis area, as appropriate. These work plans delineate where, when and how predator damage management would be conducted, and reviewed annually by ADC and cooperating agencies. The cooperating agencies would be responsible for insuring that resources, under their jurisdiction, are protected while also insuring that wildlife damage is kept to a minimum. See Chapter 3 for a more detailed description of the current program and the proposed action.

1.2.2 Need for Predator Damage Management for Protection of Livestock and Poultry

Contribution of Livestock to the Economy

Agriculture ranks among the top three industries in Wyoming with an estimated economic impact of nearly $1.5 billion annually (Wyoming Agricultural Statistics (WAS 1996)). Cash income from Wyoming agriculture in 1995 totaled about $726 million, a reduction of 7% from 1994. In 1995, marketing of livestock and livestock products account for about 75% of Wyoming's agricultural cash receipt (WAS 1996). About 56 percent of Wyoming land area, or 34.6 million acres, are controlled and operated by 9,200 farms and ranches (WAS 1996). The January 1, 1996 inventories of cattle and calves totaled 1.41 million head, with a value of $776 million (WAS 1996). An estimated 740,000 calves were born on Wyoming farms and ranches during 1995, the same as in 1993 (WAS 1996).

Wyoming sheep and lamb inventory on January 1, 1996 was 683,000 head with a value of about $61 million (WAS 1996). This includes about 560,000 breeding sheep and 120,000 market sheep for slaughter, down 111,000 head from 1995(WAS 1996). Stock sheep increased 4% from 1995 while market sheep decreased

52 percent. Sheep numbers in Wyoming have declined annually for a number of years (WAS 1996). This has been the result of several factors, including low market prices for lambs and wool, increased cost of production, and wildlife predation (R. Phillips, ADC, pers. obs., U. S. District Court of Utah 1993). Even with this decline in sheep numbers, Wyoming ranks second nationally in stock sheep and lambs and third for sheep and lambs on feed for slaughter. Wyoming ranks second nationally in wool production. An estimated 6,410,000 pounds of wool were produced in Wyoming during 1995 for a total value of $7.69 million (WAS 1996).

Livestock producers lost an estimated 119,000 sheep and lambs to all causes during 1995, 2% less than in 1994. Predators accounted for 56 percent of the total sheep death losses while weather related deaths accounted for 20 percent of all losses. Total predator losses were 66,000 head, down 3 percent from the previous year but were higher as a percent of total inventory. Coyotes (*Canis latrans*) continued to cause the most predator losses, followed by red fox (*Vulpes vulpes*) and eagles (*Aquila chrysaetos* and *Haliaeetus leucocephalus*). The economic loss to sheep and lamb producers caused by predators in 1995 was an estimated $3.5 million (WAS 1996).

Table 1-1. Livestock Inventory by County in the Western Wyoming Analysis Area in 1994-1995 (WAS 1995)

County	Cattle/Calves		Breeding Sheep	
	1995	1994	1995	1994
Big Horn	51,000	50,000	20,000	25,000
Carbon	105,000	105,000	31,000	34,000
Fremont	95,000	90,000	19,000	23,000
Hot Springs	24,000	27,000	3,000	5,000
Lincoln	50,000	52,000	37,000	32,000
Park	67,000	65,000	18,000	9,000
Sublette	62,000	65,000	11,000	15,000
Sweetwater	18,000	18,000	14,000	19,000
Teton	11,000	12,000	1,000	2,000
Uinta	42,000	41,000	38,000	41,000
Washakie	33,000	33,000	16,000	18,000

Livestock production in the analysis area contributes significantly to the economy of Wyoming. About 39% of all sheep and lambs and 42% of all cattle and calves produced in Wyoming are raised in the analysis area. Livestock inventories from the counties in the analysis area are about 311,000 head of cows that calved and 178,000 breeding sheep (Table 1-1). These livestock are valued at more than $187 million (WAS, 1996).

Scope of Livestock Losses

In 1995, the WAS (1996) reported that predators killed 10,000 adult sheep valued at about $790,000 and 56,000 lambs valued at $2,710,000. The National Agricultural Statistics Service (NASS) (1996) reported that predators killed 200 cattle (1.3% of the total loss) and 1,600 calves (5.3% of the total loss) in Wyoming, valued at $694,000.

Cattle and calves are most vulnerable to predation (killing, harassment, or injury) at calving time and less vulnerable as calves get older and larger (Shaw 1977, 1981, Horstman and Gunson 1982). Black bear (*Ursus americanus*), grizzly bear (*U. horribilis*) and mountain lion (*Puma concolor*) predation on livestock can be severe (NASS 1991, 1996, MIS 1996). Because calving generally occurs at lower elevations, vulnerability of calves to mountain lions and bears is reduced. Calves, however, remain vulnerable to these predators if they are grazed in higher elevations in more suitable habitats for mountain lions and bears.

Sheep and lambs are vulnerable to predation throughout the year, particularly from coyotes, and to mountain lions and bears 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 predation on sheep and lambs throughout the year (WAS 1996). Newborn and young lambs are sometimes

vulnerable to red fox predation, primarily at the lower elevations. Bears and mountain lions are occasionally responsible for large losses of sheep and lambs (Mysterud 1977, Shaw 1987), 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, causing 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, causing substantial economic hardships to livestock owners.

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 they 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). The question of whether or not all coyotes kill sheep may be of little relevance, since a depredating coyote may readily gain access and kill sheep in another coyote's territory (Shivik et al. 1996). Therefore, management that selectively leaves territorial non-sheep killing coyotes in a population would not necessarily safeguard against sheep kills by other coyotes. The beneficial secondary effects of leaving territorial non-sheep killing coyotes within a population may be negligible because they do not necessarily prevent access by other coyotes that are inclined to kill sheep (Shivik et al. 1996).

The WGFD (1996a) reported that bear and mountain lion damage may be increasing within the analysis area. However, the WGFD believes depredation is directed more toward sheep than cattle. From January 1990 until March 1997, six damage claims for mountain lion depredation to cattle and 15 claims for black bear depredation to cattle have been filed with WGFD (Faccianni, 1997). Dogs are responsible for considerable predation on livestock and wildlife. The WAS (1996) reported that in 1994, 400 adult sheep and 400 lambs were killed by dogs, and in 1995 there were 500 adult sheep and 600 lambs killed by dogs in Wyoming.

Connolly (1992a) determined that only a fraction of the total predation attributable to coyotes is reported to or verified by ADC. Verified losses are only those losses that ADC personnel scrutinized as killed by predators. Connolly also suggested that the fraction of actual losses typically verified by ADC could be expected to be between 5-20% (Connolly 1992b). ADC personnel do not attempt to find every head of livestock reported to be killed, but to verify sufficient losses to determine that a problem exists that requires management action and the species responsible for predation.

Although it is impossible to accurately determine the amount of livestock saved from predation by ADC, it can be estimated. Predation on livestock can have a significant economic impact on livestock producers. Without effective predator damage management to protect livestock, predation would be higher (Nass 1977, 1980, Howard and Shaw 1978, Howard and Booth 1981, O'Gara et al. 1983). Increased (livestock) predation loss was the predominant reason ranchers were leaving the sheep business and threatened the economic viability of livestock grazing permittees (U.S. District Court of Utah 1993). 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 1977, Munoz 1977, O'Gara et al. 1983). Conversely, other studies indicate that sheep and lamb losses are much lower where predator damage management is applied (Nass 1977, Tigner and Larson 1977, Howard and Shaw 1978, Howard and Booth 1981).

ADC recognizes that, with the technology presently available, predator damage management is usually effective for only the current grazing season. To cause a long-term solution to livestock predation, one of two things would have to occur: (1) livestock would have to be removed from areas occupied by predators, or (2) predators would have to be totally removed from areas occupied by livestock. Neither of these alternatives is practical nor acceptable. Therefore, ADC directs predator damage management projects toward minimizing predation during the current grazing season; realizing that natural immigration of predators from surrounding areas and annual reproduction may result in need for recurring actions the

following year.

Table 2-1 shows the ADC verified livestock losses for 1995 from cooperating producers by county and value. Verified (confirmed) losses are those physically examined by ADC and determined to have been killed by predators. Of these, coyote predation accounted for about 92% of the verified calf loss, 95.3% of adult sheep loss, and 90.3% of the lambs killed during FY 1995 (MIS 95). Further analyses of verified loss included: black bear, 8.0% of calves, 4.2% of ewes, 1.6% of lambs; mountain lion, 0.4% of ewes; dogs, 3.9% of lambs; red fox, 3.1% of lambs; common raven (*Corvus corax*), 1.0% of lambs (MIS 1995). In addition, the percentage breakdown for reported but unverified loss (all classes of livestock) is: coyotes 75.7%, black bear 10.8%, ravens 11.1%, mountain lion 1.6%, golden eagles 0.8%, red fox 0.1%.

These losses occurred in spite of current damage management efforts by producers, who often entail substantial indirect costs (Jahnke et al. 1987), and the Wyoming ADC program. Wyoming ADC (unpubl. data) indicate that 99.3% of 290 cooperating producers in the analysis area currently practice at least one non-lethal measure and 85% use three or more nonlethal methods. Fully 20% of these producers use 10 or more non-lethal methods to help reduce predation, with some producers utilizing as many as 18 separate strategies (Wyoming ADC unpubl. data) Non-lethal options for cattle producers are more limited, yet many producers practice improved husbandry at calving time and other techniques, in part, to reduce predation. Of the 290 producers above, 36% are cattle producers, 34% raise only sheep, and 30% raise both sheep and cattle. Of those who raise sheep, 52% are utilizing guard dogs as one of their non-lethal strategies (Wyoming ADC unpubl. data).

1.2.3. Need for Predator Damage Management to Protect Wildlife.

Revenue derived from recreation, especially recreation related to wildlife and the outdoors, is increasingly important to the economy of Wyoming. Southwick (1994) estimated the total economic impact from deer hunting in the United States in 1991 to be $16.6 billion. In Wyoming, local economies also benefit from these wildlife-related recreational activities. Hunting generated more than $92 million in retail sales, created more than 2,900 jobs and produced more than $4.5 million in Federal income tax in Wyoming (Southwick 1994). As a result, the maintenance of wildlife populations is important to the WGFD which has the responsibility for managing resident wildlife for the benefit of the State of Wyoming.

Table 1-2. FY 1995 Verified Livestock Killed by Predators in the Analysis Area (MIS 1995)

County	Lambs	Sheep	Cattle	Calves	Poultry & Other	Value ($)
Big Horn	39	10	0	3	0	$3,850
Carbon	353	129	0	21	0	$51,395
Fremont	69	5	1	7	0	$7,315
Hot Springs	6	6	0	8	0	$4,290
Lincoln	483	144	0	4	3	$56,836
Park	33	9	0	5	36	$13,445
Sublette	199	32	0	0	0	$18,980
Sweetwater	75	386	1	6	0	$51,021
Teton	0	0	0	0	0	$0
Uinta	360	111	1	1	0	$48,995
Washakie	88	15	0	0	0	$7,530

It should be remembered that predation is a natural mortality factor in any prey population. Factors such as predator densities, alternate prey densities, weather conditions, vegetative cover (influencing ability of prey animals to hide or escape), and prey vulnerability can influence survival and recruitment of young into a population. Predation on game species is well documented and can adversely impact survival and recruitment of individuals into a population, especially when environmental factors (i.e., weather influences, forage conditions, prey populations, vulnerability, etc.) are poor and do not favor the prey species (for additional discussion of predator/prey relationships see 2.3.1). However, under certain conditions, predators, primarily coyotes, have been documented as having a significant adverse impact on wildlife 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). Connolly (1978) reviewed 68 studies of predation on wild ungulate populations and concluded that, in 31 cases, predation was a limiting factor. These cases showed that coyote predation had a significant influence on white-tailed deer (*Odocoileus virginianus*), black-tailed deer (*O. hemionus columbianus*), pronghorn antelope (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*). Other studies indicate that predation has an adverse impact on game bird and T&E species populations (Johnson et. al. 1988, Gazda and Connelly 1993, Thomas 1989, Speake 1985, Kurzejeski et al. 1987, Wakeling 1991, USDI 1995, Drewien et. al. 1985, Massey and Atwood 1981, Gore and Kinnison 1991, MacIvor et al. 1990).

Predator damage management undertaken to protect livestock could be coordinated to augment wildlife management objectives/goals of the WGFD or the USFWS. Conversely, a lack of predator damage management to protect livestock could conceivably result in adverse impacts to some wildlife species.

Deer

Mackie et al. (1976) documented high winter loss of mule deer (*Odocoileus 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 contained nearly 90% deer during May and June. They concluded from work done at the Welder Wildlife Refuge in Texas that coyotes take a large portion of the fawns each year during their 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) and Litvaitis and Shaw (1980). Another Texas study (Beasom 1974a) found that predators were responsible

for 74% and 61% of the fawn mortality for two consecutive years. Hamlin et al. (1984) observed that a minimum of 90% summer mortality of fawns was a result of coyote predation. 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. 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 on Steens Mountain in Oregon. Their study concluded that predation, primarily by coyotes, was the major cause for low fawn survival. Other authors observed that coyotes were responsible for most of fawn mortality during the first few weeks of life (Knowlton 1964, White 1967).

Mule deer fawn survival was significantly increased and more consistent inside a predator-free enclosure in Arizona (LeCount 1977, Smith and LeCount 1976). 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. 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. 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 (hunting), ultimately returned to original densities due primarily to malnutrition and parasitism.

Pronghorn Antelope

Jones (1949) demonstrated 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). 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, Tucker and Garner 1980).

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. Coyote damage management on Anderson Mesa increased the herd from 115 animals to 350 in three years, and peaking at 481 animals in 1971. 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 removal 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 (Neff et al. 1985). 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 predator damage management have been reported by Riter (1941), Udy (1953), and Bodenchuk (1995). Coyote reduction was necessary and cost effective in pronghorn antelope management, as shown by Smith et al. (1986).

Bird Species of Special Concern

In a study of waterfowl nesting success in Canada, researchers found that eggs in most nests were destroyed by predators. These predators included red fox, coyote, striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), Franklin's ground squirrel (*Citellus franklini*), badger (*Taxidea taxus*), black-billed magpie and American crow (*Corvus brachyrhynchos*) (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 that skunks and raccoons are major waterfowl nest predators that can contribute to 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, (Gazda and Connelly 1993). 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 radiotelemetry 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). Dumke and Pils (1973) reported that ringed-neck pheasant (*Phasianus colchicus*) hens were especially prone to predation during the nest incubation period. In Minnesota, pheasant hatching success and brood production was more than doubled with an intensive reduction of predators (Chessness et al. 1968). Trautman et al. (1974) stated that during a 5-year study in South Dakota, there was a 19% increase in ring-necked pheasant populations on areas with only fox predator damage management. During a second 5-year study in South Dakota, ring-necked pheasant populations increased 132% on areas with red fox, raccoon, badger, and skunk damage management (Trautman et al. 1974).

In documenting an extensive study of the effects of red fox predation on waterfowl in North Dakota, Sargeant et al. (1984) concluded that reducing high levels of predation was necessary to increase waterfowl production. Williams et al. (1980) reported that a 72% hatching success of wild turkey eggs following a predator poisoning campaign, but only 59% when predators were not poisoned. Balser et al. (1968) determined that predator damage management resulted in 60% greater production in waterfowl in areas with damage management areas as compared with areas without damage management. He also recommended that when conducting predator damage management, to target the entire predator complex or compensatory predation may occur by a species not under control, a phenomena also observed by Greenwood (1986).

Threatened and Endangered (T&E) Species

Predation can have a major impact on T&E species. Predation has been documented in black-footed ferret (*Mustela nigripes*) reintroductions in Wyoming, South Dakota and Montana (E. Stukel, SD Game, Fish and Parks pers. comm. 1995; USDI 1995). Drewien et. al. (1985) found that coyote and red fox predation on endangered whooping crane (*Grus americana*) eggs and chicks was common during a whooping crane cross-fostering experiment at Grays Lake National Wildlife Refuge, Idaho. Predator damage management measures were implemented in response to this finding, and the authors concluded that predator damage management was effective in reducing mortality of whooping cranes and other avian species nesting at Grays Lake. Massey (1971) and Massey and Atwood (1981) found that the presence of predators alone can prevent least terns (*Sterna antillarum*) from nesting and cause them to abandon previously occupied sites. Mammalian predators were found to have significantly impacted the loss of least tern eggs on sandbars and sandpits (Kirsch 1996). Skunks (Massey and Atwood 1979), red fox (Minsky 1980), coyotes (Grover and Knopf 1982), and raccoons (Gore and Kinnison 1991) are common predators of least terns. During a two-year study, coyote predation accounted for 25% to 38.5% of the nesting interior least tern (Grover 1979). In Massachusetts from 1985-1987, predators destroyed 52-81% of all active piping plover (*Charadrius melodus*) nests (MacIvor et al. 1990). Red foxes accounted for 71-100% of the nests destroyed by predators at the site (MacIvor et al. 1990).

Summary

Based on research and experience, some State and Federal wildlife management agencies have found that predator damage management can increase specific wildlife populations where predation is affecting the ability of these populations to maintain or increase their densities (recruitment). It is also reasonable to assume that wildlife populations in areas where predator damage management is being conducted for protection of livestock could be receiving a benefit from those actions. It should,

however, be emphasized that management of game animals and birds in Wyoming is the responsibility of WGFD. The WGFD has held that while in some situations predators may need to be controlled to assist a wildlife population, these cases are the exception and that, in most cases, the wildlife population is probably limited in numbers due to other factors, such as habitat loss. The WGFD believes that predator control for protection of free-ranging wildlife populations is not economical (Facciani, 1997).

Predator damage management could be requested on a case-by-case basis when WGFD or the USFWS determines predation is detrimental to their management objectives, and ADC would only respond after WGFD or the USFWS has made such a determination.

1.2.4 Need for Predator Damage Management for Black and Grizzly Bears and Mountain Lions Determined to be a Nuisance or Threat to Public Safety.

The WGFD is responsible for responding to bear and mountain lion complaints relating to nuisance and public safety. When ADC responds to livestock damage requests involving bear or mountain lion damage management is initiated only after coordination with the WGFD. Within the analysis area, human interactions with bears and mountain lions could occur wherever habitat or food sources overlap with human activities. For bears and mountain lions, the WGFD estimates that current harvest levels, whether by hunting, damage management or unknown causes, are not causing a decline in the bear and mountain lion population statewide.

Mountain lion and black bear populations are estimated to be increasing (WGFD, pers. comm. 1995) based on increasing observations, road kills and damage complaints. Although rare, mountain lion attacks on humans in the western United States and Canada have increased markedly in the last two decades, primarily due to increased mountain lion populations and human use of mountain lion habitats (Beier 1992). The recent fatal attacks in Montana, California, Colorado and British Columbia also emphasize the need for awareness.

When black and grizzly bear and mountain lions damage property or threaten public health and safety, immediate action is taken. Normally, WGFD responds to nuisance black and grizzly bear and mountain lion complaints and public health and safety threats. ADC responds to livestock-related black bear and mountain lion problems when requested by producers, and could respond to black and grizzly bear and mountain lion threats to public health and safety situations when requested by the WGFD. Wyoming statutes state that livestock depredating black bear may be destroyed by the landowner, the landowner's employee or lessee (Wyoming Statutes (WS) 23-3-115). Other WGFD management alternatives for black bears would include lengthening the hunting season or increasing the number of hunting permits in areas experiencing problems with black bears if the circumstances indicate such action. If ADC confirms grizzly bear predation on livestock, the problem would be referred to the WGFD. The WGFD has sole responsibility for responding to and addressing nuisance grizzly bear complaint, and any ADC involvement would be at the request of the WGFD. Relocations of grizzly bears between grizzly bear ecosystems would be done in accordance with State and Federal laws, regulations, and policy. Handling and control of nuisance grizzly bears would be governed by the grizzly bear special rule (50 CFR 17.40) and guidance provided by the Interagency Grizzly Bear Committee Guidelines (IGBC 1986). Damage management actions are designed to capture and remove the specific target bear(s).

1.3 Relationship of This Environmental Assessment to Other Environmental Documents and Management Plans

1.3.1 ADC Programmatic EIS. ADC has issued a Final EIS on the national APHIS/ADC program (USDA 1994). Pertinent and current information available in the EIS has been incorporated by reference into this EA. The Record of Decision (ROD) for the EIS was published on March 7, 1995. This EA will be evaluated for consistency with the ROD. If inconsistencies are found, the EA would be supplemented pursuant to NEPA.

1.3.2 National Forest Land and Resource Management Plans (LRMPs). The National Forest Management Act (NFMA) requires that each National Forest prepare a Land and Resource Management Plan (LRMP) for guiding long-range management and direction. The National Forests administering lands in the analysis area accomplished this requirement in the early to mid 1980's. These first generation LRMP's contained directions, goals, standards and guidelines that were appropriate for that time. Since the 1993 national Memorandum of Understanding (MOU) between Forest Service and ADC, the Forest Service has been working with ADC to transition into the procedures outlined in the MOU. The MOU formulates an agreement that the Forest Service would cooperate with ADC in the development and annual review of Forest-wide Animal Damage Management (ADM) (work) plans. This cooperation is one means of promoting the compatibility of APHIS-ADC proposed damage management actions with National Forest System Land and Resource Management Plans.

The eight National Forest LRMPs pertinent to the analysis area have varying levels of reference to ADM in their texts. The 1993 MOU is the primary operating instrument to bring continuity to these LRMPs and their relationship to ADC ADM activities.

The **Ashley National Forest** administers lands in western Wyoming that are in a special management status. This is the Flaming Gorge National Recreation Area. An appendix in the Ashley National Forest LRMP addresses management of this designated recreation area. ADM is recognized to be appropriate when a need is identified.

The **Big Horn National Forest LRMP** addresses wildlife damage management with a view to targeting offending animals and presenting least risk to non-target species and human Forest users. Cooperation with other agencies to prevent damage is a General Direction. Forest Service, Region 2 Forests display standardized General Directions for ADM.

The **Bridger-Teton National Forest LRMP** discloses the goals and Forest challenge to *"Reduce Interference with and Improve Conditions for Livestock Operations."* A subsidiary goal is to *"Help implement a predator control program where intolerable losses to livestock are demonstrated."* In a section regarding protection from pests, damage management efforts and descriptions of possible damage management methodologies are described.

The **Caribou National Forest LRMP** recognizes that *"Animal damage control (ADC) is considered a resource management tool to be applied when and where necessary on the depredating animal. Damage control on the Forest will be carried out by the U.S. Fish & Wildlife Service, Department of the Interior (Division of Animal Damage Control)."* In 1986 this Division was transferred to the U.S. Department of Agriculture-APHIS-ADC. At time of revision, this LRMP will be updated to reflect this change.

The **Medicine Bow National Forest LRMP** addresses wildlife damage management in the context of cooperation with appropriate agencies. It gives a General Direction, *"To prevent or reduce damage to other resources and direct control toward preventing damage or removing only the offending animal."*

The **Shoshone National Forest LRMP** displays identical language to the Medicine Bow National Forest Plan. Both plans address aerial gunning and denning as applicable damage management methodologies.

The **Targhee National Forest LRMP** contains, within the Range Program Element, Summary of Program Direction, a statement to, *"Maintain an effective predator control program in cooperation with other State and Federal agencies having predator control authority and responsibility."* The 1985 Forest Plan continues in the Range Summary to articulate fairly specific approval levels for damage management. This was in accordance with Forest Service Manual direction of 1985 regarding ADM.

The **Wasatch-Cache National Forest LRMP** addresses discrete portions of Forest lands with customized Management Direction, Standards and Guidelines. The *"North Slope"* Area reflects coordination with USFWS and State agencies to accomplish predator damage management. The Standards and Guidelines for this area dwell upon damage management specific to target species and offending animals. Environmentally acceptable methods of damage management are emphasized.

1.3.3 National Forest EAs for Predator Damage Management. Predator damage management would continue under Forest Service documents until superseded by a new decision document. EAs prepared by the Forest Service to address predator damage management by ADC are currently in place on the Ashley (Forest Service 1990b), Bighorn (Forest Service 1993), Bridger-Teton (Forest Service 1990a), Targhee (Forest Service 1990c) and Wasatch-Cache (Forest Service 1991) National Forests.

1.3.4 BLM Resource Management Plans/Environmental Impact Statements (RMP/EISs).

The **Rawlins BLM District RMP** states that predator damage management will be coordinated with APHIS-ADC and conducted according to the *"Cooperative Animal Damage Control Plan for Public Land in the Rawlins District"* (Work Plan). The Rawlins BLM District has authorized predator damage management at the request of permittees or the WGFD, and has an ADC Work Plan (BLM 1994a).

The **Rock Springs BLM District RMP** states that predator damage management will be coordinated with APHIS-ADC and conducted in accordance with *the "Cooperative Animal Damage Control Plan for Public Land in the Rock Springs District"* (Work Plan). The Rock Springs BLM District has authorized predator damage management at the request of permittees and has an ADC Work Plan. Currently predator damage management is conducted according to the Rock Springs District Predatory Animal Damage Control EA (BLM 1994b) and Decision Record/Finding of No Significant Impact (FONSI).

The **Worland BLM District RMP** states that *Animal damage control (ADC) activities in the planning area, including the use of poisons that are lethal to vertebrate animals, will be considered as proposals are submitted. These activities are subject to established ADC procedures and policies as outlined in the national and state level memoranda of understanding between BLM and the USDA Animal and Plant Health Inspection Service (APHIS), BLM manual 6830, and other directives* (BLM 1990). The RMP authorizes predator damage management at the request of permittees and the WGFD, and the Worland District has an ADC Work Plan.

1.3.5 BLM EAs for Predator Damage Management. EAs prepared by the BLM to address predator damage management conducted by ADC are currently in place on the Rawlins (BLM 1994a), Rock Springs (BLM1994b), and Worland Districts (BLM1994c). In 1995, ADC adopted these EAs and

wrote new Decisions to include ADC predator damage management on intermingled and contiguous private and State lands. These documents will be superseded by this EA.

1.3.6 Final EIS on The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho. The entire analysis area is within the nonessential experimental gray wolf (*Canis lupus*) population area identified in the Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho EIS. This document and 50 CFR 17.84 provide guidance on when, where, and how wolf damage management would be conducted. ADC is authorized to assist the USFWS in reducing wolf predation on livestock on private and public land in the Northern Rocky Mountains. The Northern Rocky Mountain Wolf Recovery Plan (USDI 1987) indicates that, if necessary, lethal damage management could be used to stop depredations. Any decision made from this EA process would be consistent with that guidance.

1.3.7 Interagency Grizzly Bear Committee Guidelines. These guidelines address when and how management of nuisance and depredating grizzly bears would occur and defines agency roles and responsibilities. Any decision made from this EA process would be consistent with guidance in the contingency plan. Damage management of grizzly bears would be done in accordance with State and Federal laws, regulations, and policy. Handling and control of nuisance grizzly bears would be governed by the grizzly bear special rule (50 CFR 17.40) and guidance provided by the Interagency Grizzly Bear Guidelines (IGBC 1986). Control actions are designed to capture and remove the specific target bear(s).

1.3.8 WGFD Wildlife Management Plans. WGFD has prepared strategic plans for big game and game birds, and management plans for black bear (WGFD 1994) and mountain lion (WGFD 1996c). These plans outline the management goals, objectives, strategies and methodologies for these species, and as other plans are developed the EA would be reviewed to ensure consistency with the plan. Criteria from existing plans are incorporated by reference into this EA and used for the analysis.

1.4 DECISION TO BE MADE

Based on agency relationships, MOUs and legislative direction, ADC is the lead agency for this EA and therefore responsible for the scope, content and decisions made. As cooperating agencies, the Forest Service, BLM, WGFD, WDA and WSLI have had input throughout preparation of the EA to ensure an interdisciplinary approach in compliance with NEPA, and that the EA and agency mandates, policies, plans and regulations would be in compliance.

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

- Should predator damage management be continued as currently implemented in the analysis area (the "no action" alternative)?
- If not, how should ADC fulfill their legislative directive and responsibilities in the analysis area.
- Might the proposal have significant impacts needing an EIS.

1.5 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.5.1 Actions Analyzed. This EA evaluates planned predator damage management to protect livestock, property, apiaries, designated wildlife species (as determined by WGFD or USFWS), and public health and safety threats from predation/disease within the analysis area. Other program activities will be addressed in other NEPA documents. Cultural and archeological concerns will be considered and addressed in this

document as they relate to the proposed action.

1.5.2 Wildlife Species Potentially Protected by ADC Besides Mule Deer and Pronghorn Antelope. Short-term predator control projects may be necessary in the following situations:

a. In waterfowl production areas and bighorn sheep transplant areas (WGFD 1996a).

b. For protection/enhancement of populations of T&E, or candidate species under special circumstances. For example, Wyoming ADC historically aided the USFWS and WGFD in black-footed ferret reintroduction areas by collecting predators (coyotes and badgers) for disease and parasite analysis. "*Coyote control, through lethal control and exclusionary fencing, has proven valuable by dramatically increasing short-term survival rates in black-footed ferrets at the Montana reintroduction site"* (USDI 1996).

NEPA analysis of wildlife damage management for other species would be conducted by the authorized agency, if necessary. This EA would be reviewed and if necessary supplemented pursuant to NEPA, or other Federal agency (ies) would conduct their own NEPA analysis.

1.5.3 Counties Not Part of the Operational ADC Predator Damage Management Program. Sublette and Teton Counties do not presently have Cooperative Agreements with ADC. ADC does, however, conduct predator damage management within Sublette County (primarily on Forest Service lands) to protect livestock for owners who reside in other counties that have grazing leases in Sublette County. ADC policy is to provide service to entities experiencing wildlife damage when requested and appropriate within the constraints of available funding and workforce. Therefore, ADC may have signed *Agreements for Control* with entities from Sublette and Teton County. Predators taken by ADC and livestock losses reported to or verified by ADC are included in this analysis. Should Teton and Sublette Counties enter into Cooperative Agreements with ADC, this EA would be reviewed and if necessary supplemented by ADC pursuant to NEPA.

1.5.4 American Indian Lands and Tribes. Presently, no tribes have Cooperative Agreements with Wyoming ADC for predator damage management. If a tribe enters into a Cooperative Agreement, this EA would be reviewed and if necessary supplemented by ADC pursuant to NEPA.

1.5.5 Period for Which this EA is Valid. This EA would remain valid until ADC and other appropriate agencies determine that new needs for action or new alternatives having different environmental effects must be analyzed. Then, this analysis and document would be supplemented pursuant to NEPA. Review of the EA would be conducted each year at the time of the planning process by ADC and cooperating agencies to ensure that the EA is complete and appropriate.

1.5.6 Site Specificity. This EA addresses the potential impacts of predator damage management on all lands under Cooperative Agreement, Agreement for Control or ADC Work Plans in the analysis area. These lands are under the jurisdiction of the Forest Service, BLM, 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 could occur. This EA emphasizes major issues as they relate to specific areas whenever possible; however, many issues apply wherever predator damage and resulting management occur, and are treated as such. The standard ADC Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by ADC in the analysis area. (See Chapter 3 for a description of the ADC Decision Model and its application.)

1.5.7 Summary of Public Involvement Efforts

Issues related to the proposed action were identified during the public involvement process conducted with members of the livestock industry, environmental interest groups, the general public, American Indians tribes, BLM, Forest Service, WGFD, WDA, and WSLI resource specialists, county agencies, and other Federal agencies. The public was notified about the proposed action through a letter requesting *public involvement* and invited to comment on the eastern or western Wyoming program, or both. This letter was mailed on March 26, 1996 to about 2,500 individuals, organizations and agencies, and legal notices were published in five newspapers throughout Wyoming (some newspapers have statewide distribution). Among key interest groups contacted were: Predator Project, Wildlife Damage Review, The Humane Society of the U.S., Friends of the Bow/Biodiversity Project, Wyoming Wildlife Federation, Wyoming Outfitters Assoc., Friends of Animals, American Sheep Industry Association, National Audubon Society, Sierra Club, Defenders of Wildlife, PETA, the Wyoming Stockgrowers, and the Wyoming Wool Growers Association.

Public involvement responses were received and documented from 125 letters and telephone calls. Most respondents addressed their comments to both the eastern and western analysis areas. The responses represented a wide range of opinions, both supporting and opposing the proposal. All comments received are maintained in the administrative file at the ADC State Director's Office, POB 59, Casper, WY 82602.

1.5.8 Other Agency Involvement

To assure that the concerns of other Federal and State agencies have been addressed, the Forest Service, BLM, WGFD, WDA, and WSLI were asked to participate on the Multi-agency Team, and are cooperating agencies in the development of the EA. A team of resource specialists with expertise in range management, wildlife biology, wildlife damage management, cultural resources and environmental coordination evaluated the issues identified in the public involvement process. Issues determined to be significant and relative to the analysis are discussed in Chapter 2 and evaluated in Chapter 4. Concerns that were not significant were not analyzed in detail. The USFWS was consulted regarding possible impacts (either positive or negative) to T&E species. In addition, the *Pre-Decisional* EA was circulated to each National Forest in the analysis area, the Forest Service Regional Office, BLM State and District Offices and other Federal agencies within the area of coverage. American Indian Tribes were provided a copy of the *Pre-Decisional* EA and asked to review and comment.

1.5.9 Results of the Review of the *Pre-Decisional* Environmental Assessment

Any additions or revisions deemed necessary after reviewing public comments related to this EA would be handled either through revision of the EA or by addressing specific public comments in conjunction with the written decision document. The documentation on the public involvement effort, including the written responses, would be available for public review. They are located in the administrative file in the ADC State Director's Office, POB 59, Casper, Wyoming 82602.

1.6 AUTHORITY AND COMPLIANCE

1.6.1 Authority of Federal[1] and State Agencies in Wildlife Damage Management in Wyoming[1]

ADC Legislative Authority

[1] Detailed discussions of the legal authorities and relationships of pertinent Federal wildlife and land management entities, and key legislation pertinent to wildlife damage management are found in Chapter 1 of USDA 1994.

The primary, statutory authority for the ADC 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 the changes in societal values, ADC 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 authority of ADC with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

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

1.6.2 Wyoming Game & Fish Department (WGFD)

The WGFD has the responsibility to manage all protected and classified wildlife in Wyoming, except Federally listed T&E species, regardless of the land class on which the animals are found (WS 23-1-103, 302). By Wyoming statute and policy, the State provides for the conservation of lands, protection of natural resources, wildlife and public lands (WS 11-16-103). WGFD is also authorized to cooperate with ADC and the WDA for controlling predatory animals (WS 11-6-104, 107, 108). Wyoming State law allows: 1) predatory animals to be taken at any time and in any manner (WS 23-3-103), 2) an owner, employee of the owner, or lessee to take any black bear, mountain lion, or bobcat that is causing damage to private property (WS 23-3-115), and 3) owners of private property damaged or killed by trophy game animals (black bear, mountain lion, or grizzly bear) are to be compensated for the loss by WGFD (WS 23-1-901). In Wyoming, black bear and mountain lion management is the responsibility of the WGFD. However, in coordination with WGFD, ADC would take depredating bear and mountain lion on a case-by-case basis.

1.6.3 Wyoming Department of Agriculture (WDA)

The WDA is authorized to enter into Cooperative Agreements with ADC and local entities for reducing damage caused by predatory animals or to administer such programs (WS 11-6-104). The WDA is also responsible for the issuance of permits for aerial hunting per the Fish and Wildlife Act of 1956, as amended (WS 11-6-105). The WDA currently has an MOU, Cooperative Agreement, and Work Plan with ADC. These documents establish a cooperative relationship between ADC and WDA, outline responsibilities, and set forth annual objectives and goals of each agency for resolving wildlife damage management conflicts in Wyoming.

1.6.4 County Predatory Animal Districts and State Predatory Animal Advisory Board

Each county in Wyoming is legislatively designated as a predatory animal district (WS 11-6-201) with the

authority to hold property and be a party to suits and contracts. The individual districts have the responsibility to: *" exercise general supervision over the predatory animals that prey upon and destroy livestock, other domestic animals and wild game"* within the boundaries of the county (WS 11-6-205). Therefore, the individual County Predatory Animal Boards determine how predator control is to be conducted within their respective domains, and administer funds collected from the brand inspection fees (and other sources) for that purpose (WS 11-6-210). Some choose to conduct their own programs with little or no Federal involvement. All but two counties within the analysis area have chosen to enter into Cooperative Agreements with ADC to provide expertise and operational support in wildlife damage management.

The Wyoming State Predatory Animal Advisory Board is made up of one representative from each County Predatory Animal Board, and provides general coordination, direction, and advice regarding predatory animal control operations across the State.

1.6.5 Wyoming Statutes - Animal Control Laws

Under Wyoming state law, any dog found in the act of killing or injuring livestock may be killed immediately (WS 11-31-107). Dog control is generally the responsibility of local governmental agencies. Local animal control officials or County Sheriffs are responsible for dealing with dogs that threaten, damage or kill livestock. ADC policy provides for ADC to assist in dog damage management at the written request of local authorities and upon approval of the ADC State Director.

1.6.6 U.S. Forest Service and Bureau of Land Management

The Forest Service and BLM have the responsibility to manage 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 managing 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 ADC to facilitate a cooperative relationship. Copies of these MOUs are available by contacting the ADC State Director's Office, POB 59, Casper, WY 82602.

1.6.7 U. S. Fish and Wildlife Service (USFWS)

The USFWS has the statutory authority to manage Federally listed T&E species through the Endangered Species Act of 1973 (ESA) (16 USC 1531-1543, 87 Stat. 884). Authorization, under Section 10 of the ESA, permits the USFWS to manage T&E species damage in accordance with the USFWS's plans (i.e., Interim Wolf Control Plan, Interagency Grizzly Bear Guidelines) and through Memorandum of Understanding (MOU) and Interagency Agreement. ADC is authorized to assist the USFWS in reducing wolf predation to livestock on private and public land in the Northern Rocky Mountains.

1.6.8 COMPLIANCE WITH FEDERAL LAWS. Several Federal laws regulate ADC wildlife damage management. ADC complies with these laws, and consults and cooperates with other agencies as appropriate. Some of these laws are:

1.6.8.1 National Environmental Policy Act (NEPA) Environmental documents pursuant to NEPA must be completed before work plans consistent with the NEPA decision can be developed and implemented. ADC would also review the NEPA documents annually to insure that program activities are in compliance with the Decision. Before 1993, each National Forest (and occasionally individual Ranger Districts) and each BLM District would prepare its own NEPA document. This resulted in different requirements and procedures for different areas, and omitted analysis of ADC activities on private lands. This EA, with ADC as the lead agency, is the first time that all land classes under Cooperative Agreements, Agreements for Control and ADC Work Plans will be analyzed in a comprehensive manner in the analysis

area.

ADC also coordinates specific projects and programs with other agencies. The purpose of these contacts is to coordinate any wildlife damage management that may affect resources managed by these agencies or affect other areas of mutual concern. Federal agencies that request ADC assistance to protect resources are responsible for NEPA compliance.

1.6.8.2 Endangered Species Act (ESA) It is Federal policy, under the ESA, that *"All Federal agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of the Act"* (Sec.2(c)). ADC conducts Section 7 consultations with the USFWS to use the expertise of the USFWS to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species. Each agency shall use the best scientific and commercial data available*" (Sec.7(a)(2)). Wyoming ADC conducted a consultation with the USFWS for Federally listed species in Wyoming to insure that the proposed action is unlikely to affect any listed species adversely.

1.6.8.3 Migratory Bird Treaty Act (MBTA) The MBTA provides the USFWS regulatory authority to protect bird species that migrate outside the United States. Currently, Federal Agencies are not subject to the MBTA's procedural requirement for obtaining permits and the USFWS is no longer authorized to issue permits to Federal Agencies for the take of migratory birds.

1.6.8.4 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The U.S. Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods integrated into the ADC program in the analysis area are registered with and regulated by the EPA and the WDA, and used by ADC in compliance with labeling procedures and requirements.

1.6.8.5 National Historical Preservation Act (NHPA) of 1966 as amended The NHPA requires: 1) Federal agencies to evaluate the effects of any Federal undertaking on cultural resources, 2) consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources, and 3) consult with appropriate American Indian tribes to determine whether they have concerns for traditional cultural properties in areas of these Federal undertakings.

1.7 PREVIEW OF THE REMAINING CHAPTERS IN THIS EA

The remainder of this EA is composed of four (4) chapters and three (3) appendices. Chapter 2 discusses and analyzes the issues and affected environment. Chapter 3 contains a description of each alternative, alternatives not considered in detail, mitigation and standard operating procedures (SOPs). Chapter 4 determines consistency with Forest Service LRMPs, and BLM RMP, analyzes the environmental impacts associated with each alternative considered in detail, and determines the economic impacts of each alternative. Chapter 5 contains the list of preparers and reviewers of this EA.

2.0 CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

INTRODUCTION

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

2.1 ISSUES ANALYZED IN DETAIL IN CHAPTER 4

The Multi-agency Team, consisting of representatives from the lead (ADC) (40 CFR 1501.5) and cooperating agencies (BLM, Forest Service, WGFD, WDA, WSLI) (40 CFR 1501.6) determined the issues to be:

Issue 1. Cumulative impacts on the viability of wildlife populations.

- Potential for the ADC take of predators to negatively impact recreational or commercial harvest of predators.

Issue 2. Effectiveness and selectivity of damage management methods.

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

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

Issue 4. Concern about ADC impacts on T&E species.

Issue 5. Cost-effectiveness of ADC activities.

2.2 ISSUES USED TO DEVELOP MITIGATION

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 that currently have a special designation and/or require special management consideration (Appendix C). These include wilderness (WAs) or primitive areas (PAs), Wilderness Study areas (WSAs), research natural areas (RNAs), areas of critical environmental concern (ACECs), and wild and scenic rivers (WSR). The special management required for these different areas varies considerably by designation, land administrator, and are governed by different legal mandates. ADC Work Plans, developed by ADC in cooperation with the land management agency described the type of damage management that would be permitted and any mitigation measures that apply to the special management area.

WAs or PAs are areas designated by Congress to be managed for the preservation of wilderness values. Currently, the only WAs in Wyoming are on National Forest System lands and there are numerous WSAs under interim management on BLM that could be designated as WAs in the future. RNAs are located on some National Forests in the analysis area.

ADC has conducted 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 and that it may adversely affect the aesthetic quality of the wilderness experiences.

ADC wildlife damage management is conducted (and is proposed to continue in the future) only in limited instances, when and where a specific need exists, only when allowed under the provisions of the specific WA designation, and with the concurrence of the land managing agency. ADC activities in special management areas have historically been, and are expected to continue to be a minor part of the ADC program. Restrictions on activities in Special Management Areas are listed in Chapter 3 under Mitigation.

Special Management Areas

WSAs. WSAs are areas studied for their potential to qualify as WAs and are currently awaiting Congressional designation. These are primarily BLM lands and managed according to the BLM's Wilderness Interim Management Handbook H-8550-1 in a manner that does not diminish their wilderness values (BLM 1995). However, this management does allow for continuation of most prior (non-land disturbing) activities and does not preclude wildlife damage management. Currently, all or parts of 37 WSAs occur on BLM lands within the analysis area (Appendix C). Wildlife damage management in these areas would be carried out according to the guidelines and restrictions imposed by BLM Handbook H-8550-1 (BLM 1995) and BLM Manual 6830. Those lands officially designated as WAs would be managed according to the BLM's Wilderness Management Policy (BLM, 1981).

RNAs. RNAs are Federal lands managed for the protection of unusual, scientific, or special interest natural characteristics for research and education. There are no designated RNAs on BLM in Wyoming at this time, however, there are RNAs on some National Forests in the analysis area. BLM and Forest Service policy does not automatically exclude wildlife damage management within these areas should they be designated in the future.

ACECs. ACECs are BLM lands for which special management was deemed necessary. However, it should be noted that the legal responsibility for designation and management for ACECs comes from the Federal Land Policy and Management Act (FLPMA) and is considerably different from either RNA or wilderness designations. 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. ACEC's 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 determines what is allowable.

There is a total of 20 existing ACECs designated within the analysis area. During preparation of BLM EAs (BLM, 1994a, 1994b, 1994c) eleven ACECs on the Rock Springs BLM District and two on the Worland BLM District were identified as requiring some sort of mitigation regarding wildlife damage management. Mitigation would be agreed to as part of the work plan process on each BLM district. It is not expected that wildlife damage management would negatively affect resource values that prompted ACEC designation. Therefore, such activities would continue unless specifically excluded by a future management plan.

WSR

At this time, there is one designated WSR in Wyoming, the Clark's Fork of the Yellowstone on the Shoshone National Forest. There are no WSRs on BLM lands currently recommended for designation.

2.2.2 Humaneness of methods as used by ADC

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. Schmidt (1989) indicated that vertebrate pest control for societal benefits could be compatible with animal welfare concerns, if *" . . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process."*

Suffering has been described as a *" . . . highly unpleasant emotional response usually associated with pain and distress*." However, suffering *" . . . can occur without pain . . . ,"* and *" . . . pain can occur without suffering . . . "*(American Veterinary Medical Association (AVMA) 1987). Because suffering carries with it the implication of a time frame, a case could be made for *" . . . little or no suffering where death comes immediately . . . "*(California Department of Fish and Game (CDFG) 1991), such as ADC lethal control techniques of shooting and M-44s.

Defining pain as a component in humaneness of ADC methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would *" . . . probably be causes for pain in other animals . . . "*(AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 1991). Some ADC control methods such as leghold traps and body snares, may thus cause varying degrees of pain in different animal species for varying time frames. At what point pain diminishes or stops under these types of restraint has not been measured by the scientific community.

Pain and suffering as it relates to a review of ADC damage management methods to capture animals, has both a professional and lay point of arbitration. Wildlife managers and the public would both be better served to recognize the complexity of defining suffering, since *" . . . neither medical or veterinary curricula explicitly address suffering or its relief"*(CDFG 1991).

Therefore, humaneness appears to be 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 and individuals are concerned that some methods used to manage wildlife damage exposes animals to unnecessary pain and suffering. Kellert and Berry (1980) in a survey of American attitudes toward animals related that 58% of his respondents, *" . . . care more about the suffering of individual animals . . . than they do about species population levels."* Research suggests that with some methods, such as restraint in leghold traps, changes in the blood chemistry of trapped animals indicate "*stress.*" Blood measurements showed similar changes in foxes chased by dogs for about five minutes as those restrained in traps (USDA 1994:3-81). 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 (Glosser 1993). Predators frequently do not kill larger prey animals quickly, and will often begin feeding on them while they are still alive and conscious (Wade and Bowns 1982). The suffering apparently endured by livestock or pets damaged in this way is unacceptable to many livestock producers and pet owners.

Thus, the decision-making process involves tradeoffs between the above aspects of pain and humaneness. An objective analysis of this issue must consider not only the welfare of a wild animal caught in a leghold trap, but also the welfare of the domestic animals that may continue to be injured or killed if the leghold 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 and funding.

ADC has improved the selectivity of management devices through research and development of such apparatuses as pan-tension devices for leghold traps to exclude smaller nontarget animals and other device modifications such as breakaway snares to allow large animals to escape. Research is continuing to bring new findings and products such as electronic trap monitoring devices and capture device-mounted tranquilizing agents into practical use. Until new findings and products are found practical, a certain amount of animal suffering will occur where predator damage management occurs where nonlethal damage management methods are not practical or ineffective. Furthermore, if quantifying suffering were possible, it is possible that the actual net amount of animal suffering would be less under the proposed action (or any other alternative involving the use of lethal methods) than under no control since suffering of livestock preyed upon by predators would be reduced if the action is successful.

ADC personnel in the analysis area are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology. Mitigation measures/SOP used to maximize humaneness are listed in Chapter 3.

2.2.3 The public's concern about use of chemicals

Much of the public concern over the use of wildlife damage management chemicals is based on erroneous perceptions that ADC uses nonselective, outdated chemical methodologies. The proposed ADC chemical use includes sodium cyanide in the M-44, carbon monoxide produced by the gas cartridge, sodium flouroacetate used in the LPC and DRC 1339 for reducing raven damage. These chemicals are regulated by the EPA through the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), by the Wyoming Department of Agriculture, by the Wyoming Department of Environmental Quality (DEQ), by MOUs with Federal land managing agencies, and by ADC Directives. Based on a thorough Risk Assessment, APHIS concluded that when ADC 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).

2.2.4 American Indian Concerns

2.2.4.1 Cultural Resources

The NHPA requires Federal agencies to evaluate the effects of any Federal undertaking on historic properties of religious and cultural importance to an Indian tribe and to consult with appropriate American Indian Tribes on the identification, evaluation, and treatment of such properties. The Native American Graves Protection and Repatriation Act of 1990 provides for protection of American Indian burial sites and establishes procedures for notifying Tribes of any new discoveries.

In consideration of American Indian cultural resource interests, the ADC program contacted the following Tribes within the analysis area:

The Eastern Shoshone Tribe, Fort Washakie, Wyoming
The Northern Arapaho Tribe, Ethete, Wyoming
The Shoshone-Bannock Tribes, Fort Hall, Idaho
The Ute Indian Tribe, Fort Dushesne, Utah
The Crow Tribe, Crow Agency, Montana

Each Tribe was requested to identify any cultural concerns relating to the proposed ADC program and identify a contact person for the Tribe. The only Tribe that responded was the Northern Arapaho Tribe. No specific concerns were expressed, but the Tribe did request to be kept informed of the EA process and decision.

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. The areas proposed for wildlife damage management are not in areas of high sensitivity for cultural resources. No American Indian burial sites are known to be present in damage management areas.

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

Environmental Justice 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. Environmental Justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. (The Environmental Justice movement is also known as Environmental Equity -- which is the equal treatment of all individuals, groups or communities regardless of race, ethnicity, or economic status, from environmental hazards).

Environmental Justice is a priority both within USDA/APHIS and ADC. Executive Order 12898 requires Federal agencies to make Environmental Justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. A critical goal of Executive Order 12898 is to improve the scientific basis for decision-making by conducting assessments that identify and prioritize environmental health risks and procedures for risk reduction. APHIS-ADC developed a strategy that: 1) identifies major programs and areas of emphasis to meet the intent of the Executive Order, 2) minimize any adverse effects on the human health and environment of minority and low-income persons or populations, and 3) carries out the APHIS mission. To that end, APHIS operates according to the following principles: 1) promote outreach and partnerships with all stakeholders, 2) identify the impacts of APHIS activities on minority and low-income populations, 3) streamline government, 4) improve the day-to-day operations, and 5) foster nondiscrimination in APHIS programs. In addition, APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA.

All APHIS-ADC activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to insure Environmental Justice. ADC personnel use wildlife damage management methods as selectively and environmentally conscientiously as possible. All chemicals used by APHIS-ADC are regulated by the EPA through the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), the Wyoming Department of Environmental Quality (DEQ), by MOUs with Federal land managing agencies, and by ADC Directives. Based on a thorough Risk Assessment, APHIS concluded that when ADC 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 APHIS-ADC operational program, discussed 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 and low-income persons or populations.

2.3 ISSUES NOT CONSIDERED IN DETAIL WITH RATIONALE

2.3.1 ADC's impact on Biodiversity and Predator/Prey Relationships (Potential for ADC's take of predators to result in population increases of rodents and rabbits, which might then increase agricultural damage.)

No ADC wildlife damage management is conducted to eradicate a native wildlife population. ADC operates following international, Federal and State laws and regulations enacted to ensure species viability. Any reduction of a local population or group would be temporary because migration from adjacent areas or reproduction would soon replace the animals removed. The impacts of the current ADC program on biodiversity are not significant nationwide, statewide, or in the analysis area (USDA 1994). The ADC take is a small proportion of the total population as analyzed in Chapter 4.

The relationship between predators and rodent and rabbit population (predator/prey relationship) has been summarized in USDI (1979).

Rabbit and rodent populations normally fluctuate substantially in multi-year cycles. There are two basic schools of thought as to the factors responsible for these fluctuations. One is that rodent and rabbit populations are self-regulated through behavior, changes in reproductive capacity due to stress, or genetic changes (Chitty 1967, Myers and Krebs 1983). The other is that populations are regulated by environmental factors such as food and predation (Pitelka 1957, Fuller 1969).

Keith (1974) concluded that: 1) during cyclic declines in prey populations, predation has a depressive effect and as a result, the prey populations may decline further and be held for some time at relatively low densities, 2) prey populations may escape this low point when predator populations decrease in response to the reduced food base, and 3) since rabbit and rodent populations increase at a faster rate than predator populations, factors other than predation must initiate the decline in populations.

Wagner and Stoddart (1972) and Clark (1972) independently studied the relationship between coyote populations and jackrabbit (*Lepus californicus*) populations in northern Utah and southern Idaho. Both noted that coyote populations increased as jackrabbit numbers increased, but with a 1-2 year delay, suggesting that the prey population controlled the predator population, rather than the reverse.

In two studies conducted in south Texas (Beasom 1974b, Guthery and Beasom 1977), intensive short-term predator removal was employed to test the response of game species to reduced coyote abundance. At the same time, rodent and lagomorph species were monitored. A marked reduction in coyote numbers apparently did not affect the populations of rabbits or rodents in either study. Similarly, Neff et al. (1985) noted that reducing coyote populations on their study area in Arizona to protect antelope fawns did not affect the rodent or rabbit population. At the relatively low levels of predator removal currently being sustained (see Section 4.2.1), it is unlikely that overall rodent or rabbit populations would increase in response to predator removal.

2.3.2 Disturbance of nontarget wildlife through aerial hunting activities.

Disturbance of big game herds could conceivably induce stress that might negatively affect these animals. Under the terms of the MOU between the WGFD and the Wyoming ADC program, ADC and WGFD consult and cooperate to identify areas that may be of concern for big game species. ADC 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 ADC aircraft encounter any wild horse herds, the aircraft moves away if the animals are reacting to the aircraft.
The WGFD annually conducts 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. The WGFD has monitored this situation to determine whether these flights may be negatively affecting those animals being surveyed. They do not believe their surveys cause significant impacts to big game because surveys are routinely conducted only once a year, and they do not spend large amounts of time in any one area (Facciani 1997). Similarly, while ADC may hunt the same area more than once a year, days, weeks, or even months may intervene between flights. Unless a coyote is being pursued, the airplane typically just flies over the area. Some big game animals may *"spook"* and run for a short distance, but once they realize they are not being pursued they usually stop and watch the aircraft as it leaves the area. Other big game animals in the same group may not react to the aircraft and leave their *"beds."* Because of the infrequency of aerial hunting flights and limited time spent in any area, ADC does not believe aerial hunting causes a significant impact to big game. The WDA issues aerial hunting permits to private aerial hunters in Wyoming according to Federal law. The WDA has only received one complaint in six years from the public about this lawful practice (Micheli 1997).

While conducting aerial hunting operations on lands with cooperative agreements, ADC flight crews have frequently witnessed coyotes chasing deer and antelope in deep snow conditions (R. Phillips, 1996, ADC pers. comm.). To the extent that aerial hunting activities remove coyotes that might otherwise stress or kill wintering big game animals, this activity may have a beneficial effect.

2.3.3 Livestock losses are a cost of doing business and the need to consider a threshold of loss.

Some commenters felt that livestock producers should expect some level of loss as a cost of doing business, and that ADC should not initiate any damage management until economic losses reach some predetermined "*threshold*" level. Although some losses of livestock can be expected and tolerated by livestock producers, ADC has a legal responsibility to respond to requests for wildlife damage management, and it is program policy to aid each requester to minimize losses. If damage management efforts are not initiated soon after a damage problem is detected, damages may sometimes escalate to excessive levels before the problem is solved.

In the Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie National Forest, et al., the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part, the court found that a forest supervisor needs only show that damage from predators is threatened to establish a need for wildlife damage management (U.S. District Court of Utah 1993).

2.3.4 No wildlife damage management at taxpayer expense, wildlife damage management should be fee based.

During public involvement, some respondents felt that wildlife damage management should not be provided at the expense of the taxpayer or that it should be fee based. ADC was established by Congress as the program responsible for providing wildlife damage management to the people of the United States. Funding for ADC comes from a variety of sources besides Federal appropriations. Wyoming Department of Agriculture general funds, livestock producer funds, county funds, and WGFD funds are all applied to the program under Cooperative Agreements. Federal, State and local officials have decided that ADC should be conducted by appropriating funds. Additionally, wildlife damage management is an appropriate sphere of activity for government programs, since wildlife management is a government responsibility.

2.3.5 Appropriateness of manipulating wildlife for the benefit of hunters or recreation.

Some individuals felt that manipulating one wildlife species for the benefit of another wildlife species or for the benefit of hunters or recreation was not appropriate. This is an individual perception; the jurisdiction for managing most resident wildlife rests with the WGFD, and WGFD may request ADC's assistance in achieving their management objectives.

2.3.6 Appropriateness of using rancher-supplied data to quantify livestock losses.

Some individuals felt that ranchers often intentionally overestimated the extent of their livestock losses to justify more lethal predator damage management. Pearson (1986), however, reported on several studies that indicated little or no bias occurred in ranchers reporting loss, and Shelton and Klindt (1974) found that some ranchers underestimated their losses due to some husbandry practices. Schaefer et al. (1981) investigated sheep predation and determined that: 1) producers correctly assessed the cause of livestock death more than 94% of the time, and 2) the results of two types of loss surveys yielded similar results. Average losses attributed to predation by Wyoming sheep producers between 1992 and 1995 amounted to about 61% (range 52.3 to 63.9%) of the total reported death loss (WAS 1996). Through intensive monitoring conducted during a study on three typical range sheep operations in southern Idaho, Nass (1977) found that predation was responsible for 56% of the total death losses. This data suggests that attributing an average of 61% of total death losses to predation is realistic, and that Wyoming sheep producers are not intentionally overestimating their predation losses.

2.3.7 Relocation (rather than killing) of problem wildlife.

Relocation may be appropriate in some situations (i.e., if the problem species' population is at very low levels, there is a suitable relocation site, and the additional dollars required for relocation can be obtained.) However, those species that often cause livestock damage problems (i.e., coyotes, red fox, black bears, mountain lions) are relatively abundant in much of the suitable habitat in the analysis area, and relocation is not necessary for the maintenance of viable populations. Relocation of predators implicated in livestock depredation may result in future depredations if the predator encounters livestock again, and for black bears and mountain lions in Wyoming, could also require payment of damage compensation claims (WS Title 23, Article 9, 23-1-901). Any decisions on relocation of black bears or mountain lions are coordinated with local WGFD officials, and relocation of wolves is conducted by the USFWS.

The American Veterinary Medical Association, The National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists all opposes the relocation of mammals because of the risk of disease transmission, particularly for small mammals such as raccoons or skunks (Center for Disease Control 1990). Although relocation is not necessarily precluded in all cases, it would often be logistically impractical and biologically unwise.

2.3.8 Appropriateness of preparing an EA (instead of an EIS) for such a large area.

Some individuals questioned whether preparing an EA for an area as large as about 36 million acres would meet the NEPA requirements for site specificity. If in fact a determination is made through this EA that the proposed action would have a significant impact on the human environment, then an EIS would be prepared. In terms of considering cumulative impacts and *ecosystem management*, one EA covering the entire analysis area would provide a better analysis than multiple EAs covering smaller zones and presenting more fragmented or segmented data within the analysis area.

2.3.9 ADC work on private versus public lands.

Some individuals expressed concern about how ADC activities would be conducted on private versus public lands. ADC activities on private lands are carried out only after the landowner has requested services from ADC and after an *Agreement for Control on Private Property* has been signed. This agreement stipulates which methods may be used on the property. ADC activities on public lands are only carried out after development of site specific work plans between ADC and the respective land management agencies. These plans stipulate any restrictions that may be deemed necessary to ensure public safety or resource protection on those public lands. ADC activities on public lands are typically carried out under more restrictions than on private land to mitigate the likelihood of conflicts with users of public lands.

2.3.10 Rancher responsibility to protect their own livestock through use of husbandry methods.
Although no law or policy requires livestock producers to employ good husbandry practices to protect their

livestock, most Wyoming sheep producers do employ a variety of husbandry practices and nonlethal damage management methods to protect their sheep as a matter of good business. In 1995, 99.3 % of the analysis area sheep producers that cooperate with ADC used nonlethal predator damage management measures to protect sheep. About 52% of the analysis area sheep operations that cooperate with ADC, for example, use guard animals to protect their flocks (ADC 1996), and **all** range sheep producers employ herders to stay with the sheep. Most requests for assistance to protect sheep from predation come from producers who are already employing nonlethal control measures but experience predation problems in spite of these practices. ADC policy is to respond to all requests for assistance within program authority and responsibility. If improved husbandry practices or additional nonlethal methods would likely reduce a predation problem, ADC makes recommendations regarding these practices.

2.3.11 Qualifications of ADC personnel.

One commenter questioned the qualifications of ADC personnel carrying out predator damage management activities. ADC employees are experienced in the use of a wide variety of damage management methods, and are provided training on use of firearms, aerial hunting, and use of pesticides and immobilization/euthanasia drugs. All Wyoming ADC personnel using pesticide products are certified and licensed by the WDA as commercial pesticide applicators; personnel that use immobilizing or euthanizing chemicals are trained and certified to use each chemical authorized by ADC and the Food and Drug Administration (FDA).

2.3.12 Appropriateness of ADC preparing this EA, rather than the Forest Service or BLM.

Under the terms of a 1993 MOU between APHIS and the Forest Service, and a 1995 MOU between APHIS and the BLM, APHIS-ADC is recognized as the agency with the authority and expertise to conduct wildlife damage management. The Forest Service, BLM and ADC all recognize that ADC is responsible for NEPA compliance related to any the wildlife damage management conducted by ADC. The Forest Service and BLM cooperated with ADC in the preparation of NEPA documents addressing ADC's activities on lands administered by these two agencies.

2.3.13 Need for public awareness and education.

Some individuals suggested that there was a need to educate the public regarding ADC activities and the need for wildlife damage management. Although this is a recognized need, ADC does not require each State administered program to undertake efforts to promote public understanding of this issue. Wyoming ADC personnel, however, do participate in *AG in the Class Room* throughout Wyoming, conduct presentations to high school and college students, and provide instructional sessions as requested by individuals or organizations.

2.3.14 Livestock losses are a tax "write off"

There is a belief that livestock producers receive double benefits by having a partially publicly funded program to resolve predation problems and also receive deductions as a business expense on tax returns. The Internal Revenue Service tax code (Internal Revenue Code), Section 1245, 1281) does not allow for livestock losses to be *"written off"* if the killed livestock were produced on the ranch. About 85% (MIS 1996) of predation occurs to young livestock (lambs and calves) in the analysis area. Many ewes and cows are added to herds as young livestock as replacements for breeding stock, and if lost to predation they cannot be *"written off"* since they were not purchased. These factors limit the ability of livestock producers to recover against economic losses. Producers do not receive double benefits by having a Federal program to manage wildlife damage and Federal tax deductions for predation losses.

2.3.15 Wildlife populations need to be monitored

ADC's proposed action is to reduce or minimize damage to livestock, property, wildlife, and to safeguard

public health and safety against wildlife in the analysis area. The Wyoming ADC program, in cooperation with the WGFD, monitors the impact on target species in the analysis area and statewide to determine if the total take is within allowable harvest levels. WGFD harvest and population census/survey/modeling data would be used to determine the impact of total take on predator species.

2.3.16 ADC Causes Genetic Loss in the Subspecies of Coyotes Found in Wyoming

To assess the concern about coyote subspecies and loss of genetic material, it is necessary to understand what a "subspecies" is. A subspecies is a morphologically distinguishable group whose members are at least partially isolated geographically, but interbreed successfully with members of other subspecies of the same species where their ranges overlap. Scientists often use other terms, such as race and variety, as synonyms for the word "subspecies" (Connolly 1994). If crossbreeding occurs in nature in places where the geographic ranges of two kinds of mammals meet, the two kinds are considered subspecies of one species. If no crossbreeding occurs, the two kinds are regarded as two distinct species. Coyotes are regarded as predators with generalized feed habits that allow them to inhabit wide variety of habitat types. They are considered widely distributed throughout most of North America and highly mobile, migrating over large areas, and it is generally recognized that interbreeding of subspecies occurs, invalidating subspecies classifications (Voigt and Berg 1987). In other words, the animals are morphologically indistinguishable and are so much alike that a trained wildlife biologist could not tell one subspecies from another (Connolly 1994). Young and Jackson (1951) wrote of the great amount of individual color, size and cranial characteristic variations of coyotes, and stated that the actual limits of the geographic range of any subspecies cannot be indicated by sharp and fast lines. They also indicated that, within the range of one subspecies, individual coyotes will be found that are typical of other subspecies. Dispersal of "*surplus*" animals 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 with lower densities. There are two subspecies of coyotes found in Wyoming, *Canis latrans latrans* (Plains coyote)and *C. l. lestes* (Mountain coyote). The mountain coyote is one of the most widely distributed subspecies, occurring throughout the Great Basin of the U.S. and north into British Columbia and Alberta (Connolly 1994). Young and Jackson (1951) stated that, *The subspecies "lestes." shows clear intergradation with all races adjoining it distributionally, and often borderline specimens are difficult to determine over a considerable range."* This means that the average person looking at a coyote on or near the edges of the published geographic range of the mountain coyote would find it difficult or impossible to tell if the animal was, in fact, a mountain coyote, or a member of another subspecies.

The ADC take of coyotes is limited to areas where Cooperative Agreements or Work Plans are in place in specific livestock grazing areas. Wyoming ADC personnel normally remove only a small percentage of the total coyote population, as analyzed in Chapter 4 of this EA, and therefore do not nor has not had an impact on genetic variability of the coyote population. There is no indication that either of the coyote subspecies occurring in Wyoming is scarce or rare. In keeping with CEQ direction (*agencies should discuss only briefly issues other than significant ones*) (40 CFR 1500.4© and (*agencies shall avoid useless bulk in statements and concentrate effort and attention on important issues)* (40 CFR 1502.15) ADC is in compliance with this direction.

2.3.17 By Removing Coyotes in an Area Causes Younger More Aggressive Coyote to Inhabit the Area, Thus Causing Greater Livestock Losses

Two studies (Connolly et al. 1976, Gese and Grothe 1995) investigated the predatory behavior and social hierarchy of coyotes, and determined that the more dominant (alpha) animals were the ones that initiated and killed most of the prey items. Connolly et al. (1976) concluded from pen studies, with known aged coyotes, that the proclivity of individuals that attacked livestock seemed related to their age and relationship with conspecifics. The coyotes that attacked sheep most frequently were the dominant males and females paired with these males, with the males responsible for the majority of the attacks and kills. Gese and Grothe (1995) concluded from observing wild coyotes that the dominant pair was involved in vast majority of predation attempts. The alpha male was the main aggressor in all successful kills, even when other pack

members were present. A phenomenon observed by ADC personnel over many years involves the wounding and maiming of lambs in late summer (usually August and September) by pups of the year being trained to hunt/kill by the alpha pair. In these instances, one or two lambs may be killed cleanly by the adults, and several more will be bitten on the throat, nose, ears, etc., by pups that lack the experience and strength to kill cleanly. These maimed lambs usually die, in spite of medical attention, because of infections, fly maggots in the wounds, and shock (R. Phillips, 1996 ADC pers. obs.) Thus, it appears the above concern is unfounded because removal of local territorial (dominant) coyotes removes the individuals that are most likely to kill livestock and generally results in the immigration of subdominant coyotes that are less likely to kill livestock during that particular grazing season.

2.4 Issues Outside the Scope of this Analysis.

1. Mad Cow Disease, and Hormones and Antibiotic Used in the Livestock Industry.
2. Delisting of Threatened and Endangered Species.
3. Establishing Hunting Quotas.
4. Development and Urbanization of Wildlife Habitat and Human Overpopulation.
5. Prairie Dog Control.
6. Prevent Bison from Wondering from Yellowstone National Park.
7. Wildlife and Livestock Research.
8. Threatened and Endangered Species Reintroductions, particularly Wolves and Grizzly Bears.
9. Establishment of Predator Management Units.
10. Contract with Private Trappers and Develop a State Administered Program.
11. Require Livestock Producers to Have Insurance for Livestock Losses.
12. Protected status of some predator species versus a less protected status for some game animals.

3.0CHAPTER 3: ALTERNATIVES

INTRODUCTION

This chapter consists of four parts: 1) an introduction, 2) description of alternatives considered and analyzed in detail including the Proposed Action (Alternative 3), 3) a description of alternatives considered, but eliminated from detailed study, and 4) a discussion of mitigating measures. This EA consists of seven alternatives identified, developed, and analyzed in detail by the Multi agency Team (ADC, BLM, Forest Service, WGFD, WDA, WSLI); four alternatives were considered but not analyzed in detail with supporting rationale. The seven alternatives analyzed in detail are:

1) Alternative 1 - Current Analysis Area ADC Program: (No Action). This alternative consists of the current program of technical assistance and operational Predator Damage Management by ADC on Forest Service, BLM, State, county and private lands under Cooperative Agreement, Agreement for Control and Work Plans with ADC.

2) Alternative 2 - No Federal Predator Damage Management in the Analysis Area. This alternative would terminate the Federal program for predator damage management on the ADC analysis area.

3) Alternative 3 - Fully Integrated Wildlife Damage Management (IWDM) for Multiple Resources and Land Classes (as described in Alternative 1) (Proposed Action). This alternative would allow for predator damage management to be based on the needs of multiple resources (livestock, property, wildlife and public health and safety) and would be implemented following consultations with the WGFD, WDA, Federal agencies, or Tribal governments. The alternative would allow for the program to protect multiple resources on all lands within the analysis area, and for the use of M-44s on BLM lands within policies of the agencies and Work Plans, and the Livestock Protection Collar (LPC) on private lands.

4) Alternative 4 - Non-lethal Control Required Prior to Lethal Control. This alternative would require that livestock owners conduct non-lethal damage management measures prior to the initiation of ADC lethal damage management.

5) Alternative 5 - Corrective Control Only. This alternative would require that livestock losses occur before to the initiation of ADC lethal damage management. No preventive lethal damage management would be allowed.

6) Alternative 6 Technical Assistance Only. Under this alternative, ADC would not conduct predator damage management in the analysis area. The entire program would consist of only technical assistance.

7) Alternative 7 - Predator Damage Management with Only Mechanical Methods (No Use of Chemicals). Under this alternative, ADC would be restricted to using only mechanical damage management methods (i.e., traps, snares, aerial hunting, calling and shooting, shooting) with no chemical damage management methods allowed (i.e., DRC 1339, sodium cyanide, gas cartridge, LPC, immobilizing and euthanizing chemical agents).

3.1DESCRIPTION OF THE ALTERNATIVES

3.1.1 ALTERNATIVE 1 - Current Analysis Area ADC 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 Council on Environmental Quality's (CEQ) definition (CEQ 1981). In this case, selecting the No Action Alternative would not result in the cessation of existing practices; that result would be achieved by selection of Alternative 2.

The No Action alternative would continue the current ADC predator damage management 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 livestock, property, wildlife, and public health and safety (described in Chapter 1). ADC personnel in the analysis area conduct technical assistance, preventive (in response to historical loss) and corrective (in response to current loss or hazard) operational predator damage management using a full array of legally available predator damage management methods. The methods for ADC's use include: traps, snares, aerial hunting, calling and shooting, shooting, DRC 1339, gas cartridge and M-44s. M-44s are not currently used on BLM lands because the current EAs restrict their use. ADC activities are conducted on National Forest System, BLM, State, county and private lands under MOU, Cooperative Agreements or Agreement for Control. All predator damage management is based on interagency relationships, which require close coordination and cooperation because of overlapping authorities and legal responsibilities.

On Federal lands, ADC Work Plans describe the wildlife damage management that would occur. During the ADC work planning process with the BLM or Forest Service, and WGFD and WDA, plans and maps are prepared or updated which describe and delineate where predator damage management would be conducted and which methods would be used. Before management is conducted on private lands, *Agreements for Control on Private Property* would be signed with the landowner or administrator that describe the methods to be used and the species to be managed. Management is directed toward localized predator populations or groups, and/or individual offending animals, depending on the circumstances and species.

3.1.2 Alternative 2 - No Federal Predator Damage Management in the Analysis Area.

This alternative would eliminate all ADC or any other Federal program for predator damage management (operational and technical assistance) on all land classes within the analysis area. However, State and county agencies, and private individuals could conduct predator damage management. ADC would not be available to provide technical assistance or make recommendations to individuals or entities experiencing predator damage. In some cases, control methods applied by non-agency personnel could be used contrary to their intended or legal use, or in excess of what is recommended or necessary. Illegal use of pesticides could increase (Schueler 1993).

A *No Control* alternative was analyzed by the USFWS EIS (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 also evaluated in USDA (1994).

3.1.3 Alternative 3 - Fully Integrated Wildlife Damage Management (IWDM) for Multiple Resources and Land Classes (as described in Alternative 1) (Proposed Action).

This alternative is similar to the current program as described in Alternative 1. However, this alternative proposes to: 1) combine an ADC livestock protection program with identified needs to protect designated wildlife species as requested by the WGFD and as coordinated with the WGFD, BLM and the Forest Service, 2) protect T&E species as requested by the WGFD and/or USFWS, 3) in addition to the methods described in Alternative 1, provide for the use of M-44s on BLM and National Forest System lands within the analysis area. Such use would not be BLM District or Forest wide, but would be contingent upon agency policy, safety, effectiveness, need and EPA use restrictions, and 4) provide for LPC use on private lands within the analysis area under the current WDA registration. Use of the LPC would follow EPA

registration and WDA requirements, and would be restricted to specially trained and certified ADC employees. 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 proposed predator damage management, including areas to receive damage management, timing of damage management and methods to be used would be selected based on the combined needs of livestock and wildlife resources, rather than just the needs of the livestock resources, mitigated by potential adverse impacts to wildlife. This strategy provides for more of an *ecosystem management* approach for areas where ADC conducts predator damage management. For any specific area of public land, the WGFD would be invited to the Work Plan meeting between ADC and the BLM or Forest Service. All predator damage management would be outlined in ADC Work Plans based on close cooperation and coordination with each BLM District and National Forest. ADC would identify areas where requests for assistance to protect livestock have been received or are anticipated (based on historic loss data). The WGFD or USFWS would identify areas where protection of wildlife may be necessary to achieve their management objectives, and any mitigation necessary to protect other wildlife resources. The land management agency, consistent with existing MOUs, would identify areas where other mitigation is necessary to protect resources under their jurisdiction. A damage management strategy would then be developed based on the combined resources need and mitigation requirements. Maps of each BLM District and National Forest showing the areas where predator damage management could be needed would be developed/updated utilizing information brought forth in the work plan meetings.

3.1.4 Alternative 4 - Non-lethal Control Required Prior to Lethal Control.

This alternative would require requesters to conduct non-lethal damage management before the use of lethal damage management efforts by ADC. Non-lethal methods selected by livestock producers would include livestock husbandry, habitat modification and animal behavior modification methods. Verification of the methods used would be the responsibility of ADC. No standard exists to determine producer diligence in applying these methods, nor are there any standards to determine how many non-lethal applications are necessary before the initiation of lethal controls. Thus, only the presence or absence of non-lethal methods can be evaluated. The mechanical and chemical damage management methods described in Alternatives 1 and 3 would apply, where appropriate, once the criteria for non-lethal damage management have been met. Consideration of wildlife needs would not be included with the producer implemented non-lethal methods, nor would ADC base damage management strategies on the needs of designated wildlife.

3.1.5 Alternative 5 - Corrective Control Only.

This alternative would provide for predator damage management only in places where damage/losses are occurring. Incumbent in this alternative is ADC verification of the loss and the species responsible. Livestock producers would still implement non-lethal methods they determine to be practical and effective. Lethal damage management 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 damage management methods described in Alternatives 1 and 3 would be available, once losses have occurred and are verified.

3.1.6 Alternative 6 - Technical Assistance Only.

Under this alternative, Wyoming ADC would eliminate operational predator damage management in the analysis area. ADC would only provide technical assistance and make 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 WS 11-6-101, 11-6-102, 11-6-105, 13-3-115, and 23-3-114.

This *technical assistance only* alternative would place the immediate burden of operational control on State agencies, individuals and requesters. Individuals experiencing wildlife damage would, independently or with ADC recommendations would carry out and fund control activities. Individual livestock 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 predator damage management.

If this alternative would be selected, ADC could not direct how a State agency or individuals would implement predator damage management. Some agencies or individuals may choose not to take action to resolve predator damage. Other situations may warrant the use of legally available management methods because of public demands, mandates, or individual preference. Methods and control devices could be applied by people with little or no training and experience, and with no professional oversight or monitoring for effectives. 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 nontarget animals. The illegal use of pesticides could increase which would be extremely detrimental to wildlife (Schueler 1993).

3.1.7 Alternative 7 - A Predator Damage Management Program with Only Mechanical Methods (No Use of Chemical Methods).

This alternative would only provide for predator damage management with the mechanical methods described under 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. ADC personnel would conduct predator damage management through the use of leghold and cage traps, neck and foot snares, ground shooting, aerial hunting, denning (without the use of gas cartridges), and using hunting dogs where signed *Agreements for Control on Private Property* are in place, or on Federal lands according to the provisions of ADC Work Plans or other comparable document. For technical assistance requests, cage or leghold traps could be recommended or loaned to the requester for use in resolving problems.

3.2 Predator Damage Management Strategies and Methodologies Used in the Western Wyoming Analysis Area.

Generally, the strategies and methodologies described below are common to Alternatives 1, 3, 4 and 5 of this EA. Under Alternative 1, no M-44 use would occur on BLM lands, nor LPC use on private lands. Alternative 2 would terminate both ADC technical assistance and operational predator damage management by ADC. Under Alternative 6, ADC personnel would only make technical assistance recommendations to requesters. Only mechanical damage management methods would be used under Alternative 7. Alternatives 1, 3, 4, 5, 6 and 7 management strategies would be applied based on practical and legal strategies supported by the ADC Decision Model (USDA 1994).

3.2.1 Integrated Wildlife Damage Management (IWDM)

During more than 80 years of resolving wildlife damage problems, ADC has considered, developed, and used numerous methods of managing damage problems (USDA 1994, P. 2-15). The 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 reduction of damage caused by wildlife based on local problem analyses and the informed judgement of trained personnel. The ADC Program applies IWDM, commonly known as Integrated Pest Management (ADC Directive 2.105), to reduce damage through the ADC Decision Model (Slate et al 1992) discussed on page 3-7.

The philosophy behind IWDM is to implement effective management techniques, in a cost-effective manner while minimizing the potentially harmful effects to the public, 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 techniques), 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[2], consideration is given to the:

- Local environmental conditions
- Potential biological, physical, economic, and social impacts
- Potential legal restrictions
- Species responsible
- Magnitude of the damage
- Geographic extent of damage
- Duration and frequency of the damage
- Status of target and nontarget species, including T&E species
- Prevention of future damage (lethal and nonlethal techniques)

3.2.2 The IWDM Strategies Used in the Analysis Area Consist of:

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

3.2.2.2 Direct Damage Management (assistance conducted or supervised by ADC personnel): Direct damage management assistance is implemented when the problem cannot be resolved through technical assistance and when Cooperative Agreements or Work Plans provide for ADC direct damage management. The initial investigation defines the nature and history of the problem, extent of damage, and the species responsible for the damage. Professional skills of ADC personnel are often required to resolve problems effectively, especially if restricted pesticides are proposed or if the problem is complex, requiring the direct supervision of a wildlife professional. ADC considers the biology and behavior of the damaging species and other factors using the ADC Decision Model (Slate et al 1992). The recommended strategy(ies) may include any combination of preventive and corrective actions that could be implemented by the requester, ADC, or other agency personnel, as appropriate. Two strategies are available:

1. **Preventive Damage Management** is applying wildlife damage management strategies before

[2]The cost of damage management may sometimes be secondary because of overriding environmental, legal, public health and safety, animal welfare, or other concerns.

damage occurs, based on historical problems and data. All nonlethal methodologies, whether applied by ADC or livestock owners, are employed to prevent damage from occurring and therefore fall under this heading. When requested, ADC personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. For example, in areas where substantial lamb or calf depredations have occurred on lambing or calving grounds, ADC may provide information about livestock guarding animals, fencing or other husbandry techniques, or if requested, conduct predator damage management before lambing or calving begins, if appropriate; black bear and mountain lion damage management is conducted on a corrective only basis.

The rationale for conducting preventive damage management to reduce damage differs little in principle from holding controlled hunts for deer or elk in areas where agricultural damage has been a historical 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 in lamb losses 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 (in press) determined that aerial hunting 3 to 6 months before sheep are grazed on an area was cost effective when compared to areas without aerial hunting. Wagner (in press) also determined that in areas where preventative aerial hunting was conducted, that fewer hours of subsequent ground work were required. She concluded that, *"The reduction of device nights as a result of aerial hunting represents a potentially significant reduction in the risk to non-target species because species other than coyotes can fall prey to traps, snares and M-44s."*

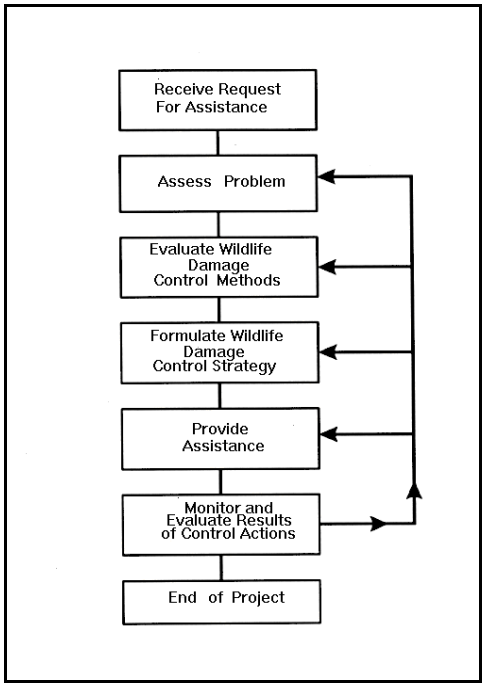
Preventive damage management could take place on private, county and State lands without special authorization. For preventive damage management on Federal lands, historical loss areas are delineated on maps by representatives of the Federal agencies which identify areas where preventive damage management may occur. Management areas and techniques are reviewed during the annual meeting between the appropriate agencies. Maps are available for public review at the appropriate Federal office. In addition, when conducting predator damage management on Federal lands, ADC must receive a request from the individual or livestock owner experiencing the damage.

2. **Corrective Damage Management** Corrective damage management is applying predator damage management to stop or reduce current losses. As requested and appropriate, ADC personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring [3]. For example, in areas where verified and documented lamb depredations are occurring, ADC may provide information about livestock guarding animals, fencing or husbandry techniques, or conduct operational damage management to stop the losses. The U.S. General Accounting Office (GAO) concluded that, according to available research, localized lethal damage management is effective in reducing predator damage (GAO 1990).

3.2.3 ADC Decision Model used for Decision Making

[2] Requesters enter into a *Agreement For Control On Private Property* with ADC, and rely on professional personnel to carry out the wildlife damage management deemed necessary.

The ADC EIS and Slate et al. (1992) describe the decision making procedures used by ADC personnel to determine management strategies or methods applied to specific damage problems (USDA 1994: 2-20 to 31 and Appendix N).



The ADC decision making process is a procedure for evaluating and responding to damage complaints (Figure 1). ADC personnel are frequently contacted **only** after requesters have tried several nonlethal techniques and found them to be inadequate for reducing damage to an acceptable level. ADC personnel evaluate the appropriateness of strategies, and methods are evaluated for 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. The EIS provides detailed examples of how the ADC Decision Model is implemented for coyote predation to sheep on public and private lands (USDA 1994, Appendix N).

On most ranches, predator damage may occur whenever vulnerable livestock are present, because no socially acceptable method or combination of methods that permanently stops or prevents predation are available. When damage continues intermittently over time, ADC personnel and the rancher monitor and reevaluate the situation frequently. If one method or combination of methods fails to stop the damage, a different strategy is implemented.

In terms of the ADC Decision Model (Slate et al 1992), most damage management efforts consist of a continuous feedback loop between receiving the request and monitoring the results with the management strategy reevaluated and revised periodically.

3.2.4 Predator Damage Management Methods Used in the Western Wyoming Analysis Area

3.2.4.1 Livestock Producer Implemented Methods 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 risk, need, and practicality. ADC cooperates with the WDA and the Wyoming Cooperative Extension Service to offer technical assistance to producers on nonlethal methods and provides sources for guard dog procurement. Livestock producer practices recommended by ADC include:

> **Animal husbandry** generally includes modifications in the level of care or attention given to livestock that may vary depending on the age and class of the livestock. Animal husbandry practices include but are not limited to techniques such as livestock guarding dogs, herders, shed lambing, night penning, carcass removal, temporary fencing, 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, clearing brushy or wooded areas in or adjacent to lambing or calving pastures may be appropriate to reduce available cover

for predators. However, aggressive actions of this type might not be allowed on public lands. Further, any habitat modification must be approached with caution. For instance, while clearing brush and trees may reduce predation, it could also reduce habitat for beneficial wildlife or lead to soil erosion.

Animal behavior modification refers to tactics that alter the behavior of wildlife and reduce predation. Animal behavior modification may use scare tactics or fencing to deter or repel animals that cause loss or damage to livestock, apiaries or property [4]. Some but not all devices used to accomplish this are:

- Predator-proof fences
- Electronic guards
- Propane exploders
- Pyrotechnics

3.2.4.2 Mechanical Management Methods:

Mechanical management methods are non-chemical predator damage management methods implemented by either livestock producers, private individuals or Wyoming ADC personnel. The methods consist primarily of tools or devices to repel, capture or kill a particular animal or local population to prevent or reduce resource damage. Mechanical methods may be nonlethal such as barrier fencing, frightening devices such as the siren/strobe device or the propane cannon, or lethal such as the M-44, shooting or neck snares. If ADC personnel apply mechanical damage management methods directly on private lands, an *Agreement for Control on Private Property* must be signed by the landowner or administrator authorizing the use of each damage management method. On Federal lands, damage management would be conducted according to a work plan that identifies areas where and times when damage management requests may be expected, based on livestock use and historic documentation of losses. Federal lands managers are responsible for identifying, in the Work Plan, areas where other multiple use priorities may conflict with predator damage management activities. For technical assistance requests, traps may be recommended or loaned to the requester for resolving problems.

1. **Leghold 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 leg-hold 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 leghold trap's selectivity. An additional advantage is that leghold traps can allow for the release of nontarget animals, and the release or relocation of animals such as wolves.

   Disadvantages include the difficulty of keeping traps operational during rainy, snowy, or freezing weather conditions. In addition, they lack selectivity where nontarget species are of a similar or heavier weight than the target species. The use of leghold traps requires more workforce than some methods, but they are indispensable in resolving some depredation problems.

   In FY 95, 403 coyotes (11% of the analysis area take) and 189 red fox (33% of the analysis area take) were captured in leghold traps.

2. **Cage traps**, typically constructed of wire mesh, are sometimes used or recommended to capture smaller animals such as raccoons or skunks. Larger cage traps constructed of sections of culvert

[4] 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, Conover 1982).

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 more wary species such as coyotes or wolves.

3. **Snares** 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.) and are easier to keep operational during periods of inclement weather than leghold 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 also allow for live capture of neck-snared animals. Wyoming ADC incorporates the use of some *"break-away"* snares that allow larger nontarget animals to break the snare and escape (Phillips 1996).

   Spring-activated foot snares are sometimes used to capture depredating mountain lions or bears. When resolving bear and mountain lion problems, ADC personnel typically use spring-activated foot snares, and culvert or enclosure type cage traps. These techniques allow for chemical immobilization, marking and relocation of animals, or if necessary, euthanasia when the WGFD determines that relocation is not a viable option.

4. **Ground shooting** is highly selective for target species and may involve the use of spotlights, decoy dogs or 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 damage management 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 damage management options available if other factors preclude the setting of equipment. Shooting with rifles or shotguns is used to manage livestock depredation problems and public health and safety hazards when lethal methods are determined appropriate.

5. **Hunting dogs** are essential to the successful tracking and capture of depredating bears and mountain lions to alleviate livestock depredation, or for public health and safety threats. Dogs are also trained and used for coyote damage management to reduce and 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.

6. **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 in Wyoming. 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 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.)

7. **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 from the aircraft. Shooting results in a 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 the cost-effectiveness and efficacy as benefits of aerial hunting for protecting 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 (in press) stated that: 1) aerial hunting may be an especially appropriate tool as it reduces risks to non-target animals, 2) minimizes contact between damage management operations and recreationists, and 3) is an effective method for reducing livestock predation.

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 damage management methods available to ADC in the analysis area. In FY 95, 1692 coyotes (48% of the analysis area take) were taken by this method.

3.2.5 Chemical Management Methods:

All chemicals used by ADC are registered under the FIFRA and administered by the EPA, Wyoming Department of Environmental Quality (DEQ), and WDA Technical Services Division. All analysis area ADC personnel are certified and licensed as commercial pesticide applicators by the WDA Technical Services Division. The WDA requires pesticide applicators to adhere to all certification requirements set forth in the FIFRA. No chemicals are used on Federal, State, or private lands without authorization from the land management agency or property owner/manager (see Mitigation page 3-17 for a more detailed explanation). The chemicals and methods used and/or registered for uses in the analysis area are:

1. **Sodium cyanide** used in the M-44 device. The M-44 spring-activated cyanide ejector device was developed specifically for coyote damage management, is selective to reduce coyote, red fox, gray fox and feral dog predation (EPA Reg. No. 56228-15), and also for protecting T&E species and for certain public health uses (Thomas 1986, Connolly 1988). Sodium cyanide, the active ingredient in M-44s, is used for many purposes in the United States, including agricultural, pharmaceutical, mining, and for industrial dyes. Sodium cyanide is odorless when completely dry, emits an odor when dampened, is strongly alkaline, and rapidly decomposes in the environment. In 1989, about 215 million pounds of sodium cyanide were used in North America (Knudson 1990) of which the ADC Program nationwide used about 0.0001%. In 1995, about 1.69 pounds of sodium cyanide were used in the analysis area. This includes capsules discharged through *test-firing* of units by ADC personnel (MIS 1996).

   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: 269-271).

   The M-44 can be used very effectively during winter months when leghold traps are more difficult to keep functional, and M-44s are typically more selective for target species than leghold traps. They may also be more economical as a damage management 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 only by pulling straight up on it. Dogs are susceptible to M-44s, and discretion would 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.

M-44s would be used for corrective and preventive damage management on private lands where authorized by Agreement for Control and on State and Federal lands where authorized. ADC personnel comply with the EPA label and 26 use restrictions (see USDA 1994, Appendix Q: 9-12), USDA reporting requirements, and reporting requirements of the FIFRA.

In FY 95, 307 coyotes (9% of the analysis area take) and 157 red fox (27% of the analysis area take) were taken with M-44s. Four nontarget animals (2 badgers, 1 free-ranging dog, and 1 striped skunk) were taken in the analysis area during FY 95 by M-44s, representing about 2% of the total M-44 take. Five years of WDA records show that up to 305 M-44 devices are used on a monthly basis by private trappers, and yet only 11 nontarget animals have been taken in that time, six of those being skunks. Most M-44 use occurs on private lands.

BLM Lands: In recognition of APHIS-ADC's role as lead-agency in preparation of predator damage management Work Plans and associated NEPA documents and decisions, BLM currently neither requires nor approves Pesticide Use Permits (PUPs) for ADC initiated M-44 use on BLM administered lands (BLM IM95-135, IB95-214). BLM is responsible, however, for cooperating with ADC in the development and review of Work Plans affecting BLM lands and resources. This to ensure that these plans are consistent with existing RMPs or MFPs, including identification of areas on BLM lands where mitigation or other restrictions may be needed to ensure public safety, appropriate protection of special status species, and land use plan conformance.

National Forest System Lands: Although at present no M-44s are used on National Forest System lands in the analysis area, none of the eight Forest Service LRMPs prohibit their use. Currently, in National Forests in both Forest Service Regions 2 and 4, authorization would have to be procured from a delegated Forest Service Official. For example, in Forest Service Region 2, the Regional Forester has not delegated the authorization for the use of a restricted herbicide, pesticide, or predacide below that level. Should ADC deem the use of M-44s to be practical and necessary, coordination with the appropriate Forest Service unit during preparation of the predator damage management work plan would facilitate this authorization.

For both Forest Service and BLM administered lands, EPA M-44 Use Restriction No. 8 (in the 26 numbered restrictions) has direct applicability. This restriction states: *"The M44 device shall not be used: (1) in areas within national forests or other federal lands set aside for recreational use, (2) in areas where exposure to the public and family pets is probable, (3) in prairie dog towns, or, (4) except for protection of federally designated threatened or endangered species; in national and state parks, national or state monuments, federally designated wilderness areas, and wildlife refuge areas."*

State Lands: Authorization for use on State land would be obtained by contacting the Director of the State Land and Farm Loan Office. Placement of M-44 devices would be subject to the applicator contacting the surface lessee and placement would be left with the lessee, who best knows the land use pattern (WSLI 1996).

2. The **Livestock Protection Collar (LPC),** is registered with the EPA (Reg. No. 56228-22) for producer or ADC use nationwide. Before use in individual states, the registrant must receive

approval from the agency within the state that oversees pesticide usage; ADC has approval to use the LPC from the WDA. Use of the LPC would follow EPA registration and WDA requirements, and is restricted to specially trained and certified ADC employees.

Sodium fluoroacetate (Compound 1080), is the toxicant in the LPC and has been used since World War II. 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. Fluoroacetate 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 canines than to most nontarget species (Atzert 1971, Connolly and Burns 1990). Sodium fluoroacetate is a white powder soluble in water and is very stable in solution; it would only be used in the LPC. Sodium fluoroacetate kills by disrupting the Krebs Cycle, which is the energy producing process for cells. Many EPA imposed restrictions apply to the use of LPC (Connolly 1993).

The individual small and large collars contain 1.1 oz. (30.4 grams) of a 1% solution of sodium fluoroacetate and 99% inert ingredients. The LPC is worn around the neck of lambs, and kills only the animal attacking collared lambs (Connolly et al. 1978, Johnson 1984, Burns et al. 1988). When LPC's are used, lambs or goats are made susceptible to attack to prompt target predators to attack collared animals (Blakesley and McGrew 1984, Scrivner and Wade 1986, Connolly and Burns 1990). LPCs consist of two pouches that are punctured when collared livestock are attacked and bitten on the throat by a predator. Upon puncturing the pouches, the offending animal ingests a small volume of the solution and dies a short time later. In this usage, sodium fluoroacetate has virtually no risk of secondary poisoning (USDA 1994, Appendix P).

3. The **gas cartridge**, comprised of 35% charcoal and 65% sodium nitrate, is registered as a fumigant by the EPA (Reg. No. 56228-21) and is used in conjunction with denning 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 which kills animals in the den. The combination of carbon monoxide exposure and oxygen depletion kills the animals. This technique is used on State, county, private and Federal lands where authorized in the analysis area, where livestock killing can be attributed to food procurement for young (Till and Knowlton 1983, Till 1992). In the analysis area during FY 1994, 106 coyote or red fox dens were fumigated, and in FY 1995, 96 dens were fumigated.

4. **DRC-1339** (3-chloro-4-methylbenenamine hydrochloride) is a slow acting avian toxicant that is rapidly metabolized and/or excreted after ingestion. Because of the rapid metabolism of DRC-1339 in the body, it poses little risk of secondary poisoning to nontarget animals, including avian scavengers (Cunningham et al. 1979, Schafer 1984, 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 1981).

DRC-1339 is registered with the EPA (Reg. No. 56228-29) to reduce raven damage to newborn livestock, or to the eggs or young of wildlife species. DRC-1339 is incorporated into baits where ravens are killing or injuring livestock (Larsen and Dietrich 1970). The feeding habits of the birds are observed before placing any treated baits 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 are found more quickly and easily, thereby reducing the risks to nontarget animals. Selective management would be applied because corvids learn to exploit a readily available food source and will continue to focus on that source until the availability declines.

The only project conducted in Wyoming using DRC 1339 was in the summer of 1996. Five ravens were confirmed killed, but bait consumption indicated that as many as 30 ravens could have been killed.

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

Telazol™ (NADA 106-111), Ketaset™ (NADA 45-290), and Capture-All 5 are the immobilizing agents used by ADC, and are approved by the FDA. Telazol, Ketaset, and Capture-All 5 are rapid acting, non-narcotic, nonbarbiturate injectable anesthetic agents, having a wide margin of safety. All three drugs produce unconsciousness known as "*dissociative*" which in general terms means that reflexes needed to sustain life (breathing, coughing, swallowing, etc.) are not affected by the drugs. These agents are used to immobilize live-captured animals for relocation, or administered before euthanasia. Before using an immobilizing agent, the size, age, temperament, and health of the animal are considered. Immobilizing agents may also be used in tranquilizer darts fired from a aircraft to capture gray wolves. As other drugs are approved by the FDA and ADC, 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. 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, pedal 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 immobilizing the animal 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, could be used by ADC personnel as a euthanizing agent after an animal has been anesthetized (ADC Directive 2.430).

3.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

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

3.3.1 Compensation for Predator Damage Losses

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

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

- It would require larger expenditures of money and personnel 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.

3.3.2 Bounties

Payment of funds for killing predators (bounties) suspected of causing economic losses is not considered effective by the WGFD (J. Lawson, WGFD, pers. comm. 1997). WDA officials have stated that bounties can be a useful tool for population reduction, but that care must be used to ensure safeguards are in place to prevent abuse (R. Micheli, WDA, pers. comm. 1997). This alternative will not be considered by ADC in detail because:

- ADC does not have the authority to establish a bounty program.
- Bounties are generally not as effective in controlling damage because depredating individuals/local populations are not specifically targeted.
- Circumstances surrounding take of animals is completely unregulated.
- No effective process exists to prohibit taking of animals from outside the damage management area for compensation purposes.

3.3.3 Eradication and Suppression

An eradication alternative would direct all ADC program efforts toward planned, total elimination of native predator species.

Eradication of unprotected predators, such as coyotes, is legal in Wyoming under WS 11-6-101, 11-6-102, and WS 23-3-103(a) but not supported by the WGFD, WDA or ADC. This alternative will not be considered by ADC in detail because:

- C ADC opposes eradication of any native wildlife species.
- C WGFD opposes eradication of any native Wyoming wildlife species.
- C WDA opposes eradication of any native Wyoming wildlife species.
- C The eradication of a native species or local population would be extremely difficult if not impossible to accomplish and cost prohibitive.
- C Eradication is not acceptable to most members of the public.

Suppression would direct ADC program efforts toward managed reduction of certain localized populations or groups.

In localized areas where damage can be attributed to predation by specific groups, WGFD has the authority to increase hunting seasons and hunter tag quotas; WDA has the authority to control unprotected predators, such as coyotes. When a large number of requests for wildlife damage management are generated from a localized area, ADC would consider suppression of the local population or groups of the offending species, if appropriate.

It is not realistic, practical, or allowable under present ADC policy to consider large-scale population suppression as the basis of the ADC program. Typically, ADC activities in the analysis area would be conducted on a small portion of the area inhabited by depredation species or the species causing a threat to public health or safety.

3.3.4 The Humane Society of the United States (HSUS) Alternative

The HSUS proposed an alternative that requires: 1) "*permittees evidence sustained and ongoing use of nonlethal/husbandry techniques aimed at preventing or reducing predation prior to receiving the services of the ADC Program*"; 2) "*employees of the ADC 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, in the Northern Utah Predator Damage Management EA (USDA 1996) and through court rulings (U.S. District Court of Utah). The HSUS alternative would not allow for a full range of IWDM techniques to resolve predator damage management problems. In addition, ADC is directed by Congress to protect American agricultural and natural resources, and property despite the cost of damage management. Further, in the Southern Utah Wilderness Society et al. v. Hugh Thompson et al. U.S. Forest Service (U.S. District Court of Utah 1993) the court clearly states 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 an ADC. The alternatives and option 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 ADC.

3.3.5 Provide Economic Incentives for Herd Protection

Providing economic incentives for a herd protection alternative would direct ADC program efforts

and resources toward the verification of herd protection methods and providing monetary compensation to the producers. ADC services would not include direct damage management nor would technical assistance, or nonlethal methods be available.

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

Analysis of this alternative indicates that it has many drawbacks:

- It would require larger expenditures of money and workforce to investigate and validate all protective methods, and to determine and administer appropriate compensation.
- Making prompt responses to all requests to assess and confirm herd protection would be difficult, and 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/compensation 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.

3.3.6 No Wildlife Damage Management within any Wilderness or Proposed Wilderness Area

Under the current and proposed ADC programs (Alternatives 1 and 3), the amount of predator damage management that would occur in WAs 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 management conducted by ADC in WAs or proposed WAs conforms to legislative and policy guidelines as administered by the responsible land management agency. ADC and the land management agency meet annually to review work plans that delineate what, when, and where wildlife damage management would be conducted. Mitigation specific to this issue is listed at the end of Chapter 3.

3.3.7 Transfer the Present Wyoming ADC Program to the WDA

This alternative would transfer the Federally administered Wyoming ADC program to the WDA, and consist of transferring all field and administrative activities including technical assistance and direct control. The conveyance of the Federal responsibility and funding to the WDA could only occur after a U.S. Congressional Directive allowed for such an action. Many other unresolved factors dealing with this alternative also include: 1) personnel and equipment transfers, 2) management and administration of the program, 3) proposed control methodologies, and 4) NEPA responsibilities, etc., under a State managed program. Given the myriad of unknowns surrounding this alternative and the fact that ADC would not be part of such a program, this alternative will not be analyzed further.

3.4Management Techniques Not Considered for Use in the IWDM Strategy

3.4.1 Guarding Animals Other Than Livestock Guarding Dogs

Besides livestock guarding dogs, which are widely used to protect livestock from predators, several other species of animals have been proposed as livestock guardians. Burros, llamas and emus have been advocated for this purpose, but their efficacy and practicality have not been established (Green 1989, Franklin and Powell 1994). Research is continuing in this area, however, at this time ADC does not believe the use of guarding burros, llamas and emus can be

recommended for general use. As research provides proven preventive methodologies, they will be incorporated into the list of recommended guarding animals. To some degree, hazards may exist to wild ungulates 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.

3.4.2 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; Johnson 1984; Burns and Connolly 1980, 1985). In addition, lithium chloride is currently not registered for this use by the EPA or WDA, and therefore cannot legally be used or recommended for this purpose.

3.5 Mitigation and Standard Operating Procedures (SOPs) For Wildlife Damage Management Techniques

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 ADC program, nationwide and in Wyoming, uses many mitigation measures and these are discussed in detail in Chapter 5 of the ADC EIS (USDA 1994). The following mitigation measures apply to some or all of the alternatives, as indicated in the columns. Mitigation measures for Alternatives 2 and 6 are listed together since the mitigation for these alternatives is similar.

Mitigation Measures	1	2/6	3	4	5	7
Activities in Wilderness and Special Management Areas (BLM and National Forest System Lands)						
Wildlife damage management would follow guidelines as specified and agreed upon in ADC Work Plans, or other comparable documents.	X		X	X	X	X
Vehicle access would be limited to the same restrictions as the land management agency.	X		X	X	X	X
Predator damage management would be conducted only with the concurrence of the land management agency.	X		X	X	X	X
Predator damage management would be conducted only when and where a need exists.	X		X	X	X	X
No aerial hunting would be conducted in any WAs unless authorized.	X		X	X	X	X
No toxicants would be used in any WAs or other special management area unless otherwise authorized.	X		X	X	X	X
No preventive control work would be conducted in any WA unless otherwise authorized.	X		X	X	X	X
Should any of BLM's existing WSAs be officially designated as WAs in the future, wildlife damage management would be performed according to						

Mitigation Measures	1	2/6	3	4	5	7
BLM Wilderness Management Policy (BLM 1981) and the designating legislation.	X		X	X	X	X
Animal welfare and humaneness of methods used by ADC						
Research would continue to improve the selectivity and humaneness of management devices and these would be implemented into the Wyoming ADC Program.	X		X	X	X	X
Pan-tension devices are used to reduce the incidence of nontarget animal capture in leghold traps.	X		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 and livestock.)	X		X	X	X	X
Chemical immobilization and euthanasia procedures that do not cause pain are used.	X		X	X	X	X
Traps and snares would be checked at intervals consistent with State of Wyoming regulations.	X		X	X	X	X
Safety concerns regarding ADC's use of toxicants, traps and snares						
All pesticides used by the Wyoming ADC program are registered with the EPA and WDA.	X		X	X	X	X
EPA-approved label directions are followed by ADC employees.	X		X	X	X	X
The ADC Decision Model, designed to identify the most appropriate wildlife damage management strategies and their impacts, is used when planning ADC activities.	X		X	X	X	X
Most use of toxicants would be restricted to private lands.	X		X	X	X	X
ADC employees that use pesticides are trained to use each specific material and are certified to use pesticides under approved certification programs.	X		X	X	X	X
ADC employees who use pesticides participate in continuing education programs to keep abreast of developments and to maintain their certifications.	X		X	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						

Mitigation Measures	1	2/6	3	4	5	7
Forest Transportation Maps, or from Federal, State, or county roads.	X		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 damage management period.	X		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	X	X
No M-44 devices would be used on public land designated bird hunting areas during the regular upland bird hunting seasons.	X		X	X	X	
No traps, snares, or M-44s would be allowed within ¼ 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	X
Concerns about impacts of ADC's activities on T&E species and other species of special concern						
ADC has consulted with the USFWS regarding the Wyoming ADC program and would continue to implement all applicable measures identified by the USFWS to ensure protection of T&E species.	X		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	X
Neck snares would not be used for coyotes, black bears or mountain lions in areas identified by the WGFD as *"occupied by grizzly bears*."	X		X	X	X	X
All leghold traps would be checked at least daily in areas identified by the USFWS as *"occupied gray wolf range*."	X		X	X	X	X
M-44s would not be used in areas identified by USFWS as *"occupied gray wolf range*."	X		X	X	X	X
Only break-away neck snares would be used in *"occupied gray wolf range"* between May and September unless they were set specifically to take a wolf as a target species.	X		X	X	X	X
Only ADC personnel trained in wolf identification would be used as aerial gunners in areas where gray wolves may be encountered.	X		X	X	X	X

Mitigation Measures	1	2/6	3	4	5	7
No leghold traps or snares would be set within 30 feet of any exposed bait or animal carcass (except when attempting to catch bears or mountain lions) to preclude capture of bald eagles or other raptors.	X		X	X	X	X
Leghold traps or snares set near exposed baits to capture bears or mountain lions would incorporate tension devices to preclude capture of bald eagles and other nontarget species.	X		X	X	X	X
ADC personnel would contact public land management agencies to determine bald eagle nest and roost locations in areas where ADC activities are proposed on those public lands.	X		X	X	X	X
If wintering big game are encountered during aerial hunting operations and react to the aircraft, the aircraft would leave the area.	X		X	X	X	X
Bear and mountain lion damage management would be restricted to offending individuals.	X		X	X	X	X
The use of non-lethal methods such as guard dogs, scare devices, llamas, and other methods, would be encouraged when appropriate.	X		X	X	X	X

4.0CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Chapter 4 provides information needed for making informed decisions on the predator damage management, and the issues and affected environment addressed in Chapter 2. The chapter consists of: 1) assesses the consistency of alternatives with existing management plans, 2) analysis of the environmental consequences of each alternative, and 3) an economic analysis of predator damage management in the analysis area.

4.1Alternative Consistency with Forest Service Land and Resource Management Plans (LRMP) and Bureau of Land Management Resource Management Plans (RMP) or Management Framework Plans (MFP).

Before an Alternative could be considered for implementation on National Forest System or BLM lands, it must be consistent with the land management and/or resource management plans. These are termed Land and Resource Management Plans (LRMP) or more commonly *"Forest Plans"* in the Forest Service; on BLM lands, the equivalent documents are called Resource Management Plans (RMP). If the Alternative is consistent with the LRMP or RMP/MFP, no additional action would be necessary by the Forest Service or BLM should that alternative be selected.

If an alternative that is inconsistent with the LRMP or RMP is selected in the decision process, the LRMP or RMP could amend to be consistent with the EA or the alternative(s) could be modified to be consistent. The decision would not be implemented on the Forest or BLM District until the inconsistency is resolved.

The Forest Service and BLM recognize the State wildlife and fish agencies as responsible for the management of wildlife and the Federal land management agencies are responsible for the management of habitat (FSM 2603.2, Federal Land and Policy Management Act). It is Forest Service and BLM policy to allow predator damage management when there is: 1) a threat to public health or safety, or 2) unacceptable damage to T&E animals or plants, other wildlife, livestock or other resources, or public or private property.

The following is a review of the consistency of each Alternative with existing LRMPs and RMPs:

4.1.1 Forest Service LRMPs

4.1.1.1 Ashley National Forest LRMP

Forest direction provides for coordination of the predator damage management. Predator damage management has been conducted since domestic livestock were grazed on lands now within the Ashley National Forest (Forest Service 1990). The Ashley National Forest determined that Alternative 1 or Alternative 3, IWDM with a wide array of tools as needed on an area by area basis, would be consistent with the Land Management Plan and that Alternative 2 would be inconsistent. Ashley National Forest System lands in Wyoming are in special management status, i.e., the Flaming Gorge National Recreation Area. At the time of development of ADC Work Plans, the compatibility of recreational emphasis and appropriate damage management methodology would be emphasized.

4.1.1.2 Big Horn National Forest LRMP

The Big Horn NF has determined that Alternative 2 of this EA (No Control) would not be consistent with the LRMP because of the potential need for predator damage management. The LRMP states objectives for deer and elk populations may be achieved only through the use of predator damage management. The LRMP does not have objectives regarding the number of livestock that would be grazed, though an upper

limit of livestock grazing is stated.

4.1.1.3 Bridger-Teton National Forest LRMPs

The Bridger-Teton NF LRMP recognizes a *"Forest Challenge: Reduce Interference With and Improve Conditions for Livestock Operations."* A goal of *"4.89(c) - Help implement a predator-control program where intolerable losses to livestock are demonstrated"* appears to be compatible with all alternatives except Alternative 2, No Program.

4.1.1.4 Caribou National Forest LRMP

The Caribou NF LRMP recognizes predatory animals as important components of the natural ecosystem, but also considers animal damage control *"a resource management tool to be applied when and where necessary on the depredating animal."* All proposed alternatives reflecting forms of active predator damage management are therefore compatible. The No Program (Alternative 2) proposal would not be consistent with the LRMP.

4.1.1.5 Medicine Bow National Forest LRMPs

The Medicine Bow NF and Thunder Basin National Grassland LRMP reflects a General Direction of Management of Animal Damage. Specific direction to *"prevent or reduce damage"* connotes an active cooperative role with *"other appropriate agencies"* to accomplish this general direction. The only alternative this pro-active direction appears inconsistent with is Alternative 2, No Program.

4.1.1.6 Shoshone National Forest LRMPs

The Shoshone NF LRMP reflects the same language and program emphasis as the Medicine Bow LRMP. Indeed, all the Forest Service Region 2 National Forests have standardized language, Standards and Guidelines, for the most part. Again, only the No Program Alternative is inconsistent and would afford no response/consistency to react to needed control efforts. All National Forest LRMPs also contain language pertaining to the recovery of T&E species. The Shoshone National Forest is involved in participation in the recovery of grizzly bears and gray wolves. This EA has addressed Work Plans, prepared by APHIS-ADC. These work plans when coordinated with individual National Forests will assure that damage management methodologies are consistent with the recovery of such species.

4.1.1.7 Targhee National Forest LRMPs

The Targhee NF Land Management Plan calls for the maintenance of an effective predator damage management program in cooperation with State and Federal agencies having predator control authority and responsibility. The Targhee NF has been asked to make a consistency determination based on this EA and follow appropriate NEPA procedures in making amendments that may be needed to accommodate any changes. The Targhee NF determined that Alternative 1 or Alternative 3, IWDM with a wide array of tools as needed on an area by area basis, would be consistent with the Land Management Plan and that Alternative 2 would be inconsistent.

4.1.1.8 Wasatch-Cache National Forest LRMP

The Wasatch-Cache LRMP is different in that it is customized to areas of the Forest. The Wyoming administered area contains Direction, Standards and Guidelines that promote active damage management where a need for action is discerned. Only Alternative 2, No Program, would appear to be inconsistent.

In summary, all eight National Forest LRMPs reflect or suggest some form of pro-active recognition of

wildlife damage management. A *"No Program"* alternative is not consistent with a recognized *"need for management"* approach.

As all eight LRMPs were accomplished and approved into execution during the early to mid-1980's, their language reflects the policy of Forest Service Manual 2650 (Animal Damage Management) at that time. Since the 1993 Forest Service and APHIS-ADC MOU established a change of roles in NEPA compliance and responsibility for preparing work plans, some language may need adjustment. The May 1995 revision of Forest Service Manual 1650 reflects this change in roles. In many, if not most cases, the LRMPs may have some language that speaks to a *"work plan"* and does not specify the preparer. This could likely remain in place, with the new MOU and new FSM 2650 guiding the preparation of documents to APHIS-ADC. Another item of early to mid-1980's vintage is reference to USFWS, USDI, as the parent agency of ADC. This has changed to USDA. Various National Forests will be unlikely to amend this departmental change in assignment, but will defer such a correction to major revision of their LRMP.

4.1.2 Bureau of Land Management District RMPs

4.1.2.1 Rawlins BLM District RMPs

The implementation of predatory animal damage control within the District is in conformance with the District's land use plans, (i.e., the Lander Resource Management Plan (RMP/FEIS) (BLM 1986, p. 30), the Great Divide Resource Management Plan Record of Decision (BLM 1991, p. 45)). The No Program (Alternative 2) would not be consistent with the RMP.

4.1.2.2 Rock Springs BLM District RMPs/MFPs

The implementation of predatory animal damage management within the Rock Springs District is in conformance with the District's land use plan, (i.e., the Big Sandy Management Framework Plan (1982a), the Salt wells Management Framework Plan (1982b), the Kemmerer Resource Management Plan (1986), and the Pinedale Resource Management Plan (1988a)). In addition, the Salt Wells-Pilot Butte Grazing EIS (1984) and the Big Sandy Grazing EIS (1981b) also provide for predatory animal damage management. Only Alternative 2, No Program, would appear to be inconsistent.

4.1.2.3 Worland BLM District

Planning decisions affecting ADC activities in the Worland District are contained in the Grass Creek MFP (BLM 1983), in the Washakie RMP (BLM 1988b), and in the Cody RMP (BLM 1990). Planning decisions in these documents concerning ADC activities are briefly stated below.

> Grass Creek MFP - *Annually review the Interagency Agreement on ADC to identify changes needed in the control, noncontrol, and restricted damage management areas prior to November 1.*
>
> Washakie RMP - *Protect and enhance important fish and wildlife habitats.*
>
> Cody RMP - *ADC activities will be considered as proposals, are submitted and are subject to established ADC procedures and policies as outlined in the National and state level Memoranda of Understanding (MOUs) between the BLM and APHIS, BLM Manual 6830, and other directives.*

The Worland BLM District determined that Alternative 1 or Alternative 3, fully IWDM with a wide array of tools as needed would be consistent with the RMP, and that Alternative 2 (No Program) would be inconsistent.

4.2Environmental Consequences

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 4-8 (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.

4.2.1 Social and Recreational Concerns: Social and recreational concerns are discussed throughout the document as they relate to issues raised during public involvement, and are discussed throughout USDA (1994). Recreationists and others interested in special management areas, particularly WAs, could consider these activities to be an invasion of solitude and that it could adversely affect the aesthetic quality of the wilderness experience. ADC predator damage management is conducted, and is proposed to continue in the future, only in limited instances, when and where a specific need exists, only when allowed under provisions of the specific wilderness designation, and with the concurrence of the land managing agency. ADC activities in special management areas have historically been, and are expected to continue to be, a minor part of the overall ADC program. Restrictions on activities in WAs and WSAs are listed in Chapter 3 under Mitigation.

4.2.2 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. Analysis of the State *"takes"* during FY93, FY94 and FY95, in combination with other mortality, indicate that cumulative impacts are not significant. It is not anticipated that the proposed action would result in any adverse cumulative impacts to T&E species, or to WSAs or WAs.

4.2.3 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.

4.3 Issues Analyzed in Detail

4.3.1 Cumulative Impacts on the Viability of Wildlife Populations - (Potentials for ADC Take of Predators to Negatively Impact Recreational or Commercial Harvest of Predators.)

The species evaluated in this chapter were selected for analysis because they are taken by ADC in response to livestock, property, wildlife and apiary predation, or public health threat situations. Analysis of this issue will be limited primarily to coyotes, red fox, striped skunks, badgers, raccoons, bobcats, black bears, and mountain lions. Although ADC has not typically targeted ravens for lethal damage management in the analysis area, reduction of raven damage is included as a potential component of the current program and the proposed action, and potential impacts to this species' population are addressed as well.

The WGFD is the state agency responsible for protecting and preserving fish, big game, trophy game, and furbearer populations (WS 23-1-101, 23-1-302). WGFD harvest regulations are subject to public review and comment before they are adopted by the Game and Fish Commission. In a typical year, the WGFD will have several dozen local public meetings and eight major public hearings to discuss harvest regulations. Harvest regulations provide for public recreation and assist in controlling wildlife populations to reduce conflicts with a variety of human land uses.
Due to the biology of trophy game animals and furbearers, and the quotas imposed on harvest of trophy game, it is unlikely that either sport harvest or harvest by ADC personnel to reduce depredations will significantly impact local or statewide population viability. ADC personnel do not take black bears and mountain lions unless the WGFD requests assistance with animals killing livestock, and furbearer harvest by ADC personnel is not large enough to affect population viability (Harju 1996).

The "*Magnitude*" analyses for this EA follow the process described in the ADC EIS in Chapter 4 as outlined in Table 4-2 (USDA 1994) when applicable. Magnitude is defined 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 analysis is used wherever possible as it is more rigorous and is based on allowable harvest levels, population estimates and harvest data when applicable. Qualitative analysis is based on population trends and harvest data or trends and modeling. Allowable harvest levels were determined from research studies which are cited in USDA (1994, Table 4-2) as well as other research not cited in USDA (1994). *"Other Harvest"* includes the known fur harvest, sport harvest, and other information obtained from the WGFD and WDA. *"Total Harvest"* is the sum of the ADC kill and the *"Other Harvest."*

Estimating wildlife densities is not precise, often dynamic and professional judgement is required to account for unknowns and variables, such as the ability of habitat to support populations. Therefore, when assessments are used, they are based on conservative population estimates rather than higher population estimates to better insure that no adverse wildlife population impacts occur.

4.3.1.1 Alternative 1 - Continue the Current District Program: (No Action).

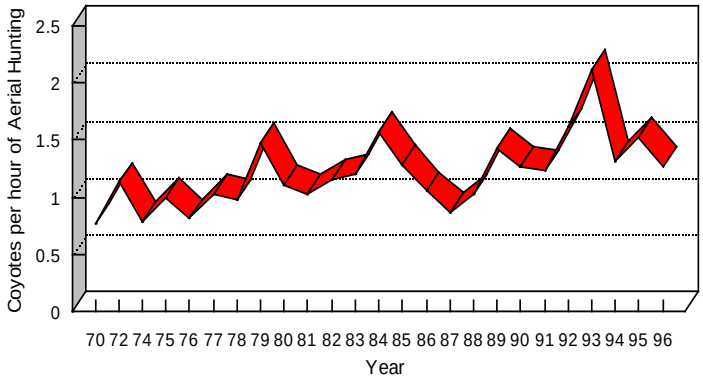
Coyotes typically are responsible for the largest portion of predation losses inflicted on livestock producers in the analysis area. During the 3-year period of 1993-1995, for example, an average of 72.7% of the predator-caused losses to sheep and lambs in Wyoming were caused by coyotes (WAS 1996). Most of ADC's predator damage management efforts are therefore directed at coyotes, and ADC takes more coyotes than any other predator species. Coyotes are responsible for about 89% of the verified and 74.6% of the reported analysis area dollar losses. ADC County Summary Reports (MIS 1995) indicate that the coyote is reported to be the primary predator on sheep (95.6%), lambs (87.8%), cattle (100%), calves (91.9%), and poultry (28%). The total ADC verified loss to coyotes in the analysis area during FY 95 was valued at $276,110 (MIS 1995).

Coyote Population Information

To discuss the impacts of various environmental constraints and external factors on coyote populations and density, it is essential to understand the basic mechanisms that play a role in the coyotes' response to constraints and actions. The species unique resilience, its ability to adapt, and its perseverance under adverse conditions is commonly recognized among biologists and rangeland managers.

Absolute coyote population density determinations are frequently limited to educated guesses (Knowlton 1972), and the cost of studies to accurately determine absolute coyote densities over large areas would be prohibitive (Connolly 1992b) and would not be warranted for this EA given the coyote's relative abundance. 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), and the literature on coyote spatial organization is confusing (Windberg and Knowlton 1988, Messier and Barrette 1982). 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 management 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. Coyote home ranges may vary from 2.0 mi^2 to 21.3 mi^2 (Andelt and Gipson 1979, Gese et al.1988[5]). Gese et al. (1988) reported that resident annual coyote home ranges averaged: canyon - 2.1 mi^2, hill - 2.5 mi^2, pinyon-juniper-prairie - 4.2 mi^2, and prairie habitats - 6.3 mi^2. Ozoga and Harger (1966), Edwards (1975), and Danner (1976) however, observed a wide overlap between coyote home range and did not consider coyotes territorial. For purposes of this analysis, data on ADC's take of coyotes per hour of aerial hunting effort was assembled from historical program records (Figure 4-1). Minor year-to-year variation in the 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).

Figure 4-1. Aerial Hunting Index for Wyoming Coyote Populations
1970-1996



The 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 and the data suggests that Wyoming coyote densities are higher today than they were back in the '70s, '80s and early '90s (Figure 4-1).

The presence of unusual food concentrations and non-breeding helpers at the den can influence territoriality and coyote densities, and complicate any effort to estimate abundance (Danner and Smith 1980, Shivik et al. 1996). A positive relationship was established between coyotes densities in mid-late winter and the availability of dead livestock (Roy and Dorrance 1985). Each occupied coyote territory may also contain several non-breeding helpers at the den during whelping (Allen, et al. 1987, Bekoff and

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

Wells 1982). Therefore, each defended coyote territory may have more than just a pair of coyotes. Messier and Barrette (1982) reported that during November through April, 35% of the coyotes were in groups of three to five animals and Gese et al. (1988) reported that coyote groups of 2, 3, 4, and 5 comprised 40%, 37%, 10% and 6% of the resident population, respectively. In addition, Shivik et al. (1996) observed nonresident coyotes crossing other coyote territories, apparently without aggressiveness directed at the nonresident coyote.

Based on the information cited above, coyote densities for purposes of this analysis will be estimated conservatively at $0.6/mi^2$ throughout the analysis area. The analysis area would then hold an estimated coyote population of about 33,750.

	Analysis Area	Wyoming
Est. Pop.	33750	58748
ADC Kill	3092	5565
Other Take	5541	10865
Total Take	8633	16430
ADC Kill -% of Population	9.2	9.5
Other Take-% of Population	16.4	18.5
Total Take - % of Population	25.6	28

Coyote Population Impact Analysis

Data will be used to examine State and analysis area potential impacts on coyote populations. It should also be noted that the level of *"Other Take"* reported to WGFD may be low because the reporting of coyotes killed is not required. During 1994-95, ADC took an average 3,092 coyotes annually in the analysis area, or about 9% of the estimated population (Table 4-3). Numbers of coyotes taken by private trappers are only available on a statewide basis. However, survey data collected by WGFD during the 1995-96 fur season suggests that about 46% of the statewide take occurred in the analysis area. For purposes of this analysis we will assume about 46% of the animals taken by private trappers were taken in the analysis area. The average annual private trapper harvest in the analysis area over the 1993-1994 and 1994-1995 seasons has been about 1,489 coyotes, and the average annual private aerial hunting take of coyotes from 1994 and 1995 has been about 2,573 coyotes. 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 8,633 coyotes in the analysis area, or about 26% of the estimated population. Although coyote densities in localized areas may be temporarily reduced through ADC's damage management actions, reproduction and immigration of coyotes from surrounding areas eventually repopulates these areas (Windberg and Knowlton 1988). Henke (1992) noted that in his study area, coyote density returned to pre-removal levels within 3 months following removal efforts.

A population model developed by Connolly and Longhurst (1975), and revisited by Connolly (1995), suggested that coyotes can 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 26% of the coyote population in the analysis area would result in cumulative impacts of a *low magnitude*. This conclusion is consistent with the GAO (1990) assessment regarding ADC's impacts on coyote populations in the western U.S.

Red Fox Population Information

Red fox predation in the analysis area is confined to lambs and poultry. Verified and reported damage was about $4560 and $3750 in 1994 and 1995, respectively. Additionally, red fox predation on nesting waterfowl and nesting and winter concentrations of pheasants are sometimes of concern to the WGFD.

Red fox are the most common and well-known species in the genus *Vulpes* and are the most widely

distributed nonspecific predator 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, Richards 1974, 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 25 years. Investigations have revealed that red foxes are extremely adaptive with much diversity in their behavior and habitats. Voigt and Earle (1983), Sargeant et al.(1987), and Gese et al. (1996) 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 is capable of withstanding 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, 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 suggest 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 more than 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.
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 states that habitat destruction that reduces prey numbers, water and cover will impact fox populations to a greater extent than a short-term over harvest.

Fox populations in western Wyoming appear to be stable (WGFD 1995). Concerns however, have been expressed by sportsmen and legislators that high red fox populations may be having a detrimental impact on game bird populations. While red fox populations are usually higher in cultivated areas and river valleys, ADC personnel routinely observe red fox in every habitat in western Wyoming, from high mountains to open desert. For purposes of this analysis, we will conservatively estimate red fox densities at 1.0/mi^2 on 50% of the analysis area. This would equate to a total population in the analysis area of about 28,125 red fox.

Red Fox Population Impact Analysis

ADC removed 714 and 575 red fox in the analysis area in 1994 and 1995, respectively, (Table 4-4). The WGFD reported an estimated 7,730 and 4,526 red foxes harvested by fur trappers Statewide in 1994 and 1995, respectively, (WGFD 1995). An unknown number of red fox were harvested by sport hunters, however, for purposes of this analysis we will assume that number equals the number taken by fur trappers. Survey data collected by WGFD suggest that about 58% of red fox were taken in the analysis area. The total average known take of red fox in the analysis area was about 4,484 and 2,625 animals in 1994 and 1995, respectively. The total estimated cumulative annual take would be about 9,682 and 5,825 animals in 1994 and 1995, respectively or 34.4% and 11.8% of the population, respectively.

The allowable harvest level cited for red fox (USDA 1994, Chap. 4, p.12) is 70% of the total population. The data for 1994 and 1995 suggest that the ADC kill in the analysis area was about 2.5% and 2% of the estimated population. The total estimated take was about 34.4% and 11.8% of the total estimated

population. Because this harvest level is well below 70%, the magnitude of impact is determined to be low.

Black Bear Population Information

The 1994 and 1995 ADC verified black bear predation in the analysis area included 80 sheep, 86 lambs and 7 calves valued at $17,605 (MIS 1994-95).

Black bears have a wide but patchy distribution in the United States. They can be found throughout the Rocky and West Coast Mountain ranges and can occur throughout Wyoming but are more common in forests, swamps, dense thickets and mountainous areas in the northwestern part of the State. Bears can also be found in croplands, forest plantations and orchards where they may cause damage. Bears also present problems concerning livestock predation, property damage, and threats to public safety and nuisance situations in the analysis area. Wyoming Statutes currently provide monetary compensation for damage to livestock caused by black bears (WS 23-1-901) and allow a property owner, employees of the owner, or lessee to immediately kill any bear doing damage to private property (WS 23-3-115) (WGFD 1994).

Table 4-4. Western Analysis Area Known Red Fox Harvest Data
Allowable Harvest = 70%

1994	Analysis area	Wyoming
Est. Pop.	28,125	49,000
ADC take	714	1,102
Other take	4,484	7,730
Total take	5,198	8,832
ADC Kill % of Pop.	2.5%	2.2%
Other take % of Pop.	15.9%	14.8%
Total take % of Pop.	18.4%	17.0%
1995		
ADC take	575	772
Other take	2,625	4,526
Total take	3,200	5,298
ADC Kill % of Pop.	2.0%	1.6%
Other take % of Pop.	11.4%	9.2%
Total take % of Pop.	13.4%	10.8%

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 over exploited, the older aged bears would not be present in the population or in low proportions. Black bears can live up to 25 years (USDA 1994) and have densities between 0.3 and 3.4/mi^2, depending on habitat.

Female black bears generally reach reproductive maturity at about 3½ years of age (Kohn 1982). In Montana, female black bears generally reach reproductive maturity at about 4½ years of age but may not breed successfully until 6 or 7 years of age and produce a litter in three year intervals (MFWP 1994). In Idaho, female black bears generally reach reproductive maturity at 4 years of age. Following a 7-8 month gestation period (about 220 days), black bear can produce from one to five cubs, with two young per litter being most common (Rogers 1976, Alt 1981, Kolenosky and Strathearn 1987); in Idaho 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%), with 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 1992). Researchers have estimated total adult mortality of black bears between 15% and 27% annually. Fraser et al. (1982) determined natural mortality in adult bears in his study area to be about 10 to 20%. Their (1990) recorded an annual mortality rate of 25%, and Jonkel and McT. Cowan (1971) estimated natural

mortality rates for adults at 14%. Juvenile black bear annual mortality ranges from 20% to 70%, with orphaned cubs having the highest mortality (Kolenosky and Strathearn 1987); natural mortality of cubs is difficult to document but has been found to vary from 12% to 48% annually (MFWP 1994). Mortality in subadult black bears in northwestern Montana has been reported to be 36.8% (Their 1990).

Black bear movements and densities reflect the scattered nature of important food sources and can be as high as 3.4 bear/mi^2, depending on the quality of habitat. The highest quality black bear foods are typically products of lush vegetative habitats, often productive riparian lands (Schoen 1990), a factor contributing to conflicts with humans and other land uses (MFWP 1994). Black bear densities of at least 1.0/mi^2 have been documented in the states of Washington, California and Idaho (ODFW 1993). The current Wyoming statewide population is not known. Much of the analysis area lays within the medium to high density black bear habitats of Wyoming, with about half the analysis area in high density mountainous area in the Rockies.

Black Bear Population Impact Analysis

ADC did not take any black bears in 1994. In 1995, ADC Specialists killed two bear within the analysis area for protection of livestock. In 1994 and 1995, sport harvest and other take of black bear was 200 and 141, respectively (WGFD, Harvest Data, 1996b). ADC's take represented less than 1% of the average take over two years.

In specific areas with chronic or significant livestock losses from black or grizzly bears and mountain lions, damage management of offending individual animals may be necessary. These actions would be undertaken by ADC only after coordination with the WGFD. The WGFD Large Predator Coordinator in Lander, Wyoming would be provided information on the harvested animal(s) and the circumstances of each damage management action so this harvest could be included in the WGFD's harvest records for this species.

All bear damage management undertaken by ADC in Wyoming is in full cooperation with, and at the request and direction of the WGFD. As the entity with management authority over black bear in Wyoming, the WGFD is in the best position to determine whether damage management actions would have significant adverse impacts on the overall population.

The allowable harvest (kill) level for black bear described in USDA (1994, Table 4-2) is 20% of the population. WGFD (1994) uses sex ratios and age structure to evaluate harvest impacts to black bear populations. Current black bear harvest, whether by hunting, WGFD, ADC, livestock producers or other causes, is not causing a decline in bear populations, and black bear populations in Wyoming appear to be stable (D. Moody, WGFD 1996 pers. comm.).

ADC and WGFD damage management efforts are considered quite important by WGFD in resolving black bear damage, protecting public safety and to meeting WGFD black bear damage goals. The stable population trend appears unchanged and the 1994 and 1995 ADC kill and *"Other Take"* would be a *low magnitude* of impact.

Mountain Lion Population Information

In 1995, more than 98% of all mountain lion predation reported to and verified by ADC in the analysis area was on livestock (sheep). The total reported loss to mountain lions in the analysis area was valued at $8,150 (MIS 1995).

Mountain lions have an extensive distribution across North America, including Wyoming. 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 closely related 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 mountain lions is why their densities do not reach levels observed in a number of other wildlife species.

A change in the mountain lion age structure and hunter effort expended to harvest are measures of mountain lion density and the health of the population (WGFD 1996c). 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). In Wyoming, mountain lion harvest rates have been increasing with 85 lions taken in 1992, 106 in 1993 and 124 in 1994. Analysis of harvest data suggests that mountain lion populations are increasing throughout Wyoming.

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 in the USDA (1994) is 30% of the population.

Mountain lions are managed as trophy game animals in Wyoming by the WGFD with the 1993-1995 average annual sport harvest in Wyoming about 105 animals; any ADC mountain lion would be closely coordinated with the WGFD. ADC did not take any mountain lions, target or nontarget, during FY 1993 through 1995. This data indicates that ADC is not having any impact on the mountain lion population in the analysis area.

Bobcat Population Information

Bobcat predation on livestock in the analysis area is primarily on lambs and poultry. The 1994 and 1995, ADC verified bobcat predation accounted for two sheep, two lambs and four head of poultry valued at $405.

Bobcats reach reproductive maturity at 9 to 12 months of age and may have from 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 has been as high as 47% (Rolley 1985). Analysis of Wyoming bobcat harvest data suggests that populations are healthy and productive, and that current harvest levels are not detrimental to bobcat populations (WGFD 1995). Knick (1990) estimated that bobcat densities on his

study area in southeastern Idaho ranged from 0.35/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 0.14/mi^2.

Bobcat Population Impact Analysis

The WGFD reported an estimated Statewide bobcat harvest of 687 in 1993 and 489 in 1994. Of this total, about 58% (341 bobcats) were probably taken within the analysis area (WGFD 1995). ADC killed two bobcats in the analysis area in 1994 and six in 1995, one and three of which were nontarget animals, respectively. ADC also freed two other nontarget bobcats in 1994. The ADC average take is about 0.1% of the estimated population. The allowable harvest for bobcats cited in USDA (1994) is 20% of the total population. The WGFD manages bobcats as furbearers and monitors the harvest to maintain the health and viability of the population, and the ADC take is a low magnitude of impact.

Raccoon Population Information

Raccoon damage in the analysis area is confined primarily to poultry and food stocks. In 1995, all ADC verified raccoon depredation involved vegetable foods and livestock feed.

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 western Wyoming, but the WGFD believes that current populations are stable to increasing (WGFD 1995).

Raccoon Population Impact Analysis

In 1994, raccoon harvests for Wyoming totaled about 1,202 animals. About 689 (57%) of these were harvested within the analysis area (WGFD 1995). ADC killed a total of 71 raccoons in the analysis area in FY 95, 23 of which were nontargets.

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

Badger damage within the analysis area ranges from damage to pasture and agricultural lands to losses of equipment and livestock. During 1995, ADC verified no damage specifically attributable to badgers. ADC occasionally takes badgers as a target species, but they are more often captured as a nontarget species when attempting to capture coyotes in leghold traps. The badger is classified as a furbearer within Wyoming and managed by the WGFD but there is no closed season.

Badgers are members of the *Mustelidae* family. The badger is a large broad bodied animal with strong

legs and long claws adapted for digging. Male badgers average 19 lb. and females average 14 lb. (Hegdal and Harbour 1991). Badgers are inhabitants of grassland communities, but can also be found inhabiting forest edges. Badgers are opportunistic feeders preying on a wide variety of birds, mammals, eggs, reptiles, amphibians, invertebrates, and even plant materials (Long and Killingley 1983).

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.

Badger Population Impact Analysis

Badger populations can safely sustain a harvest rate of 30-40% annually (Boddicker 1980). The WGFD reported an estimated 383 badgers taken by private trappers Statewide during the 1994/95 season. An estimated 218 badgers, or 57% of the Statewide harvest was estimated to have occurred within the analysis area (WGFD 1995). ADC removed a total of 14 badgers in the analysis area during FY 95, 11 of which were nontarget animals. An additional nine nontarget badgers were released. The combined private trapping harvest and ADC harvest of badgers within the analysis area was about 232 badgers in 1995. The WGFD believes that badger populations in Wyoming are stable (WGFD 1995), therefore cumulative impacts are of the low magnitude.

Striped Skunk Population Information

Skunks primarily cause odor problems around homes, transmit diseases such as rabies and distemper to humans and domestic animals, and prey on poultry.

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, no well-defined land type can be classified as skunk habitat (Rosatte 1987). Striped skunks can live 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 for striped skunks in rural areas averaged between 0.85 to 1.9/mi^2 (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 Wyoming are not available.

Striped Skunk Population Impact Analysis

Skunk populations can reportedly sustain a 60% annual harvest level indefinitely (Boddicker 1980). Fur harvest data indicates that during the 1994/95 season, 1,040 skunks were taken by trappers Statewide (WGFD 1995). During 1995, ADC personnel killed eight skunks in the analysis area, six of which were nontarget animals. It is unknown what percentage of the Statewide fur harvest occurred in the analysis area. Because the ADC harvest is very low when compared to the other harvest level, ADC cumulative impacts are of the low magnitude.

Raven Populations and Impact Analysis

The common raven, American crow (*C. brachyrhynchos*), and black billed magpie (*Pica pica*) are the

most well known species in the family *Corvidae*. The common raven is widely distributed throughout the Holarctic Regions of the world including Europe, Asia, North America and extends well into Central America (Goodwin 1986). Ravens generally are a resident species but some wandering and local migration occurs with immature and non-breeding birds (Goodwin 1986). Immature birds, which have left their parents, form flocks with non-breeding adults; these flocks tend to roam and are loose-knit and straggling (Goodwin 1986). The raven is an omnivorous species known to feed on carrion, crops, eggs, birds, small mammals, amphibians, reptiles, fish and insects (Nelson 1934). Larsen and Dietrich (1970) reported that ravens are sometimes responsible for lamb mortality on spring lambing ranges. In the analysis area during FY 95, cooperators reported a total of 238 lambs valued at $17,500 killed by ravens. ADC verified raven predation on 18 lambs valued at $1,460. Although ADC has not typically targeted ravens for lethal damage management in the analysis area, limited raven damage management was conducted with DRC-1339 in 1996 to alleviate predation on newborn lambs.

Knight and Call (1981) summarized a number of studies on raven territories and home ranges in the western United States. Nesting territories ranged in size from 3.62mi^2 to 15.7mi^2 in Wyoming and Oregon and home ranges varied from 2.53mi^2 to 3-6mi^2 in Utah and Oregon. Linz et al. (1990) found nest densities of 1.7/mi^2 in their Camp Pendleton, California study. Raven home ranges overlap considerably and it is believed that a reasonable density estimate of breeding birds in the analysis area is one raven/3 mi^2, resulting in a population estimate of 18,750 birds. Information on actual raven densities in the analysis area is not available, but population trend information is available from two different sources. Breeding Bird Survey data maintained by the USFWS, and National Audubon Society Christmas Bird Count data both suggest that raven populations in Wyoming are increasing. Christmas Bird Count data (1966-1995) shows a trend of raven numbers increasing at about 4.9% annually and abundant in Wyoming. If current raven densities in the analysis area were conservatively estimated at about one raven/15mi^2, there would be an estimated minimum population of about 1,250 ravens in the analysis area. If raven populations are increasing at an annual rate of 4.9%, then about 61 ravens could presumably be removed from the population annually without reducing the current population level. ADC has removed, at most, 30 ravens during predator damage management operations in the analysis area during the 1993-1996 period. The figures cited above suggest that if necessary, ADC could remove as many as 61 ravens annually without having an impact on the overall raven population in the analysis area.

4.3.1.2 Alternative 2 - No Federal Predator Damage Management in the Analysis Area, and Alternative 6 - Technical Assistance Only:

Because neither of these alternatives would provide for any operational ADC activities, there would be no ADC impacts on the viability of any wildlife populations. There would likely be increased impacts on some wildlife populations, particularly coyotes from other sources addressing 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 ADC's current program results in a low magnitude of impact on the viability of wildlife populations, it is believed that other compensatory forms of wildlife damage management could result in different impacts, particularly to nontarget species.

4.3.1.3 Alternative 3 - Fully Integrated Wildlife Damage Management (IWDM) for Multiple Resources and Land Classes (Proposed Action):

The M-44 and LPC are selective for the target species and individual, and would not substantially increase the number of coyotes removed because of depredation problems. Predator damage management Work Plans on BLM and National Forest System lands would restrict the areas where the M-44 would be used and when they would be used; LPCs would not be used on public lands. The total take of coyotes could increase slightly but the nontarget species would decrease slightly. These changes would not be enough to appreciably change the impacts as assessed under Alternative 1.

4.3.1.4 Alternative 4 - Non-lethal Control Required Prior to Lethal Control:

As noted throughout the document, Alternative 4 is similar to the existing program because so many livestock producers utilize non-lethal methodology on a voluntary basis. The viability of wildlife populations under Alternative 4 would not be substantially different from Alternative 1.

4.3.1.5 Alternative 5 - Corrective Control Only:

The total number of coyotes taken by ADC could decrease under this alternative, and ADC impacts to coyote populations could be reduced to some degree. But because ADC's current take of coyotes results in a low magnitude of impact, the impacts to coyote populations resulting from implementation of a "*corrective control only*" alternative would not 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.

4.3.1.7 Alternative 7 - Predator Damage Management with Only Mechanical Methods (No Use of Chemicals):

Alternative 7 would not allow for use of M-44s, the gas cartridge, the LPC, DRC-1339 or immobilizing or euthanizing chemicals in predator damage management operations within the analysis area. While these methods are at times important in resolving specific damage problems, the overall numbers of animals taken by these methods would be low in comparison to the take of animals by mechanical methods such as aerial hunting. Use of other methods would likely increase to compensate for the loss of chemical damage management methods. While this would result in decreased cost-effectiveness and reduced effectiveness in resolving some predation problems, it would not likely result in any increased impacts to predator populations that differed significantly from the impacts of the current program.

4.3.2 Effectiveness and selectivity of damage management methods.

Chapter 3 includes discussions about the relative effectiveness and selectivity of various methods used by Wyoming ADC and that discussion will not be repeated here. Under the current program, all methods are used as selectively and effectively as practically possible, in conformance with the ADC Decision Model (Slate et al. 1992) and ADC Program Directives. The selectivity of each method is based, in part, on the application of the method, skill of the ADC personnel, and the direction provided by ADC Directives and policies. The humaneness of each method is based on the perception of 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 effectiveness of each alternative are based on the methods employed under that alternative. ADC personnel are trained in the use of each method and certified by the WDA as pesticide applicators for each pesticide and certified by ADC to use immobilizing or euthanizing chemicals 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 damage management tools to most effectively resolve predator damage problems.

4.3.2.1 Alternative 1 - Current Analysis Area ADC 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 capture some nontarget animals, but these animals can typically be released unharmed. DRC-1339, for reducing raven damage, 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 chemical's low toxicity to mammals (DeCino et al. 1966, Schafer 1981). Immobilizing and euthanizing chemicals are 100% selective, not only for the target species but for the target individual.

While the methods discussed above are nearly 100% selective in killing only the target species, other methods such as leghold traps and snares are somewhat less selective. Table 4-5 shows the FY 94-95 cumulative number of target and nontarget animals captured and killed in the analysis area by these methods, and their selectivity expressed as an average percent of target animals taken by each method.

ADC's use of leghold 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 area that each ADC Specialist is responsible for and the number of requests for assistance is such that ADC personnel are typically not able to monitor traps every day. ADC's trap-checking interval is more often closer to the 72-hour limit imposed by State statute than it is to every 24 hours. ADC uses leghold traps with offset jaws to reduce injuries, and ADC's use of pan-tension devices make leghold traps much more selective. Pan-tension devices increase the weight required to set off the trap, and are successful in significantly reducing the incidence of capturing smaller nontarget species (Turkowski et al. 1984, Phillips and Gruver 1996). Pan-tension devices are always used by ADC unless their use would preclude capture of the intended target species. ADC personnel often try to reduce the need for setting traps or snares by first trying to remove problem animals by shooting. If shooting is unsuccessful or not feasible, then equipment must be set to try to resolve the problem. Nontarget animals captured in traps or snares are released whenever it is judged that they would survive.

As used by ADC in the analysis area, snares are slightly less selective for target species than leghold 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. Break-away snares locks are used to provide for the release of larger animals that would be accidentally caught.

Use of livestock guarding dogs by sheep producers has been effective in preventing at least some predation losses (Green and Woodruff 1987), and use of guard dogs is generally perceived as a selective form of non-lethal 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 ADC field personnel and livestock producers suggest 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

Table 4-5. Selectivity of Leghold Traps, Snares and M-44s by ADC Personnel in the Analysis Area (FY 1994-95)

	Traps[1]	Snares[1,2]	M-44s [3]
Targets			
Badger	3	1	
Beaver	0	1	
Black Bear	0	1	
Bobcat	2	1	
Coyote	644	602	648
Red Fox	418	325	371
Raccoon	82	24	
Skunk	40	4	
Porcupine	0	8	
2-Year Total	1,189	967	1,019
Nontargets			
Badger	8	7	2
Bobcat	3	1	0
Feral Cat	0	1	0
	0	5	0
Deer(Mule)	0	0	1
Feral Dog	5	11	1
Red Fox	2	9	0
Porcupine	21	30	0
Raccoon	20	9	1
Skunk			
2-Year Total	59	73	5
% Selectivity	95.2	92.9	99.5

[1] These figures refer only to the lethal take of animals caught in leghold traps and snares.
2 These figures refer primarily to animals caught in neck snares, but also include bears caught in foot snares.
3 Seven red fox were taken as unintentional targets but are considered a target species on the label.

(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.

Animals that are captured are euthanized, or in the case of a nontarget animal, released if judged capable of surviving. Target to nontarget capture rates for less skilled trappers, or trappers that do not use pan-tension devices contribute to the perception that leghold traps are not selective. However, because of their skill, mitigation measures, and ADC trapping policy restrictions, traps are selective as used by ADC Specialists. In FY94 and FY95 combined, 1275 animals were captured of which only 86 were nontarget. Of the nontarget animals captured, 27 were released while 59 were euthanized. Nontarget animals killed, therefore, represent less than 5% of the total animals taken by ADC with traps.

Use of dogs can be highly selective, not only for the offending species but for offending individuals. Dogs are moderately expensive to use due to expenses required for feeding and maintaining the dogs, but they can be utilized in several ways which increases predator damage management effectiveness.

Denning is the practice of finding the den of the offending species and asphyxiating the young with a gas cartridge that produces carbon monoxide when ignited. Denning is very selective and effective for reducing predator losses because positive identification of the species is possible (Till and Knowlton 1983, Till 1992).

The current program uses the preceding methods to manage predator damage in the analysis area. Non-capture methods (aerial hunting, call and shoot, shooting, denning, M-44s and dogs) accounted for 5469 target animals taken in the analysis area, or 72% of the target animals taken in FY94 and FY95 (MIS 1994, MIS 1995). Capture methods (leghold traps, cage traps and neck snares) accounted for 2156 target animal captures, or 28% of the target animal captures taken in FY94 and FY95 (MIS 1994, MIS 1995).

Aerial hunting, call and shoot, shooting, dogs, and denning by skilled ADC Specialists are extremely selective methods: no nontargets were taken by these methods in FY94 and FY95 while 58% of the target animals were taken by these four methods combined.

4.3.2.2 Alternative 2 - No Federal Predator Damage Management in the Analysis Area, and Alternative 6 - Technical Assistance Only:

Under both Alternative 2 and Alternative 6, no Federal operational predator damage management would exist, therefore no methods would be employed by ADC personnel and selectivity and effectiveness of methods used by ADC would not be an issue. Livestock producers, or State and local agencies would likely conduct predator damage management and possibly the use of methods under these programs would be less selective due to lack of training, experience, adequate time to devote to damage problems, and less regulated. Illegal use of pesticides could occur, along with indiscriminant trapping. State law currently provides that red fox and coyotes may be taken by livestock producers without a license or season restrictions. Further, livestock producers or their employees may take a mountain lion or bear which has killed livestock. Without the Federal ADC program, producer implemented non-lethal methods would likely decrease, as producers focus their attention on lethal methods.

4.3.2.3 Alternative 3 - Fully Integrated Wildlife Damage Management (IWDM) for Multiple Resources and Land Classes (Proposed Action):

Alternative 3 would be considered more selective and effective than Alternative 1, owing to increases in M-44 and LPC use, and a decrease in the reliance on leghold traps and snares. M-44 devices could not be used for the protection of wildlife other than T&E species, and LPC's would only be used to protect

livestock on private lands. Methods and restrictions for reducing black bear and mountain lion damage would not change. Producer implemented non-lethal control methods would remain the same. The shift in methods would result in an increase in selectivity and effectiveness over Alternative 1.

4.3.2.4 Alternative 4 - Non-lethal Control Required Prior to Lethal Control:
As noted throughout the document, Alternative 4 is similar to the existing program because so many livestock producers utilize non-lethal methodology on a voluntary basis. Selectivity would not be substantially different from Alternative 1. Livestock losses under Alternative 4 would be likely to increase somewhat, because ADC response would be postponed or denied to those livestock producers who, for whatever reason, choose not to employ non-lethal methods.

4.3.2.5 Alternative 5 - Corrective Control Only:

Under Alternative 5, ADC would still be able to respond with all the methods included under Alternative 1 or 3, but would not be authorized to employ any of these methods under a lethal preventive damage management strategy. Selectivity of methods would be similar to Alternative 1 or 3, but ADC would be less effective at reducing livestock losses. By restricting corrective control to the immediate vicinity of predation losses, ADC 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. Shivik et al. (1996), by using radio-telemetry, documented that coyotes would travel up to seven kilometers, and through other coyote territories, to kill lambs.

ADC would likely be less effective at reducing coyote predation on spring and summer livestock grazing areas. Decreased effectiveness is tied to the logistics of getting to these areas and having to use less effective coyote damage management methods during certain months. Till and Knowlton (1983) noted that the coyotes most likely to kill sheep are the ones raising pups. Gantz (1990) suggested that late winter aerial hunting of coyotes on summer sheep grazing allotments removes coyotes that otherwise likely would have produced pups. By conducting preventive damage management in late winter or early spring, the likelihood of transient coyotes reoccupying and establishing their own territories in time to produce pups is reduced. Gantz (1990) concluded that late winter aerial hunting of coyotes on summer sheep range was an effective method to reduce coyote predation. Wagner (in press) determined that aerial hunting 3 to 6 months before sheep are grazed on an area was cost effective when compared to areas without aerial hunting. Wagner concluded that preventive aerial hunting reduced the number of traps, snares, and M-44s needed in the field to reduce predation and therefore a potentially significant reduction in risks to nontarget species.

Alternative 5 would be considered less selective than Alternative 1 or 3, because of the loss of preventive aerial hunting on summer sheep grazing allotments and subsequent reliance on methods that may be less species-specific. The cost of predator damage management would increase under Alternative 5, due to intensive predator damage management that would be required without preventive damage management. Livestock loss to predators would be expected to increase under Alternative 5 as compared to Alternatives 1 or 3 because damage management would only occur after a livestock loss was verified as predation.

4.3.2.7 Alternative 7 - Predator Damage Management with Only Mechanical Methods (No Use of Chemicals):

This alternative would preclude use of the M-44, the gas cartridge, the LPC, DRC 1339, and immobilizing and euthanizing chemicals, all of which are very selective. Use of traps and snares would likely have to increase, so overall selectivity and effectiveness would probably be slightly reduced. The ADC Decision Model (Slate et al. 1992) 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 non-lethal methods would remain unchanged.

4.3.3 Risks Posed by Damage Management Methods to the Public and Domestic Pets.

Predator damage management conducted by ADC in the analysis area is directed by ADC Directives, Cooperative Agreements, MOUs, and Federal and State laws. Effects on public health and safety include potential benefits caused by ADC fostering a safer environment and potential negative effects that might result from the exposure of the public to damage management methods. ADC uses chemical and non-chemical methods that are appropriate to reduce or minimize a variety of damage problems and ADC personnel are aware of the potential risks to nontarget species and humans. The use of toxicants by ADC in all instances is regulated by the EPA through the FIFRA, by State law, and by ADC 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 ADC 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 ADC program methods are used in accordance with Directives, policies and laws, and when chemicals are used according to label directions, they are selective for target individuals or populations, and such use has negligible impacts on the environment.

4.3.3.1 Alternative 1 - Current Analysis Area ADC Program: (No Action)

The current Wyoming ADC predator damage management program is based on an IWDM approach to protect livestock on public and private lands and described in Chapter 3 of this EA. Based on the risk assessment from USDA, Appendix P (1994) the environmental and public health and safety risks associated with ADC's damage management are low. The four chemical methods used in predator damage management (sodium cyanide in the M-44, sodium nitrate in the gas cartridge, Compound 1080 in the LPC and DRC 1339) posed possible risks, but noted that the risks associated with these methods were mitigated through specific direction provided by ADC program policies. Risks identified in the evaluation process for these four chemicals were primarily environmental risks addressed by the EPA rather than safety or health risks to the public. The greatest risks to public health and safety from ADC's use of chemical methods are incurred by ADC personnel who use these methods. Likewise, the greatest risk to public health and safety from ADC's use of mechanical damage management methods are incurred by ADC personnel who use methods such as aerial hunting. During the FY 93 through FY 95 analysis period, there were no reported injuries to ADC personnel or members of the public related to ADC's use of any chemical or mechanical damage management methods. Mitigation measures that address safety concerns about ADC's use of management methods are listed at the end of Chapter 3.

Of the non-chemical wildlife damage management methods used by ADC, leghold 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. ADC limits the use of leghold 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 by ADC, M-44s are the only method that may present some degree of risk to the public or free roaming dogs. As discussed in Chapter 3, this risk is mitigated by restricting M-44 use, by not placing M-44s on public lands during the regular bird hunting seasons or in any other place where exposure to the public or pets is probable, and by placing warning signs in the general area and within 25 feet of each M-44 device.

4.3.3.2 Alternative 2 - No Federal Predator Damage Management in the Analysis Area and Alternative 6 - Technical Assistance Program:

Both alternatives would result in no Federal operational predator 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 damage management methods would be nonexistent under this Alternative. ADC would make recommendations (Alternative 6), but implementing the recommendation would be by another entity. However, increased use of the same methods by less skilled trappers or livestock producers, and greatly reduced restrictions on how predator damage management is conducted could result in an increased risk to the public. No program would be available to protect aviation safety, and WGFD or Wyoming Department of Health would not have access to ADC personnel in the event of wildlife threats to public health and safety, such as rabies. This Alternative would likely result in increased risks to public health and safety over those identified in Alternative 1.

4.3.3.3 Alternative 3 - Fully Integrated Wildlife Damage Management (IWDM) for Multiple Resources and Land Classes (Proposed Action):

Analysis is the same as Alternative 1, except for the inclusion of the use of M-44s on BLM and National Forest System lands and LPC use on private lands. The impacts to public health and safety would be similar to Alternative 1 because of the EPA restrictions and mitigation for M-44 and LPC use, to decreased risks because of enhanced cooperation, coordination and planning between ADC and other agencies that would be included in the planning process. The 26 EPA use restrictions preclude use of the M-44 in areas where it may pose a danger to T&E species. Dogs are susceptible to M-44s, and discretion must be used when setting M-44s in areas that may be frequented by dogs. However, no M-44 devices would be used on any public lands during the regular upland bird hunting seasons and no M-44s would be allowed within ¼ 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. Warning signs would be posted on main roads and/or trails leading into any areas where M-44s were being used and individual warning signs would be placed within 25 feet of each M-44 device. These signs would be removed at the end of the damage management period. M-44s (sodium cyanide) present no secondary poisoning risks to other animals that may scavenge on a coyote carcass (USDA 1994, Appendix P, pp. 269-271).

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 1080-contaminated carcass of a collared lamb or sheep killed by coyotes. The likelihood of this occurrence would be low because LPCs would only be used within fenced pastures on private lands, and the carcasses 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 for scavengers to feed preferentially in the area of the thoracic cavity and the hind portion of the carcass, while 1080 contamination would be limited primarily to the wool on the sheep's neck. The risk assessment in USDA (1994 Appendix P, p. 274) concluded that use of the LPC would pose little likelihood of a dog being poisoned.

4.3.3.4 Alternative 4 - Non-lethal Control Required Prior to Lethal Control:

As noted throughout the document, Alternative 4 is similar to the existing program because so many livestock producers utilize non-lethal methodology on a voluntary basis. The impacts of Alternative 4 on public health and safety are similar to those identified for Alternative 1.

4.3.3.5 Alternative 5 - Corrective Control Only:

Preventive damage management is normally carried out at the time of year when opportunity for public conflict is lowest. If no preventive damage management resulted in an increase in management actions at the year of year when the public is present this could result in an increased risk to the public and pets

(Wagner in press).

4.3.3.7 Alternative 7 - Predator Damage Management with Only Mechanical Methods: (No Use of Chemicals)

The analysis would be the same as Alternative 1 for the mechanical methods. Overall level of risk to domestic pets and public safety would be reduced slightly because there would be no risk associated with M-44 use.

4.3.4 Concerns about ADC's Impact on T&E Species.

4.3.4.1 Alternative 1 - Current Analysis Area ADC Program: (No Action)

Wyoming ADC has conducted an informal Section 7 consultation with the USFWS regarding the potential impacts of the current program and the proposed action. The USFWS has concurred with ADC's assessment that neither the current program nor the proposed action is likely to adversely affect any T&E species that may occur within the analysis area. Mitigation measures to address concerns about impacts to T&E species are listed in the mitigation measures at the end of Chapter 3.

4.3.4.2 Alternative 2 - No Federal Predator Damage Management in the Analysis Area and Alternative 6 - Technical Assistance Program.

There would be no operational ADC activities under either of these alternatives, and hence no risks to T&E species from ADC. Some type of damage management would most likely be implemented by livestock producers or private predator control programs and these activities could pose greater risks to T&E species than ADC's 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 ADC, some livestock producers may be motivated to consider use of more economical forms of control than those practiced by ADC. 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 2 and 6 than for any other alternative.

4.3.4.3 Alternative 3 - Fully Integrated Wildlife Damage Management (IWDM) for Multiple Resources and Land Classes (Proposed Action):

The analysis is similar to Alternative 1. ADC has consulted with the USFWS regarding the nationwide program and would continue to implement all applicable measures identified by the USFWS to ensure protection of T&E species. M-44s would not be used in areas identified by USFWS as *"occupied gray wolf or grizzly range."* Implementation of this alternative may slightly increase the risk to wolves than would Alternative 1, but ADC can currently use M-44s on private lands in the analysis area where there are signed *Agreements for Control*.

4.3.4.4 Alternative 4 - Non-lethal Control Required Prior to Lethal Control:

As noted throughout the document, Alternative 4 is similar to the existing program because so many livestock producers utilize non-lethal methodology on a voluntary basis. The impacts of Alternative 4 on T&E species are the same as those identified for Alternative 1.

4.3.4.5 Alternative 5 - Corrective Control Only:

The analysis for Alternative 5 would be similar to the analysis for Alternatives 1. Although the use of predator damage management methods under Alternative 5 may differ from the current program, the shift

would not change the low risk factors associated with any of the methods. The risks posed by corrective control would be no different than the risks posed by the same methods used under a strategy that included preventive damage management. The impacts of Alternative 5 on T&E species are similar to those identified for Alternative 1.

4.3.4.7 Alternative 7 - Predator Damage Management with Only Mechanical Methods (No Use of Chemicals):

The analysis would be the same as Alternative 1 for the mechanical methods. Overall level of risk to T&E species would be reduced slightly because there would be no risk associated with M-44 use.

4.3.5 Cost-effectiveness of ADC activities.

NEPA does not require preparation of a specific cost-benefit analysis, and consideration of this issue would not be essential to making a reasoned choice among the Alternatives being considered. However, cost-effectiveness of ADC's activities was a common concern among many commenters during the public involvement process, and a specific cost-benefit analysis of a major component ADC's activities was prepared.

A cost-benefit analysis of ADC activities as conducted during the decades of widespread toxicant use would likely show a much higher benefit per unit cost than predator damage management programs as currently practiced. Although certain toxicants were cheaper and very effective at keeping predator numbers and predator losses low, there were valid concerns about some environmental impacts. Our social value system has essentially established limits on how cost-effectively predator damage management can be conducted. As restrictions on use of damage management methods increase, cost-effectiveness of damage management is reduced.

Connolly (1981) examined the issue of cost effectiveness of Federal predator damage management programs and concluded that public policy decisions have been made to steer the program away from being as cost effective as possible. This is because of the elimination of damage management methods believed to be effective but less environmentally preferable, such as toxic baits. In addition, the increased costs of implementing the remaining available methods were to achieve other public benefits besides livestock protection and could be viewed as mitigation for the loss of effectiveness in reducing damage. USDA (1994) stated that *"Cost effectiveness is not, nor should it be, the primary goal of the ADC program."* Additional constraints, such as environmental protection, land management goals, and others, are considered whenever a request for assistance is received (USDA 1994). These constraints increase the cost of the program while not necessarily increasing its effectiveness; yet they are considered a vital part of the ADC program.

4.3.5.1 Alternative 1 - Current Analysis Area ADC Program: (No Action)

This cost-benefit analysis is limited to quantifiable values and does not consider a number of values that would be difficult to measure. When sheep on rangelands are repeatedly harassed by predators, for example, they become extremely *spooky* and do not disperse and feed normally. Therefore, they would not find the quality and quantity of feed that they would have if unstressed, resulting in lower lamb weights at the end of the grazing season. This is a form of predator damage, but it would be difficult to quantify. Jahnke et al. (1987) and Wagner (1988) discussed additional examples of indirect predator damage, including increased labor costs and producer efforts to find sheep scattered by predators and range damage related to the tighter herding required in response to the presence of predators. This analysis likewise does not consider the value that some individuals may place on being able to see or hear coyotes more often when they visit Wyoming rangelands, nor does it consider the unintentional harm or indirect benefits to certain wildlife species.

Cost-effectiveness of ADC's predator damage management can be assessed by looking at the difference between: 1) the value of actual losses with the program in place, plus the cost of the program, and 2) the value of what losses could reasonably be expected without the program in place. This cost-benefit analysis is limited specifically to ADC's efforts to protect sheep in the analysis area during FY 95 for two primary reasons. A critical part of the determination of cost-benefit is the estimation of what losses might reasonably be expected to be without a damage management program and 2) sheep are the only class of livestock for which studies have been specifically conducted to look at this issue. FY 95 is the first full year for which Wyoming ADC has data available under the MIS reporting system. Availability of data through this system allowed for closer estimation of the amount of money spent specifically for the protection of sheep.

USDA (1994) cites four studies where sheep losses to predators were documented with no damage management program in place (Table 4-6). Annual predation loss rates during these studies varied from 6.3-29.3% for lambs and 0 to 20.8% for adult sheep. The unweighted average rate of loss to predators was about 7% for sheep and 17% for lambs. Conditions in Wyoming would be similar as in Montana (Henne 1977, Munoz 1977), and it is reasonable to assume losses without damage management in place could be about 16% for adult sheep and 24% for lambs. However, for purposes of this analysis, we will conservatively assume that loss rates for sheep and lambs could be expected to be 7% and 17%, respectively, in the absence of a damage management program.

Source	Location	Year	Sheep	Lambs
Henne (1977)	Montana	1974/1975	20.8%	29.3%
Munoz (1977)	Montana	1975/1976	16%	24.4%
McAdoo and Klebenow (1978)	California	1976	Losses were not reported.	6.3%
Delorenzo and Howard (1976)	New Mexico	l976	0%	15.6%
Delorenzo and Howard (1976)	New Mexico	l975	0%	12.1%

Data provided by the WAS (1996) suggests that actual predator losses in the analysis area in 1995 were 3,375 adult sheep and 19,125 lambs, valued at an average price of $90 each. Table 4-7 shows that based on expected predation loss rates in the absence of a damage management program, the projected losses for sheep producers in the analysis area in 1995 could have been more than $3.8 million. ADC expenditures for predator damage management to protect sheep in the analysis area in FY 95 were estimated to be $503,000. This figure includes salaries and benefits for field, supervisory, and administrative staff, vehicle and aircraft expenses, supplies and equipment, and overhead for all activities to protect sheep in the analysis area during FY 95. The difference between 1) the value of actual 1995 losses, plus the cost of the damage management program, and 2) the value of what losses could reasonably be expected to be without a damage management program is conservatively estimated at $1,348,480. This amount, divided by the cost of the FY 95 program, yields a positive cost-benefit.

Table 4-7 Actual and Hypothetical Sheep and Lamb Losses to Predators in the Western Wyoming Analysis Area for FY 1995

	Actual losses w/ ADC (% predation)	Projected losses w/out ADC (% predation)	Difference	Avg. 1995 $ Value/Head	Total Saved
Sheep	3,375 (1.7)	14,000 (7)	10,625	$90	$956,250
Lambs	19,125 (11.1)	29,072 (17)	9,947		$895,230
Total	22,500	43,072	20,572		$1,851,480

ADC's Budget to Protect Sheep and Lambs in Western Wyoming = $503,000 in FY 1995.

4.3.5.2 Alternative 2 - No Predator Damage Management in the Analysis Area:

The economic effects of implementing this alternative would be similar to implementation of Alternative 6 with regard to impacts on livestock producers. No Federal funds would be expended by ADC, so cost-effectiveness of the Federal program would not be an applicable issue. However, producer losses to predation would likely be higher.

4.3.5.3 Alternative 3 - Fully Integrated Wildlife Damage Management (IWDM) for Multiple Resources and Land Classes (Proposed Action):

Initial costs associated with using M-44s on BLM and National Forest System lands or LPC use on private lands should not significantly increase the costs of the program. Once M-44s are integrated into the current program, costs are expected to be less than those of other more labor-intensive methods since maintenance of M-44s in the field should be less than current available methods. Use of M-44s would allow ADC to be more effective in resolving predation problems. Their use would probably increase the cost-effectiveness of the program over the long term.

Initial costs associated with implementation of LPC use in the program would be slightly higher for producers and ADC than for currently employed methods. However, once LPCs are integrated into the current program, costs are expected to be similar to those of other labor-intensive methods. ADC would coordinate LPC use with the WDA and producers would only have to pay to replace collars that were lost or punctured on their property. After the predation problem was solved on a particular ranch and the collars were no longer needed, they would then become available to be used on sheep at other ranches. If use of LPCs allowed ADC to be more effective in resolving predation problems, their use would probably increase the cost-effectiveness of the program over the long term.

4.3.5.4 Alternative 4 - Non-lethal Control Required Prior to Lethal Control:

Under this alternative, ADC's costs would be lower, but producers' losses to predation would likely be higher. There is at least some evidence to suggest that preventive damage management on summer sheep grazing areas would provide a positive cost-benefit, as discussed under Alternative 1 (Gantz 1990, Wagner 1997). Packham (1973) documented the results from studies done on four different areas in Idaho. His data suggests that for every dollar spent for helicopter damage management to remove coyotes on the study areas, an average of $5.20 worth of sheep and lambs were saved. A similar cost-benefit 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 aerial gunning 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 damage management saved $5.40 worth of sheep and lambs (Collinge 1996).

4.3.4.5 Alternative 5 - Corrective Control Only:

Under this alternative, ADC's costs would be lower, but producers' losses to predation would likely be higher. Losses of all livestock to mountain lion and bear are currently on a corrective control only basis and would not be expected to change. Losses of lambs might approach the levels described in the literature and in Table 4-7, as often lamb losses go undetected until the lambs are large enough that carcass remains may be readily found. Adult sheep losses would increase, although not to the extent suggested in Table 4-7. While speculative, adult sheep losses could be about 4.5% and lamb losses could be about 14%.

As with the current program, Alternative 5 would provide little direct protection for wildlife. Incidental benefits could occur to wildlife living in areas where livestock protection is afforded, but this would be less than in Alternative 1. No direct economic benefit to wildlife would be attributed to Alternative 5. The economic costs of administering a corrective control only program would be expected to increase, due to increased aerial hunting and increased costs associated with confirming losses prior to initiating wildlife damage management techniques.

If preventive damage management is one of the most cost-effective components of the current program (Wagner in press), then the overall cost-benefit ratio for Alternative 5 (corrective only) would probably be lower than for Alternative 1.

4.3.5.6 Alternative 6 - Technical Assistance Program:

Costs to implement this alternative would be much lower than the current program. Numbers of ADC 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.

4.3.5.7 Alternative 7 - Predator Damage Management with Only Mechanical Methods (No Use of Chemicals):

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 damage management 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 damage management methods to use because they require relatively little maintenance as compared to traps or snares, and the LPC is sometimes effective in reducing damage when other methods are ineffective.

4.3.6 Summary of ADC's Impacts

Table 4-8 presents a relative comparison of the anticipated impacts of each of the alternatives as they relate to each of the major issues identified in Chapter 2.

Table 4-8 Relative Comparison of Anticipated Impacts From Alternatives

Issues/ Impacts	*Alt. 1 Current Program*	*Alt 2 No Program*	*Alt. 3 Proposed Action*	*Alt. 4 Nonlethal Control*	*Alt. 5 Corrective Control*	*Alt. 6 Tech. Asst. Only*	*Alt. 7 Mechanical Methods*
Cumulative impacts on wildlife	low	low/mod	low	low	low	low/mod	low
Effectiveness and selectivity of methods	good effective-ness and selectivity	probably lower than Alt. 1, 3, 4, 5, 7	greatest effective-ness and selectivity	similar selectivity as Alt. 1 - lower effective	lower effectiveness than Alt.1/3, but similar selectivity	probably lower than Alt. 1, 3, 4, 5, 7	probably lower than Alt. 1, 3, 4, 5
Risks to public and pets	low	probably greater risks than Alt. 1, 3, 4, 5, 6, 7	lower risks than Alt. 1	similar risks as Alt. 1	slightly higher risk than Alt. 1	probably greater risks than Alt. 1, 3, 4, 5, 7,	similar risks to Alt. 1, lower than Alt 3
Impacts to T&E species	low risks	probably greater overall risks than Alt. 1, 3, 4, 5, 7	similar risks as Alt. 1	similar risks as Alt. 1	similar risks as Alt. 1.	probably greater overall risks than Alt. 1, 3, 4, 5, 7	similar risks as Alt. 1
Cost-effectiv eness	good	not applicable	best	similar to Alt. 1	similar to Alt. 1 or 3	not applicable	lower than Alt 1 or 3

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APPENDIX A

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APPENDIX B

Abundance: The number of individuals in a population of a species in a given unit of area

Allotment: A specific area of public lands within which grazing by one or more livestock operators is authorized.

Animal Behavior Modification: The use of scare tactics/devices to deter or repel animals that cause loss or damage to resources or property. It includes the use of electronic distress sounds, propane exploders, pyrotechnics, lights, scarecrows.

Animal/Livestock Husbandry: The use of livestock management practices, such as shed lambing, night penning, or employing herders or guard dogs to reduce mortality from weather, predation or other causes.

Animal Rights: A philosophical and political position that animals have inherent rights comparable to those of humans.

Animal Welfare: Concern for the well-being of individual animals, unrelated to the perceived rights of the animal or the ecological dynamics of the species.

Behavior Modification: see "Animal Behavior Modification"

Canid: A coyote, dog, fox, wolf or other member of the dog (Canidae) family.

Carnivore: A species that primarily eats meat (member of the Order Carnivora).

Carrying Capacity: The number of animals a given unit of habitat can support.

Compensation: Monetary reimbursement for loss of agricultural resources.

Confirmed Losses: Wildlife-caused losses or damages verified by APHIS-ADC. These figures usually represent only a fraction of the total losses.

Corrective Damage Management: Management actions applied when damage is occurring or after it has occurred.

Denning/Den Hunting: The process of finding burrows where predators (primarily coyotes) have their young and then euthanizing the pups. The adult predators may also be euthanized.

Depredating Species: An animal species causing damage to or loss of crops, livestock, other agricultural or natural resources, or wildlife.

Depredation: The act of killing, damaging or consuming animals, crops, other agricultural or natural resources, or wildlife.

Direct Control: Administration or supervision of wildlife damage management by ADC, often involving direct capture or intervention to take depredating animals.

Diversity: The distribution and abundance of living organisms.

Draw Station: A livestock carcass, bone pile, or scented control area for attracting target species, particularly coyotes.

Endangered Species: Federal designation for any species that is in danger of extinction throughout all or a significant portion of its range.

Environment: The surrounding conditions, influences, or forces that affect or modify an organism or an ecological community and ultimately determine its form and survival.

Environmental Assessment (EA): An analysis of the impact of a planned action to the human environment to determine the significance of that action and whether an EIS is needed.

Environmental Impact Statement (EIS): A document prepared by a Federal agency to analyze the anticipated environmental effects of a planned action or development, compiled with formal examination of options and risks.

Eradication: Elimination of specific wildlife species, generally considered pests, from designated areas.

Forage: Food for animals, especially when taken by browsing or grazing.

Furbearer: An administrative or legal grouping of mammal species harvested for their fur.

Habitat: An environment that provides the requirements (i.e., food, water, and shelter) essential to development and sustained existence of a species.

Habitat Modification/Management: Protection, destruction or modification of a habitat to maintain, increase or decrease its ability to produce, support, or attract designated wildlife species.

Harvest Data: An estimate of the number of animals removed from a population.

Harvest Rate/Level: For any given wildlife species, a harvest ceiling established by wildlife management specialists to regulate the harvest of a species. This value represents a proportion of the population that can be taken without adversely impacting the long-term maintenance of the population.

Humaneness: The perception of compassion, sympathy, or consideration for animals from the view point of humans.

Integrated Pest Management (IPM): The procedure of integrating and applying practical management methods, to keep pest species from reaching damaging levels while minimizing potentially harmful effects of pest management measures on humans, non-target species, and the environment, incorporating assessment methods to guide management decisions.

Integrated Wildlife Damage Management: (See Integrated Pest Management) The IPM approach modified to the objective of managing damage rather than pest animal populations.

Lethal Management Methods/Techniques: Wildlife damage management methods that result in the death of animals (e.g., M-44s, aerial shooting, calling and ground shooting, and denning).

Local Population: The population within an immediate specified geographical area causing damage to human health

and safety, to other wildlife, or to forest, range, and agricultural resources.

Long-Term: An action, trend, or impact that affects the potential of an event over an extended period of time.

Magnitude: Criteria used in this EA to evaluate the significance of impacts on species abundance. Magnitude refers to the number of animals removed in relation to their abundance.

Non-Lethal Control Methods/Techniques: Wildlife damage management methods or techniques that do not result in the death of target animals (e.g., live traps, repellents, fences, etc.).

Non-Target Species/Animal: An animal or local population that is inadvertently captured, killed, or injured during wildlife damage management. The same species may be either a target or non-target animal, depending on the damage management.

Offending Animal/Species: The individual animal or animals within a specified area causing damage to public health and safety, to other wildlife, or to forest, range and agricultural resources.

Omnivore/Omnivorous: An animal that eats both animal and plant matter; a generalist, opportunistic feeder that eats whatever is available.

Open Range: Unfenced grazing lands.

Pesticide: A chemical substance used to control pest animals.

Pesticide Use Proposal (PUP): A procedure whereby, a petition is submitted to government agency(ies), and must be approved by the agency(ies), before a pesticide, in a specific formulation and purpose can be used.

Population: A group of organisms of the same species that occupies a particular area.

Predacide: A toxicant used to control or manage predators or damage caused by predators.

Predator: An animal/species that kills and/or consumes another animal.

Preventive Damage Management: Management applied before damage begins.

Prey: An animal that is killed and consumed by a predator.

Public Land: Land that is owned and controlled by a government agency (i.e., Federal, state, regional, county or municipal jurisdiction).

Pyrotechnics: Fireworks or projectiles used to frighten wildlife.

Range Lambing: Lambs born on the open-range or pasture situation.

Rangeland: Land on which the natural plant cover is made up primarily of native grasses, forbs, or shrubs valuable for forage.

Raptors: Carnivorous bird species (e.g., owls, hawks, falcons) that prey on other birds, amphibians, reptiles, and

mammals.

Registered Chemical: A chemical that has been approved by the appropriate governmental agency(ies), such as the EPA or MDA, for use in a specific formulation and for a specified purpose.

Repellent: A substance with taste, odor or tactile properties that discourages specific animals or species from using a food or place.

Requester: Individual(s) or agency(ies) that requests wildlife damage management assistance from ADC.

Selectivity: Damage management methods that affect specific animals or animal species responsible for damage without adversely affecting other species.

Sensitive Species: Species designated, usually in cooperation with the state agency responsible for managing the species, as sensitive. Sensitive species are those that: 1) are under status review by the USFWS/NMFS; or 2) whose numbers are declining so rapidly that Federal listing may become necessary; or 3) typically have small and widely dispersed populations; or 4) inhabit ecological refuge or other specialized or unique habitats. Sensitive species are managed under the same criteria as T&E species pending formal listing as a T&E species or until it is delisted.

Shed Lambing: Housing ewes and newborn lambs in pens or sheds to provide food, shelter, and medical care during and immediately after birth.

Short-Term: An action, trend, or impact that does not have long lasting affects to the reproductive or survival capabilities of a species.

Significant Impact: An impact that will cause important positive or negative consequences to man and his environment.

Take: The capture or killing of an animal.

Target Species/Animal/Population: An animal or population toward which wildlife damage management is directed to alleviate damage to agriculture and non-agriculture resources. The same species may be either a target or non-target, depending on the situation.

Technical Assistance: Advice, recommendations, information, demonstrations, and materials provided to others for managing wildlife damage problems.

Threatened Species: Federal designation for species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Total Harvest: The total number of individuals intentionally taken by humans from a population. Harvest does not include natural or accidental mortality.

Toxicant: A poison or poisonous substance.

Unconfirmed Losses: Losses or damage reported by resource owners or managers, but not verified by ADC.

Wilderness Study Area (WSA): Undeveloped Federal land retaining its primeval character and influence, without

permanent improvements or human habitation, and managed to preserve its natural conditions.

Wildlife: Any wild mammal, bird, reptile or amphibian.

Wildlife Damage Management: Actions directed toward resolving livestock or wildlife predation, protecting property or safeguarding public health and safety in a coordinated, managed program.

Work Plan: A management plan developed jointly by ADC and/or the BLM, Forest Service, WGFD, and WDA specifying when, where, how, and under what constraints wildlife damage management would be conducted. If applicable, the plan may include a map showing planned damage management, restricted damage management, no damage management, and special protection areas.

APPENDIX C
SPECIAL MANAGEMENT AREAS

ACEC	Administrator
Cedar Canyon	Rock Springs, BLM
Greater Sand Dunes	Rock Springs, BLM
Natural Corals	Rock Springs, BLM
Oregon Buttes	Rock Springs, BLM
Pine Springs	Rock Springs, BLM
Raymond Mountain	Rock Springs, BLM
Red Creek Watershed	Rock Springs, BLM
Rock Creek	Rock Springs, BLM
White Mountain Petroglyphs	Rock Springs, BLM
Beaver Rim	Rawlins, BLM
Dubois Badlands	Rawlins, BLM
East Fork	Rawlins, BLM
Green Mountain	Rawlins, BLM
Lander Slope	Rawlins, BLM
Oregon/Mormon Pioneer National Historic Trails	Rawlins, BLM
Red Canyon	Rawlins, BLM
South Pass	Rawlins, BLM
Whiskey Mountain	Rawlins, BLM
Spanish Point Karst Area	Rawlins, BLM
Beaver Creek	Rawlins, BLM
Wilderness Study Area	
Alkali Basin/East Sand Dunes	Rock Springs, BLM
Alkali Draw	Rock Springs, BLM
Buffalo Hump	Rock Springs, BLM
Devils Playground/Twin Butte	Rock Springs, BLM

ACEC	Administrator
Dubois Badlands	Rock Springs, BLM
Honeycomb Buttes	Rock Springs, BLM
Oregon Buttes	Rock springs, BLM
Lake Mountain	Rock Springs, BLM
Owl Creek	Rock springs, BLM
Raymond Mountain	Rock Springs, BLM
Red Creek Badlands	Rock Springs, BLM
Red Lakes	Rock springs, BLM
Sand Dunes	Rock Springs, BLM
Scab Creek	Rock Springs, BLM
South Pinnacles	Rock springs, BLM
Whiskey Mountain	Rock Springs, BLM
White Horse Creek	Rock Springs, BLM
Adobe Town	Rawlins, BLM
Bennett Mountains	Rawlins, BLM
Encampment River Canyon	Rawlins, BLM
Ferris Mountains	Rawlins, BLM
Prospect Mountain	Rawlins, BLM
Sweetwater Canyon	Rawlins, BLM
Sweetwater Rocks	Rawlins, BLM
Alkali Creek	Worland, BLM
Big horn-Tack-on	Worland, BLM
Bobcat Draw Badlands	Worland, BLM
Cedar Mountain	Worland, BLM
Copper Mountain	Worland, BLM
Honeycombs	Worland, BLM
McCullough Peaks	Worland, BLM

ACEC	**Administrator**
Medicine Lodge	Worland, BLM
Pryor Mountain	Worland, BLM
Red Butte	Worland, BLM
Sheep Mountain	Worland, BLM
Trapper Creek	Worland, BLM
Wilderness Area	**Administrator**
Cloud Peak	Big Horn NF
Bridger	Bridger NF
Wilderness Area	**Administrator**
Encampment River	Medicine Bow NF
Huston Park	Medicine Bow NF
Platte River	Medicine Bow NF
Savage Run	Medicine Bow NF
Absaroka-Beartooth	Shoshone NF
Fitzpatrick	Shoshone NF
North Absaroka	Shoshone NF
Popo Agie	Shoshone NF
Washakie	Shoshone NF
Winegar Hole	Targhee NF
Gros Ventre	Teton NF
Teton	Teton NF
National Recreation Area	
Flaming Gorge	Ashley NF
Wild and Scenic Rivers	
Clarks Fork Canyon	Shoshone NF
Research Natural Area	
Shell Canyon	Big Horn NF
Snowy Range	Medicine-Bow NF