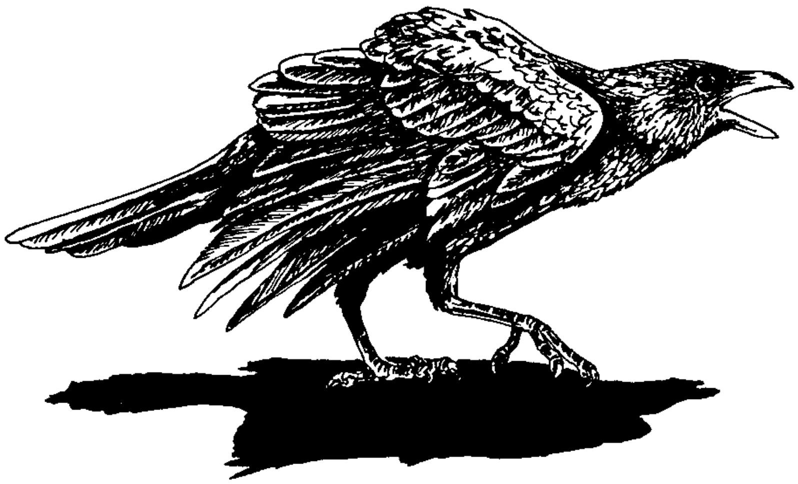
FINAL ENVIRONMENTAL ASSESSMENT

of

BIRD DAMAGE MANAGEMENT IN NEW MEXICO



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New Mexico Department of Agriculture

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United States Fish and Wildlife Service

May 2009

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ACRONYMS USED

A-C	Alpha-chloralose
AI	Avian Influenza
APHIS	Animal and Plant Health Inspection Service
BISON-M	Biota Information System of New Mexico
BBS	Breeding Bird Survey
BDM	Bird Damage Management
BO	Biological Opinion
CAFO	Confined Animal Feeding Operation
CBC	Christmas Bird Count
CFR	Codes of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	Fiscal Year
HP	Highly Pathogenic
IWDM	Integrated Wildlife Damage Management
JPA	Joint Powers Agreement
LC50	Lethal Concentration in Water that Kills 50%
LD50	Lethal Dose that Orally Kills 50%
MA	Methyl-anthranilate
MIS	Management Information System
MOU	Memorandum of Understanding
MRGV	Middle Rio Grande Valley
NAS	National Audubon Society
NEPA	National Environmental Policy Act
NHPA	National Historical Preservation Act
NMAC	New Mexico Administrative Codes
NMASS	New Mexico Agricultural Statistics Service
NMDA	New Mexico Department of Agriculture
NMDGF	New Mexico Department of Game and Fish
NMOS	New Mexico Ornithological Society
NMSA	New Mexico Statutes Annotated
NWRC	WS-National Wildlife Research Center
P	Probability
PIF	Partners in Flight
RMBO	Rocky Mountain Bird Observatory
RMS	Rocky Mountain States
SMC	Species of Management Concern
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WDM	Wildlife Damage Management
WS	Wildlife Services

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

While wildlife is a valuable natural resource, some species of wildlife can cause problems with human interests. Many bird species, those that reside in or migrate into or through New Mexico, can come into conflict with human interests at sometime or another, and may need to be managed to control their damage. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program has personnel with expertise to respond to damage caused by wildlife, including birds.

USDA-APHIS-WS is authorized by Congress to manage a program to reduce human-wildlife conflicts. WS' mission, developed through a strategic planning process (APHIS 2007), is to *"... provide Federal leadership in managing problems caused by wildlife. WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can damage agricultural and industrial resources, pose risks to human health and safety, and affect other natural resources. The WS program carries out the Federal responsibility for helping to solve problems that occur when human activity and wildlife are in conflict with one another*." This is accomplished through:

< training of wildlife damage management (WDM) professionals;
< development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
< the collection, evaluation, and dissemination of management information;
< cooperative WDM programs;
< informing and educating the public on how to reduce wildlife damage; and
< providing technical advice and a source for limited use of management materials and equipment such as cage traps.

This Environmental Assessment (EA) evaluates ways that this responsibility could be carried out to resolve conflicts with bird species in New Mexico. Bird damage management (BDM) is an important function of the New Mexico WS Program. Appendix C lists all bird species with their scientific names that have been found in New Mexico (514) with Appendix C: Table C1 listing those species that have the highest probability of coming into conflict with people in New Mexico or being part of disease surveillance projects (192). However, New Mexico WS has targeted only a minimal number of species from FY03 (federal fiscal year 2003 = October 1, 2002 – September 30, 2003) to FY07 with the top ten species responsible for the majority of requests for assistance being the feral Rock Pigeon, Sandhill Crane, invasive Eurasian Collared-Dove, Common Raven, nonnative European Starling, Great-tailed Grackle, Turkey Vulture, Canada Goose, Great Horned Owl, and Chihuahuan Raven. Most BDM projects conducted by WS in New Mexico are focused on the protection of property and agriculture from damage. New Mexico WS conducts some BDM for the protection of human health and safety. WS has an airport wildlife hazard management program which primarily hazes birds at this site, but could potentially take some birds to augment wildlife hazard reductions. As far as disease surveillance, shorebirds and waterfowl are currently the primary focus because many of these species migrate into New Mexico from far northern regions where they could have potentially become infected with diseases of concern. Finally, natural resource protection is periodically the focus of a BDM project. These will be discussed.

WS is a cooperatively funded (funding sources for the program come from federal appropriations, state and county agency contracts, and individuals) and service oriented program. Before operational BDM is conducted, *Agreements for Control* or *WS Work Plans* must be signed by WS and the land owner/administrator. WS cooperates with private property owners and managers and with appropriate land and wildlife management agencies, as requested, with the goal of effectively and efficiently resolving wildlife damage problems in compliance with all applicable federal, state, and local laws.

The U.S. Fish and Wildlife Service (USFWS) regulates and manages migratory bird and threatened and endangered (T&E) species. Under their direction, the New Mexico Department of Game and Fish (NMDGF) also regulates and manages these species and resident bird species populations with the exception of feral domestic pets. The species NMDGF manage are classified as game birds or protected species under New Mexico statutes. Game birds include waterfowl, cranes, shorebirds, doves, and gallinaceous (turkeys, grouse, quail) birds. By statute, NMDGF has the responsibility to manage bird damage. Feral birds (e.g., domestic waterfowl, escaped parrots) are the responsibility of County and municipal Animal Control Offices or the County Sheriff Departments.

Under State law (NMSA 17-2-7.2), NMDGF must respond to complaints of animal damage, including birds, from private landowners or lessees when protected wildlife, including game and nongame, cause damage. WS, under a Joint Powers Agreement (JPA) and contract, assists NMDGF with responding to these complaints. WS also assists public entities such as USFWS and Tribes with BDM when requested and when they have the appropriate permits necessary from USFWS or NMDGF, as required.

APHIS-WS has the Federal statutory authority under the Act of March 2, 1931, as amended, and the Act of December 22, 1987, to cooperate with other federal agencies and programs, states, local jurisdictions, individuals, public and private agencies, organizations, and institutions while conducting a program of wildlife services involving animal species that are injurious or a nuisance to, among other things, agriculture, horticulture, forestry, animal husbandry, natural resources such as wildlife, and human health and safety as well as conducting a program of wildlife services involving mammalian and avian (*bird*) species that are reservoirs for zoonotic diseases.

1.1.1 The New Mexico WS Program

WS is a cooperatively funded, service-oriented program that responds to wildlife damage complaints from cooperators ranging from private citizens to other agencies. WS has received requests for assistance for damage caused by 38 bird species with the inclusion of feral domestics from FY05 to FY07 (Table 1). Feral Rock Pigeons and Sandhill Cranes are responsible for the majority of complaints. WS has not received a request for BDM assistance for most species covered in this EA in the past 3 FYs; however, the need could arise to assist with management projects for other species.

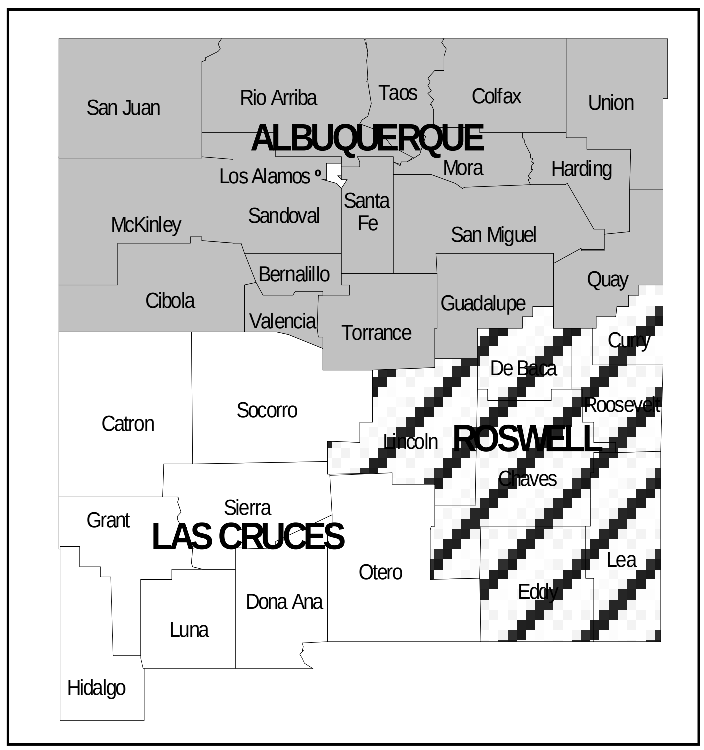

Figure 1. WS in New Mexico has three Districts (Albuquerque, Las Cruces, and Roswell) that have personnel to respond to bird damage complaints in New Mexico's 33 Counties.

WS works mostly in response to requests from the public, but conducts some BDM for agencies. Under the JPA with NMDGF, WS can respond to requests for assistance involving damage from birds. In addition, Tribes are responsible for wildlife management on their properties and can request assistance from WS.

WS receives requests for BDM throughout New Mexico. New Mexico encompasses 121,598 mi^2 in 33 Counties (Figure 1): Bernalillo, Catron, Chaves, Cibola, Colfax, Curry, De Baca, Dona Ana, Eddy, Grant, Guadalupe, Harding, Hidalgo, Lea, Lincoln, Los Alamos, Luna, McKinley, Mora, Otero, Quay, Rio Arriba, Roosevelt, Sandoval, San Juan, San Miguel, Santa Fe, Taos, Sierra, Socorro, Torrance, Union and Valencia. The State is divided into 3 WS Districts: Albuquerque, Las Cruces, and Roswell. WS personnel receive requests to conduct BDM in many counties and on a variety of land classes including mostly private and federal, state, Tribal, county, and municipal lands. New Mexico consists of 43% private, 17% Bureau of Land Management 12% U.S. Forest Service, 12% State, 9% Tribal, and 7% other lands.

1.2 PURPOSE

The purpose of this EA is to analyze the effects of WS activities in New Mexico to manage damage caused by bird species or species groups or to monitor wild bird populations for the presence of disease on the human environment. WS BDM activities are conducted to protect human health and safety at airports and threats of human disease, agricultural resources including livestock and their feed and health, crops, and aquaculture, property such as homes, aircraft, turf, machinery, electrical equipment, and ornamental trees, and natural resources such as threatened and endangered (T&E) species, other wildlife, fisheries, and public recreation areas. New Mexico has 329 species of birds that can be found regularly in all or a portion of the State at some time during the year. An additional 185 species have been documented to occur in New Mexico, but are normally outside of the species' normal range (accidentals); some of these species are seen annually and a few may even nest, but not in any abundance or regularity. Of the regular residents, 192 (not including T&E species) could be the focus of a BDM project. Of these, 103 species could be targeted to protect resources other than aircraft and human health and safety at airports. The species that this EA will address are those that are normally found in New Mexico and cause problems and are listed in Appendix C: Table C1. The primary species that WS receives requests for assistance are feral domestic Rock Pigeons[1], Sandhill Cranes, Eurasian Collared-Doves, Common Ravens, European Starlings, Turkey Vultures, Great-tailed Grackles, Canada Geese, Great Horned Owls, and American Crows. Several other species cause minor, but potentially locally serious, problems. Information is given on these and other species or their groups in Section 2.2.1.

Ordinarily, according to APHIS procedures implementing the National Environmental Policy Act (NEPA), individual WDM actions, and research and developmental activities may be categorically excluded (7 Code of Federal Regulation (CFR) 372.5(c), 60 Fed. Reg. 6000-6003, 1995). Many species involved in WS BDM actions in New Mexico are individual actions because WS receives few requests for assistance for these species, even over several years; WS received an average of 1 or fewer requests for assistance for 25 of the 35 species listed in Table 1 with few of these requests handled operationally which suggests that these activities would be categorically excluded for NEPA analysis. However, we prepared this EA on BDM in New Mexico to facilitate planning and interagency coordination, to streamline program management, and to involve the public and obtain their input through comments and feedback. This EA documents the need for BDM in New Mexico and assesses potential impacts and effects of various alternatives addressing the resolution of bird damage problems.

The analysis in this EA includes an effort to consider existing data contained in other NEPA and related documents. WS completed a BDM EA in 1999 for New Mexico (WS 1999). The current WS BDM

[1] Bird species found in New Mexico and their scientific names are given in Appendix C.

program in New Mexico is very similar to that analyzed in WS (1999) with the exception that WS is conducting disease surveillance.

Following the implementation of the EA, if a new issue arises or the analysis in monitoring reports concludes that WS BDM activities are outside the scope of that EA, the EA would be supplemented to include the new information and sent out for public review. Monitoring reports for the prior EA (WS 1999) found no new issues with the exception of increased work with the Eurasian Collared-Dove, an invasive species that has rapidly expanded its population across the United States; this species will be discussed in this EA. Additionally, many new species have the potential for being involved in BDM, especially at airports, and this EA will discuss all species that could potentially be involved in BDM in New Mexico, though many likely never will be. In addition to incorporating the WS BDM EA for New Mexico (WS 1999), this EA is tiered to the USDA-APHIS-WS programmatic Environmental Impact Statement (EIS) (*hereinafter referred to as* USDA 1997).

1.3 NEED FOR ACTION

Birds are responsible for damaging of a wide variety of agricultural resources, property, and natural resources. In addition, birds can be a threat to human health and safety. From FY05 to FY07, 37 bird species (ave. 21 spp. per year) were responsible for an annual average of 926 requests for BDM assistance to resolve associated damage, 505 related to agriculture, 331 for property, 89 for human health and safety, and 1 for natural resources. In addition to the requests for assistance, WS was also involved in conducting disease surveillance (no damage) and collected 1,562 samples in FY07 from birds and their droppings. This information is kept in the MIS[2]. The MIS has been in place since FY92 and an additional 17 species of birds were responsible for damage from FY92 to FY04 indicating the low number of species that have caused requests for assistance. Requests for assistance are an indication of need, but the requests that WS receives likely represents only a portion of the need in actuality. WS loss reports do not actually reflect the total value of bird damage in New Mexico, but provides an indicator of the annual losses. Also, some people are unaware of the WS program and may try to resolve problems themselves without requesting WS assistance.

1.3.1 Summary of Proposed Action

The proposed action is to continue the current portion of the WS program in New Mexico that responds to requests for BDM to protect human health and safety, agricultural resources such as livestock feed, livestock, livestock health, aquaculture, and crops, property such as turf, landscaping, and structures, and natural resources such as T&E species, other wildlife, and forestry in New Mexico. The two primary components of the WS BDM program in New Mexico have been the goal of reducing threats or hazards to human health and safety from feral pigeons and damage or the threat of loss to agricultural crops from Sandhill Cranes which were discussed thoroughly in the previous BDM EA for New Mexico (WS 1999). Additionally, property damage from waterfowl, the loss of livestock feed and the risk of bird-related livestock health problems presented by starlings and blackbirds at dairies and feedlots, and livestock losses from predatory birds such as ravens are a much more minor program component. Program goals are also to minimize damage or the risk of damage to other agricultural resources, natural resources such as wildlife species, property, or other public or private resources from birds. To meet these goals WS has the objective of responding to all requests for assistance with, at a minimum, technical assistance or self-

[2] MIS - Computer-based Management Information System used by WS for tracking Program activities. WS in New Mexico has had the SQL-based MIS system operational since FY92. However, a new system, the MIS 2000, replaced an old system 10/01/04. Differences in the systems have changed some outputs such as requests for assistance. Thus, information will be given for FY05 to FY07 in this document. MIS reports will not be referenced in the Literature Cited Section since most reports from the MIS are not kept on file. A database is kept that allows queries to be made to retrieve the information needed.

help advice, or, where appropriate and when cooperative or congressional funding is available, direct control assistance where professional WS personnel conduct BDM. An Integrated Wildlife Damage Management (IWDM) approach is implemented which allows the use of any legal technique or method (discussed in Section 3.3.1.3), used singly or in combination, to meet the needs of requestors for resolving conflicts with birds. Agricultural producers and others requesting assistance are provided with information regarding the use of effective nonlethal and lethal techniques. Lethal methods used by WS would include shooting, trapping, egg addling/destruction, DRC-1339, Avitrol® (Avitrol Corporation, Tulsa Oklahoma), and live capture by trapping or use of the tranquilizer alpha-chloralose (A-C) which is often followed by euthanasia with an appropriate drug such as Fatal Plus® or cervical dislocation. Nonlethal methods used by WS may include wire barriers and deterrents such as porcupine wire, netting, and fencing, the tranquilizer A-C followed by relocation, chemical repellents (e.g., methyl anthranilate, polybutene products), and harassment with auditory (e.g., propane cannons, pyrotechnics, distress calls) and visual devices (e.g., reflective tape, human effigies, balloons). In many situations, the implementation of nonlethal methods such as exclusion-type barriers would be the responsibility of the requestor to implement. BDM by WS would be allowed in the State, when requested, on private property sites or public facilities where a need has been documented, upon completion of an Agreement for Control. All management actions would comply with appropriate federal, state, and local laws.

Table 1. Value of damage caused by birds in New Mexico as reported to or verified by Wildlife Services from FY05 to FY07. The damage reported in this table is only a fraction of the actual damage caused by birds in New Mexico.

SPECIES	**FY05**		**FY06**		**FY07**		**Average**	
	Req.	**$ Value $**	**Req.**	**$ Value $**	**Req.**	**$ Value $**	**Req.**	**$ Value $**
Snow Goose	-	-	2	$3,500	-	-	1	$1,167
Canada Goose	1	$0	2	$10,100	9	$3,000	4	$4,367
American Wigeon	5	$52,500	-	-	-	-	1	$17,500
Mallard	1	$50,000	-	-	-	-	0	$16,667
Feral ducks (Dom. Mallard)	-	-	-	-	1	$2,500	0	$833
Feral Poultry (Peafowl, Guinea Fowl)	1	$0	-	-	1	$0	1	$0
Great Blue Heron	-	-	-	-	1	$500	0	$167
Turkey Vulture	3	$50	13	$0	2	$6,000	6	$2,017
Mississippi Kite	1	$0	2	$200	-	-	1	$67
Bald Eagle	-	-	1	$130	-	-	0	$43
Sharp-shinned Hawk	-	-	3	$0	-	-	1	$0
Swainson’s Hawk	-	-	1	$1,000,000	-	-	0	$333,333
Golden Eagle	-	-	1	$100	1	$100	1	$67
American Coot	2	$52,000	1	$8,962	-	-	1	$20,321
Sandhill Crane	411	$0	359	$33,450	477	$106,000	416	$46,483
Feral Rock Pigeon	312	$101,000	548	$116,600	467	$14,250	442	$77,283
Eurasian Collared-Dove	-	-	21	$0	29	$0	17	$0
White-winged Dove	1	$0	-	-	1	$0	1	$0
Mourning Dove	2	$72,000	-	-	-	-	1	$24,000
Barn Owl	-	-	1	$0	-	-	0	$0
Western Screech-Owl	1	$0	-	-	-	-	0	$0
Great Horned Owl	9	$1,025	1	$150	1	$5	4	$393
Burrowing Owl	-	-	1	$0	-	-	0	$0
Acorn Woodpecker	2	$150	-	-	-	-	1	$50
Hairy Woodpecker	-	-	-	-	1	$2,500	0	$833
Northern Flicker	1	$2,500	-	-	3	$1,500	1	1,333
American Crow	6	$1,500	-	-	3	$0	3	$500
Chihuahuan Raven	1	$5,000	-	-	-	-	0	$1,667
Common Raven	9	$31,000	5	$27,000	7	$16,000	7	$24,667
Cliff Swallows	-	-	1	$0	-	-	0	$0
Barn Swallow	1	$100	-	-	1	$25	1	$42
European Starling	15	$7,000	2	$0	2	$0	6	$2,333
Great-tailed Grackle	5	$0	7	$0	6	$180,000	6	$60,000
Brown-headed Cowbird	-	-	2	$0	-	-	1	$0
House Finch	1	$50	-	-	-	-	0	$17
House Sparrow	1	0	-	-	-	-	0	$0
Total ~37 spp. (ave. 21 spp./yr)	**792**	**$389,375**	**974**	**$1,200,192**	**1,013**	**$332,380**	**926**	**$640,649**

Req. = Requests for assistance

1.3.2 Need for BDM to Protect Human Health and Safety

1.3.2.1 Disease. Feral pigeons and starlings have been suspected in the transmission of 29 different diseases to humans, (Weber 1979 and Davis et al. 1971). These include viral diseases such as meningitis and seven different forms of encephalitis; bacterial diseases such as erysipeloid, salmonellosis, paratyphoid, Pasteurellosis, and Listeriosis; mycotic (fungal) diseases such as aspergillosis, blastomycosis, candidiasis, cryptococcosis, histoplasmosis, and sarcosporidiosis; protozoal diseases such as American trypansomiasis and toxoplasmosis; and rickettsial/chlamydial diseases such as chlamydiosis and Q fever (Figure 2). As many as 65 different diseases transmittable to humans or domestic animals have been associated with feral pigeons, starlings, and House Sparrows (Weber 1979). In most cases in which human health concerns are a major reason for requesting BDM, no actual cases of bird transmission of disease to humans have been proven to occur. The risk of disease transmission from birds is often the underlying reason people request assistance from WS.

Many times, individuals or property owners that request assistance with feral domestic pigeons or nuisance blackbird or starling roost problems are concerned about potential disease risks but are unaware of the types of diseases that can be associated with these birds. In most such situations, BDM is requested because the droppings left by concentrations of birds is aesthetically displeasing and can result in continual clean-up costs.

Further problems arise as resident Canada Geese and other waterfowl have become accustomed to and are successful in suitable urban habitats. These resident geese are becoming more and more of a nuisance around public parks, lakes, housing developments, and golf courses as they sometimes attack humans. The threat to human health from high fecal coliform (e.g., *Escherichia coli*) levels and other pathogens including *Cryptosporidium parvum, Giardia lambia*, and *Salmonella spp*. is also associated with large amounts of droppings (Clark 2003).

Avian Influenza (AI). WS is part of an interagency team conducting, assisting, or supervising in disease surveillance by collecting biological samples to monitor for the presence of various diseases such as highly pathogenic (HP) avian influenza (HP H5N1 AI). Both WS and USFWS are collecting samples to test for the presence of this disease in western states. Samples are obtained from live and dead birds, and droppings, and often certain species are targeted.

The EA discusses the need to monitor, and possibly manage, wild and feral birds to reduce the risk of disease transmission to humans and livestock. WS is receiving increasing requests for assistance with disease surveillance in wild and feral birds. In 2006, WS was one of several agencies and organizations participating in surveillance for the AI virus in North American migrating birds.

AI is caused by a virus in the Orthomyxovirus group. Viruses in this group vary in the intensity of illness they may cause (virulence). Wild birds, in particular waterfowl and shorebirds, are considered natural reservoirs for AI (Clark 2003). Most strains of AI rarely cause severe illness or death in birds although the H5 and H7 strains tend to be highly virulent and very contagious (Clark 2003).

Recently, the occurrence of HP H5N1 AI virus has raised concerns regarding the potential impact on wild birds, domestic poultry, and human health should it be introduced into the U.S. It is thought that a change occurred in a low pathogenicity AI virus of wild birds, allowing the virus to infect chickens, followed by further change into the HP H5N1 AI. HP H5N1 AI has been circulating in Asian poultry and fowl resulting in death to these species. HP H5N1 AI likely underwent further changes allowing infection in additional species of birds, mammals, and humans. More recently, the virus moved back into wild birds resulting in significant mortality of some species of waterfowl, gulls, and cormorants. This is only the second time in history that a highly pathogenic form of AI has been recorded in wild birds. Numerous potential routes for introduction of the virus into the United States exist including illegal movement of domestic or wild birds, contaminated products, and the migration of infected wild birds.

Disease	Human Symptoms	Potential for Human Fatality	Effects on Domestic Animals
BACTERIAL			
erysipeloid	skin eruption with pain, itching; headaches, chills, joint pain, prostration, fever, vomiting	sometimes - particularly in young children, old or infirm people	serious hazard for the swine industry
salmonellosis	gastroenteritis, septicemia, persistent infection	possible, especially in individuals weakened by other disease or old age	causes abortions in mature cattle, possible mortality in calves, decrease in milk production in dairy cattle
Pasteurellosis	respiratory infection, nasal discharge, conjunctivitis, bronchitis, pneumonia, appendicitis, urinary bladder inflammation, abscessed wound infections	rarely	may fatally affect chickens, turkeys and other fowl
Listeriosis	conjunctivitis, skin infections, meningitis in newborns, abortions, premature delivery, stillbirth	sometimes - particularly with newborns	In cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles
VIRAL			
meningitis	inflammation of membranes covering the brain , dizziness, and nervous movements	possible — can also result as a secondary infection with Listeriosis, salmonellosis, cryptococcosis	causes middle ear infection in swine, dogs, and cats
encephalitis (8 forms)	headache, fever, stiff neck, vomiting, nausea, drowsiness, disorientation	mortality rate for eastern equine encephalomyelitis may be around 60%	may cause mental retardation, convulsions and paralysis
MYCOTIC (FUNGAL)			
aspergillosis	affects lungs and broken skin, toxins poison blood, nerves, and body cells	not usually	causes abortions in cattle
blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	rarely	affects horses, dogs and cats
candidiasis	infection of skin, fingernails, mouth, respiratory system, intestines, and urogenital tract	rarely	causes mastitis, diarrhea, vaginal discharge and aborted fetuses in cattle
cryptococcosis	lung infection, cough, chest pain, weight loss, fever or dizziness, also causes meningitis	possible especially with meningitis	chronic mastitis in cattle, decreased milk flow and appetite loss
histoplasmosis	pulmonary or respiratory disease. May affect vision	possible, especially in infants and young children or if disease disseminates to the blood and bone marrow	actively grows and multiplies in soil and remains active long after birds have departed
PROTOZOAL			
American trypansomiasis	infection of mucous membranes of eyes or nose, swelling	possible death in 2-4 weeks	caused by the conenose bug found on pigeons
toxoplasmosis	inflammation of the retina, headaches, fever, drowsiness, pneumonia, strabismus, blindness, hydrocephalus, epilepsy, and deafness	possible	may cause abortion or still birth in humans, mental retardation
RICKETTSIAL/CHLAMYDIAL			
chlamydiosis	pneumonia, flu-like respiratory infection, high fever, chills, loss of appetite, cough, severe headaches, generalized aches and pains, vomiting, diarrhea, hepatitis, insomnia, restlessness, low pulse rate	occasionally, restricted to old, weak or those with concurrent diseases	in cattle, may result in abortion, arthritis, conjunctivitis, and enteritis
Q fever	sudden pneumonitis, chills, fever, weakness, severe sweating, chest pain, severe headaches and sore eyes	possible	may cause abortions in sheep and goats

Figure 2. Diseases transmittable to humans and livestock associated with feral pigeons, starlings and House Sparrows (*copied from* Weber 1979).

The nationwide surveillance effort has detected some instances of low pathogenic AI viruses, as was expected given that waterfowl and shorebirds are considered natural reservoirs for AI. Tens of thousands of birds have been tested, but there has been no evidence of the HP H5N1 AI virus in North America.

New Mexico WS has been involved in the nationwide surveillance effort for the HP H5N1 AI virus. The focus of surveillance in New Mexico has concentrated on waterfowl and shorebirds and began in FY06. In FY06 and FY07, WS collected 207 and 1,562 samples from 8 and 20 known species (droppings sampled are not identified to bird in the MIS) in New Mexico.

1.3.2.2 Need for BDM at Airports. An increase in air traffic (Federal Aviation Administration (FAA) 2007) along with increases in certain wildlife species that are commonly involved in bird strikes (waterfowl, gulls, raptors, blackbirds/starlings, and other species) have contributed greatly to the increase in the number of reported strikes (Dolbeer 2006). From FY98 to FY07, New Mexico aviation officials reported 231 strikes with 4 of those causing substantial damage (FAA National Wildlife Strike Database *unpubl. data*). Several significant strikes that occurred in New Mexico are given.

> In FY99, an unknown bird was struck by a B-757-200 on take-off roll damaging several of the engine's fan blades. The airplane circled the airport and did an emergency precautionary landing. Major damage to the aircraft was reported and the plane was out of service to undergo repairs.
>
> In FY04, a large bird was ingested on take-off roll by a DC-9 causing complete engine failure. The plane was able to shut down the engine and return. The engine had to be replaced.
>
> In FY07, a Citation Jet on take-off roll ingested at least one small bird from a flock. The plane had to have several of the engine blades replaced and was out of service for 36 hours while the airplane engine was fixed.

To date, no documented bird strikes have resulted in loss of human life in New Mexico; however, strikes continue to occur, increasing the risk for a catastrophic event. Such was the case at Elmendorf Air Force Base, Alaska in September 1995 where 24 human lives were lost when an "AWACS" aircraft crashed after ingesting four Canada Geese during takeoff (Cleary and Dolbeer 1999).

New Mexico WS has one operational airport program at Las Cruces International Airport where the majority of work conducted involves mammal control. So far, bird work at this airport has consisted only of harassment. The species that have been identified to cause the most strikes in New Mexico are Rock Pigeons, Mourning Doves, Turkey Vultures, Horned Larks, American Kestrels, other raptors, and Kingbirds. Take of these species could occur at the Las Cruces International Airport or other airports should additional agreements for hazard management be developed, but the majority of birds would be hazed from the air operating area.

1.3.3 Need for BDM at Confined Animal Feeding Operations (CAFOs)

Starlings, blackbirds, feral domestic pigeons, and Sandhill Cranes and to a lesser extent House Sparrows often cause damage at CAFOS, specifically cattle and hog feeding facilities and dairies, by congregating in large numbers to feed on the grain component of livestock feed. These birds also cause damage by defecating on fences, shade canopies, and other structures which can accelerate corrosion of metal components. Droppings from these species, especially starlings, have clean-up costs associated with them and are considered unsightly. Additionally, these birds and their droppings are a source of several diseases that can infect feedlot operators, their personnel, and livestock. Some CAFOs suffer additional damage in the form of lost business because some customers tend to avoid facilities that have excessive numbers of birds present during a significant portion of the year.

Livestock Depredations. WS personnel respond to reports from resource owners of losses to predatory birds which may or may not be verified. Predatory birds are responsible for the depredation of a wide variety of livestock including cattle, goats, sheep, swine, exotic pen-raised game, other hoofed-stock, and poultry. Depredation to livestock is defined as the killing, harassment, or injury of livestock resulting in monetary losses to the owner. These impacts, chiefly livestock injury or fatality, have been primarily attributed to Chihuahuan Ravens, Common Ravens, American Crows, Golden Eagles, Bald Eagles, Great-Horned Owls, Red-tailed Hawks, and Turkey Vultures. To a lesser extent, other owls, falcons, and other species have also impacted livestock resources. Predatory birds mostly kill or injure small (i.e., rabbits, poultry) or young livestock, or incapacitated (i.e., injured, calving) adult hoof-stock. Domestic fowl (i.e., chickens, ducks, geese, guineas) are reported as livestock and are included in this discussion as well.

WS considers non-lethal dispersal techniques (i.e., pyrotechnics, live trapping and relocation, modified animal husbandry practices, laser lights to disperse roosts) as the initial course of action. However, in situations where birds do not respond to non-lethal techniques, or where the use of these techniques is not practical, problems may be more effectively resolved using lethal methods. Population reduction or removal of specific problem-causing birds by live trapping and relocation, trapping and euthanasia, shooting, and the selective use of the avicide DRC-1339 (egg baits placed for problem causing ravens and crows) is sometimes required to resolve specific conflicts. WS also investigates and sometimes recommends resource owners or managers be given depredation permits by USFWS to allow for lethal control of certain species (e.g., turkey vulture, raven). Avian depredation is often difficult to control, but eagle depredation can be particularly problematic due to additional protective laws. During FY05-FY07, WS reported an average of 94 occurrences of livestock depredation annually (Table 2), but only provided technical assistance to producers for the most part.

Table 2. The number of requests for assistance and value of damage to agricultural resources caused by birds in New Mexico as reported to or verified by WS personnel from FY05 to FY07. The damage reported in this table is only a fraction of the actual damage caused by birds in New Mexico. One incident of livestock damage could involve multiple predations, one incident of crop damage could involve thousands of birds covering large acreages of cropland, and one incident for aquaculture damage could be losses for the entire year and include brood fish that would not be sold.

Category	Resource	FY05		FY06		FY07		Average	
		Req.	$ Value $	Req.	$ Value $	Req.	$ Value $	Req.	$ Value/Yr
Livestock	Cattle			95	$0	63	$0	53	$0
	Goats	8	$3,025	-	-	-	-	3	$1,008
	Sheep	1	$8,000	3	$230	1	$100	2	$2,777
	Other Hoof-stock			1	$0			0	$0
	Poultry/Eggs			15	$150	1	$5	5	$52
	Livestock Feed	93	$7,000	61	$60,000	6	$300	53	$22,433
Subtotal		**102**	**$18,025**	**175**	**$63,380**	**71**	**$405**	**116**	**27,270**
Crops	Wheat	1	$0	43	$21,450	79	$50,000	41	$23,817
	Alfalfa, Pasture	242	$1,000	139	$5,100	205	$15,000	195	$7,033
	Peppers	103	$0	127	$10,500	194	$38,000	141	$16,167
	Pecan/Nuts	12	$19,500	4	$27,000	8	$21,000	8	$22,500
	Other Crops*	3	0	15	$0	1	$6,000	6	$2,000
Subtotal		**361**	**$20,500**	**328**	**$64,050**	**487**	**$130,000**	**392**	**$71,517**
Aquacult.	Ornamental Fish	-	-	-	-	1	$500	0	$167
Subtotal		**0**	**$0**	**0**	**$0**	**1**	**$500**	**0**	**$167**
TOTAL		**463**	**$38,525**	**503**	**$127,430**	**559**	**$130,905**	**508**	**$98,953**

Req. = Requests for assistance

Contribution of Livestock and Dairies to the Economy. Livestock and dairy production in New Mexico contributes substantially to local economies. In January 2008, the cattle inventory was 1.53 million with 320,000 head of cattle on feed in feedlots and 342,000 milk cows. The market value for 2002 from dairy and cattle and calves in New Mexico was reported at $1.09 billion dollars. Of this, New Mexico dairy operators generated $730 million in producer gross income (New Mexico Agricultural Statistics Service (NMASS) 2008).

Scope of Livestock Feed Losses. The problem of starling damage to livestock feed has been documented in France and Great Britain (Feare 1984), and in the United States (Besser et. al. 1968). The concentration of larger numbers of cattle eating huge quantities of feed in confined pens results in a tremendous attraction to starlings, blackbirds, and feral domestic pigeons. Diet rations for cattle contain all of the nutrients and fiber that cattle need, and are so thoroughly mixed that cattle are unable to select any one component over others. The basic constituent of most rations is silage and the high energy portion is usually provided with corn, barley, or other grain which may be incorporated as whole grains, crushed, or steamed and flaked. While cattle cannot select individual ingredients from that ration, starlings can and do select certain high-energy portions, thereby altering the energetic value of the complete diet. The removal of the high energy fraction by starlings, is believed to reduce milk yields, weight gains, and is economically significant (Feare 1984). Glahn and Otis (1986) reported that starling damage was associated with proximity to roosts, snow, and freezing temperatures and the number of livestock on feed. WS in New Mexico responded to an average of 53 requests for assistance annually from FY05 to FY07.

The economic significance of feed losses to starlings has been demonstrated by Besser et al. (1968) who concluded that the value of losses in feedlots near Denver, Colorado was $84 per 1,000 birds in 1967. Forbes (1995) reported starlings consume up to 50% of their body weight in feed each day. Glahn and Otis (1981) reported losses of 4.8 kg of pelletized feed consumed per 1,000 bird minutes. Glahn (1983) reported that 25.8% of farms in Tennessee experienced starling depredation problems of which 6.3% experienced significant economic loss. Williams (1983) estimated seasonal feed losses to five species of blackbirds (primarily brown-headed cowbirds) at one feedlot in south Texas at nearly 140 tons valued at $18,000.

A cost:benefit analysis of starling depredation at CAFOs in Nevada (WS 2006) that received WS BDM services found that the ratio of the cost of the livestock feed losses prevented (the analysis did not include livestock health related problems) to providing BDM services was 4.6:1. For every dollar spent providing BDM, $4.60 was saved by CAFO operators. The CAFOs in Nevada had similar numbers of starlings to CAFOs in New Mexico. Another analysis of blackbird and starling depredation at 10 cattle feeding facilities in Arizona that used WS BDM services conservatively estimated that the value of feed losses on the 10 facilities would have been about $120,000 without WS BDM services which cost approximately $40,000/yr (WS 1996). A similar analysis has not been performed for New Mexico feedlots. However, blackbird and starling numbers that have been observed by WS personnel at New Mexico feedlots have generally been similar to the numbers observed at the Arizona facilities (WS 1996). Therefore, the value of feed losses at New Mexico feedlots is probably similar to the Arizona analysis.

Scope of Livestock Health Problems. Most livestock health problems determined to be associated with birds in New Mexico occur at CAFOs where indirect losses from the transmission of disease from birds to livestock such as coccidiosis, transmissible gastroenteritis virus, and tuberculosis can occur. Some of these diseases have been linked primarily to migratory flocks of starlings and blackbirds (Gough and Beyer 1982). Several diseases that arise in birds affect livestock and have been associated with feral domestic pigeons, starlings, blackbirds, and House Sparrows (Figure 3).

Although yet to be proven scientifically, transmission of diseases such as transmissible gastroenteritis virus, tuberculosis, and coccidiosis to livestock have been suspected as being linked to migratory flocks of starlings and blackbirds. Estimates of the dollar value of this type of damage are not available. Starlings were implicated in a transmissible gastroenteritis virus outbreak that killed more than 10,000 pigs in one county in southeast Nebraska in the winter of 1978-79 (Johnson and Glahn 1994). Livestock health is a concern to New Mexico cattle and other livestock producers since many requests for assistance to WS are to reduce the potential for disease transmission, especially at CAFOs (Table 2).

1.3.4 Need for BDM to Protect Agricultural Crops

New Mexico has a variety agricultural crops that were valued at 400 million in 2002 (NMASS 2008). Alfalfa, silage, and hay crops had a market value of $105 million, grains including wheat $68 million, vegetables and melons including chili peppers $97 million, and fruit, nut, and berry crops $59 million in

2002 in New Mexico (NMASS 2008). Crops can be damaged by birds and WS responded to an average of 392 requests for assistance to protect crops from FY05 to FY07 with damage totaling $72,000 (Table 2). Many requests are received prior to the occurrence of damage, especially in areas with historic damage occurrence. Much of the assistance given is on hazing methods to reduce damage.

Disease	**Livestock affected**	**Symptoms**	**Comments**
BACTERIAL			
erysipeloid	cattle, swine, horses, sheep, goats, chickens, turkeys, ducks	Pigs - arthritis, skin lesions, necrosis, septicemia Sheep - lameness	serious hazard for the swine industry, rejection of swine meat at slaughter due to septicemia, also affects dogs
salmonellosis	all domestic animals	abortions in mature cattle, mortality in calves, decrease in milk production in dairy cattle Colitis in pigs,	over 1700 serotypes
Pasteurellosis	cattle, swine, horses, rabbits, chickens, turkeys	Chickens and turkeys die suddenly without illness pneumonia, bovine mastitis, abortions in swine, septicemia, abscesses	also affects cats and dogs
avian tuberculosis	chickens, turkeys, swine, cattle, horses, sheep	Emaciation, decrease in egg production, and death in poultry. Mastitis in cattle.	also affects dogs and cats
Streptococcosis	cattle, swine, sheep, horses, chickens, turkeys, geese, ducks, rabbits	Emaciation and death in poultry. Mastitis in cattle, abscesses and inflammation of the heart , and death in swine	feral pigeons are susceptible and aid in transmission
yersinosis	cattle, sheep, goats, horses, turkeys, chickens, ducks	abortion in sheep and cattle	also affects dogs and cats
vibriosis	cattle and sheep	In cattle, often a cause of infertility or early embryonic death. In sheep, the only known cause of infectious abortion in late pregnancy	of great economic importance
Listeriosis	Chickens, ducks, geese, cattle, horses, swine, sheep, goats	In cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles	also affects cats and dogs
VIRAL			
meningitis	cattle, sheep, swine, poultry	inflammation of the brain, newborn calve unable to suckle	associated with Listeriosis, salmonellosis, cryptococcosis
encephalitis (8 forms)	horses, turkeys, ducks	drowsiness, inflammation of the brain	mosquitoes serve as vectors
MYCOTIC (FUNGAL)			
aspergillosis	cattle, chickens, turkeys, and ducks	abortions in cattle	common in turkey poults
		Rarely	affects horses, dogs and cats
candidiasis	cattle, swine, sheep, horses, chickens, turkeys	In cattle, mastitis, diarrhea, vaginal discharge, and aborted fetuses	causes unsatisfactory growth in chickens
cryptococcosis	cattle, swine, horses	chronic mastitis in cattle, decreased milk flow and appetite loss	also affects dogs and cats
histoplasmosis	horses cattle and swine	(in dogs) chronic cough, loss of appetite, weakness, depression, diarrhea, extreme weight loss	also affects dogs; actively grows and multiplies in soil and remains active long after birds have departed
PROTOZOAL			
Coccidiosis	poultry, cattle, and sheep	bloody diarrhea in chickens, dehydration, retardation of growth	almost always present in English sparrows; also found in pigeons and starlings
American trypanosomiasis	infection of mucous membranes of eyes or nose, swelling	possible death in 2-4 weeks	caused by the conenose bug found on pigeons
toxoplasmosis	cattle, swine, horses, sheep, chickens, turkeys	In cattle, muscular tremors, coughing, sneezing, nasal discharge, frothing at the mouth, prostration and abortion	also affects dogs and cats
RICKETTSIAL/CHLAMYDIAL			
chlamydiosis	cattle, horses, swine, sheep, goats, chickens, turkeys, ducks, geese	In cattle, abortion, arthritis, conjunctivitis, enteritis	also affects dogs and cats and many wild birds and mammals
Q fever	affects cattle, sheep, goats, and poultry	may cause abortions in sheep and goats	can be transmitted by infected ticks

Figure 3. Diseases of livestock linked to feral pigeons, starlings, blackbirds, and House Sparrows (*taken from* Weber 1979).

Sandhill Cranes, Canada Geese, and Snow Geese can cause considerable damage to crops, particularly alfalfa, winter wheat, chili peppers, and pasturelands. Large numbers of Sandhill Cranes along with lesser numbers of Canada and Snow Geese winter in the Middle Rio Grande Valley (MRGV) and WS has had a program in place to haze these birds from agricultural fields since FY94. The overall populations of Sandhill Cranes and many species of geese in North America have experienced drastic increases over the last few decades. Large Sandhill Crane and goose flocks often congregate in New Mexico on croplands to feed and take advantage of the large open spaces that the fields offer as a safety strategy. Damage to these crops during feeding by cranes and geese can be quite extensive; these species often pluck younger plants from the ground during feeding rather than clip off the vegetative portion of the older plants. From FY05 to FY07, WS responded to an average of 394 incidents of crane and goose damage annually for alfalfa, pasture, silage, chili, and winter wheat fields where it was reported that they caused $31,000 in damage. This is considerably less than the damage that occurred prior to the initiation of the MRGV Sandhill Crane and goose management program that was directed by Congress. The MRGV hazing program has been a success and continues to this day. Figure 4 illustrates the drop of damage following the beginning of the program in 1993. It should be noted that the reported damage for cranes and geese in the MIS is for all of New Mexico and not just MRGV as depicted in Figure 4.

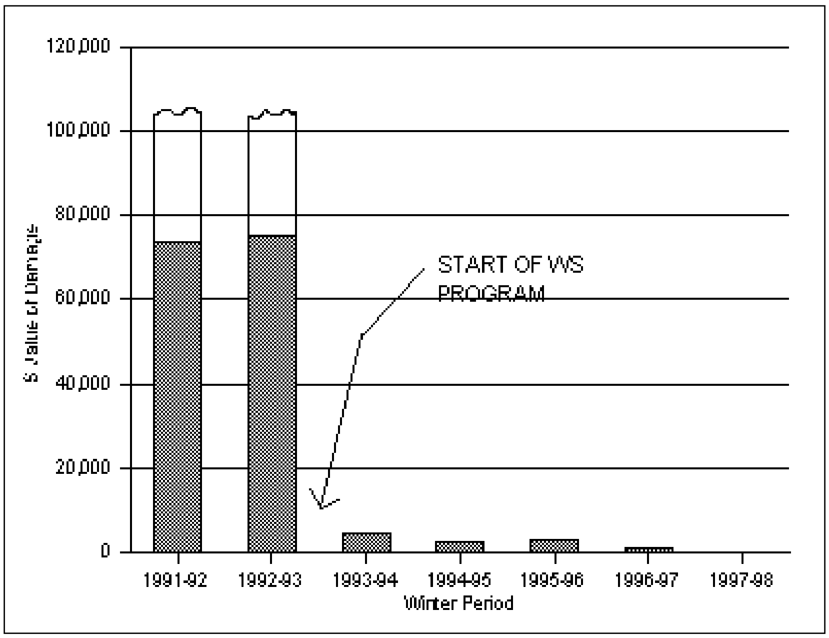

Figure 4. WS in New Mexico has a Sandhill Crane and goose management program that was directed by Congress in MRGV. The program reduced damage to crops following its initiation and is a continued success to this day.

New Mexico pecan groves are mostly located in the lower Rio Grande Valley. New Mexico pecan growers produce about 50 million pounds annually. From the time pecans first ripen, as early as late summer, until they are harvested in the fall or winter, pecan nuts are vulnerable to shell cracking, feeding, or caching by ravens, crows, jays, woodpeckers, and other birds. One pecan producer estimated annual losses to crows and ravens at 10,000 to 20,000 pounds at his orchard and 75,000 to 100,000 pounds for all producers in the Mesilla Valley. Pecan producers typically employ a variety of nonlethal methods to reduce bird depredation including harassment with pyrotechnics, propane cannons, and electronic noise makers. Some producers hold federal permits which allow them to shoot ravens. In the fall of 2003, NM WS was issued a 24(c) Special Local Needs registration for DRC-1339 to reduce pecan losses to crows and ravens in Dona Ana County. Only limited success was achieved, but since then there has been a decrease in the requests for WS assistance. From FY05 to FY07, WS received 8 requests for assistance annually with an average of $22,500 damage to pecans (Table 2).

1.3.5 Need for BDM to Protect Aquaculture

New Mexico has a few aquaculture facilities. In 2002, 19 aquaculturalists in New Mexico marketed $1.6 million (NASS 2005). Additional aquaculture facilities are managed by the state through NMDGF. Occasionally, fish-eating birds such as herons, egrets, Double-crested Cormorants, Ring-billed Gulls, Ospreys, and other piscivorous bird species prey on young fry, fingerlings, adult fish ready for stocking, or brood fish at these fish rearing facilities. In most cases, WS only provides advice (technical assistance) to the facility operators on how to resolve such problems through primarily nonlethal means such as barriers, deterrent wires, or harassment. In some cases, the producer or facility might obtain a depredation permit from USFWS to kill a few of the birds to reinforce the remaining birds' fear of harassment and exclusionary techniques. Under the proposed action, WS could also be requested to provide on-site operational assistance involving the use of nonlethal and lethal means of resolving bird damage problems at these or similar facilities. Lethal methods would generally be restricted to taking only a few birds to reinforce the remaining birds' fear of harassment and exclusionary techniques. WS responded to 1 request for assistance for an aquaculture facility from FY05 to FY07 to protect fish from Great Blue Herons (Table 2). WS has also responded to other aquaculture requests from FY92 to FY04 for Black-crowned Night-Herons, Ring Billed and Herring Gulls, Osprey, and Great Egrets, primarily for trout (*Onychorhynchus spp*.) predation at hatcheries.

1.3.6 Need for BDM to Protect Property

WS has conducted many BDM projects to protect property. Property encompasses a wide range of resources that are damaged by birds. Much of the damage is from bird droppings. Feral pigeons congregate under bridges and on building causing damage to these. Utility towers are sometimes used by turkey vultures for roosting where they, as well as other flocking birds such as starlings and crows, can cause damage problems, primarily from their droppings. Other property can be damaged because birds will feed on it such as landscaping, grass, and flowers. Finally, the bulky nests of some species can be damaging, but most are more of a fire hazard when built in or on structures.

Feral domestic and wild waterfowl sometimes congregate at golf courses, parks, and other recreational areas that have ponds or watercourses and cause damage by grazing on turf and the accumulation of droppings. A golf course manager reported $150,000 in damages to golf greens and fairway turf from the feeding activities of large flocks of Mallards, American Wigeons, and American Coots. The greens on a golf course are particularly vulnerable and very costly to repair. Additionally, small to large flocks of Canada Geese are common at golf courses throughout New Mexico.

Bird droppings cause damage because they are acidic and have ammonia. Once dried, they become salts which react with water. Corrosion damage to metal structures and painted finishes, including those on automobiles and aircraft, can occur because of uric acid from bird droppings. Several incidents involving bird droppings on vehicles, equipment, and aircraft in storage buildings at airports and airbases have created concern. Estimates of damage to aircraft at an airbase in Oklahoma have been made (WS 2003b) for repairing aircraft skin on a KC-135 damaged from bird droppings (primarily roosting starlings, pigeons, and House Sparrows) and ranged from $10,000-$15,000 in replacement materials with an additional estimated 100 hrs labor at $95/hr. required for a full wing repair for a total cost of over $20,000. Spot repairs can be expected to require $3,000-$4,000 in materials with approximately 50 hrs. labor at $95/hr.

Birds damage structures such as houses on private property or public buildings and bridges with fecal contamination. Accumulated bird droppings can reduce the functional life of some building roofs by 50% (Weber 1979). Woodpeckers sometimes cause structural damage to wood siding and stucco on homes. Damage to buildings by birds was the most frequent property damage complaint in New Mexico averaging 278 requests per year with a recorded value of about $40,000. The feral pigeon was the most frequent species involved in these damage complaints. The feral pigeon was also responsible for an average of 23 requests for assistance for damage to bridges. Newspapers reported that pigeons were thought to have been a contributor to the bridge collapse in Minneapolis that killed 13 people from corrosion that occurred because of their droppings on the steel girders in 2007.

Rookeries, or nesting colonies, are established by egret and heron species, including Cattle Egrets, Great Egrets, Great Blue Herons, and Snowy Egrets. Most residential colonies in New Mexico consist of Snowy Egrets and Black-crowned Night-Herons. These nesting sites can encompass areas between 0.1 and 5 ha in size. Egret and heron activities can be destructive to desirable trees, shrubs, and other vegetation at these sites. Defoliation of the plants by bird movements through the canopy, removal of plant material for nest building, covering of leaves by droppings, and drastic increases in soil nutrients from bird droppings will destroy the vegetative community in 1-12 years depending on the plant species present and the number of birds (Telfair and Thompson 1986, Telfair 2006).

Finally, as discussed for livestock, birds can depredate pets and zoo animals or potentially be involved in the transmission of disease to them. Small dogs and cats can be killed by large raptors such as the Great Horned Owl. Small zoo animals, depending on size, are also vulnerable to attack by raptors. WS assisted one person and a zoo with predation from raptors from FY05 to FY07 (Table 3).

Table 3. The number of requests for assistance and value of damage caused by birds in New Mexico as reported to or verified by WS from FY03 to FY07 for property and natural resources. The damage reported in this table is only a fraction of the actual damage caused by birds in New Mexico.

Category	Resource	FY05		FY06		FY07		Average	
		Req.	$ Value $	Req.	$ Value $	Req.	$ Value $	Req.	$ Value/Yr
Property	Pets/Zoo Animals	1	$0	1	$10,000	-	-	1	3,333
	Aircraft	1	$72,000	1	1,000,000	1	$0	3	357,333
	Other Equipment	1	$0	14	$10,000	6	$500	7	3,500
	Landscaping/Golf C.	9	$168,100	-	-	2	$3,500	4	$57,200
	General Property	39	$41,000	3	$0	5	$10,000	16	$17,000
	Buildings/Houses	219	$67,250	303	$46,600	313	$6,975	278	$40,275
	Utilities	1	$500	1	$0	-	-	1	$167
	Roads/Bridges	39	$0	13	$0	18	$0	23	$0
Subtotal		310	$348,850	336	$1,066,600	345	$20,975	332	$475,475
Natural Resources	T&E Species	2	$0	-	-	-	-	1	$0
	Recreational Area	1	$2,000	-	-	1	$500	1	$833
Subtotal		3	$2,000	0	$0	1	$500	2	$833
Human Health And Safety		26	$0	135	$200	106	$180,000	89	$60,067
Subtotal		26	$0	135	$200	106	$180,000	89	$60,067
TOTAL		339	$350,850	471	$1,066,800	452	$201,475	423	$536,375

Req. = Requests for assistance

1.3.7 Need for BDM to Protect Wildlife Including T&E Species

Some species of wildlife including those listed as T&E under the Endangered Species Act (ESA) of 1973 are preyed upon or otherwise adversely affected by certain bird species. Direct predation has been shown to seriously limit the recovery of T&E and sensitive bird species, particularly ground nesting birds. Snowy Plovers, the western population is a T&E species in California where it is protected by WS from predatory birds, is an example of a species that breeds in New Mexico that could be subjected to damage from predatory birds. Studies have been conducted in other states to determine population trends of least terns and piping plovers and these studies have shown that predation plays a significant role in nest losses (Kirsch 1993). Birds of prey, as well as mammalian carnivores, kill adult California Least Terns and their young, and destroy nests in nesting colonies of this endangered species. The California WS program trapped raptors at several breeding sites to protect this species at the request of land managing agencies which allowed for successful reproduction (Butchko and Small 1992). Bird species documented as potential threats to the long term nesting success of terns include Red-tailed Hawks, Great Horned Owls, American Kestrels, Northern Harriers, and Burrowing Owls. Black-crowned Night-Herons are another potential predator of terns and plovers (Kirsch 1993). Interior Least Terns mostly migrate through New Mexico, but have nested at two sites in New Mexico.

Inter-specific nest competition has been well documented in starlings. Miller (1975) and Barnes (1991) reported starlings were responsible for a severe depletion of the Eastern Bluebird population due to nest competition. Nest competition by starlings has also been known to adversely impact American Kestrels (Nickell 1967; Von Jarchow 1943; Wilmer 1987), Red-bellied Woodpeckers, Gila Woodpeckers (*Centurus uropygialis*) (Ingold 1994, Kerpez and Smith 1990), and Wood Ducks (Shake 1967, Heusmann et al. 1977, Grabill 1977, McGilvery and Uhler 1971). Red-headed Woodpeckers is the species of most concern in New Mexico that has potentially been impacted by starlings (W. Howe, USFWS, NM pers. comm. 2008). Weitzel (1988) reported 9 native species of birds in Nevada had been displaced by starling nest competition, and Mason et al. (1972) reported starlings evicting bats from nest holes. Control operations as proposed under the current program could reduce very local starling populations, but it is not likely to reduce them enough unless BDM were focused at the time of nesting. Reduction in nest site competition would be a beneficial impact on the species listed above. Although such reductions are not likely to be significant over large areas, there could be some cases where some individuals limited by environmental factors could benefit by enhanced recruitment during nesting seasons.

Lesser Prairie-Chickens were once common birds in eastern New Mexico. A lack of quality habitats, along with other factors have contributed to over a 90% decline in prairie-chicken numbers over time. The Lesser Prairie-Chicken is currently at a critical period for long-term survival (Hagen 2003) and has been listed as a species “warranted but precluded” for listing under the ESA (Fed. Reg. Notice 63(110):31400-31406). While habitat fragmentation and availability are the over-arching issue for their decline, some research has shown that management of predator species, including predatory birds, in fragmented habitat can enhance prairie-chicken recruitment (Schroeder and Baydack 2001). Primary predators of Lesser Prairie-Chickens are Red-tailed Hawks, Rough-legged Hawks, Ferruginous Hawks, Prairie Falcons, Great Horned Owls, Golden Eagles, and Northern Harriers.

The nests of several endangered birds are frequently parasitized by Brown-headed Cowbirds. An endangered bird that has been negatively affected by Brown-headed Cowbirds is the Black-capped Vireo (Brown 1994, Grzybowski 1995). The cowbirds lay their eggs in active nests of other bird species. Cowbirds are known to lay eggs in the nests of more than 100 different bird species. Each female will lay as many as 40 eggs per year in surrogate nests (Lowther 1993). The cowbird eggs hatch first and the young are cared for by the host bird as if they were its own. By the time that the host birds’ own eggs hatch, the cowbird nestlings are already much larger, out-competing the host birds’ young for food and frequently pushing them out of the nest. With endangered bird species, such parasitism can cause enough nest failures to jeopardize the host species. A number of agencies, including WS in Arizona, California, Michigan, and Texas, have historically conducted cowbird trapping and other population control measures in certain areas (e.g., at feedlots and roost locations) to successfully reduce nest parasitism in areas where the host birds have been impacted. The only T&E species in New Mexico that has been impacted by the cowbird is the Southwestern Willow Flycatcher.

Another natural resource protection activity is the protection of T&E fish and fisheries from fish-eating birds, especially where piscivorous birds congregate in large numbers. Several piscivorous bird populations have escalated significantly over the last 40 years and can deplete fisheries in local areas.

WS is currently not involved in operational natural resource or T&E species protection activities from birds in New Mexico, but could be called upon to do so in the future.

1.4 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

WS issued a Final EIS on the national APHIS-WS program (USDA 1997). Pertinent information from USDA (1997) has been incorporated by reference into this EA. WS has covered BDM activities in New Mexico under a previous EA, Finding of No Significant Impact, and Decision for BDM in New Mexico (WS 1999). This EA will supersede that Decision.

1.5 DECISION TO BE MADE

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

- Should BDM as currently implemented by WS be continued in the State?
- If not, how should WS fulfill its legislative responsibilities for managing bird damage in the State?
- What standard operating procedures (SOPs) should be implemented to lessen identified potential impacts?
- Do WS BDM activities have significant impacts requiring preparation of an EIS?

1.6 SCOPE OF THIS EA ANALYSIS

1.6.1 Actions Analyzed

This EA evaluates WS BDM to protect human health and safety, agricultural resources, property, and natural resources on private or public lands throughout New Mexico wherever such management is requested. This includes BDM for the protection of resources and bird management for monitoring and surveillance purposes.

1.6.2 American Indian Lands and Tribes

WS only conducts BDM at a Tribe's request. WS has not been requested to provide assistance with BDM in New Mexico on tribal lands. Since tribal lands are sovereign and the methods employed are the same as for any private land upon which WS provides services, tribal officials would determine if BDM is desired and the BDM methods that would be allowed. Because tribal officials have the ultimate decision on whether BDM is conducted, no conflict with traditional cultural properties or beliefs is anticipated. Therefore, this EA would cover BDM on tribal lands, where requested and implemented.

1.6.3 Federal Lands

New Mexico has a number of different federal lands (e.g., Bureau of Land Management, U.S. Forest Service) within its boundaries and WS could be requested to conduct BDM on them. The methods employed and potential impacts are the same on these lands as they would be on private lands upon which WS provides service. Therefore, if WS were requested to conduct BDM on federal lands for the protection of agriculture, property, human health and safety, or natural resources, this EA would cover the BDM actions implemented, if the impacts of BDM activities for such actions have been considered in this EA. NEPA compliance for BDM conducted to protect property or natural resources such as T&E species at the request of USFWS or other federal agency is the requesting agency's responsibility. However, WS could accept the NEPA responsibility at the request of another agency, but that agency would still be responsible for issuing a NEPA Decision.

1.6.4 Period for which this EA is Valid

This EA will remain valid until WS determines that new needs for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document will be reviewed and revised as necessary. This EA will be reviewed each year to ensure that it is complete and still appropriate for the scope of the BDM activities conducted by WS in New Mexico.

1.6.5 Site Specificity

This EA analyzes potential impacts of BDM on the human environment as required by NEPA and addresses WS BDM activities on all lands under Cooperative Agreement or Agreements for Control or as otherwise covered by WS Work Plans (e.g., on federal public lands) within New Mexico. It also addresses the impacts of BDM on areas where additional agreements with WS may be written in the reasonably foreseeable future in New Mexico. Because the proposed action is to continue the current BDM program, and because the current program's goal and responsibility is to provide service when requested within the constraints of available funding and manpower, it is conceivable that additional BDM efforts could occur. Thus, this EA anticipates potential expansion and analyzes the impacts of such expanded efforts as part of the current program.

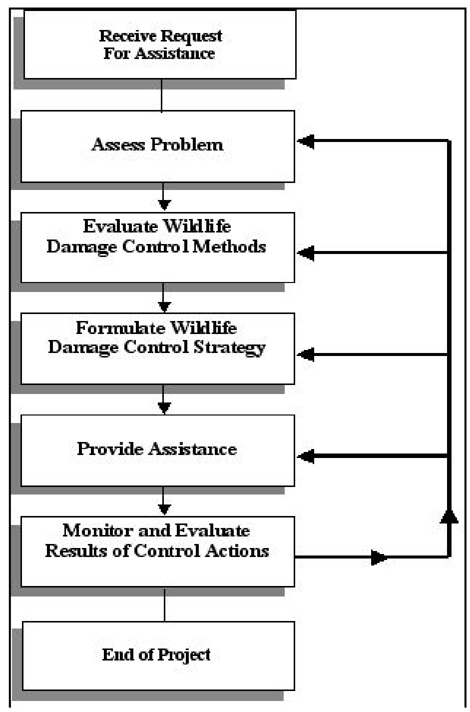

Figure 5. WS Decision Model used at the field level to evaluate a wildlife damage problem (*copied from* Slate et al. 1992).

Planning for the management of bird damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, insurance companies, and other emergency response agencies. Although some of the sites where bird damage is likely to occur and lead to requests to WS for assistance can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible; however, many issues apply wherever bird damage and resulting management occurs, and are treated as such.

The standard WS Decision Model (Figure 5) and WS Directive 2.105 is the site-specific routine thought process for determining methods and strategies to use or recommend for individual actions conducted by WS (see USDA 1997, Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application). The Decision Model is not intended to require documentation or a written record each time it is used, and it necessarily oversimplifies complex thought processes (Slate et al. 1992). Decisions made using the model would be in accordance with SOPs described herein and adopted or established as part of the decision.

The analysis in this EA considers impacts on target and nontarget wildlife species, people, pets, and the environment. Wildlife populations, with the exception of T&E species, are typically monitored over large geographic areas (i.e., the West, the State) and smaller geographic areas by the State Wildlife agency (i.e., NMDGF game management units). WS monitors target bird and nontarget take for New Mexico by county. The game management units and counties do not correspond to each other in New Mexico, thus, analysis of wildlife population impacts is better analyzed at the statewide level. Additionally, because most birds migrate, harvest is analyzed better at the statewide and regional levels. Waterfowl harvest by sportsmen in New Mexico is estimated by NMDGF and USFWS from mail and internet surveys. Statistically, the variance at the local level (i.e., the game management unit or County) is very high and can be ± 100% making the data not as useful. However, the variance is much lower at the statewide or Flyway level and, therefore, much more reliable. Cumulative impacts, therefore, are more accurate, especially for migratory birds on a broader level and the statewide level is often used.

1.7 AUTHORITY AND COMPLIANCE

1.7.1 Authority of Federal and State Agencies for BDM in New Mexico

1.7.1.1 WS Legislative Authority. USDA is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. WS has legislative authority to conduct WDM in New Mexico.

The primary statutory authorities for the APHIS-WS program are the Act of March 2, 1931 (46 Stat. 1468; 7 United States Code (USC) 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c). The Act of March 2, 1931, as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, provides that:

> "*The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001.*"

The Act of December 22, 1987 provides 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 mammals and birds 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*."

WS conducts WDM in cooperation with and under the authorities of NMDA and NMDGF. WS works cooperatively with local livestock associations and county governments to provide BDM assistance for its constituents. BDM assistance is provided statewide in areas where funding has been provided. BDM activities occur on both private and public lands as addressed in Section 1.6.2. The BDM methods that can be used in New Mexico are discussed in Section 3.3.1.3 and each bird damage operational project may require the use of one or more of these.

1.7.1.2 U.S. Fish and Wildlife Service. USFWS is responsible for managing and regulating take of migratory bird species listed under the Migratory Bird Treaty Act. They are also responsible for regulating T&E species under ESA. Sections 1.7.2.2 and 1.7.2.3 below describe WS's interactions with the USFWS under these two laws.

1.7.1.3 New Mexico Department of Game and Fish. NMDGF is responsible under New Mexico Statutes Annotated (NMSA) Chapter 17 for managing most wildlife species in the State under the direction of the New Mexico State Game Commission. NMSA 17-2-13 prohibits trapping, killing, or injuring songbirds that include "*. . . perching birds which feed entirely or chiefly on insects.*" NMDGF has issued a letter of authorization to WS which constitutes a permit to take state-protected bird species for depredation purposes. In addition, NMDGF has issued a letter of authorization to WS to allow for incidental take of state-protected species.

1.7.1.4 New Mexico Department of Agriculture (NMDA). NMDA is authorized to cooperate with WS to conduct WDM. NMDA regulates the pesticide laws in New Mexico. WS registers any pesticides it uses with NMDA. WS personnel that use pesticides in their job duties must be certified as a pesticide applicator through NMDA or be supervised by a certified pesticide applicator. DRC-1339 and Avitrol are the only avicides registered for use in New Mexico and pesticide users must be registered to use these under NMAC 21.17.57.1-11.

1.7.2 Compliance with Federal Laws

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

1.7.2.1 National Environmental Policy Act. WS prepares analyses of the environmental impacts of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in New Mexico. Most federal actions are subject to NEPA (Public Law 91-190, 42 USC 4321 et seq.) and its implementing regulations established by the Council on Environmental Quality (40 CFR 1500-1508). In addition, WS follows USDA (7 CFR 1b) and APHIS (7 CFR 372) NEPA implementing regulations as a part of the decision-making process. When WS operational assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency.

1.7.2.2 Endangered Species Act. It is federal policy, under ESA, that all federal agencies shall seek to conserve T&E species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with 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)). WS obtained a Biological Opinion (BO) from USFWS in 1992 describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F). WS is in the process of initiating formal consultation at the programmatic level to reevaluate the 1992 BO and to fully evaluate potential effects on T&E species listed or proposed for listing since the 1992 USFWS BO (USDA 1997, Appendix F). WS has conducted a Section 7 consultation in New Mexico with USFWS in 2003 (WS 2003a, USFWS 2003a).

1.7.2.3 Migratory Bird Treaty Act. The Migratory Bird Treaty Act of 1918 (16 USC 703-711; 40 Stat. 755), as amended, provides USFWS regulatory authority to protect species of birds classified as "migratory" and are listed in 50 CFR 10.13 (most all bird species except gallinaceous (e.g., Wild Turkey, grouse) and introduced birds (E.g. feral pigeon, starling). The law prohibits any "*take*" of bird species, eggs, and nests and possession of birds or bird parts by private entities, except as permitted by the USFWS; therefore, the USFWS issues permits to private and public entities, including WS, for reducing bird damage. A draft Memorandum of Understanding (MOU) for the purpose of migratory bird conservation is currently being developed between WS and USFWS to comply with Executive Order 13186 of January 10, 2001, the Responsibilities of Federal Agencies to Protect Migratory Birds (see Section 1.7.2.7 below).

WS may provide on-site assessments for persons experiencing migratory bird damage to obtain information on which to base damage management recommendations. Damage management recommendations could be in the form of technical assistance or operational assistance. When appropriate, WS may provide recommendations to the USFWS for the issuance of depredation permits to private entities to resolve a bird damage problem. The ultimate responsibility for issuing such permits rests with the USFWS (50 CFR 21.41). Starlings, feral domestic pigeons, House Sparrows, and domestic waterfowl are not classified as protected migratory birds and, therefore, have no protection under this Act. USFWS depredation permits are not required to kill blackbirds, cowbirds, all grackles, crows, or magpies in New Mexico found committing or about to commit depredation upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance. Based on evidence that migratory game birds have accumulated in such numbers to threaten or damage agriculture, horticulture or aquaculture, the Director of the USFWS is authorized to issue a depredation order to permit the killing of such birds (50 CFR 21.42-47).

1.7.2.4 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods used or recommended by WS are registered with and regulated by the EPA and NMDA, and are used by WS in compliance with labeling procedures and requirements.

1.7.2.5 Food, Drug, and Cosmetic Act. This Act, as amended, gives the Food and Drug Administration (FDA) the authorization to regulate the study and use of animal drugs. FDA regulates A-C and other immobilization drugs used by WS under this Act.

1.7.2.6 National Historic Preservation Act (NHPA). NHPA of 1966, as amended, and its implementing regulations (36 CFR 800) requires federal agencies to: 1) determine whether activities they propose constitute "*undertakings*" that can result in changes in the character or use of historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources, and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings. Tribe's request WS BDM and sign agreements for WS to conduct BDM on their lands; thus, tribes have control over any potential conflict with cultural resources on tribal properties. WS activities as described under the proposed action do not cause ground disturbances nor do they otherwise have the potential to significantly affect visual, audible, or atmospheric elements of historic properties and are, thus, not undertakings as defined by NHPA. BDM could benefit historic properties if birds were damaging such properties. In those cases, the officials responsible for management of such properties would make the request and would have decision-making authority over the methods to be used. Harassment techniques that involve noise-making could conceivably disturb users of historic properties if they were used at or in close proximity to such properties; however, it would be an exceedingly rare event for noise-producing devices to be used in close proximity to such a property unless the resource being protected from bird damage was the property itself, in which case the primary effect would be beneficial. Also, the use of such devices is generally short term and could be discontinued if any conflicts with historic properties arose. WS has determined BDM actions are not undertakings as defined by the NHPA because such actions do not have the potential to result in changes in the character or use of historic properties.

1.7.2.7 Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act of 1940 (16 USC, 668-668d), as amended, allows for the protection and preservation of Bald Eagles and Golden Eagles by prohibiting, except under certain specified conditions, the taking, possession, and commerce of these birds. The Secretary of the Interior can permit the taking, possession, and transportation of specimens for scientific or exhibition purposes or for the religious purposes of Native American Tribes if the action is determined to be compatible with the preservation of the Bald or Golden Eagle. USFWS has recently drafted an EA to amend the Act to allow the "incidental take" of both Bald and Golden Eagles. Incidental take was formerly allowed only for the endangered Bald Eagle.

BDM could benefit eagles by providing protection from a direct wildlife threat to birds, nests or eggs by predation or disease, protection to individuals from being killed by aircraft strikes, or prevent eagles from being killed illegally by frustrated or careless individuals experiencing eagle damage or damage threats to resources. Although limited in New Mexico, depredation of livestock and wildlife has been documented for both Bald Eagles and Golden Eagles. Generally, though, most predation of livestock is associated with Golden Eagles. Any interaction with eagles by WS is further tempered by WS Policy (WS Directive 2.315).

1.7.2.8 Executive Order 13186 - Responsibilities of Federal Agencies to Protect Migratory Birds. Executive Order 13186 of January 10, 2001 directs federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within 2 years, an MOU with USFWS that shall promote the conservation of migratory birds. WS currently has been working with USFWS on the MOU to cover such activities.

1.7.2.9 Executive Order 13112 - Invasive Species. Nonnative plants and animals that inadvertently find their way to the United States are of increasing concern as they threaten our natural resources. One study estimated that the total cost of invasive species in the United States amounted to more than $100 billion each year (Pimentel et. al., 1999). Invasive species impact nearly half of the species currently listed as T&E under ESA. On February 3, 1999, Executive Order 13112 was signed establishing the National Invasive Species Council. The Council is an inter-Departmental body that helps coordinate cost-effective federal activities regarding invasive species and ensure that activities are complementary. Council members include the Departments of the Interior, Agriculture, Commerce, State, Treasury, Transportation, Defense, and Health and Human Services, EPA, and the U.S. Agency for International Development. Together with the Invasive Species Advisory Committee, stakeholders, concerned members of the public, and member departments, the National Invasive Species Council formulated an action plan for the nation. The Council issued the National Invasive Species Management Plan early in 2001 to provide an overall blueprint for federal action. The Plan recommends specific action items to improve coordination, prevention, control and management of invasive species by the federal agency members of the National Invasive Species Council.

1.7.2.10 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 levels, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice, also known as Environmental Equity, 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. This Executive Order is a priority within both APHIS and WS. 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. APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA. All WS activities are evaluated for their impact on the human environment and compliance with

Executive Order 12898 to insure environmental justice. WS personnel use WDM methods as selectively and environmentally conscientiously as possible. 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.

1.7.3 Compliance with State Laws

Several New Mexico laws regulate WS and BDM. WS complies with these laws as applicable, and consults and cooperates with State agencies as appropriate. These laws are in NMSA or the New Mexico Administrative Codes (NMAC).

NMSA 17.2.3. Game Birds. This statute defines protected game birds.

NMSA 17.2.41. Endangered species. This is the State law that provides special protection to State designated T&E species.

NMSA 17.3.31. Permit to capture or destroy protected game damaging crops or property; . . . NMDGF can issue permits to take game and protected birds under this Statute.

NMSA 77.15.1-14. Predatory wild animals and rodent pests. These statutes allow the State of New Mexico to cooperate with and fund WS WDM.

NMAC 19.30.2.1-11. Procedures for NMDGF to handle depredations caused by wildlife. These sections of provide information for NMDGF and private landowners on how to handle wildlife damage on private and leased lands. In essence, these set the time frames for handling wildlife complaints for NMDGF. NMDGF will provide landowners with short- and long-term solutions for depredation problems.

1.8 A PREVIEW OF THE REMAINING CHAPTERS IN THIS EA

This EA is composed of 5 chapters and appendices. Chapter 2 discusses and analyzes the issues and affected environment. Chapter 3 contains a description of each alternative, alternatives not considered in detail, and SOPs to reduce potential problems associated with implementing BDM. Chapter 4 analyzes the environmental impacts associated with each alternative considered in detail. Chapter 5 contains the list of preparers of this EA, persons consulted, and literature cited in the EA.

CHAPTER 2: DISCUSSION OF ISSUES

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

A major overarching factor in determining which issues to include for analysis of the potential environmental impacts of WS's involvement in BDM in New Mexico is that if, for whatever reason, the BDM conducted by WS were discontinued, similar types and levels of BDM will most likely be continued by State or local governments or private entities as allowed by state and federal laws. Thus, many of the BDM activities could take place without federal assistance, and, hence, would not trigger NEPA. From a practical perspective, this means that the Federal WS program has limited ability to affect the environmental outcome of BDM in New Mexico, except that, based on WS employees' years of professional expertise and experience in dealing with BDM actions, WS is likely to have lower risks to and effects on nontarget species and the human environment in general, including people, than some other programs or alternatives available to State agencies and private landowners. Therefore, WS has a less likely chance of negatively affecting the human environment affected by BDM actions than would non-federal or private entities. In other words, WS BDM activities most likely have less of an adverse effect on the human environment than would BDM programs that would be likely to occur in the absence of WS BDM assistance. Thus, WS has a limited ability to affect the environmental status quo in New Mexico. Despite this limitation of Federal decision-making in this situation, this EA process is valuable for informing the public and decision-makers of relevant environmental issues and analyzing these under the potential alternatives of BDM to address the various needs for action described in the EA.

2.1 ISSUES

The following issues or concerns about BDM have been identified through interagency planning and coordination, from the EA which preceded this document (WS 1999), WS EAs in other states, and USDA (1997) as areas of primary concern that will be addressed in this EA.

- Effects of BDM on Target Bird Species Populations
- Effects of BDM on Nontarget Species Populations, including T&E Species
- Effects of BDM on Public and Pet Safety and the Environment
- Effects of BDM on Aesthetics

2.1.1 Effects of BDM on Target Bird Species Populations

A common concern among members of the public, wildlife management agencies, and WS is whether BDM actions adversely affect the viability of target native species populations. The target species selected for analysis in this EA are the primary ones which may be affected by WS's BDM activities, especially those species that more than just a few individuals would likely be killed by WS' use of lethal control measures under the proposed action in any one year. From FY03 to FY07, species taken lethally included three nonindigenous species, the feral domestic Rock Pigeon, European Starling, and Eurasian Collared-Dove, various blackbird species (Red-winged, Yellow-headed, Brewer's and Rusty Blackbirds, Common and Great-tailed Grackles, and Brown-headed and Bronzed Cowbirds), American Crows, Common Ravens, Canada Geese, Turkey Vultures, a Cooper's Hawk, and a Prairie Falcon. Other species that have been killed from FY93 to FY02 by WS have included small numbers of feral ducks, Northern

Flickers, Black-crowned Night-Herons, Western Scrub-Jays, and House Sparrows. Also, there may be concerns about potential adverse impacts from WS' harassment activities of Sandhill Cranes and geese. This analysis will address those impacts as well.

Maintaining viable populations of all native species is a concern of the public and of biologists within the State and Federal land and wildlife management agencies, including WS. This EA will analyze the potential impacts on the primary species targeted in BDM by WS which, for purposes of this EA are feral Rock Pigeons, Eurasian Collared-Doves, European Starlings, blackbirds (primarily Red-winged and Brewer's Blackbirds, Great-tailed Grackles, and Brown-headed Cowbirds), American Crows, and Common Ravens. Other species taken have been minimal, but will be discussed briefly along with species that have the potential to be taken. Additionally, some birds addressed in this EA are harvested in New Mexico by hunters. Where data is available, harvest will be used with WS take to determine cumulative impacts.

Scoping during USDA (1997) revealed that some persons believe WDM interrupts the "balance of nature" which should be avoided. Others believe that the "balance" has shifted to unfairly favor generalist species, including birds. Several species' populations have steadily increased over the past several years due to adaptability to human-made environments and damage from these species has increased accordingly (International Association of Fish and Wildlife Agencies 2004). To address these concerns, the effects of the alternatives on populations for each target species are examined. To fully understand the need for BDM, it is important to have knowledge about the species that cause damage and the likelihood of damage. Full accounts of life histories for these species can be found in bird reference books. Some background information is given here for the bird species in New Mexico covered by this EA, especially information pertaining to their range and seasonal movements in New Mexico. Species are primarily given in order of WS BDM efforts directed towards them, their subsequent take, and the occurrence and value of damage that the species cause in New Mexico. However, less damaging species may be combined with species that cause more damage where life history and damage are somewhat similar. Finally, it should be noted that jurisdiction and management of these species mostly lies with USFWS and NMDGF which was discussed in Section 1.7.1.2 and 1.7.1.5.

2.1.1.1 Basic Bird Species Information.

Pigeons and Doves. Feral pigeons (Rock Pigeons), Band-tailed Pigeons, Eurasian Collared-Doves, White-winged Doves, Mourning Doves, Inca Doves, and Common Ground-Doves are found in New Mexico (Appendix C) with Mourning Doves being the most numerous followed by Rock Pigeons, White-winged Doves, and Band-tailed Pigeons. Eurasian Collared-Doves, an invasive species, are rapidly becoming common after self-introduction into Florida from a population introduced on the Bahamas in the 1970s (Romagosa 2002). Additionally, the Ruddy Ground-Dove has also been found in New Mexico, but rarely. From FY05 to FY07, pigeons and doves caused an annual average of 461 requests for assistance with damage documented at $101,000 (Table 1). Several BDM methods are used to manage damage caused by pigeons and doves (see Section 3.3.1.3) with most emphasis placed on controlling Rock Pigeon damage (Williams and Corrigan 1994) and dispersing birds from damage situations such as crop fields and airports (Booth 1994, Godin 1994). Additionally, the newly established Eurasian Collared-Dove has also caused damage similar to the Rock Pigeon and, therefore, many of the BDM methods used to control pigeons will be similar to those used to control collared-doves.

Feral pigeons are mid-sized familiar urban birds. Doves are smaller, but also familiar. Inca Doves and Common Ground-Doves are much smaller and rare in New Mexico, mostly confined to the southern portion of the State; it is doubtful that WS in New Mexico will ever respond to requests for assistance involving either of these species. All have robust bodies with small heads and short beaks. All are powerful fliers; Mourning Doves typically fly close to the ground near cover between feeding and roosting areas, while feral pigeons will fly at higher altitudes. Feral pigeons are found in urban and agricultural areas in close association with man, especially inhabiting buildings because they provide desirable nesting areas (i.e. flat surfaces under eaves). Mourning and White-winged Doves, and Eurasian Collared-Doves are common in a wide variety of habitats, but most common near wooded streams, in agricultural and weedy fields, and in urban areas. Band-tailed Pigeons are found in ponderosa pine and pinyon-juniper forests, and oak woodlands.

Feral pigeons and doves cause a wide variety of damage and are a threat to aviation due to size and flocking behavior, abundance, and medium size. Feral pigeons have an impact on property from their droppings; their droppings will deface buildings and paint on airplanes in hangars. Pigeons and their droppings, if allowed to build up, are a source of several diseases such as psittacosis that can infect people. Band-tailed Pigeons can cause crop damage, especially to fruits. Feral pigeons and Eurasian Collared-Doves are not regulated by federal laws. Feral pigeons are not regulated under State laws and can be taken at any time. A season has been established in New Mexico by NMDGF for Eurasian Collared-Doves, but with no daily bag or possession limit. Mourning Doves and Band-tailed Pigeons are migratory game birds and have established seasons with bag limits. The estimated breeding populations of Rock Pigeons, Band-tailed Pigeons, Mourning Doves, and White-winged Doves in New Mexico are 200,000, 70,000, 3.1 million, and 90,000 (RMBO 2007). The Eurasian Collared-Dove is a recent arrival in New Mexico (2002 was first time recorded in the BBS) and its breeding population was not estimated; it is significantly increasing ($P=0.03$) at a rate of about 195% annually in New Mexico (Sauer et al. 2008). WS has estimated the current population in New Mexico at about 170,000 (Table 4).

Starlings and Blackbirds. European Starlings and blackbirds are common residents and migrants in New Mexico. Eight species of blackbirds are found in New Mexico (Appendix C); Red-winged, Yellow-headed, Brewer’s, and Rusty Blackbirds, Common and Great-tailed Grackles, and Brown-headed and Bronzed Cowbirds and all are abundant seasonally, except the Rusty Blackbird and Bronzed Cowbird. From FY05 to FY07, starlings and blackbirds caused an average of 13 requests for assistance valued at $62,000 (Table 1). Several BDM methods are used to manage damage caused by starlings (Johnson and Glahn 1994) and blackbirds (Dolbeer 1994) with the most applicable and current techniques discussed in see Section 3.3.1.3.

Blackbirds are medium sized songbirds with heavy bills. They have iridescent black feathers and medium length tails. Starlings are similar in size, but appear stockier with a shorter tail and are heavily speckled in winter; they were introduced into North America from Europe. Starlings are cavity nesters and will use any structures with holes for nesting. All are gregarious, especially in winter when they form mixed species roosts in the thousands. Large flocks begin to form roosts as early as August and disband in April. Starlings require a higher protein diet consisting of mainly fruits, insects, and some grains. Blackbirds are primarily granivorous. Blackbirds are attracted to a variety of habitats depending on the species. Brewer's Blackbirds and starlings are attracted to urban areas such as at an airport, grass and weedy fields, fallow croplands, and livestock feeding operations. Great-tailed Grackles are found in open areas with scattered trees including residential neighborhoods and marshlands. Brown-headed Cowbirds are found in similar environments and open woodlands. Red-winged and Yellow-headed Blackbirds and Common Grackles are attracted to croplands and weedy fields, and roost and nest in marshy areas, especially cattails. Rusty Blackbirds are most common in wet woodlands where they prefer a diet of invertebrates rather than grain. This species roosts with other blackbird species, but often is found foraging in single species flocks or together with common grackles in or near wooded wetlands. Only occasionally are Rusty Blackbirds observed foraging in agricultural fields with other blackbirds.

Most species of blackbirds are found in New Mexico year-round, but a few only migrate through or winter in New Mexico. Most BDM projects are conducted by WS from late fall to spring when most species can be present. The European Starling, Red-winged Blackbird, Brown-headed Cowbird, and

Great-tailed Grackle are found in New Mexico year-round with breeding populations of 500,000, 800,000, 580,000, and 180,000 (RMBO 2007). The Common Grackle primarily summers in New Mexico with a breeding population of 70,000 (RMBO 2007), but some overwinter. Yellow-headed Blackbirds breed in northern New Mexico in deep water cattail marshes with a breeding population of 160,000 (RMBO 2007), but are most common in the State during migration. They are much more abundant nesters in states further north and migrate south into Mexico for the winter. Brewer's Blackbirds also breed in northern New Mexico with a breeding population of 300,000 (RMBO 2007), but winter throughout the State. Bronzed Cowbirds are found in the southern portion of the state and have an estimated breeding population of 3,000. Rusty Blackbirds nest in the Canadian boreal forest, and mostly migrate to and winter in southeastern states; a few stragglers are found during migration and winter in New Mexico. Their population has been in serious decline over the last 40 years.

Blackbirds are classified as migratory nongame birds, but can be taken under a USFWS Depredation Order when concentrated in a manner that constitutes a health hazard (Rusty Blackbirds will likely be removed from this list). The starling is unprotected by State and Federal laws and can be taken at any time. Blackbirds and starlings can cause significant damage to agricultural crops and livestock health and feeding operations. Blackbirds and starlings are considered a great threat to aviation because of the large flocks they form. In addition, winter roosts are a noise nuisance and their droppings damage buildings and property, and, where droppings are allowed to build up, they can become a source of several infectious diseases. Nesting by starlings can create a number of problems, including nuisance and fire hazards to buildings. Brewer's Blackbirds, in particular, are very aggressive nest protectors and will often attack people nearing their nest. Finally, the Brown-headed Cowbird is a parasitic nester, laying eggs in other bird nests. This has been linked to add to the decline of several song birds such as the Southwestern Willow Flycatcher, but not the primary causative factor in most species' declines, habitat loss and fragmentation.

Corvids. Corvids are jays, magpies, crows, and ravens, and are represented by 10 species in New Mexico. The Pinyon Jay is the most abundant corvid in New Mexico with an estimated population at 1.1 million (RMBO 2007), but its population is declining at a significant (P=.01) rate of -3.6%/year in BBS counts (Sauer et al. 2008). However, they rarely cause damage and are not likely to be the focus of BDM, except at an airport where their flocks could potentially be found (WS did not record damage or take for Pinyon Jays from FY92 to FY07). The Steller's Jay and Clark's Nutcracker, with estimated breeding populations of 300,000 and 80,000 (RMBO 2007) (data from 2003 to 2007 suggest breeding populations of 240,000 and 39,000 for these 2 species in New Mexico), also typically do not cause much damage because these two species are found in high elevation coniferous forests not associated with crops. The Western-Scrub-Jay on the other hand, with an estimated breeding population of 280,000, will cause damage to agricultural crops and can be very protective of nests, sometimes striking people. However, New Mexico WS has not conducted BDM for his species recently. Species of corvids that commonly inflict damage are the ravens, crows, and magpies. The Chihuahuan Raven, Common Raven, American Crow, and Black-billed Magpie have estimated breeding populations of 250,000, 60,000, 70,000, and 50,000 (RMBO 2007). The least abundant corvids in New Mexico are the Mexican Jay, confined to the far southwest corner of the state with an estimated breeding population of 1,300, and the Blue Jay, in scattered locations in eastern New Mexico with an estimated breeding population of 1,000 (RMBO 2007). From FY05 to FY07, Common Ravens, Chihuahuan Ravens, and American Crows were responsible for an annual average of 10 requests for assistance with damage valued at $26,834. Several BDM methods are used to manage damage caused by corvids (see Section 3.3.1.3) and are specifically discussed for American Crows (Johnson 1994), magpies (Hall 1994), and Western Scrub-Jays (Clark and Hygnstrom 1994). Several corvids flock from late summer through winter causing associated damage problems and BDM efforts can be focused on dispersing these birds from damage situations such as crop fields and airports (Booth 1994, Godin 1994).

Corvids are well-known, boisterous birds. Crows and ravens are medium sized black birds that are slightly iridescent in sunlight. Magpies are black and white birds that appear medium-sized because of their relatively long tail. Jays have blue in varying amounts, except the Gray Jay, contrasted with gray, black and white. Clark's Nutcrackers and Gray Jays are white, black, and gray. Ravens, crows, magpies and Western Scrub-Jays are common in open areas close to dense or scattered trees, or brushy or riparian habitats. The other jays are more common in coniferous forests with some open areas. Corvids are opportunistic feeders and will feed on a wide variety of food including fruits, nuts, small animals, insects, refuse, and carrion. Activities such as plowing are very attractive to ravens, crows, and magpies because of the food that becomes exposed. Most corvids are flocking during the winter and can cause problems. The winter roosts of magpies and crows can be a noise nuisance and potential health hazard from accumulated fecal material. Non-breeding ravens are also flocking and are often the ravens implicated in damage to livestock. All of these species, but especially flocking birds, can cause damage to crops such as pecans and corn. Ravens and magpies will kill livestock, primarily those that are somewhat incapacitated such as newborns or cows calving. Crows and ravens are medium size and can inflict severe damage to airplanes, especially where they are hunting insects in the airfield. Crows are commonly struck by aircraft. Corvids are migratory birds; the crow is a game bird and the others are nongame. Crows and magpies can be taken without a permit when found doing damage, but USFWS permits are required to take the other species.

Waterfowl. Waterfowl primarily refers to ducks, geese, and swans, but also cranes, moorhens, and coots because these species have mostly been managed as migratory game birds and are similar in size and behavior. Ducks can be further subdivided into surface feeders and divers. Nine species of surface feeding ducks, 9 species of diving ducks, 5 geese, a swan, a crane, a moorhen, and a coot can be found in New Mexico. Most are only common seasonally, with many migrating through or wintering in New Mexico. Of all of the species, Canada Geese, Mallards, Gadwalls, and feral domestic ducks and geese are the only waterfowl common in New Mexico year-round and cause many damage concerns. Ducks, geese, and swans are aquatic birds with webbed feet, long necks, narrow pointed wings, and short legs. Cranes are tall birds with long legs, beak, and neck, and non-webbed feet. Coots and moorhens are black with short tails and stubby, rounded wings; they have lobed toes and a short, whitish beak with a black band near the tip. In addition to those given, New Mexico has also documented 14 other species of ducks and geese and the Purple Gallinule in New Mexico which are only infrequently found or accidental. Finally, several feral or escaped waterfowl can be found in New Mexico and the most common problems arise from feral domestic ducks and geese (Appendix C: Table C4). From FY05 to FY07, waterfowl caused an annual average of 423 requests for assistance valued at $107,000 (Table 1). Several BDM methods are used to manage damage caused by waterfowl (see Section 3.3.1.3) and are specifically discussed in Cleary (1994). Waterfowl are flocking from late summer through winter causing associated damage problems and BDM efforts can be focused on dispersing these birds from damage situations such as crop fields and airports (Booth 1994, Godin 1994).

Waterfowl, cranes, and coots are attracted to wetland habitats. Several species of ducks, geese, cranes, and coots are attracted to field crops such as wheat. Geese, swans, and to a lesser extent, wigeons and coots, frequent grass and winter wheat fields. Other species, especially the divers, are attracted to open water where they feed on fish and submerged aquatic vegetation and some can be a problem at aquaculture facilities. Canada Geese and Mallards can be a nuisance in urban areas at parks and in residential areas where they cause property damage and fecal contamination of water and lawns. Additionally, nesting Canada Geese can be very aggressive and injure people nearing their nests. Waterfowl are particularly hazardous to aircraft because of their size and weight, flocking behavior, and relative abundance. Waterfowl, cranes, and coots are protected as migratory game birds by federal and state laws, but most can be hunted during the fall and winter. Hunting dramatically increases the effectiveness of hazing techniques. Permits are needed to take waterfowl, but hunters with the appropriate licensing can take waterfowl during open seasons. One note, a population of the federally endangered Whooping Crane (*Grus americana*) once wintered in New Mexico that came from birds fostered by Sandhill Cranes in Idaho. The experimental reintroduction was unsuccessful (the Whooping Cranes bred with Sandhill Cranes) and the last of these cranes died. Thus, Whooping Cranes are no longer found in New Mexico. However, wild populations are expanding and it is possible that Whooping Cranes will again be found in New Mexico.

Raptors. Raptors include vultures, eagles, hawks (osprey, kites, harriers, accipiters, buteos, and falcons), and owls. Shrikes are also included in this category because of behavioral similarities. New Mexico has one species of vulture, 2 eagles, 14 hawks, 6 owls, and 2 shrikes that have the potential to be involved in BDM projects. Additionally 7 species of owls are found in New Mexico that will not likely be the focus of BDM because these are found in habitat not conducive to causing damage, including airports. Lastly, 9 species of raptors have been found in New Mexico only rarely and, as a result, are not likely to be the focus of a BDM project. From FY05 to FY07, the Turkey Vulture, Mississippi Kite, Bald Eagle, Sharp-shinned Hawk, Swainson's Hawk, Golden Eagle, Barn Owl, Western Screech-Owl, Great Horned Owl, and Burrowing Owl were responsible for an average of 13 requests for assistance and $335,930 damage. It should be noted that an airplane suffered the loss of an engine and other damage when it struck a Swainson's Hawk causing $1 million damage; this incident alone was responsible for most of the damage value. Several BDM methods are used to manage damage caused by raptors (see Section 3.3.1.3) and can be focused on hawks and owls (Hygnstrom and Craven 1994), eagles (O'Gara 1994), and Mississippi Kites (Andelt 1994). Several species of raptors are significant problems at airports, and are often hazed or trapped (Godin 1994), but hazing efforts usually are not as effective for them.

Raptors are predatory birds or scavengers that possess hooked beaks and talons to capture and feed on prey. Shrikes do not have talons; they impale their prey on thorns or barbed-wire to feed on them. Raptors range in size from small such as the Burrowing Owl and American Kestrel to large such as Golden Eagles. Most species have typical hunting styles including soaring (vultures, eagles, red-tailed hawks), low-flying ambush (harriers), dense forest ambush (accipiters), hovering (kestrel), or watching from perches (buteos, owls). Most are solitary hunters. Most owls are nocturnal and hunt at night. The combination of abundant small mammal populations, open spaces, and roosting and perching structures provides ideal habitat for most raptors. Most raptors do not cause significant problems, except potentially at airports. Eagles, Red-tailed Hawks, Great Horned Owls, and, to a lesser extent, other raptors will take livestock and poultry. Turkey Vultures will roost sometimes in large flocks and can be an odor nuisance in and around residences or cause property damage to structures. Cooper's Hawks sometimes chase prey, birds, into warehouses where, often, they cannot find their way out. Kites are very aggressive nest defenders and will occasionally strike people that near their nest, often drawing blood from the victim in the attack. However, this problem infrequently occurs in New Mexico. Most raptors represent a significant hazard to aircraft due to their larger sizes and hunting over open spaces such as airfields. Raptors are protected as migratory birds. Eagles are specifically protected under their own Act and a permit is required to harass or take them. Wildlife control personnel avoid harassing eagles, but would if it became necessary at an airport or livestock facility where they were a potential threat to aircraft or where they were killing livestock. The Northern Harrier, Northern Goshawk, Swallow-tailed Kite, Common Black-Hawk, Gray Hawk, Swainson's Hawk, Ferruginous Hawk, Golden Eagle, Peregrine Falcon, Prairie Falcon, Aplomado Falcon, Burrowing Owl, Short-eared Owl, and Loggerhead Shrike are species of conservation concern (USFWS 2002) and considered accordingly.

House Sparrows. The House Sparrow, or sometimes referred to as the English Sparrow, is common in urban and agricultural areas. They were introduced into the United States from Europe and have become established from coast to coast. They are very common in New Mexico. House Sparrows are small chunky birds with thick bills. Males have a gray crown, chestnut nape, black bib, and black bill. Females are brown overall with streaked backs, buffy eye-stripes, and unstreaked breasts. House Sparrows are found in close association to people, especially on farms, where cavities for nesting, dense trees for roosting, and food sources are available. House Sparrows are primarily granivorous; seeds, grains, and fruits make up almost their entire diet, but they will also feed on refuse from trash bins and in parking lots. Damage includes consumption and contamination of stored grains and damage to structures and other property from pecking. Their bulky nests in the cavities of buildings and other structures create a fire hazard and require constant cleaning maintenance. Their winter roosts, often in the thousands, are a noise nuisance and their droppings are a source of several diseases and parasites that increase custodial maintenance costs. House Sparrows are not usually considered a great airstrike hazard. House Sparrows are classified as unprotected nongame birds and can be taken at any time without a permit. Their estimated breeding population in New Mexico is 960,000 (RMBO 2007). BDM methods for House Sparrows are discussed in Fitzwater (1994) and Section 3.3.1.3.

Woodpeckers. Fourteen species of woodpeckers have been found in New Mexico and all but the Yellow-bellied Sapsucker, Red-bellied Woodpecker, Arizona Woodpecker, and Gila Woodpecker are fairly common. Woodpeckers are familiar birds because of their drumming and cavity building behavior. They are relatively small birds with short legs, two forward - two back, sharp clawed toes for climbing trees, stiff tail feathers for support, and a sharp, stout beak for drilling. These characteristics enable them to climb trees while probing for insects or making cavities. Woodpeckers are found near or in wooded areas. Their flight is undulating, a very characteristic trait. They are territorial and usually found alone or in pairs. Woodpeckers are primarily attracted to areas with trees, space, water, and a good food supply. Woodpeckers are primarily insectivorous, though they also eat fruits and nuts (sap for sapsuckers). Woodpeckers can damage structures such as buildings and telephone poles. They can also damage crops such as pecans. Since woodpeckers are fairly territorial damage is typically at low levels to orchard crops and uniform throughout orchards rather than focused in a particular area. Woodpeckers are protected as migratory non-game birds. The Gila Woodpecker is a State threatened species and the Lewis's Woodpecker, Red-headed Woodpecker, Arizona Woodpecker, and Williamson's Sapsucker are species of conservation concern (USFWS 2002). Of all the woodpeckers found in New Mexico, the Northern Flicker and Acorn Woodpecker are typically responsible for most damage. From FY05 to FY07, WS received and average of 2 complaints annually valued at over $2,200. BDM methods for woodpeckers are discussed in Marsh (1994) and Section 3.3.1.3.

Wading Birds. Waders include herons, egrets, ibis and bitterns. Wading birds in New Mexico include 9 species commonly found in New Mexico and 8 others species that have only been occasionally to accidentally found. The largest, the Great Blue Heron, is somewhat common. The Cattle Egret and Snowy Egret are the most common during the breeding season, but their populations have been declining according to BBS data (Sauer et al 2008). However, USFWS (W. Howe, Albuquerque, NM, pers. comm. 2008) has stated that Cattle Egrets are increasing in New Mexico (this reflects the inherent problems with BBS data monitoring colonial waterbirds). Black-crowned Night-Heron are also breeders in New Mexico and one of the few to invoke a request that WS conducted operationally. The others are present, but not as common. Most wading birds are medium-sized and have long legs, beaks, and necks for stalking and hunting foods in shallow waters and open fields. Many are adorned with plumes in the breeding season. Wetlands and open areas with abundant prey such as rodents, amphibians, insects, and crayfish are attractive to most wading birds. Many of these species nest communally, rookeries, which can become an odor and noise nuisance in residential areas. Additionally, where these nesting areas are used year after year, the trees often die from fecal contamination. Wading birds can be a significant problem at aquaculture facilities and to aircraft because of their size and slower flight speeds; the feeding behavior of great blue herons and great egrets in open grasslands and the flocking behavior of particularly the cattle egret presents hazards to aircraft. Wading birds are protected as migratory non-game birds. BDM methods for use at aquaculture facilities are discussed in Gorenzel et al. (1994) and, for general use, in Section 3.3.1.3.

Gulls. Gulls are familiar birds. Only 4 species are consistently found in New Mexico in any numbers, the Ring-billed, Herring, Bonaparte's, and Franklin's Gulls. The majority of gulls in New Mexico are seen during migration or winter months. Gulls are robust birds with webbed feet, long pointed wings, a stout slightly-hooked bill, and, typically, a square tail. Most gulls are white with gray backs and black wing tips and, sometimes, heads. Gulls are attracted to water or food including refuse from dumpsters and landfills, earthworms, insects, and carrion. They are also attracted to lakes, sandy beaches, flat-roofed buildings, parking lots, and airports because they often provide ideal loafing sites. Gulls are considered a primary hazard at airports because of their size, abundance, wide and expanding distribution, flocking behavior, and general tendency to concentrate at airports. As a group, gulls caused 27% of the strikes at civil airports in the United Sates from 1990 to 2004 where the species was identified (4,582 out of 16, 727) with most strikes (89% occurred at less than 500 feet above ground) occurring at or near the airport (Dolbeer 2006). Several have been struck at airports in New Mexico. Gulls are also a problem at landfills where they may carry off refuse, potentially hazardous materials, to nearby residential areas (landfills are often cited by the Health Department for not having adequate bird control programs). Finally, gull fecal material, such as on a rooftop, can build-up to the point of causing damage. Gulls occasionally will also damage agricultural crops. Gulls are protected as migratory birds under the Migratory Bird Treaty Act by USFWS, and are classified as migratory nongame birds by NMDGF. BDM methods for gulls are discussed in Solman (1994) and Section 3.3.1.3.

Shorebirds. New Mexico hosts 25 species of shorebirds including avocets, stilts, plovers, sandpipers, and phalaropes. Most only migrate through New Mexico with only a few actually nesting. Additionally, 17 species of shorebirds are accidental or rare in New Mexico. Avocets and stilts are sleek and graceful waders with long slender beaks, and spindly legs. Plovers are compact birds with short beaks; they dart across mudflats, will stop abruptly, and race off again. Sandpipers vary much more, but typically have medium to long legs and beaks, and flocks fly seemingly erratic, but in unison. Phalaropes are similar to plovers with semi-webbed feet, but spin like tops in the water when they are feeding; phalaropes are somewhat unique in that the female is the more colorful and larger than the male. Most shorebirds are attracted to open, shallow water and mudflats. A few can be seen around agricultural fields and airport operating areas, especially fallow or short grass fields, after rains. They feed on invertebrates, typically probing mudflats with their beaks. Shorebirds are commonly hit by aircraft on or around airports where they are abundant (Dolbeer 2006). A few shorebirds are medium in size and most flock presenting their biggest threat to aviation. Aviation safety is again the primary concern with these species and BDM methods used to reduce their hazards at airports are discussed in Godin (1994), Booth (1994), and Section 3.3.1.3. Shorebirds are protected as migratory non-game birds. The Eskimo Curlew is listed as endangered, but is likely extinct. The Piping Plover, listed as threatened, very rarely migrates through New Mexico. Additionally, USFWS (2002) lists the Snowy Plover, Mountain Plover, Solitary Sandpiper, Long-billed Curlew, Marbled Godwit, and Wilson's Phalarope as species of conservation concern.

Loons, Grebes, Pelicans, Cormorants, and Other Fish-Eating Birds. New Mexico commonly has one species of loon, 5 grebes, 4 terns, the American White Pelican, Double-crested Cormorant, Neotropic Cormorant, and Belted Kingfisher that are found in New Mexico with most only migrating through the State. None of them is particularly common. Loons are large waterbirds with thick bills and necks, and webbed feet; they submerge directly underwater to feed on fish, crustaceans, and aquatic plants. Grebes are smaller with narrow beaks, long thin necks, and lobed toes; they dive forward to submerge under water and feed on fish. Loons and grebes are rarely seen in flight. Loons and grebes live in close association to wetlands with abundant fish, invertebrates, and aquatic vegetation. Terns are typically similar to gulls, except that they are smaller and slimmer with long narrow wings, forked tails, and pointed beaks. American White Pelicans are large, white water birds with black wing tips, a massive bill, and throat pouch. Cormorants are large, black birds with set back legs, a hooked bill, and reddish-orange facial skin and throat pouch. All form small flocks. Kingfishers are smaller stocky birds with a slate blue back and breast band. Terns, pelicans, and kingfishers dive from the air and cormorants from the water's surface to catch fish. Pelicans and terns primarily roost and nest on the ground, cormorants in trees that are submerged in water, and kingfishers in banks. These species are attracted to open waters with a good fishery. Kingfishers are usually associated with wooded streams and lakes where they hunt fish and aquatic invertebrates from trees, wires, or other perches. All of these species cause damage at aquaculture facilities and to native fisheries and applicable BDM methods used to protect aquaculture are discussed in Gorenzel et al. (1994) and Section 3.3.1.3. Pelicans and cormorants both represent significant hazards to aircraft because of their size and flocking behavior. They also fly at higher altitudes while traveling to and from feeding areas. Terns are only a problem at airports where good fishing waters are present. Kingfishers are usually not much of a problem because of habitat preference. These species are migratory non-game birds. The Least Tern's interior population is listed as endangered.

Many of these species, especially cormorants and pelicans, depredate fish at aquaculture facilities. Most of these species do not represent significant hazard to aircraft because they are mostly solitary and stay close to water. Pelicans and cormorants, though, can be extremely hazardous, because of their large size and slow flight. They frequently fly at night creating more concern. Loons, pelicans, and cormorants have been struck by aircraft, though infrequently, and have the potential to cause severe damage. These species are classified as migratory non-game birds.

The kingfisher, the only "landbird" in this group, has a breeding population of 7,000 (RMBO 2007). The Double-crested Cormorant is somewhat uncommon compared to northern states, but breeds in south central area of New Mexico. Four species of grebes breed in the state, primarily in the north-central area. Four additional species of terns, Brown Pelican, Anhinga, and Magnificent Frigatebird have also been documented to occur in the State. From FY05 to FY07, these species did not provoke any requests for assistance from WS.

Nighthawks, Swifts, and Swallows. Seven species of swallows, the Purple Martin, 3 swifts, 2 nighthawks, and 4 nightjars (Whip-poor-will, Poor-will, Chuck-will's-widow, and Buff-collared Nightjar) are found in New Mexico. Swallows and swifts are slender aerialists with long-pointed wings. Nighthawks are similar, but much larger and primarily nocturnal. Swifts are especially fast fliers. They all feed on insects caught on the wing with their wide, gaping mouths. Cliff and barn swallows build mud nests under eaves and bridges. The other swallows, and swifts, nest in cavities of rocks, banks, and trees. Nighthawks nest on the ground or large branches. These species are attracted to areas with an abundance of flying insects. They also are attracted to areas with suitable roosting or nesting habitat (barren to sparsely vegetated ground with large trees for nighthawks, dead snags in riparian areas for tree swallows, eaves or tunnels for mud-nest builders, crevices and cracks in buildings or rocks for the others). The nightjars are typically found in forested habitats and mostly nest on the ground. The primary damage from this group is from the mud-nest builders, and especially the colonial nesting Cliff Swallow (Barn Swallows are usually tolerated because they nest singly). Mud-nest builders can cause damage from falling debris and droppings, especially in and around buildings, causing continual clean-up costs during the nesting season. Additionally, parasites (bugs such as mites and fleas) in the nest can cause problem for domestic animals and people. Chimney swifts, a rarity in New Mexico, can also cause damage from their twig nests in chimneys and other structures. The nightjars are typically not associated with damage because of habitat preference. All of these species can be a problem at airports where colonies of them are found because they are commonly on the wing, like bats, searching for insects; nighthawks can cause more damage to aircraft than the other species because they are somewhat large. Swallows, swifts, and nighthawks are migratory nongame birds. From FY05 to FY07, WS received an average of 1 request annually for these species, swallows in particular, averaging $40 damage. BDM methods specifically for swallows are discussed in Gorenzel and Salmon (1994), and for all of these species, as appropriate, in Section 3.3.1.3.

Gallinaceous Birds. The Ring-necked Pheasant, Lesser Prairie-Chickens, Wild Turkey, and Northern Bobwhite are found in New Mexico having the potential to cause conflicts and are collectively known as gallinaceous birds. Gallinaceous birds are primarily ground-dwellers with short, rounded wings and short strong bills. Flight is usually very brief for these species, as they prefer to walk. Males are typically very colorful and perform elaborate courting displays. Pheasants and quail can be found in several habitats ranging from riparian woodlands to agricultural fields, but primarily open areas with brushy cover. Quail are normally found close to permanent water. Turkeys are found in close association with wooded regions. The prairie-chickens are found in short- and long-grass prairies with interspersed agricultural areas. All are primarily grain and seed eaters. Of these, the turkey and pheasant are usually the only two that cause problems, primarily to agricultural crops. However, their damage is often tolerated because they are highly sought after game birds. Additionally, these species can be hazardous to aircraft when found on or around airports. Gallinaceous birds are protected as resident game birds by NMDGF and have hunting seasons. These birds are non-migratory and not protected by federal laws. BDM methods for gallinaceous birds are discussed in Section 3.3.1.3.

Frugivorous Birds. Several fruit and seed eating birds are found in New Mexico and cause damage. The most notable of these, other than those discussed above such as starlings, are the American Robin, Cedar Waxwing, and House Finch. These birds are all mid-sized small birds, often forming large flocks. The robin is well-known with its red-breast and slate-black or grayish back. Waxwings are brownish and have crests, black masks, short tails with yellow tips; they get their name from wax-like red tips on the wing feathers of adults. House Finches are small brownish sparrow-sized birds; males have a bright red forehead, breast, and rump. These species are attracted to trees that have fruits or nuts, grains, and areas with an abundance of insects. Earthworms are a major attractant for robins. Most prefer brushy to open areas with scattered trees, and sometimes dense forests. Robins use dense trees or thickets for roosting. Grapes and other fruits can be significantly damaged by these species. Other than agricultural damage, robins and finches can form nightly roosts in residential areas causing some nuisance problems. These species are migratory nongame birds and can be taken with a federal permit. BDM methods for frugivorous birds are discussed in Section 3.3.1.3. Clark and Hygnstrom (1994) discuss methods specifically for to address House Finch damages.

Grassland Species. Kingbirds, meadowlarks, Horned Larks, pipits, Dickcissels, Bobolinks, longspurs, buntings, and goldfinches are often found in grasslands or semi-open country and are common grassland species in New Mexico. Kingbirds, phoebes, and flycatchers are somewhat small birds that are often found in somewhat open country using hunting perches for hawking insects. Horned Larks, pipits, longspurs, and Snow Buntings are slender, sparrow sized ground dwellers. Western and Eastern Meadowlarks are similar in size and appearance to starlings except they are light brown with black Vs on their breasts and yellow underparts. Dickcissels are somewhat smaller versions of meadowlarks. These species, with the exception of the kingbirds, phoebes, and flycatchers, form mostly loose-knit flocks, especially in winter. These species are attracted to short grass habitats and agricultural fields where seeds and insects are abundant. These species tend to stay near the ground; however, meadowlarks and kingbirds will use perches such as telephone wires. These species are often abundant at airports where they are struck by aircraft. Though most of these species are small which reduces damage to aircraft considerably, these species often will be in flocks of up to several hundred (horned larks, buntings, and longspurs often congregating together) presenting a hazardous situation. Additionally, the Horned Lark is often referred to as a “feathered-bullet” because of its dense body mass relative to other species and cause significantly more damage than similar sized birds. These species may need to be controlled periodically at airports and to protect some agricultural crops. All of these species are migratory nongame birds. BDM methods for grassland birds are discussed in Section 3.3.1.3 and for Horned Larks, specifically, in Clark and Hygnstrom (1994).

Other Birds. A few other birds (Appendix C: Table C1) in New Mexico cause damage, though only infrequently. The Northern Mockingbird is a very aggressive nester, often attacking people that come near the nest. This is especially a problem at the entrance to residences and businesses. Northern Cardinals often see their reflection in windows and incessantly attack the window, becoming a nuisance or sometimes damaging screens. White-crowned Sparrows can cause damage to landscaping and crops, especially in those fields and gardens adjacent to river bottoms (Clark and Hygnstrom 1994). Finally, Greater Roadrunners are somewhat common in the southern counties of New Mexico where they prey on lizards and the eggs and nestlings of birds. Several other birds are commonly found in New Mexico (Appendix C: Table C2), but few cause, or are expected to cause, damage.

2.1.1.2 Bird Population Estimates. To determine impacts from WS BDM lethal activities, a reasonable quantitative estimate of a bird population provides the best reference for impacts from WS and others. Bird populations generally are quite mobile and wide-ranging. Thus, a population estimate should be somewhat specific to the population potentially affected, but include all areas where the species may reside, even if for just a short duration in New Mexico. For example, WS conducts BDM year-round in New Mexico and winter projects often involve migratory birds migrating into New Mexico from northern breeding grounds such as the Sandhill Crane; thus, birds likely come from a larger area and impacts need to be considered for the overall population and not just for New Mexico because Sandhill Cranes only winter in New Mexico. For migratory birds, it is important to know when birds are present that cause damage and when the BDM projects are conducted. However, most estimates can only encompass the overall population of birds that are likely to cause damage because data is unavailable for specific populations and impacts to the overall population within a large geographic area are most meaningful.

Bird populations that are affected by BDM are either migratory or resident with some bird species having populations that are both (e.g., Canada Geese). The majority of WS BDM projects involving migratory birds come from the Pacific and Central Flyways, but some could come from the other flyways in North America (Figure 6). Several migratory species are found in New Mexico year round, but the population may actually shift during the year (e.g., European Starling). Additional birds may come into New Mexico for the winter while some that summer in New Mexico may leave. Some species only nest in New Mexico and migrate out of the State from fall through spring (e.g., Yellow-headed Blackbird), though a few may linger in the area during winter months. Some only migrate through the State from northern breeding areas to southern wintering grounds (e.g., Franklin's Gull) and return passing through in spring. And finally, some species of migratory birds targeted in BDM may only winter in New Mexico (e.g. Rough-legged Hawk). Of the species that typically are involved in BDM, starlings, feral pigeons, House Sparrows, and Common Ravens have resident populations with some migrating into the State in winter from northern states. Canada Geese have a "resident" population and have migrants that pass through or winter in the State, but most all lethal BDM for Canada Geese invariably involves the "resident" geese as WS lethal BDM activities for Canada Geese have occurred from spring through summer with nesting geese (WS does conduct nonlethal harassment of migratory flocks to protect crops during winter).

Current bird population estimates are unavailable for most species of birds and are estimated from the best available information for impacts analyses. The best information available for monitoring most bird populations, primarily non-colonial land birds, is trend data from the Breeding Bird Survey (BBS). The BBS is a long-term (1966-2007), large-scale inventory of North American birds, coordinated by the U.S. Geological Survey, Patuxent Wildlife Research Center, which combines a set of over 3,500 roadside survey routes primarily covering the continental United States and southern Canada (Sauer et al. 2008). BBS routes are surveyed each May and June by experienced birders. The stated primary objective of the BBS has been to generate an estimate of population change, or index, for songbirds. Estimates of population trends from BBS data are derived primarily from route-regression analysis (Geissler and Sauer 1990) and are dependent upon a variety of assumptions (Link and Sauer 1998). The statistical significance of a trend for a given species is reflected in the calculated P-value (i.e., the probability of obtaining the observed data or more extreme data given that a hypothesis of no change is true) for a particular geographic area and is best calculated over a number of years and larger geographic areas. BBS trends are available for 1966 to 2007 and 1980 to 2007, or can be analyzed for any set of years desired. BBS data can be summarized for New Mexico, the Central or Pacific Flyways (the northern limit of the BBS is in central Alberta, British Columbia, and Saskatchewan, and southern limit Mexico), or survey-wide for species breeding in the BBS survey area.

BBS data are intended for use in monitoring bird population trends, but has the potential for providing a general estimate of the size of bird populations from the average birds seen/survey route (Rich et al. 2004, RMBO 2007). The raw data is available from counts for individual routes, all routes combined in a particular geographic area such as a state, or all routes by a single year or multiple years (Sauer et al. 2008). If a population has been increasing or declining in the last 20 years, the best estimate of a population would come from recent data. The population estimates for land birds from RMBO (2007) were derived using BBS data from the 1990s and sometimes other bird population data, especially in areas with few or no BBS counts and for nocturnal or secretive species, to derive population estimates. RMBO (2007) looked at several factors to estimate bird populations.

However, some populations have changed since the 1990s, the data used for RMBO (2007). Thus, a new estimate using current BBS data would provide a better impact analysis. For this EA, it was decided that populations from BBS raw data for different geographic areas would be averaged for the last 5 years for the geographic area of the majority of bird population involved in BDM (2003 to 2007) because 5 FYs are used to look at impacts (FY03 to FY07). This estimate would lack some of the complicated formulas RMBO (2007) used to make their estimate. A population estimate will be calculated for the analysis using 2003-2007 data, but mostly presented with the RMBO (2007) estimate because they also calculated other factors into the population estimate. The estimate made will focus on the population likely impacted from BDM. For example, Canada Geese, feral pigeons, starlings, and raven populations are estimated at the statewide level since the majority of lethal BDM projects in New Mexico involve resident birds. For most other species, except the Rusty Blackbird, the states encompassed in Figure 6 in the Central and Pacific Flyway population is estimated and used for analysis. However, the BBS physiographic areas shaded in Figure 6 would likely provide the best estimate for the population of migratory birds affected by BDM in New Mexico; the raw data, though, are available by states and provinces, and not the BBS physiographic regions. Additionally, impacts to the populations are known for WS, but less so by others, especially in Canada. Thus, only the Rocky Mountain States (RMS) will used.

Using methods adopted by Partners in Flight (PIF) to estimate population size with BBS data (Rich et al. 2004, RMBO 2007), the numbers of birds seen per route can be used to extrapolate a population estimate. The PIF system involves extrapolating the number of birds in the 50 quarter-mile circles (total area/route = 9.82 mi^2). It also makes assumptions on the detectability of bird, which *varies* for each species. For example, some species that are large such as ravens and vultures or vocalize frequently such as Mourning Doves and American Crows are much more easily detected during bird surveys than species that are small and inconspicuous such as owls and Horned Larks, or do not vocalize that often or loudly during surveys such as herons and shorebirds. Additionally, breeding males are often the most visible during surveys while females may be in cover or on a nest and not detected such as Red-winged Blackbirds. Given an idea about the detectability of a bird species, a population estimate can be obtained from the equation - # of birds/route seen/9.8 mi^2 * area of concern*detection parameters (distance, pair, and time). RMBO (2007) discusses the detectability parameters in detail.

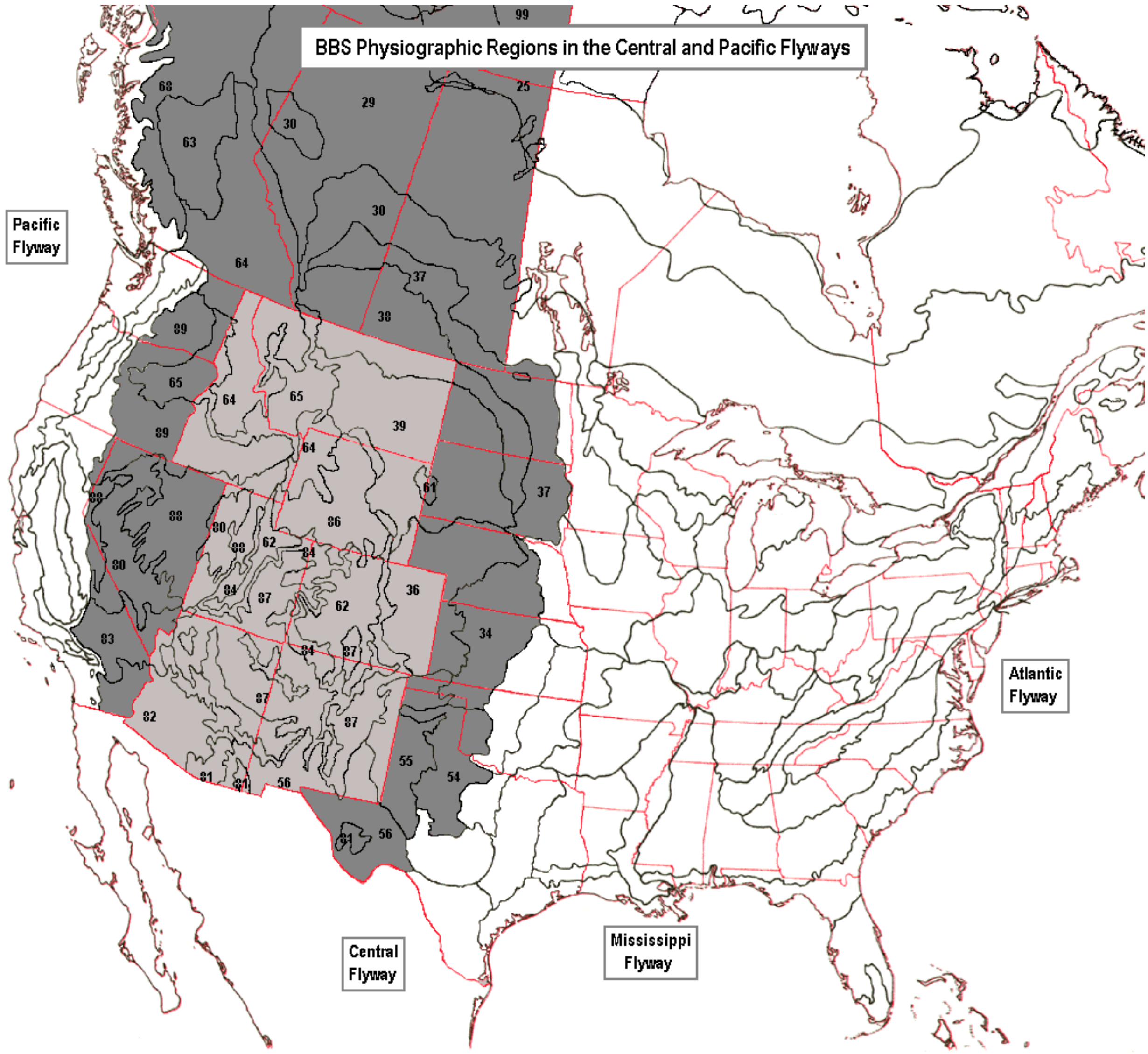

Figure 6. BBS physiographic regions in the Central and Pacific Flyways (shaded light gray) that encompass the population of birds that could be impacted by BDM in New Mexico, especially those during migration and winter. The shaded area includes BBS regions 34, 36, 37, 38, 39, 54, 55, 56, 61, 62, 63, 64, 65, 80, 81, 82, 83, 84, 86, 87, 88, 89 and that portion of region 30 in Canada excluding Manitoba. This area excludes the eastern portion of the Central Flyway (eastern Great Plains), western portion of the Pacific Flyway (coast and coastal mountains), and birds from the Canadian boreal forest and Arctic tundra (BBS regions 25, 29, 68, and 99) which are mostly north of the BBS boundary limit. Migratory bird population estimates for the EA will be derived from the light gray shaded area or the Rocky Mountain States (RMS) of Arizona, Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming using BBS raw data for those states.

WS will use BBS data, averaging the relative abundance for geographic areas from 2003 to 2007, to estimate populations that are impacted lethally by WS BDM (Table 4). WS conducts BDM for most all species that are either residents in New Mexico or primarily come from the west Central and east Pacific Flyways which, for the purposes of this EA, include the BBS physiographic regions: 34, 36, 37, 38, 39, 54, 55, 56, 61, 62, 63, 64, 65, 80, 81, 82, 83, 84, 86, 87, 88, 89 and that portion of region 30 in Canada except Manitoba in the states and Canadian provinces of southern Alberta, British Columbia, and Saskatchewan, eastern California, Oregon, and Washington, western Nebraska, North Dakota, Oklahoma, South Dakota, and Texas, and Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming (Figure 6). Additionally, some birds come from areas further north (primarily area 29) in Canada from the Central Flyway or, to a lesser extent, the far western portion of the Pacific Flyway, the far eastern portion of the Central Flyway, the Mississippi Flyway, or the Atlantic Flyways. However, for the EA, the migratory bird populations in the core area of this region will be estimated from the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming, the RMS region determined to likely produce birds that could potentially be taken by BDM in New Mexico.

To determine impacts, all known take in the area used to estimate the population is analyzed in Section 4.1.1.1. WS records or estimates take of species killed in BDM. Estimates of other take are made for species hunted or those species that are permitted to be taken under permits issued by USFWS to resolve depredations. In many cases, undocumented take can occur for species that are not protected (starling, feral pigeon, and House Sparrow) or have a USFWS depredation order (blackbirds, magpies, and crows) which allows take without a permit. For these species, an estimate of other take can be made, but should only be considered a guess; to be conservative we believe we have greatly overestimated this take.

Table 4. Population estimates for those species that WS takes the most in BDM in New Mexico from BBS (Sauer et al. 2008) raw data (see Appendix A for details).

Species	Detectability Parameter Factors			BBS Survey-wide Pop. Estimate ^	Ave. NM Birds/Count 2003-2007^^	New Mexico Pop. Estimate ^^	New Mexico Pop. Est. 1990-99^	Pop. Est.^ Rocky Mtn. States (Fig. 4)
	Dist.	Pair	Time					
Population Estimates for the Less Migratory/"Resident" Species in New Mexico								
Canada Goose*	1	2	1.00	N/A	0.96	24,000	4,800#	
Feral Rock Pigeon	4	2	1.19	26,000,000	1.87	290,000	200,000	
Eurasian Collared-Dove+	4	2	1.20	N/A	1.30	170,000	0	
Common Raven**	0.5	2	1.30	2,000,000	8.52	140,000	60,000	
Chihuahuan Raven	1	2	1.40	370,000	7.32	250,000	250,000	
European Starling	4	2	1.06	120,000,000	3.00	350,000	500,000	
Population Estimates of Migratory Raptors for New Mexico with Little Take in BDM								
Turkey Vulture**	0.5	2	2.61	1,300,000	4.15	130,000	62,000	
Cooper's Hawk	10	2	1.37	500,000	0.09	29,000	14,000	
Prairie Falcon	1	2	1.29	30,000	0.07	2,100	1,100	
Population Estimate for Migratory Species in New Mexico and Rocky Mountain States								
American Crow	1	2	1.55	31,000,000	2.06	110,000	70,000	7,700,000
Red-winged Blackbird	4	2	1.13	190,000,000	5.54	570,000	800,000	16,000,000
Yellow-headed Blackbird	4	2	1.18	20,000,000	0.23	33,000	150,000	2,200,000
Brewer's Blackbird	4	2	1.39	35,000,000	1.81	220,000	300,000	7,700,000
Common Grackle	4	2	1.23	97,000,000	0.67	100,000	70,000	2,400,000
Great-tailed Grackle	4	2	1.32	7,800,000	3.22	1,000,000	180,000	1,500,000
Brown-headed Cowbird	4	2	1.45	51,000,000	3.11	370,000	580,000	5,200,000
Bronzed Cowbird	4	2	1.29	500,000	0.01	7,500	3,000	45,000
Closed Boreal Forest Physiographic Region Index (BBS Area 29 – 580,000 mi^2) – Migratory Species								
Rusty Blackbird	4	2	1.44	2,000,000	++	++	++	++

* PIF (Rich et al. 2003, RMBO 2007) provided estimates for land birds only. BBS data do not generally provide sufficient information to estimate waterbird populations (it could be done, but would result in a population of Canada Geese of about 12,000-24,000 depending on the detectability parameters used). NMDGF estimates Canada Goose population from surveys, barring more urban populations and golf courses, at 4,800 and their estimate will be used.

** Distance detectability parameter was adjusted for these species because we believe the PIF parameters (Rich et al. 2003 and RMBO 2007) are overly conservative. PIF has twice the distance counted in the BBS point counts (800 meter radius instead of 400 meter radius set as BBS observer limit for counting) because these species may cover large distances flying during the 3 minute count or can be heard calling from long-range. However, this effectively increases the area counted or decreases the population estimated four-fold. While there is no doubt that some birds are detected from an area greater than quarter mile radius in the BBS point counts, the assumption that all birds of these species are counted in an area 4 times the size of the point count (after accounting for time and pair detectability parameters) would be an underestimate. In fact, limitations at survey stops that restrict vision such as trees, structures, and hills reduce the area surveyed at many point counts already, especially for species that are relatively quiet such as the Turkey Vulture, and many birds are not counted as a result. Therefore, we believe a more appropriate estimate, yet still believed to be conservative, would be acquired by using twice the size of the count area rather than 4 times which equates to a distance parameter of 0.5. We believe that the actual distance parameter for these species should be even closer to 1.

^ Estimates using BBS data from 1990-1999 (Rich et al. 2003 and RMBO 2007) for the United States and Canada.

^^ Estimates from 2003-2007 BBS raw data (Sauer et al. 2008) with point counts covering 9.82 mi^2 (the Canada Goose population will not be used for analysis).

+ Detectability parameters were estimated for the Eurasian-Collared Dove because this invasive species was not established in the 1990s, and, therefore, did not have these estimated by Rich et al. (2003) and RMBO (2007). It has now become established almost nationwide and the population is growing exponentially.

++ Does not breed in Rocky Mtn. States, but the northern boreal forests of Canada, mostly north of the BBS limits.

Fall population estimate from NMDGF (the discrepancy between the two estimates shows the difficulty estimating water bird populations with BBS data).

Many of the requests for assistance that WS receives occur during winter when migratory birds have come into New Mexico, thus changing bird population numbers. Birds from a larger geographic area are often involved in depredations, namely those that reside in the state and those that migrate into the state, mostly from northern areas. The National Audubon Society (NAS) conducts nationwide bird surveys within a few weeks of December 25th, the NAS Christmas Bird Counts (CBC). The CBC (NAS 2008a) reflects the number of birds in New Mexico during early winter that would occur after migrations are completed. The Christmas Counts are a volunteer effort conducted by all levels of birders and only provides the number seen in a 15 mile diameter circle (177 mi^2). The CBC data does not provide a population estimate (numbers can be extrapolated for the area of coverage giving a very rough population estimate over a larger area), but can be used as an indicator of trend in the population, used to determine winter species composition, or compared with other populations. CBC data often varies much more than BBS data due to variations in winter climate and observer ability.

2.1.1.3 BDM for T&E, and Sensitive Species. Of most concern to WS and others are BDM activities directed at T&E, and sensitive species which have limited populations. Some federal and state listed species have the potential of being the target of a BDM project. Any activity involving a listed species would require a Section 10 or States permit under ESA, New Mexico laws, or other allowance to conduct that activity. Additionally, the species being targeted, its status throughout its range, and available techniques would be considered. In most all situations, nonlethal techniques would likely be used including trapping and relocation.

Of the federal and state listed T&E bird species, 10 species could be the target of BDM (Table 5 and Appendix C: Table C1). The now federally delisted Bald Eagle could be harassed or captured where it is killing livestock (with the appropriate permit under the Eagle Protection Act), namely lambs and calves; this has been the only listed species (state) that has invoked requests for assistance from WS between FY98 and FY07 and for killing lambs. The Brown Pelican (an accidental species in New Mexico), Neotropic Cormorant, and Bald Eagle could potentially need to be hazed from aquaculture facilities where they are taking fish. These species and the Common Black-Hawk, Aplomado Falcon, Peregrine Falcon, Piping Plover, Least Tern, and Common Ground-Dove may need to be hazed from the air operating area of an airport to reduce the possibility of a bird-aircraft strike. Finally, the Gila Woodpecker could be involved in property damage at a residence in southwest New Mexico where actions may need to be taken to resolve this problem. However, most listed species rarely cause damage, especially because they are rare in the State, rarely inhabit areas where they would be perceived as a problem, and are not likely be involved in damage (e.g., Bell’s Vireo and Baird’s Sparrow).

Similar to federal and state listed T&E species, some sensitive species could also be the focus of BDM projects. The USFWS (2002) and the National Audubon Society (NAS 2007) list species of management concern (SMC: USFWS lists “birds of Conservation Concern” and NAS has a “Watch List”) (Appendix C: Tables C1, C2, and C3 denote these species). These are species of birds considered sensitive because their populations have declined over the past several years, but not serious enough to be considered T&E species (NAS lists T&E species as well in “Watch List” (NAS 2007)). Most population declines have been attributed to habitat loss, but predation or other negative wildlife interactions have been noted as a contributing factor in the decline of some species. USFWS (2002) and NAS (2007) list 97 bird species in New Mexico which are not listed as federal or state T&E, or candidate species. Of these, 27 of the regularly occurring species in New Mexico could be the focus of a BDM project with 21 of these only at airports. Similarly, 21 of the accidental species could be the focus of a BDM project with 15 of these only at airports. Most SMC species would only be hazed from the resource being protected. The only species of management concern that has been theorized to be taken by WS in New Mexico is the Rusty Blackbird. It is estimated that WS potentially took 4 in FY03. However, none was seen during BDM activities, suggesting that none were actually taken. This species’ feeding habits likely preclude it from being taken. For the sake of analysis, though, it has been estimated that 4 were taken and this take is analyzed in Section 4.1.2.1.

2.1.2 Effects of BDM on Nontarget Species Populations, Including T&E Species

A common concern among members of the public and wildlife professionals, including WS personnel, is the potential impacts of damage control methods and activities on nontarget species, particularly T&E species. WS's SOPs include measures intended to reduce the effects of BDM activities on nontarget species populations and are presented in Chapter 3. From FY03 to FY07, WS lethally took a total of 7 nontarget White-winged Doves and a nontarget Brewer's Blackbird during BDM activities. Nontarget take has been very low, annually averaging 2 taken lethally.

In contrast to adverse impacts on nontarget animals from direct take by BDM methods, some nontarget species may actually benefit from BDM, though this benefit would be unintentional unless it was the focus of the BDM project. Prime examples are the benefit to native cavity nesting bird species such as the bluebird that results from any reduction in starling populations. A number of other bird species, including some T&E species, could benefit from reductions in populations of Brown-headed Cowbirds which parasitize nests of other birds.

2.1.2.1 Federally Listed T&E Species. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS received a Programmatic BO in 1992 (USDA 1997, Appendix F) on the potential for WDM, in general and including most BDM methods currently used, to impact the species listed nationwide and completed a Section 7 consultation in New Mexico (WS 2003a, USFWS 2003a). USFWS was consulted under Section 7 of the ESA and issued BOs on the species that WS had the likelihood to adversely affect. However, USFWS concluded that WS would have no adverse affects on listed species (USDA 1997, Appendix F). These will be discussed in the following individual accounts for listed species that could be affected by BDM. The National WS Program began a new nationwide consultation to replace the 1992 BO (USDA 1997) which will guide BDM activities nationally and supersede the 1992 BO (USDA 1997) when it is complete.

In all, the Federal T&E, and candidate species list for New Mexico includes 7 mammals, 7 birds, 2 reptiles, 1 amphibian, 15 fish, 11 invertebrates, and 13 plants. WS BDM will have no effect on listed reptiles, amphibians, fish, invertebrates, and plants and little potential to adversely affect mammals or birds. USFWS had no concerns with BDM and listed species of New Mexico in their 1992 BO (USDA 1997). No species listed since that decision would be similarly affected and most of these were evaluated in a Biological Assessment (WS 2003a) with USFWS concurrence (USFWS 2003a); a few species have been delisted and added since that assessment. However, none of the species added would be adversely affected by BDM. In all, BDM has the potential to have a slight adverse impact on 1 mammal and 3 birds.

Of the mammalian and avian species listed federally, the wolf, Brown Pelican, and Least Tern could potentially be affected, as defined under the ESA, by BDM where noise harassment is used to protect livestock, crops, or aquaculture facilities from birds. These species could unintentionally be harassed by frightening devices used in the vicinity of them. This would be inconsequential to the species and typically go unnoticed by those implementing a BDM action near them. As an example, a Brown Pelican could be on a lake adjacent to a crop where birds are being hazed to reduce crop damage. The Brown Pelican could leave the lake because of the noise from pyrotechnics and propane cannons. This would not cause harm to the species. The Piping Plover, and potentially the Least Tern (this is highly unlikely), could be accidentally caught in mist nets or noose mats used to capture shorebirds for disease monitoring; it should be noted that New Mexico is concentrating on waterfowl and not shorebirds at this point and use methods such as rocket nets that are activated by the user and not passive like mist nets. These devices are monitored closely and species taken in them are released unharmed. Where these methods are used with a potential to take T&E species, WS has consulted nationally with USFWS under Section 7 of the ESA. WS has developed SOPs to avoid impacts which include ensuring WS Specialists are trained in T&E species identification, not working in areas known to be inhabited by T&E species, monitoring mist nets and traps frequently, and pulling equipment if a T&E species is seen in the vicinity of the trapping operations. These SOPs ensure that T&E species are not likely to adversely be affected.

On the other hand, some T&E species could unintentionally benefit from BDM. The Southwestern Willow Flycatcher could benefit from Brown-headed Cowbird control where their nests were significantly parasitized by the cowbirds. The Interior Least Tern would benefit from the control of predatory birds where they were impacting a nesting colony such as at Bitter Lake National Wildlife Refuge. Finally, the Brown Pelican, Aplomado Falcon, tern, and plover would benefit from being hazed away from the air operating area of an airport where they could potentially be struck by aircraft. However, WS would consult with USFWS if it was known that there was a potential to impact a T&E species, even if the species would benefit from the activity.

2.1.2.2 State Listed T&E Species. NMDGF lists animals that are considered T&E species in New Mexico through the Biota Information System of New Mexico (BISON-M 2008). This list contains most federally listed species. It also lists additional species considered threatened or endangered in New Mexico, but not their entire range. The NMDGF list contains an additional 12 mammals, 26 birds, 13 reptiles, 6 amphibians, 11 fish, and 16 invertebrates. As the same for federally listed species, BDM will have no effect on listed reptiles, amphibians, fish, and invertebrates. Of the 12 additional mammals, only the spotted bat could potentially be impacted. Mist nets used in BDM in their range after dusk and before dawn, have the potential to capture a bat. However, WS uses these minimally, puts them up after dawn, and removes them before dusk. It should be noted that the other three listed bat species in New Mexico are found in Hidalgo County where WS does not do any bird work with mist nets and, therefore, has no effect on these species. Of the 26 additional state listed bird species, only 2 species (Neotropic Cormorant and Bald Eagle) would likely be impacted as nontargets. Frightening devices intended for use on other bird species to protect several different resources could temporarily frighten these species. However, the impact would be minimal and not be expected to disrupt their behavior except temporarily.

BDM could have the potential to positively affect several of the State listed species. The Neotropic Cormorant, Bald Eagle, and Common Black-Hawk would benefit from being hazed away from an airport, even if not the intended target of a hazing program. And control of Brown-headed Cowbirds could help the Northern Beardless-Tyrannulet and vireos, species that can have their nests parasitized by the cowbird. However, this would be minor unless the control was focused for their benefit.

2.1.2.3 Sensitive Species. WS also monitors potential impact to USFWS (2002) and NAS (2007) species of management concern. Of the 99 additional species listed, few would have the potential of being taken lethally. These species will be analyzed to determine the potential for impact on them in Section 4.1.3.

2.1.3 Effects of BDM on Public and Pet Safety and the Environment

WS uses a variety of methods in BDM, but includes SOPs to reduce potential safety impacts to the public and the environment. WS relies on its Specialists to use their professional judgment to determine the most effective methods to use in a given bird damage situation, while having minimal, if any, impact to people, pets, and the environment. WS Specialists are professionally trained to use BDM techniques, especially with those techniques that have the potential to impact themselves, the public, and the environment. Several BDM methods have the potential to be hazardous including firearms, pyrotechnics, and avicides. Chapter 3 lists measures that WS implements to reduce potential problems.

Table 5. Federal and stated listed mammalian and avian T&E and candidate species in New Mexico and potential impact as nontargets of BDM.

Species	Scientific Name	Status	Locale	Habitat	BDM
Mammals					
Arizona Shrew	*Sorex arizonae*	SE	Hidalgo	F	0
Least Shrew	*Cryptotis parva*	ST	SE	G	0
Lesser Long-nosed Bat	*Leptonycteris curasoae yerbabuenae*	FE, SE	Hidalgo	R	0
Mexican Long-nosed Bat	*Leptonycteris nivalis*	FE, ST	Hidalgo	R	0
Western Yellow Bat	*Lasiurus xanthinus*	ST	Hidalgo	FGR	0
Spotted Bat	*Euderma maculatum*	ST	W	FGR	-, 0
White-sided Jackrabbit	*Lepus callotis*	ST	Hidalgo	GR	0
Peñasco Least Chipmunk	*Tamias minimus atristriatus*	ST	SC	F	0
Organ Mountains Colorado Chipmunk	*Tamias quadrivittatus australis*	ST	SC	F	0
Gunnison's Prairie Dog (north-central pop.)	*Cynomys gunnisoni*	FC	NC	GR	0
Southern Pocket Gopher	*Thomomys umbrinus*	ST	Hidalgo	FG	0
Montane Vole	*Microtus montanus arizonensis*	SE	NW	FG	0
New Mexican Meadow Jumping Mouse	*Zapus hudsonicus luteus*	ST	W	FG	0
Mexican Gray Wolf	*Canis lupus baileyi*	FE, SE	SW	FR	-,0
American Marten	*Martes americana*	ST	NC	F	0
Black-footed Ferret	*Mustela nigripes*	FE, SX	X	GR	0
Jaguar	*Panthera onca*	FE	Hidalgo	FR	0
Desert Bighorn Sheep	*Ovis canadensis mexicana*	SE	SW	GR	0
Birds					
White-tailed Ptarmigan	*Lagopus leucura*	SE	NC	F	0
Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	FC	E	FR	0
Gould's Wild Turkey	*Meleagris gallopavo mexicana*	ST	SW	F	0
Brown Pelican	*Pelecanus occidentalis*	FE, SE	Acc.	L	-, 0, +-
Neotropic Cormorant	*Phalacrocorax brasilianus*	ST	SC	L	-, 0, +
Bald Eagle	*Haliaeetus leucocephalus*	ST	All	LW	-, 0, +
Common Black-Hawk	*Buteogallus anthracinus*	ST	SW	FRW	0, +
Aplomado Falcon	*Falco femoralis*	FE, SE	S	GR	0, +
Peregrine Falcon	*Falco peregrinus*	ST	All	FGR	0, +
Piping Plover	*Charadrius melodus*	FT, ST	All	LW	-, 0, +
Least Tern (interior population)	*Sterna antillarum*	FE, SE	All	LW	-, 0, +
Common Ground-Dove	*Columbina passerina*	SE	S	FG	0
Western Yellow-billed Cuckoo	*Coccyzus americanus*	FC	W	F	0
Whiskered Screech-Owl	*Megascops trichopsis*	ST	Hidalgo	F	0
Mexican Spotted Owl	*Strix occidentalis lucida*	FT	W	F	0
Boreal Owl	*Aegolius funereus*	ST	NW	F	0
Buff-collared Nightjar	*Caprimulgus ridgwayi*	SE	Hidalgo	R	0
Broad-billed Hummingbird	*Cynanthus latirostris*	ST	Hidalgo	FR	0
White-eared Hummingbird	*Hylocharis leucotis*	ST	Hidalgo	F	0
Violet-crowned Hummingbird	*Amazilia violaceps*	ST	Hidalgo	F	0
Lucifer Hummingbird	*Calothorax lucifer*	ST	Hidalgo	R	0
Costa's Hummingbird	*Calypte costae*	ST	SW	R	0
Elegant Trogon	*Trogon elegans*	SE	Hidalgo	F	0
Gila Woodpecker	*Melanerpes uropygialis*	ST	Hidalgo	F	0
Northern Beardless-Tyrannulet	*Camptostoma imberbe*	SE	Hidalgo		0, +
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	FE, SE	W	F	0, +
Thick-billed Kingbird	*Tyrannus crassirostris*	SE	Hidalgo	F	0
Bell's Vireo	*Vireo bellii*	ST	S	FGR	0, +
Gray Vireo	*Vireo vicinior*	ST	W	F	0, +
Abert's Towhee	*Pipilo aberti*	ST	SW	RW	0
Arizona Grasshopper Sparrow	*Ammodramus savannarum ammolegus*	SE	Hidalgo	G	0
Baird's Sparrow	*Ammodramus bairdii*	ST	All	G	0
Yellow-eyed Junco	*Junco phaeonotus*	ST	Hidalgo	F	0
Varied Bunting	*Passerina versicolor*	ST	S	R	0

STATUS
F - Federal
S - State
E - Endangered
T - Threatened
C - Candidate
X Believed extirpated **g**

HABITAT (primary)
F - Forests/riparian borders/alpine
G - Grassland/meadow
R - Range/sage/high desert
W - Wetland/marsh/sandbar
L - Lakes, Rivers

BDM - Impacts
(-) - Negative
0 - none
(+) - Positive

Some individuals have expressed concerns that they believe that chemical BDM methods could adversely affect people and pets from direct exposure or indirectly from birds that have died from chemical use. Under the proposed alternatives in this EA, the avicides that WS could use are DRC-1339, an avicide used to remove damaging feral pigeons, starlings, crows, blackbirds, or gulls, and Avitrol for House Sparrows, blackbirds, and feral pigeons. Chemical repellents that could be used under the proposed action include methyl-anthranilate (MA), an artificial grape flavoring used in the food industry that repels many bird species, methiocarb (Mesurol® - Gowan Co., Yuma, AZ) used in eggs to repel corvids from raiding nests of other birds, and polybutene products which are bird repellents that have a tactile, sticky consistency to touch and are applied directly to problem locations to prevent birds such as feral pigeons from perching. Avicides and chemical repellents are regulated under FIFRA and New Mexico pesticide laws by EPA and NMDA, and applied by WS under their management and in accordance with labeling and WS Directives. WS applicators are certified by the State and must complete a written examination and undergo recurrent training. Other chemical methods that could be used are the tranquilizer A-C, used to capture waterfowl and a wide variety of other species, and euthanizing drugs such as Fatal Plus®. These drugs are regulated by FDA under the Food, Drug, and Cosmetic Act and WS policy. The chemicals used by WS from FY03 to FY07 are shown in Table 6. WS used an average of about 13 ounces of DRC-1339, 1 ounce of Avitrol, and no other chemicals. This is a minimal use of chemicals.

Table 6. Chemicals used by WS in BDM from FY03 to FY07. Avian toxicants (DRC-1339 and Avitrol) are registered for use by EPA. WS did not use A-C or other drugs from FY03 to FY07, but has in previous years.

Chemical	FY03	FY04	FY05	FY06	FY07	Ave.
DRC-1339 (g)	1,098	208	299	119	101	365
Avitrol (oz)	6	-	-	-	-	1

Some people may be concerned that WS's use of firearms and pyrotechnic bird scaring devices could cause injuries to people. WS personnel occasionally use small caliber firearms or air rifles and shotguns to remove feral domestic pigeons and other birds that are causing damage, and would continue to use such firearms in bird damage situations. WS policy has requirements for training, safe use, storage and transportation of firearms as prescribed by the WS Firearms Safety Training Manual (WS Directive 2.615, 05/03/02). The required firearms training is conducted biennially by certified instructors. Hands-on firearms proficiency is evaluated in the field and candidates must pass a written exam. Therefore, firearms are handled in a safe manner with consideration given to the proper firearm to be utilized, the target density, backstop, and unique field conditions. Pyrotechnics often emit sparks when launched, creating some potential fire hazard to private property from field use. Prior to the implementation of formalized training standards, other states reported incidents where small fires were started from the use of pyrotechnics in the field. Pyrotechnics storage, transportation, and use are regulated by the Alcohol, Tobacco and Firearms Bureau, Department of Transportation, and WS policy respectively. WS requires adherence to all federal, state, and local laws. Pyrotechnics on-hand are less than 50 lbs. in total weight; that, along with industry approved packaging of the materials allow New Mexico WS' pyrotechnics to be classified as Division 1.4 (formally known as Class C), the lowest classification of explosive materials as defined by the Alcohol, Tobacco and Firearms Bureau. Pyrotechnics are stored and transported in approved metal boxes. Training for pyrotechnics field use is also conducted and maintained under the WS Firearms Safety Training Manual guidelines.

A formal risk assessment of WS methods concluded low risks to humans (USDA 1997, Appendix P) including BDM methods used by WS such as toxicants, repellents, immobilization drugs, firearms, pyrotechnics, and traps. Under the proposed action, WS could use DRC-1339, Avitrol, A-C, euthanasia drugs such as Fatal Plus®, and chemical repellents. From FY03 to FY07 WS used an annual average of 13 oz. of DRC-1339 and 1 oz. of Avitrol (Table 6), a very minimal use of chemicals. Based on a thorough Risk Assessment (USDA 1997), WS concluded that when WS chemical methods including those referenced above are used in accordance with label directions, they are highly selective for the target individuals or populations. WS use of these pesticides in BDM has negligible impacts on the environment and do not represent a risk to the public (USDA 1997).

On the other hand, public health and safety may be jeopardized by not having a full array of BDM methods for responding to complaints involving threats to human health and safety such as bird airstrike hazards and a disease outbreak. Many bird species such as raptors, gulls, and starlings represent a significant strike risk for aircraft at airports and are commonly struck (Dolbeer 2006). This can result in damage and injuries to people. Additionally disease, especially the potential for HP H5N1 AI, could be a significant threat to humans. Surveillance of this disease is being conducted in much of the United States in migratory birds to monitor for its presence. WS often uses several BDM methods to capture target animals, depending on the specifics of these types of situation. Firearms, traps, mist nets, chemical immobilization, or toxicants may be used to take a target bird. BDM methods that may pose a slight public safety risk may be used safely and effectively to eliminate or monitor for a recognized public safety risk.

One peripheral factor pertinent to assessing the risk of adverse effects of WS BDM activities is the potential for adverse effects from not having professional assistance from programs like WS available to private entities that express needs for such services. WS operates to assist individuals with damage from birds where a need exists. In the absence of a federal BDM program, or where restrictions prohibit the delivery of an effective program, it is most likely that BDM would be conducted by other entities such as private individuals. Private BDM activities are less likely to be as selective for target species, and less likely to be accountable. Additionally, private activities may include the use of unwise or illegal methods to control birds. For example, Great-tailed Grackles were illegally poisoned in Texas with dicrotophos (Mitchell et al. 1984) and a corporation in Kentucky was fined for illegally using carbofuran to destroy unwanted predators including raptors at a private hunting club (Porter 2004). Similarly, on a Georgia quail plantation, predatory birds were being killed by eggs that had been injected with carbofuran (the Federal Wildlife Officer 2000); in Oklahoma, Federal agents charged 31 individuals with illegally trapping and killing hawks and owls to protect fighting chickens (USFWS 2003b). The Texas Department of Agriculture (2006) has a website and brochure devoted solely to preventing pesticide misuse in controlling agricultural pests. Similarly, the Department for Environment, Food and Rural Affairs (2004) in Britain has a "Campaign against Illegally Poisoning of Animals." Therefore, WS believes that it is in the best interest of the public, pets, and the environment that a professional BDM program be available because private resource owners could elect to conduct their own control rather than use government services and simply out of frustration resort to inadvisable techniques (Treves and Naughton–Treves 2005).

2.1.4 Effects of BDM on Aesthetics

Some individual members or groups of wild and feral domestic bird species have adapted to live in close proximity to humans. Some people in these situations feed such birds or otherwise develop emotional attitudes toward such animals that result in aesthetic enjoyment. In addition, some people consider individual wild birds as "pets," or exhibit affection toward these animals. Examples would be people who visit a city park to feed waterfowl or pigeons and homeowners who have bird feeders or bird houses. Other people do not develop emotional bonds with individual wild animals, but experience aesthetic enjoyment from observing them. Public reaction to BDM actions is variable because individual members of the public can have widely different attitudes toward wildlife. Some individuals that are negatively affected by wildlife support the removal or relocation of damaging wildlife. Other individuals affected by the same wildlife may oppose removal or relocation. Individuals unaffected by wildlife damage may be supportive, neutral, or opposed to wildlife removal depending on their individual personal views and attitudes.

Some people do not believe that birds such as nesting Canada Geese or nuisance egret, blackbird, or starling roosts should even be harassed to stop or reduce damage problems. Some of them are concerned that their ability to view migratory birds is lessened by WS nonlethal harassment activities and lethal control projects. The public's ability to view wild birds in a particular area would be more limited if the wildlife are removed or relocated. However, immigration of wildlife from other areas could possibly replace the animals removed or relocated during (negating the effectiveness of the action) or following a damage management action. Thus, viewing may still be an opportunity. However, if the program is successful and birds can no longer be found at a project site, the opportunity to view or feed wildlife is often available if an individual makes the effort to visit other parks or areas with adequate habitat and local populations of the species of interest.

Property owners that have pigeons roosting or nesting on their buildings or waterfowl grazing on turf areas are generally concerned about the negative aesthetic appearance of bird droppings and the damage to their buildings, turf, or other property. Business owners generally are particularly concerned because negative aesthetics can result in lost business. Costs associated with property damage include labor and disinfectants to clean and sanitize fecal droppings, implementation of nonlethal wildlife management methods, loss of property use, loss of aesthetic value of flowers, gardens, and lawns consumed by birds such as geese, loss of customers or visitors irritated by the odor of or having to walk on fecal droppings, repair of golf greens, replacing grazed turf, and loss of time contacting local health departments and wildlife management agencies on health and safety issues.

Thus, aesthetics is an issue that has very opposing views. The alternative selected must be able to accommodate the widest array of these views.

2.1.5 Issues that Were Analyzed in Prior EAs (WS 1999) that Will Not Receive Detailed Analysis under the Alternatives in This EA, but Some Background Information Will Be Discussed

In addition to the above issues, several other issues were identified and analyzed thoroughly in the previous New Mexico Bird EA (WS 1999) as well as other WS EAs and USDA (1997), and their analyses would be almost identical in this EA. These will not be considered further. The environmental consequences of these issues were found to have the least impacts under the current program alternative, the same in this EA except this EA is being considered at the statewide level for all bird species found in New Mexico. Even though these issues are not analyzed in this EA, some of these issues are still considered in determining SOPs to minimize potential impacts. Following are two issues that were sufficiently discussed in the prior EA (WS 1999) and showed little or no change. Subsequently, these will not be addressed in this EA, except where SOPs are developed to minimize impacts of these issues as necessary.

2.1.5.1 Selectivity and Humaneness of BDM Methods. Selectivity of BDM methods is related to the issue of humaneness in that greater selectivity results in less perceived suffering of nontarget animals. The selectivity of each method is based, in part, on the skill and discretion of the WS Specialist in applying such methods and on specific measures and modifications designed to reduce or minimize nontarget captures. The humaneness of a given WDM method is based on the human perception of the pain or anxiety caused to the animal by the method. How each method is perceived often differs, depending on the person's familiarity and perception of the issue as discussed in Section 2.3.5. The selectivity and humaneness of each alternative are based on the methods employed and who employs them under the different alternatives. Schmidt and Brunson (1995) conducted a public attitude survey in which respondents were asked to rate a variety of WDM methods on humaneness (1=not humane, 5= humane) based on their individual perceptions of the methods. Their survey found that the public believes that nonlethal methods such as animal husbandry, fences, and scare devices were the most humane and the use of traps, snares, and aerial hunting was the least humane. The previous Bird EA for

New Mexico (WS 1999) and many other WS EAs have discussed how selective each of the methods used in New Mexico to take target animals was and information on their humaneness.

In comparison, under the No Federal Program Alternative, the federal portion of WS would not employ methods viewed by some as inhumane and, thus, have no program effect on humaneness. NMDGF, NMDA, or other agency would probably still provide some level of hands on professional BDM assistance, but without federal supervision. They would continue to use the BDM methods considered inhumane by some, but likely at lower levels. The state personnel would not receive training from federal sources nor would the program benefit from federal research focused on improved humaneness, selectivity, and non-lethal methods. Private individuals that have experienced resource losses, but are no longer provided professional assistance from WS, could conduct lethal BDM on their own. Use of Avitrol, traps, and shooting by private individuals would probably increase. This could result in less experienced persons implementing BDM methods such as traps without appropriate modifications to reduce stress of the target animal and take of nontarget animals. Greater take or suffering of both nontarget and target wildlife would likely be the result. Therefore, it was concluded that the No Federal Program Alternative would result in the highest potential for negative effects from BDM (WS 1999). Additionally, it is hypothetically possible that frustration caused by the inability of resource owners to reduce losses could lead to the illegal use of chemical toxicants. The illegal use of toxicants could also result in increased animal suffering.

BDM conducted by private individuals would probably be less humane than BDM conducted under the auspices of a federal BDM program. WS is accountable to public input and humane interest groups that often focus their attention and opposition on BDM activities employed by WS. BDM methods used by private individuals may be more clandestine, and in particular, those that are used illegally. Members of the public that perceive some BDM methods as inhumane would be less aware of BDM activities being conducted by private individuals because private individuals would not be required to provide information under mandatory policies or regulations similar to those applied to WS. Thus, the perception of inhumane activities could be reduced, although the actual occurrence of BDM and associated inhumane activities may increase.

The No Federal Program Alternative would likely result in more negative impacts with regard to humaneness than the current program. The other alternatives analyzed in this EA were also analyzed in the previous EA (WS 1999) and found to lie between the Current Program and No Federal Program Alternatives. These will not be discussed further. However, humaneness is a concern of WS and is a criteria used to help determine the appropriate SOPs to maximize method selectivity and humaneness. The current program conducted by WS has taken minimal numbers of nontarget species from FY03 to FY07, mostly associated with cage traps. Thus, WS's SOPs have been very effective at minimizing the take of nontargets.

2.1.5.2 Effects of BDM on Water Quality and Wetlands. Two issues arose regarding water quality and wetlands in WS EAs (WS 1999, 2001) that were believed to be impacted by BDM targeting blackbirds at feedlots and other locations with avicides. Some discussion is provided here to ensure the reader that these issues have been considered. It should be noted that New Mexico WS uses much less of the chemicals and conducts far less starling and blackbird damage management than that discussed in WS (2001), and therefore, New Mexico WS anticipates that these issues are even less likely in New Mexico.

Potential for BDM Chemicals to Run off site and Affect Aquatic Organisms. An issue that was raised during interagency discussions while working on previous EAs (WS 1999, 2001) that WS has the potential to affect water quality to the point that adverse affects on humans or aquatic organisms could occur from the use of DRC-1339. This issue overlaps with "effects on human health" identified in section 2.1.3. Under the current WS BDM program, WS would use DRC-1339 in accordance with EPA-approved label directions. USDA (1997, Appendix P) contains information pertinent for analyzing the potential for effects on water quality from use of this chemical and is incorporated by reference. This chemical is very soluble in water (one liter can dissolve 91 grams). Based on its solubility, the appearance is such that DRC-1339 has a high potential to be transported from sites where it is used. However, DRC-1339 degrades rapidly under both aerobic and anaerobic conditions in soils with a half-life of less than two days. This degradation process diminishes concentrations before the chemical migrates to groundwater or off-site surface water areas. Continued degradation would be more than 90% degraded within about one week based on a half-life of two days.

Available information suggests DRC-1339 has low potential for aquatic and invertebrate toxicity (USDA 1997). Aquatic toxicity of DRC-1339 to water fleas occurred at 1.6 mg/L (Marking and Chandler 1981, Blasberg and Herzog 1991). The majority of LC_{50} (lethal concentration of a chemical in water in mg/L that is expected to kill 50 percent of the test subjects of a given species) values ranged from 6 to 18 mg/L for such species as glass shrimp, snails, crayfish, and Asiatic clams (Marking and Chandler 1981). LC_{50} values for bluegill and catfish ranged from 21 to 38 mg/L (USDA 1997, Appendix P). The greatest quantity that might be used by WS at an individual site at any one time is expected to be 16 ounces (454g). If all of the 16 ounces of chemical was transported off site and made it to surface or ground water, the water supply would have to be no more than 75,000 gallons in size to present a 50% lethal hazard to water fleas, no more than 6,700 to 20,000 gallons in size to present such a hazard to other invertebrates, or no more than 3,200 to 5,700 gallons to present such a hazard to bluegills or catfish. Put in perspective, 75,000 gallons is equivalent to a pond that is about 65 feet across and averages only 3 feet deep. These water volumes are much smaller than are likely to be encountered in streams or lakes in the area, and, undoubtedly, only a tiny fraction of the ground-water supply in the area. Because treated bait material is not applied unless target birds are already taking a similar amount of untreated bait, it is highly unlikely that much, if any, of the chemical would be left on the ground where it would be subjected to off-site transport by rainfall. The risk is further mitigated by the fact that the chemical degrades rapidly as discussed above. USDA (1997, Appendix P) concluded no probable risk to aquatic organisms. This analysis further indicates that the low quantities used at any one site, rapid degradation, and dilution factors act together to virtually eliminate any potential for hazard to humans or aquatic organisms due to possible run-off or ground water. Therefore, WS concluded in a previous EA (WS 2001) that the use of DRC-1339 would not cause runoff problems or affect aquatic organisms.

The other primary chemical used by WS, Avitrol, is used minimally (ave. 1 oz. from FY03 to FY07) and, thus, would not likely cause problems under the current program, especially used according to label directions. Avitrol is available as a prepared grain bait mixture that is mixed in with clean bait at a no greater than 1:9 treated to untreated mixture of bait kernels or particles. Several factors virtually eliminate health risks to members of the public or to water quality from the use of this product as an avicide:

- It is readily broken down or metabolized into removable compounds that are excreted in urine in the target species (Extension Toxicology Network 1996). Therefore, little of the chemical remains in killed birds to pose contamination risks to water supplies.

- Although Avitrol has not been specifically tested as a cancer-causing agent, the chemical was not found to be mutagenic in bacterial organisms (EPA 2007). Therefore, the best scientific information available indicates it is not a carcinogen. Regardless, however, the controlled and limited circumstances in which Avitrol is used would prevent exposure of members of the public to this chemical or contamination of water supplies.

- Since Avitrol is commercially available, it has already undergone extensive governmental environmental review for potential water quality impacts.

However, this chemical would likely be used much more by private individuals under the other alternatives because it would be the only legal avicide available. Therefore, it can be concluded that the current program would have the least risk. Additionally, WS uses Avitrol according to the label, and therefore, concludes that its use poses no or minimal risks, at most, to aquatic sites and organisms.

Potential to Cause Accelerated Eutrophication of Wetland Areas. This latter concern is based on the possibility that carcasses of birds killed by lethal control with DRC-1339 might significantly increase nutrients in marsh roosting areas, resulting in accelerated eutrophication. Eutrophication is the natural process by which lakes and ponds become more productive in terms of the amount of life (i.e., "biomass') they can support. If this process is accelerated by man-caused activities that increase nutrients in an aquatic ecosystem, the increased amount of plant material that is produced as a result may lead to increases in decomposition of organic material which can reduce oxygen content in the water and lead to loss of certain species in the area or changes in species composition. Major nutrients that contribute to plant production (and thus, potentially, eutrophication) in freshwater ecosystems are nitrogen, carbon, phosphorus, and potassium (Cole 1975). Thus, the amount of these nutrients was compared under no control with droppings from birds being deposited in the marshes where birds roosted and control with carcasses falling into the marshes. WS (2001) analyzed the differences in nutrients for the potential take of up to 3 million starlings and 1 million blackbirds. It was determined that there would be little difference in the amount of nutrient deposited in wetlands from bird droppings under no control to weight of birds with control using DRC-1339, except that nitrogen would likely be much more under no control. WS in New Mexico anticipates that up to 100,000 starlings and 150,000 blackbirds would be killed by use of DRC-1339 which is much less than that analyzed. WS (2001) determined that accelerated eutrophication would not be expected to occur from BDM activities and it would be much less likely in New Mexico. Thus, this issue will not be considered further.

2.2 ISSUES USED TO DEVELOP WS SOPs FOR BDM

2.2.1 Effects on Target Bird Species Populations

WS annually monitors target bird take in BDM to determine if take has remained within the range analyzed by the EA. Thus far, WS has not exceeded a significant level of take for any bird species which was analyzed in the prior EA (WS 1999). However, all bird species taken in BDM are being considered in this EA and bird populations and abundance can change, and, therefore, their populations along with applicable sport harvest, considering cumulative impacts, would be considered and monitored annually. WS SOPs, discussed in Section 3.4, ensure that the take of birds remains below a sustainable harvest, unless the managing agency has different management goals.

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

Special efforts are made to avoid taking nontargets during BDM or jeopardizing T&E species. The selectivity of BDM methods has been improving through the years, and much credit goes to WS' National Wildlife Research Center (NWRC). Improved cage traps, baits, hazing techniques, and other BDM tools and the development of new methods such as lasers have helped WS Specialists be more efficient and effective at focusing efforts on target species while minimizing take of nontarget species. T&E species are avoided by conducting biological evaluations of the potential effects and the establishment of special restrictions or measures to reduce the potential for take, and consultation with USFWS and NMDGF biologists. WS SOPs include measures intended to reduce the effects of BDM on nontarget species populations, especially T&E species, and are presented in Section 3.4.

2.2.3 Effects on Public and Pet Safety and the Environment

WS Specialists have SOPs to reduce potential safety impacts from BDM to the public, pets, and the environment. WS relies on its Specialists to use their professional judgment to determine the most effective methods to use in a given bird damage situation, while having minimal, if any, impact to people, pets, and the environment. WS Specialists are professionally trained to use BDM techniques, especially those that could have the potential to impact themselves, the public, and the environment. Several BDM methods have the potential to be hazardous including firearms, pyrotechnics, and avicides. Measures to reduce potential problems are given in Chapter 3. WS has not had any known impacts from BDM on the public, pets, or the environment from FY03 to FY07.

As discussed in Section 2.1.3, a peripheral factor pertinent to assessing the risk of adverse effects of WS BDM activities is the potential for adverse effects from not having professional assistance from programs like WS available to private entities that express needs for such services. WS operates to assist individuals with damage from birds where a need exists. In the absence of a program, or where restrictions prohibit the delivery of an effective program, it is most likely that BDM would be conducted by other entities such as State agencies and private individuals. Private BDM activities are less likely to be as selective for target species, and less likely to be accountable. Additionally, private activities may include the use of unwise or illegal methods to control birds. Therefore, WS believes that it is in the best interest of the public, pets, and the environment that a professional BDM program be available because private resource owners could elect to conduct their own control rather than use government services and simply out of frustration resort to inadvisable techniques (Treves and Naughton-Treves 2005).

2.2.4 Effects of BDM on Aesthetics

Under the proposed action, WS would kill what some people would perceive to be a large number of birds. Some people enjoy seeing birds, and, if so, might feel their interests were being harmed. However, the population impacts analysis in Section 4.1.1 indicates the overall populations of birds are not being significantly affected, which means opportunities to view these species would continue to exist.

WS's experience has generally been that, whereas many people perceive some pleasure or enjoyment at seeing relatively small concentrations of birds, most people directly affected by birds, especially large wintering concentrations, perceive them as an annoyance or a health hazard. Reductions in large wintering concentrations of birds such as starlings or local populations of feral pigeons would be viewed by those people as an aesthetic improvement. Concentrations of roosting birds have resulted in calls to the WS office in New Mexico concerning nuisance noise, odor, and fecal contamination. Some towns in New Mexico have had active harassment programs in order to move birds from urban areas.

It is possible that some birds killed with DRC-1339, due to its slow action, would die in nighttime roost sites in trees or wooded areas near to or in urban or suburban areas. This has been known to happen. Also, some birds might die en route to nighttime roost sites with DRC-1339 use, despite the tendency for most birds to die at their nighttime roost sites, and be visible to passers by. This would be particularly noticeable if they fall onto snow covered areas where the black bodies would contrast sharply with the white snow. If this occurs, some people might perceive these numbers of dead birds to be aesthetically displeasing. WS would plan to mitigate this effect by retrieving visible dead birds following baiting operations, or by requiring facility managers to provide personnel to pick up visible dead birds as a condition of receiving WS operational service. However, this depends on receiving permission to trespass by property owners.

Measures and policies are in place to help minimize the effects of WS activities on aesthetics as much as possible. WS personnel post signs in prominent places to alert the public that BDM tools are set in an area and this would allow the public offended by BDM activities to avoid these areas. On private lands, the cooperators or landowners are aware that BDM methods are set and can alert guests using the property of their presence. Landowners determine the areas and timing of equipment placement, thereby avoiding conflicts with the public, especially those that would find BDM aesthetically displeasing. For public lands, WS abides by all applicable laws and regulations regarding the use of different BDM methods. WS coordinates with the different land management agencies to determine high-use public areas and times of the year. WS limits conducting BDM in high-use public areas or limits the BDM methods used to minimize potential problems with those people that find BDM aesthetically displeasing.

2.2.5 Humaneness of Methods Used by WS

The issue of humaneness and animal welfare as it relates to killing or capturing wildlife is an important and very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management 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 is 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 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 1991), such as with shooting. Defining pain as a component of humaneness and animal welfare in BDM methods used by WS 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 . . .*" (American Veterinary Medical Association 1987). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (California Department of Fish and Game 1991). Pain and suffering, as it relates to damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering since "*. . . neither medical nor veterinary curricula explicitly address suffering or its relief*" (California Department of Fish and Game 1991).

The American Veterinary Medical Association states, "*... euthanasia is the act of inducing humane death in an animal*" and "*... the technique should minimize any stress and anxiety experienced by the animal prior to unconsciousness.*" (Beaver et al. 2001). Some people would prefer accepted methods of euthanasia to be used when killing all animals, including wild and feral animals. The American Veterinary Medical Association states, "*For wild and feral animals, many of the recommended means of euthanasia for captive animals are not feasible. In field circumstances, wildlife biologists generally do not use the term euthanasia, but use terms such as killing, collecting or harvesting, recognizing that a distress-free death may not be possible.*" (Beaver et al. 2001).

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

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

Thus, the decision-making process involves tradeoffs between the above aspects of pain and humaneness. Objective SOPs to minimize impacts from this issue must consider not only the welfare of wild animals, but also the welfare of humans and domestic animals if damage management methods were not used. Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal. People may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and funding.

WS has improved the selectivity of management devices through research and development for the use of padded jaw pole traps with pan-tension devices and other modifications, lights for deterring birds from airplanes while in flight, immunocontraception drugs to reduce fertility of overabundant species, and chemical immobilization/euthanasia procedures that minimize pain. Research continues to improve selectivity, practicality, and humaneness of management devices (USDA 1997). Until new findings and products are found to be practical, a certain amount of animal suffering will occur if BDM objectives are to be met in those situations where nonlethal BDM methods are ineffective or impractical. Furthermore, if it were possible to quantify suffering, it is possible that the actual net amount of animal suffering would be less under the proposed action (or any other alternative involving the use of lethal methods) than under the No Federal BDM Alternative since suffering experienced by domestic animals preyed upon by predators is reduced if BDM is successful in abating predation. Measures to reduce pain and stress in animals and SOPs used to maximize humaneness are listed in Chapter 3.

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

In addition to the above issues, several other issues were analyzed thoroughly in the previous EA (WS 1999), and the analyses for these issues would be identical in this EA even though this EA is for all birds and resources in New Mexico. No new information has arisen that would change the analysis provided in that document or suggest a need for their inclusion here in the issues considered in the comparison of alternatives. Therefore, analyses of the following issues can be found in the previous EA (WS 1999) and not repeated in this EA.

- WS's Impact on Biodiversity
- Wildlife Damage Is a Cost of Doing Business; a "Threshold of Loss" Should Be Established before Allowing Any BDM
- Wildlife Damage Management Should Not Occur at Taxpayer Expense, but Should Be Fee Based
- Potential Issues Related to Environmental Justice and Executive Order 12898
- Lethal BDM for Blackbirds and Starlings Is Futile Because 50-60% of Them Die Each Year Anyway
- Cost Effectiveness of BDM
- Protection of Children from Environmental Health and Safety Risks (Executive Order 13045)
- Impacts on Sandhill Crane and Waterfowl Hunting

Additional issues arose in other WS EAs such as WS (2001) which will not be repeated. The discussions on these issues can be found in WS (2001).

- Potential for Avian Cholera and Botulism to Result from Killing Blackbirds
- Beneficial Effect on Songbird Populations from Killing Brown-headed Cowbirds

Following are additional issues that that may have been discussed in the previous EA (WS 1999), but will be repeated here for clarity, or are new issues that have arisen since the previous EA, but will not be considered for inclusion under the alternatives with justification

2.3.1 Appropriateness of Preparing an EA (Instead of an EIS) For Such a Large Area.

Some individuals might question whether preparing an EA for an area as large as New Mexico would meet the NEPA requirements for site specificity. WS' mission is to manage damage caused by wildlife, not overall wildlife populations. As an agency that exists to manage specific types of damage, WS can predict the types of locations or situations where damage is likely to occur. However, due to any number of variable circumstances, WS has no absolute control over when a request for BDM assistance will be received nor can WS predict specific individual times and locations of most bird damage situations. Therefore, WS must be ready and able to provide assistance on short notice about anywhere in New Mexico to protect any resource. The missions of other federal and state wildlife management agencies generally concentrate on management for wildlife abundance and are not equipped or prepared to prevent bird damage problems without resorting to extreme and extensive population management strategies that, in most cases, would be neither prudent nor affordable. Given the numbers of birds, past experiences, and program activity monitoring, WS believes this EA addresses most potential needs and issues associated with providing BDM at any given location in New Mexico. It should be noted that MIS data shows that WS works on less than 5% of the analysis area, thus the majority of the state has no BDM. This is reflective of the need and the requests for assistance involving birds, and available manpower to conduct operational BDM.

If a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire State may provide a better analysis than multiple EA's covering smaller zones, especially considering the mobility of birds and impacts on their populations.

2.3.2 Effects from the Use of Lead in Ammunition

WS uses nontoxic shot (e.g., steel and bismuth) and lead shot, bullets, and pellets for ground-based shooting. WS uses nontoxic shot for all migratory birds shot under the authority of a permit issued by USFWS and in areas where there is a potential risk to T&E or sensitive species such as Bald Eagles. In general, sport hunting using rifles or shotguns, which would be similar in nature to ground-based shooting by WS with regard to dispersal of lead shot, tends to spread lead over wide areas and at low concentrations (Craig et al. 1999). The primary concerns raised thus far about sport hunting and lead shot contamination have been focused on aquatic areas where waterfowl hunting occurs, and the feeding habits of many species of waterfowl that result in them picking up and ingesting shot from the bottoms of ponds, lakes, and marshes. Shooting of lead shot in dry land upland areas has not raised similar levels of concern except where such activities are more intensively concentrated such as those which can occur with dove hunting at harvested crop fields and with game bird hunting at "shooting preserves" (Kendall et al. 1996). In an ecological risk assessment of lead shot exposure in non-waterfowl bird species, ingestion of lead shot was identified as the exposure mode of concern rather than just contact with lead shot or lead leaching from lead shot distributed in the environment (Kendall et al. 1996). Shots fired during WDM activities in New Mexico are scattered in distribution over relatively wide areas in mostly uninhabited locations where contact with humans or ingestion by birds picking up grit to aid in digestion of food are highly unlikely.

The amount of lead deposited on the landscape from the firing of shotguns and rifles during WDM is very small since the amount of land area involved is huge. WS conducted WDM on annual average of 12 million acres from FY05 to FY07 which includes all wildlife. WS uses firearms for many WDM activities in New Mexico including ground-based, aerial, and harassment shooting, and shooting to euthanize animals caught in traps. WS uses steel shot or pellets to take birds listed on a migratory bird permit from USFWS. However, WS took relatively few migratory birds with shooting (3 spp. averaging 7/year) from FY05 to FY07. WS took mostly feral Rock Pigeons and Eurasian Collared-Doves, averaging 5,785 and 171 annually; the majority of these (>90%) were taken with air rifles shooting pellets in developed areas. WS tracks ground-based and aerial shooting activities, number of birds or mammals dispersed from harassment shooting, and animals killed in traps. If we assume that for ground-based and aerial shooting that 3 shots are fired for every animal taken, 100 birds (often flocks are in the thousands that are dispersed - only pyrotechnics were used in New Mexico, thus, no shots were fired) and 1 mammal are dispersed with harassment shooting, and that one shot is fired to euthanize animals in traps, then an average of about 26,000 shots were fired annually from FY05 to FY07 (this is likely much higher than the actual number of shots fired by WS – 18,000 shots were fired for pigeons and doves in this analysis).

Shots fired are not tracked in the MIS, and, therefore, to err on the side of being conservative, we will assume this many shots were taken with lead. Even so, the number of shots is relatively minimal and scattered over considerable portions of the landscape. WS shooting for all species taken (including birds) or hazed (harassment shooting) in WDM occurs on small proportion of the land area in New Mexico, about 15% of the land area. The land area of exposure to shots fired is still relatively large in relation to the amount of shot distributed. When shotshells with lead are used in hazing or shooting, the typical amount of lead distributed by each shot is from 1.0 to 1.5 oz. (most bird shot is 1.0 to 1.2 oz./shell). We will assume for the analysis that high-powered rifle bullets are about 0.3 oz., small caliber firearms bullets (e.g., .22s) 0.1 oz., and pellets for air rifles 0.05 oz.). WS uses shotguns for about 50% of the shooting in New Mexico for mammalian species. Well over 95% of the shooting for birds is with air rifles (pellets weighing ~0.1 oz. each at most). High-powered rifles and small caliber pistols (.22) are used for mammals, but this is minimal and less than 1%. At least 95% of the animals shot in traps are with small caliber (.22s) and the remainder with high-powered rifles. It should be noted that the majority of animals shot by WS are retrieved and disposed of where they are not available to avian scavengers, the species of most concern for lead poisoning. However, assuming that the carcasses do not retain the shot or bullets, we can determine the amount of lead deposited over the landscape by WS.

WS potentially deposits about 500 lbs. of lead from shotshells, bullets, and pellets over about 12 million acres in New Mexico. This amounts to an average of about 20 mg of lead/acre. Thus, about an ounce of lead is distributed over 2.2 mi^2 from WS WDM. Even though this is a small amount, to address even the most extremely unrealistic concerns raised regarding this issue, we have looked at the following detailed scientific facts and data related to any potential exposure of lead resulting from the lead shot used by WS in all WDM activities.

The hazard standard set by EPA for lead concentrations in residential soils is 400 ppm (1 part per million is equivalent to 1 mg/kg or 0.0064 oz./lb.) in children's play areas, and 1,200 ppm on average for the rest of a residential yard[3]. We are unaware of any established standards for lead contamination of soil in remote rural areas of the kind where WS conducts much of its WDM activities in New Mexico, but it is reasonable to assume the guideline for residential areas would be more stringent than any such standard

[3] The EPA soil-lead hazard is bare soil on residential real property or on the property of a child occupied facility that contains total lead equal to or exceeding 400 parts per million (mg/g) in a play area or average of 1,200 parts per million of bare soil in the rest of the yard based on soil samples (40 CFR 745.65(c)).

that might ever be established for rural areas. Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil is generally retained within the top 20 cm (about 8 inches). A representative average weight of soil is in the range of 110 lbs. (49.9 kg) per cubic foot (Environmental Working Group 2007). The number of cubic feet of soil in the top 8 inches of soil in one acre is about 29,000. Therefore, a reasonable estimate of the total weight of the top layer of soil per acre where spent lead shot should remain would be 3.2 million lbs. (110 x 29,000) or 1.5 million kg. If considered over the amount of land area involved in WDM in the State during a typical year, the amount of lead distributed from WS WDM activities would constitute an average of about 1 mg/75,000 kg of soil. This is a small fraction, 30 million times less than the concentration in the EPA hazard standards for children play area soils shown above. Soil uncontaminated by human activities generally contains lead levels up to about 50 ppm (or 50 mg/kg) (Agency for Toxic Substances and Disease Registry 2005). Assuming that the soils in the areas where WS conducts WDM have the upper limit of this baseline level, it would take an additional 350 mg/kg to reach the EPA hazard standard for children's playgrounds, and 1,150 mg/kg to reach the standard for other residential yard areas. It would take 26 million years for enough lead to accumulate from shooting by WS to reach the EPA hazard standard for children's playgrounds.

A remaining question is whether lead shot deposited in remote areas by WS might lead to contamination of water, either ground water or surface water via runoff that occurs during or following rainfall or melting snow cover. Stansley et al. (1992) found that lead did not appear to "transport" readily in surface water when soils are neutral or slightly alkaline in pH (i.e., not acidic), but that it will transport more readily under slightly acidic conditions. In their study, they looked at lead levels in water that was subjected directly to high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Although they detected elevated lead levels in water in a stream and a marsh that were in the shot "fall zones", they did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot where it was believed the lead contamination was due to water runoff from the parking lot, and not from the shooting range areas. Their study indicated that even when lead shot is highly accumulated in areas with permanent water bodies present, the lead does not necessarily cause elevated lead contamination of water further downstream. They also reported that muscle samples from two species of fish collected in the water bodies with high lead shot accumulations had lead levels that were well below the accepted threshold standard of safety for human consumption (Stansley et al. 1992). Craig et al. (1999) reported that lead levels in water draining away from a shooting range with high accumulations of lead bullets in the soil of the impact areas were far below the EPA's "action level" (i.e., requiring action to treat the water to remove lead) of 15 ppb ("parts per billion"). They reported that the dissolution (i.e., capability of dissolving in water) of lead declines when lead oxides form on the surface areas of the spent bullets and fragments in the impact areas. This means "transport" of lead from bullets or shot distributed across the landscape is reduced once the bullets and shot form these crusty lead oxide deposits on their surfaces, which serves to naturally further reduce the potential for ground or surface water contamination. These studies suggest that, given the very low and highly scattered shot concentrations that occur from WS's WDM shooting activities, as well as most other forms of dry land small game hunting in general, lead contamination of water from such sources would be minimal to nonexistent. Based on the above analysis, we conclude that the amount of lead deposited by WS WDM operations is far below any level that would pose any risk to public health or of significant contamination of water supplies.

In a review of lead toxicity threats to the California Condor (*Gymnogyps californianus*), Center for Biological Diversity et al. (2004) concluded that lead deposits in soils, including those caused by target shooting by the military at shooting ranges on military reservations used by condors, did not pose significant threats to the condor. The concern was that lead might bio-accumulate in herbivores that fed on plants that might uptake the lead from the soil where the target ranges were located. However, Center for Biological Diversity et al. (2004) reported blood samples from condors that foraged at the military reservation where the target shooting occurred did not show elevated lead levels, and, in fact showed lower lead levels than samples from condors using other areas. Because lead deposited by WS's WDM activities is widely scattered in comparison to military shooting ranges, it is clear that, despite valid concerns about other sources of lead toxicity in the environment, lead deposited onto the landscape by WS should not cause any significant impacts on wildlife, nor should it contribute in any significant way to cumulative impacts from other sources of lead shot deposited by sport hunting. However, there appears to be a growing body of evidence that lead bullets and shot remaining in carcasses of animals that are shot but not removed from the landscape can pose lead toxicity problems for scavenging California Condors (Center for Biological Diversity et al. 2004). These concerns have also arisen regarding lead poisoning from Bald Eagles scavenging predators that have been shot. The WS Program has tried various nontoxic (non-lead) shot loads to reduce the concern of lead poisoning, and continues to move in this direction as new nontoxic ammunition is developed that is effective for WDM. However, some evidence has shown that the threat of lead toxicity to eagles is not as severe as previously thought. Hayes (1993) reviewed literature and analyzed the hazard of lead shot to raptors, in particular eagles from aerial hunting by WS. Key findings of that review were:

- Eagles are known to scavenge on bird and mammal carcasses, particularly when other food sources are scarce or when food demands are increased.

- In studies that documented lead shot consumption by eagles (i.e., based on examining the contents of regurgitated pellets), the shot was associated with waterfowl, upland game bird, or rabbit remains, and was smaller than BB or #4 buckshot used in aerial hunting. Lead levels have been detected in eagle blood samples, but the source of the exposure was unknown. Lead residues have been documented in jackrabbits, voles (*Microtus sp.*), and ground squirrels which can explain how eagles could ingest lead from sources other than lead shot. In one study (Pattee et al. 1981), four of five captive Bald Eagles force fed uncoated lead shot died and the fifth went blind. Frenzel and Anthony (1989) suggested, however, that eagles usually reduce the amount of time that lead shot stays in their digestive systems by casting most of the shot along with other indigestible material. It appears that healthy eagles usually regurgitate lead shot in pellet castings which reduces the potential for lead to be absorbed into the blood stream (Pattee et al. 1981; Frenzel and Anthony 1989).

- WS personnel examined nine coyotes (*Canis latrans*) shot with copper plated BB shot to determine the numbers of shot retained by the carcasses. A total of 59 BBs was recovered, averaging 6.5 pellets per coyote. Of the 59 recovered pellets, 84% was amassed just under the surface of the hide opposite the side of the coyote that the shot entered, many exhibited minute cracks of the copper plating, and two shot pellets were split. The fired shot was weighed, compared with unfired shot, and found to have retained 96% of its original weight. Eagles generally peel back the hide from carcasses to consume muscle tissue. Because most shot retained by coyotes tends to end up just under the hide, it would most likely be discarded with the hide. Any shot consumed would most likely still have the nontoxic copper plating largely intact, reducing the exposure of the lead to the digestive system. These factors combined with the usual behavior of regurgitation of ingested lead shot indicate a low potential for toxic absorption of lead from feeding on coyotes killed by aerial hunting.

The above analysis indicates adverse effects on eagles from scavenging on animals killed in WDM are unlikely. The USFWS did not identify this as a concern in the 1992 BO (USDA 1997, Appendix F) which covered potential adverse effects on Bald Eagles from all WS used WDM methods, including shooting. Bald Eagle populations appear to be increasing in the contiguous 48 states and have met or exceeded recovery goals in several states. Golden Eagle populations appear to be somewhat healthy, but show nonsignificant trends in the Breeding Bird Survey (BBS trend estimates for raptors are not as reliable because of small sample sizes). Breeding Bird Survey data indicate a general increasing trend in breeding populations of both Golden Eagles (nonsignificant +1.2, *P=0.41*) and Bald Eagles (significant +5.4, *P=0.01*) in North America since 1966 (Sauer et al. 2008). However, researchers have suggested that the population may be declining in the West (Kochert et al. 2002, Good et al. 2007). Good et al. (2007) estimated the population of Golden Eagles in 4 Bird Conservation Regions (including the northern half of New Mexico) from aerial transects at 27,000 and hope to continue the surveys to determine the trend in the population (preliminary estimates suggest a decline). Thus, Bald Eagle populations do not appear to be adversely affected by lead toxicity problems. Some portion of the Golden Eagle population dies from lead poisoning which is believed to occur from eating hunter shot carcasses which were not retrieved. However, one study found that found that eagles were exposed to lead in the environment from unknown sources in the environment over extended periods of time (Kochert et al. 2002). To minimize exposure, WS retrieves shot carcasses where practical and disposes of them in areas where eagles and other scavengers such as hawks are not able to scavenge on them. In addition, WS uses nontoxic shot where eagles have been documented recently. In addition, no evidence has been brought forth to indicate that any animals killed during WDM by WS have resulted in any indirect lead poisoning of scavenging eagles or other animals.

2.3.3 Impacts of Hazing Programs on Livestock

Some individuals have raised concerns that noise from pyrotechnics used to harass birds could startle livestock and cause problems such as injuring themselves running through fences. Some dairy operators have voiced concerns that startling effects from sound-scare devices could adversely affect milk production. WS personnel, trained and experienced in using pyrotechnics, have noted that in their experience most animals habituate relatively easily and rapidly to noises from the pyrotechnics. However, personnel avoid shooting pyrotechnics near identified livestock facilities where operators have expressed concerns.

2.3.4 National Historic Preservation Act, American Indian, and Cultural Resource Concerns

NHPA requires federal agencies to evaluate the effects of any federal undertaking on cultural resources and determine whether they have concerns for cultural properties in these areas. In most cases as discussed in Section 1.7.2, WDM activities have little potential to cause adverse affects to sensitive historical and cultural resources. If a BDM activity with the potential to affect historic resources is planned under the selected alternative in the decision for this EA, then an individual site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary. The proposed action would not cause major ground disturbance, does not cause any physical destruction or damage to property, wildlife habitat, or landscapes, and does not involve the sale, lease, or transfer of ownership of any property. In general, the proposed methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Harassment techniques that involve noise-making could have a primary effect that would be beneficial at the damage site. The use of these devices is usually short term and could be discontinued if a conflict arose with the use of historic property. Therefore, the BDM methods that WS would use under the proposed action are not the types of activities that would have the potential to affect historic properties.

The Native American Graves and Repatriation Act of 1990 provides protection of American Indian burial sites and establishes procedures for notifying Tribes of any new discoveries. Senate Bill 61, signed in 1992, sets similar requirements for burial protection and Tribal notification with respect to American Indian burials discovered on state and private lands. If a WS employee locates a burial site, the employee would notify the appropriate Tribe or official. WS only conducts BDM activities at the request of a Tribe or their lessee and, therefore, the Tribe should have ample opportunity to discuss cultural and archeological concerns with WS.

2.3.5 Concerns that Killing Wildlife Represents "Irreparable Harm"

Public comments have raised the concern that the killing of any wildlife represents irreparable harm. Although an individual bird or multiple birds in a specific area may be killed by WS BDM activities, this does not in any way irreparably harm the continued existence of these species. Wildlife populations experience mortality from a variety of causes, including human harvest and depredation control, and have evolved reproductive capabilities to withstand considerable mortality by replacing lost individuals. New Mexico's historic and current populations of big game animals, game birds, furbearers and unprotected birds, which annually sustain harvests of thousands of animals as part of the existing human environment, are obvious testimony to the fact that the killing of wildlife does not cause irreparable harm. Populations of some of these species are in fact much higher today than they were several decades ago (e.g., Snow Geese, Canada Geese), in spite of liberal hunting seasons and the killing of hundreds or thousands of these animals annually. The legislated mission of USFWS and NMDGF is to preserve, protect, and perpetuate all the wildlife in the United States and New Mexico. Therefore, USFWS and NMDGF would be expected to regulate killing of protected wildlife species in the State to avoid irreparable harm. Our analysis, herein, shows that the native species WS takes in BDM will continue to sustain viable populations. Thus, losses due to human-caused mortality are not "irreparable."

2.3.6 Concerns that the Proposed Action May Be "Highly Controversial" and Its Effects May Be "Highly Uncertain," Both of Which Would Require That an EIS Be Prepared

The failure of any particular special interest group to agree with every act of a Federal agency does not create controversy and NEPA does not require the courts to resolve disagreements among various scientists as to the methodology used by an agency to carry out its mission (*Marsh vs. Oregon Natural Resource Council*, 490 U.S. 360, 378 (1989)[4]). As was noted in the previous Finding of No Significant Impact and Record of Decision for the prior EA (WS 1999), "*The effects on the quality of the human environment are not highly controversial. Although there is some opposition to BDM, this action is not highly controversial in terms of size, nature, or effect*." If in fact a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared.

2.3.7 Impacts on the Natural Environment Not Considered

USDA (1997) evaluated many WS BDM activities for their impacts on several other natural environmental factors not discussed above. USDA (1997) concluded that WS would have negligible impacts on air quality from the use of WDM methods. In addition, the proposed action does not include construction or discharge of pollutants into waterways and, therefore, would not impact water quality or require compliance with related regulations or Executive Orders. The proposed action would cause only very minimal or no ground disturbance and, therefore, would impact soils and vegetation insignificantly.

[4] Court cases not given in Literature Cited section.

CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 ALTERNATIVES ANALYZED IN DETAIL

Four alternatives will be analyzed in detail in this EA:

1) **Alternative 1 - Continue the Current Federal BDM Program (No Action/Proposed Action).** This is the Proposed Action as described in Chapter 1 and is the No Action Alternative as defined by the Council on Environmental Quality (40 CFR 1500-1508) for analysis of ongoing programs or activities. Under the proposed action, WS will continue to provide an integrated BDM program.

2) **Alternative 2 – Nonlethal BDM by WS Only.** Under this alternative, WS would use only nonlethal methods in BDM. WS could still recommend the use of lethal methods, but would not partake in implementing them.

3) **Alternative 3 – WS Provides Technical Assistance Only for BDM.** Under this alternative, WS would not conduct direct operational BDM activities in New Mexico. If requested, WS would provide affected resource owners with technical assistance information only.

4) **Alternative 4 - No Federal WS BDM.** This alternative consists of no federal BDM program by WS or other federal agency.

3.2 DESCRIPTION OF THE ALTERNATIVES

3.2.1 Alternative 1 – Continue the Current Federal BDM Program

The No Action Alternative, the Proposed Action Alternative in this EA, a procedural NEPA requirement (40 CFR 1502), is a viable and reasonable alternative that could be selected. The No Action Alternative provides a baseline to compare to the other alternatives. The proposed action is to continue the current portion of WS that responds to requests for BDM to protect human health and safety, agricultural and natural resources, and property as discussed in Section 1.3, and conduct surveillance projects involving birds as needed. A major component of the current program is a program to haze Sandhill Cranes and geese to protect agricultural crops in the Middle Rio Grand Valley. Another major component is the protection of human health and safety and property from feral Rock Pigeon damage. The program would also operate to reduce or minimize the loss of livestock feed and the risk of bird-related livestock health problems presented by starlings and blackbirds at requesting dairies and feedlots, and to meet requests to minimize bird damage or the risk of damage to all other resources. To meet these goals WS would have the objective of responding to all requests for assistance with, at a minimum, technical assistance or self-help advice, or, where appropriate and when cooperative or congressional funding is available, direct damage management assistance in which professional WS Specialists or Biologists conduct BDM. An IWDM approach would be implemented which would allow use of any legal technique or method, used singly or in combination, to meet requestor needs for resolving conflicts with birds. Agricultural producers and others requesting assistance would be provided with information regarding the use of effective nonlethal and lethal techniques as available and appropriate. Lethal methods used by WS would include shooting, trapping, egg addling/destruction, DRC- 1339, Avitrol, and euthanasia following live capture with trapping, hand capture, nets, or the use of A-C. Nonlethal methods used by WS may include harassment with pyrotechnics, scare crows, propane exploders, and other noises or visual stimuli to frighten birds away from an impacted area, porcupine wire deterrents, wire barriers, the tranquilizer A-C, and chemical repellents (e.g., methyl anthranilate, polybutene tactile repellents, etc.). In many situations, the implementation of nonlethal methods such as exclusion-type barriers would be the responsibility of the requestor to implement which means that, in those situations, WS's only function would be to implement lethal methods, if any were determined to be necessary to resolve a damage problem. BDM by WS would be allowed in New Mexico when requested to conduct such activities to protect resources on private and public property where a need has been documented following the completion of an Agreement for Control. All management actions would comply with applicable federal, state, and local laws including obtaining the necessary permits to take birds. A detailed description of the methods that could be used in BDM is given in Section 3.3.1.3. NWRC would continue to conduct research on BDM methods with more than 75% of the budget being spent on non-lethal control methods.

3.2.2 Alternative 2 - Nonlethal BDM by WS Only

This alternative would require WS to use only nonlethal methods to resolve bird damage problems. Persons receiving BDM assistance could still resort to lethal methods that were available to them. DRC-1339 and A-C are currently only available for use by WS employees and could not be used by private individuals. Section 3.3.1.3 describes nonlethal methods available for use by WS under this alternative and the lethal techniques that could potentially be used by State agency personnel and private individuals. NWRC would continue to conduct research on nonlethal methods to resolve bird damage problems.

3.2.3 Alternative 3 - WS Provides Technical Assistance Only for BDM

This alternative would not allow for WS operational BDM in New Mexico. WS would only provide technical assistance and make recommendations when requested. Producers, property owners, State and local agency personnel, or others could conduct BDM using traps, shooting, Avitrol, or any nonlethal method that is legal. Avitrol could only be used by State certified pesticide applicators. Currently, DRC-1339 and A-C are only available for use by WS employees and could not be used by private individuals. Section 3.3.1.3 describes BDM methods that could be employed by private individuals or other agencies after receiving technical assistance advice under this alternative. NWRC would continue to conduct research on nonlethal methods to resolve bird damage problems for incorporation into WS personnel's "tool box" of BDM methods.

3.2.4 Alternative 4 - No Federal WS BDM

This alternative would eliminate federal involvement in BDM in New Mexico. WS would not provide direct operational or technical assistance and requestors of WS services would have to conduct their own BDM without WS input. This alternative was discussed in detail in USDA (1997). Section 3.3.1.3 describes BDM methods that could be employed by private individuals or other agencies under this alternative, except that DRC-1339 and A-C would not be available for use. Avitrol could be used by State certified restricted-use pesticide applicators. Information on future developments in nonlethal and lethal management techniques that culminate from NWRC would also not be available to producers or resource owners.

3.3 BDM STRATEGIES AVAILABLE TO WS UNDER THE ALTERNATIVES

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2 and 3 described above. Alternative 4 would terminate both WS technical assistance and operational BDM by WS.

3.3.1 Alternative 1 – Continue the Current Federal BDM Program

WS currently uses many of the BDM methods available for use. Some BDM methods are widely used, while others are used infrequently. WS recommends the use of many BDM methods, but does not implement them. The BDM methods available for use are described in Section 3.1.3.3.

The most effective approach to resolving wildlife damage is through IWDM, the integration of one or more damage management methods, used alone, simultaneously, or sequentially, to achieve the desired effect. The philosophy behind IWDM is to implement the best combination of effective management methods in a cost-effective manner while minimizing the potentially harmful effects on humans, target and nontarget species, and the environment. IWDM may incorporate cultural practices (i.e., animal husbandry), habitat modification (i.e., exclusion), animal behavior modification (i.e., scaring), removal of the individual offending animal, suppression or removal of a local population, or any combination of these, depending on the circumstances of the specific damage problem and the species targeted. IWDM is being implemented by WS under the current BDM program.

3.3.1.1 The IWDM Strategies That WS Employs.

Technical Assistance Recommendations

"Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate WDM methods. The implementation of damage management actions is the responsibility of the requestor. In some cases, WS provides supplies or materials that are of limited availability for non-WS entities to use. Technical assistance may be provided following a personal or telephone consultation, or during an on-site visit 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 the practicality of their application by the requestor.

Under APHIS NEPA Implementing Regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving bird damage problems.

Direct Damage Management Assistance

Direct BDM assistance is given when technical assistance alone is not sufficient to resolve a problem and landowners are unable to resolve the problem by themselves. Direct damage management assistance may be initiated *Agreements for Control* or other comparable instruments provide for WS direct damage management. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of WS personnel are often required to effectively resolve problems, especially if restricted use pesticides are necessary, or if the problem is complex. WS direct BDM assistance involves the implementation of lethal control or nonlethal capture or harassment methods.

3.3.1.2 WS Decision Making. WS personnel are frequently contacted after requestors have tried or considered both nonlethal and lethal methods and found them to be ineffective for any number of reasons. Misapplied or inappropriate methods are often impractical, too costly, time consuming, or inadequate for reducing damage to an acceptable level. WS personnel assess the problem and evaluate the legal and administrative appropriateness and availability of potential strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed practical for the situation are developed into a management strategy. After the management strategy has been implemented, monitoring and evaluation are conducted to assess the effectiveness of the strategy. This conscious thought process for evaluating and responding to damage complaints are the steps involved in the WS Decision Model (Slate et al. 1992) (Figure 5 in Section 1.6.4). In the model, most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a documented process, but a mental problem-solving process common to most, if not all, professions. As depicted in the Decision Model, consideration is given to the following factors before selecting or recommending control methods and techniques:

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

WS recognizes that the decision to implement lethal bird damage reduction activities is a serious professional responsibility. Treves and Naughton-Treves (2005) stated that lethal control can foster the coexistence between people and wildlife and has a legitimate role in wildlife management, but it must be undertaken with care. They stated further that the BDM methods to be used in an operation must be considered carefully and should most often be implemented by a government agency. The authors described a decision-making process for determining the methods and approach (lethal or nonlethal) that the applicator should consider in conducting wildlife damage management, similar to the Decision Model (Slate et al. 1992) used by APHIS-WS personnel. Examples of decision making in selecting BDM methods are given for the two most common problem species in New Mexico that WS conducts BDM.

Middle Rio Grande Valley (MRGV) Crane and Goose Damage Management Program. WS participates with USFWS-Bosque del Apache National Wildlife Refuge and NMDGF in a coordinated strategy to reduce agricultural damage by cranes and geese in the MRGV. In the decision making process, it was determined that several methods (IWDM) would be available to use and provide a reasonable solution to the problem. The strategy included the use of lure crops on state and federal refuges, harassment by WS personnel to scare birds from farm lands, and selective placement of sport hunters, used especially to reinforce hazing efforts. These methods have been implemented in a coordinated effort to minimize crane and goose damage to crops during the winter when migrant cranes and geese are present. The lure crops provide an attractive alternative food source for the birds to give them incentive to remain away from private crop fields. Methods used by WS personnel have been nonlethal including hazing with pyrotechnics, propane cannons, WS personnel on foot or in vehicles, and visual scaring devices (flags or scarecrows). During each of four weekend sport hunts for Sandhill Cranes, hunters are directed to farm lands that experience chronic crane damage where the landowner has agreed to allow hunting. Only a few cranes are typically killed by hunters on these properties, but the activity has helped reinforce the birds' fear of harassment techniques and been quite successful.

WS' current program utilizes one seasonal employee to conduct nonlethal harassment of cranes and geese from farm lands in the area from mid-October thru early April. As of May 1, 2008, WS had 77 active agreements at the landowner's request to allow harassment of cranes and geese from their fields in the MRGV. In FY05-FY07, WS only worked on average of 19 agreements dispersing an average of 75,000 cranes and 250 geese (the number of cranes hazed reflects many of the same cranes being hazed several times over the course of a season). Cultural practices, outlined in 3.1.3.3, may also be recommended to individual farmers as part of the overall IWDM damage reduction strategy. Monitoring and evaluation of the program has determined that it has been very successful in reducing damage by these species in a cost-effective and safe manner.

<u>Feral Domestic Pigeon Problems</u>. Feral domestic pigeons are responsible for many nuisance bird damage requests for assistance in New Mexico. The most common situation with this species involves pigeons roosting and nesting on buildings and structures in both urban and rural areas. The main nuisance problem is from the droppings which are most frequently addressed by recommending exclusion devices/barriers (such as netting, hardware cloth, screen, porcupine wire) or habitat modification and local population reduction. With feral pigeons, the population using a structure typically must be removed before exclusion and other techniques will work effectively because the resident population will diligently remain at the site and continue to cause damage. Methods that could be used for population reduction include shooting with pellet rifles, low-velocity .22 caliber rifle rounds, shotguns (mostly in rural or semi-rural situations), live capture with cage traps followed by euthanasia, and DRC-1339 and Avitrol applications. Once a population at a particular site is removed, clean up of droppings and feathers (an attractant to new pigeons), the use of exclusion techniques, especially from nesting sites (new pigeons looking for nesting sites are less likely to take up residence), and potentially building modifications such as replacing broken windows, covering open doorways with doors or plastic strips, and other methods are effective in minimizing the potential for a problem to recur. All of these options are available to WS Specialists determining what the best strategy would be to resolve a particular damage situation. In addition, depending on the particular situation, the WS Specialist must determine if the problem should be resolved by the requestor or if assistance is needed.

3.3.1.3 BDM Methods Available for Use. WS has been conducting WDM in the United States for more than 90 years. WS has modified WDM activities to reflect societal values and minimize impacts to people, wildlife, and the environment. The efforts have involved research and development of new field methods and the implementation of effective strategies to resolve wildlife damage. WS personnel use a wide range of methods in BDM and strategies are based on applied IWDM principles. Some techniques suggested for use by resource owners, by other entities or individuals, to stop bird damage may not be considered by WS if they are biologically unsound, legally questionable, or ineffective such as ultrasonic devices to repel birds and the use of illegal chemicals.

Resource Management

Resource management includes a variety of practices that may be used by agriculture producers and other resource owners to reduce their exposure to potential wildlife depredation losses. Implementation of these practices is appropriate when the potential for depredation can be reduced without significantly increasing the cost of production or diminishing the resource owner's ability to achieve land management and production goals. Changes in resource management are usually not conducted operationally by WS, but WS could assist producers in implementing changes to reduce problems.

Animal Husbandry. This category includes modifications in the level of care and attention given to livestock, shifts in the timing of breeding and births, selection of less vulnerable livestock species to be produced, and the introduction of human custodians to protect livestock. The level of attention given to livestock may range from daily to seasonally. Generally, when the frequency and intensity of livestock handling increases, so does the degree of protection especially during calving and lambing when young livestock are vulnerable to species such as Black Vultures. The use of human custodians, such as sheep herders, can significantly reduce damage levels, but can be very costly.

The risk of predation to poultry and small livestock, primarily newborns, can be reduced when operations monitor their livestock during the hours when predatory birds are most active. The risk of predation is usually greatest with immature livestock, and this risk can be reduced by holding pregnant females in pens or sheds to protect newborn livestock and keeping newborn livestock in pens for their first 2 weeks. The risk of predation to livestock diminishes with age and the increase in size. For example, Black Vultures, Turkey Vultures, and Common Ravens kill calves within a short time after they are born and keeping cows gathered during calving can reduce the opportunity for this, if custodians are present to scare away the birds. Shifts in breeding schedules can also reduce the risk of predation by altering the timing of births to coincide with the greatest availability of natural food items for predators or to avoid seasonal concentrations of migrating predators such as ravens and vultures.

Altering animal husbandry to reduce wildlife damage has many limitations though. Gathering may not be possible where livestock are in many fenced pastures and where grazing conditions require livestock to scatter. Hiring extra herders, building secure holding pens, and adjusting the timing of births is usually expensive. The timing of births may be related to weather or seasonal marketing of livestock. The expense associated with a change in husbandry practice may exceed the savings. WS encourages resource owners to use these strategies where they may be beneficial, but does not conduct these techniques operationally.

Guard Animals. Guard animals are used in WDM to protect a variety of resources and can provide significant protection at times. Guard animals (i.e., dogs, burros, and llamas) have proven successful in many sheep and goat operations. The effectiveness of guarding animals may not be sufficient in areas where there is a high density of wildlife to be deterred, where the resource, such as sheep foraging on open range, is widely scattered, or where the guard animal to resource ratios are less than recommended. WS often recommends the use of guard animals, but has not had an operational guard animal program.

Several breeds of dogs such as the Great Pyrenees and Komondor have been used to protect sheep and goats. Border collies and other dogs can sometimes be very effective for Canada Goose damage reduction at parks and golf courses. However, the supply and longevity of proven guard dogs is generally quite limited. Resource owners typically must purchase and rear their own guarding dog. Therefore, a 4 to 8 month lag-time is necessary to raise a guarding dog before it becomes an effective deterrent to wildlife such as vultures and geese. Since 25% to 30% of dogs are unsuccessful, the first dog raised as a protector may not be useful. Guard dogs may be ineffective for a number of reasons, but usually because they kill the livestock they are protecting or because they do not stay with the livestock or resource they are intended to guard. Guard dogs can harass and kill nontarget wildlife while protecting resources (Timm and Schmidt 1986). They do have the potential for capturing any of the mammalian and avian T&E predators if they tried to depredate on the resource being protected (e.g., lambs).

Crop Selection/Scheduling. In areas where damage to crops from wildlife is expected, different crops can be planted that are less attractive to the wildlife causing damage or crops can be planted at an earlier or later date to avoid damage. This practice depends on the species causing damage (e.g., resident vs. migrant), the availability of alternate food sources, and the market for alternative crops. Research has been conducted on damage resistant crop varieties with little success.

Lure Crops. If depredations are not avoided by careful crop selection or a modified planting schedule, lure crops can sometimes be used to mitigate the potential loss (Cummings et al. 1987). Lure crops are planted or left for consumption by wildlife as an alternate food source. To improve the efficacy of this technique, it is recommended that frightening devices should be used in nearby non-lure crop fields and wildlife should not be disturbed in the lure crop fields. This approach provides relief for critical crops by sacrificing less important or specifically planted fields. Establishing lure crops is sometimes expensive, requires considerable time and planning to implement, and may attract other unwanted species to the area. Lure crops have been used successfully to reduce damage by cranes and geese in the MRGV.

Habitat Management. Localized habitat management is often an integral part of WDM. The type, quality, and quantity of habitat are directly related to the wildlife produced or attracted to an area. Habitat can be managed to not produce or attract certain wildlife species. For example, vegetation can be planted that is unpalatable to certain wildlife species or trees and shrubs can be pruned or cleared (Figure 7) to make an area unattractive for roosting birds. Ponds or other water sources can be eliminated to reduce certain wildlife species. Habitat management is typically aimed at eliminating nesting, roosting, loafing, or feeding sites used by particular species. Limitations of habitat management as a method of reducing wildlife damage are determined by the characteristics of the species involved, the nature of the damage, economic feasibility, and other factors. Legal constraints may also exist which preclude altering particular habitats. Most habitat management recommended by WS is aimed at reducing wildlife aircraft strike hazards at airports, eliminating bird winter roosts, or managing field rodent populations at airports so not to attract raptors.

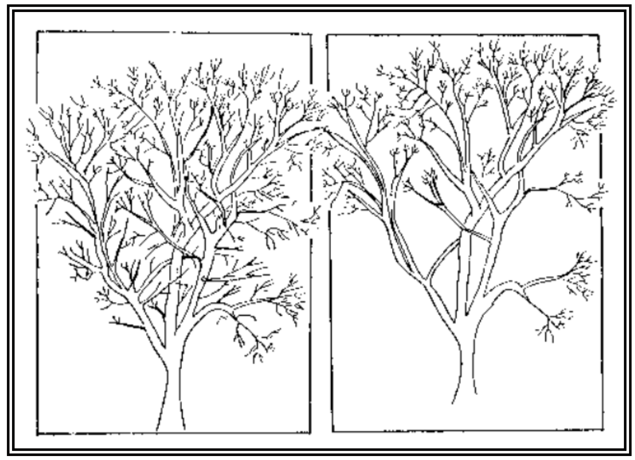

Figure 7. Tree pruning is an example of habitat management.

Change in the architectural design of a building or a public space can often help to avoid potential wildlife damage. For example, selecting species of trees and shrubs that are not attractive to wildlife can reduce the likelihood of potential wildlife damage to parks, public spaces, or residential areas. Similarly, incorporating spaces or open areas into landscape designs that expose wildlife can significantly reduce potential problems. Modifying public spaces to remove the potential for wildlife conflicts is often impractical because of economics or the presence of other nearby habitat features that attract wildlife. Some forms of habitat management may also be incompatible with the aesthetic or recreational features of the site.

Birds use trees and poles for roosting, perching and nesting, and the removal or modification of these items will often reduce the attractiveness of the area. Large winter bird roosts can be greatly reduced at roost sites by removing all the trees or selectively thinning the stand or branches in used trees. Roosts often will re-form at traditional sites, and substantial habitat alteration is the only way to permanently stop such activity. Poles can also be used to attract raptors to sites where reductions in rodent populations are desired.

Habitat management does have the potential to have an effect on all T&E species if present in an area, especially where a T&E species is present that uses the habitat to be modified. If WS determines habitat management would be appropriate to reduce wildlife damage or the threat of damage at a site, such as an airport where wetlands often should be removed, WS will ensure that the cooperator is aware for the need to address T&E species impacts. Habitat management instigated by WS will only be conducted following a consultation with USFWS on a site-specific basis where T&E species are present. Any efforts to mitigate identified effects will be the responsibility of the landowner, but must be agreed upon before WS will commence WDM activities. This will ensure that WS habitat management activities will not have an adverse impact on T&E species and their habitat.

Glyphosate, such as Glypro® Specialty Herbicide and AguaNeat® Aquatic Herbicide**,** is used by WS to reduce cattail (*Typhus spp*.) choked marshes in the Dakotas that are used by blackbirds for roosts and nesting habitat. Glyphosate treatments are conducted to reduce the density of cattails from a wetland for a period of 3-5 years, depending on weather conditions (i.e., moisture levels).

Invasive nonnative and hybrid cattail stands have recently invaded the wetlands of the Plains and are a comparatively new habitat type which has changed the species composition of the area to some degree. The marshes, where they are present, easily become inundated with the hybrid cattails and the stands become dense or "choked" with cattails (i.e., little open water exists). A few species of wildlife favor this habitat type, especially for cover, while others, do not such as waterfowl and those that become more vulnerable to predation. Toxicity studies have shown that the glyphosate is non-toxic to all wildlife and safe for use. It is commonly used on many of the National Wildlife Refuges where marsh habitat becomes choked and makes waterfowl habitat relatively unavailable. Although this method is not currently used by WS in New Mexico, it could be, especially to disperse blackbird roosts near crop fields.

Modification of Human Behavior. WS often tries to alter human behavior to resolve potential conflicts between humans and wildlife. For example, WS may talk with residents of an area to eliminate the feeding of wildlife that occurs in parks, recreational sites, or residential areas to reduce damage by certain species of wildlife, such as Rock Pigeons, Canada Geese, and Black-billed Magpies. This includes inadvertent feeding allowed by improper disposal of garbage or leaving pet food outdoors where wildlife can feed on it. Many wildlife species adapt well to human settlements and activities, but their proximity to humans may result in damage to structures or threats to public health and safety. Eliminating wildlife feeding and handling can reduce potential problems, but many people who are not directly affected by problems caused by wildlife enjoy wild animals and engage in activities that encourage their presence. It is difficult to consistently enforce no-feeding regulations and to effectively educate all people concerning the potential liabilities of feeding wildlife.

Physical Exclusion

Physical exclusion methods restrict the access of birds to resources. These methods can provide effective prevention of bird damage in many situations. Bird proof barriers can be effective but are often cost-prohibitive, particularly because of the aerial mobility of birds which requires overhead barriers as well as peripheral fencing or netting. Exclusion adequate to stop bird movements can also restrict movements of livestock, people, and other wildlife (Fuller-Perrine and Tobin 1993). Exclusionary devices are often more costly than the value of the resource being protected, especially for large areas, and, therefore, are uneconomical and not used often. In addition, some exclusionary devices are labor intensive which can further reduce their cost-effectiveness. Exclusionary devices can potentially injure, maim, and kill nontarget wildlife, particularly birds. Netting can entangle birds and needs to be checked frequently to release birds that have been trapped. Wire grids can inadvertently injure or kill nontarget wildlife species, including T&E species, from impact at high speeds.

Fencing. Fences are widely used to prevent damage from wildlife. Exclusionary fences constructed of woven wire or multiple strands of electrified wire can be effective in keeping wading birds from some areas such as an aquaculture facility or molting Canada Geese out of crop fields. The size of the wire grid must be small enough and the height of the fence high enough to keep the birds from entering the area. For ponds, fencing at least 3 feet high should be erected in water 2 to 3 feet deep. If fences are built in shallow water, birds can easily feed on the pond side of the fence. Raceway fences should be high enough to prevent feeding from the wall. Occasionally, blackbirds will cling to fencing or screening near the water and feed on small fish. A slippery surface created by draping plastic over the fence or screen can be used to eliminate this problem. Electric fences or wires have also been used with limited success. This type of exclusion can make routine work around ponds and hatcheries difficult or impossible. Fencing does have limitations. Even an electrified fence is not always bird-proof and the expense of the fencing can often exceed the benefit. In addition, if large areas are fenced, the wildlife being excluded has to be removed from the enclosed area to make it useful.

Overhead Barriers. Overhead barriers such as netting and wire grids are mostly used to prevent access to areas such as gardens, fish ponds, dwellings, and livestock and poultry pens. Selection of a barrier system depends on the bird species being excluded, expected duration of damage, size of the area or facility to be excluded, compatibility of the barrier with other operations (e.g., feeding, cleaning, harvesting, etc.), possible damage from severe weather, and the effect of on-site aesthetics. The barrier system also depends on the resource being protected and its value. Overhead barrier systems can initially be very costly and expensive to maintain.

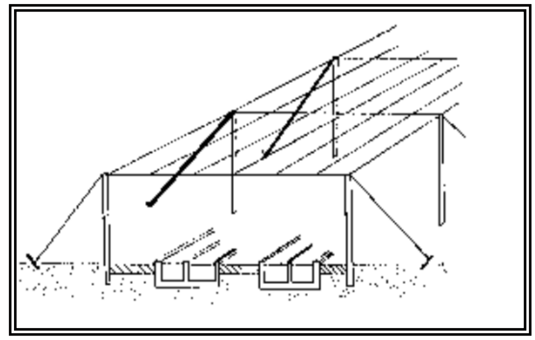

Figure 8. Overhead wire grid to exclude birds.

Netting consists of placing plastic or wire nets around or over resources in a small area, likely to be damaged or that have a high value. Netting is typically used to protect areas such as poultry pens, fish ponds and raceways, and high value crops. Complete enclosure of ponds and raceways to exclude all fish-eating birds requires 1.5- to 2-inch mesh netting secured to frames or supported by overhead wires (Figure 8). Gates and other openings must also be covered. Some hatchery operators use mesh panels placed directly on raceways to effectively exclude predatory birds. Small mesh netting or wire with less than 1-inch openings, secured to wood or pipe frames, prevents feeding through the panels. Because the panels may interfere with feeding, cleaning, or harvesting, they are most appropriate for seasonal or temporary protection. It is also used to prevent wildlife access to settling ponds that contain poisons which could kill them. Small mesh can also be used in ponds to prevent fish from entering shallow water where they would be easy prey for wading birds. Complete enclosure of areas with netting can be very effective at reducing damage by excluding all problem species, but can be costly.

Ponds, raceways, buildings, and other areas can be protected with overhead wires or braided or monofilament lines suspended horizontally in one direction or in a crossing pattern. Monofilament wires can effectively deter gull use of specific areas where they are causing a nuisance (Blokpoel 1976, Blokpoel and Tessier 1984, Belant and Ickes 1996). The birds apparently fear colliding with the wires and thus avoid flying into areas where the method has been employed. The WS program in Washington has effectively utilized steel wires to deter gulls from preying on salmon fingerlings, including T&E species, at the base of dams. Spacing between wires or lines should be based on the species and habits of the birds causing damage. Where the wire grids need to be suspended up high to allow for maintenance, perimeter fencing or wire around ponds and raceways provides some protection from wading birds and is most effective for herons. Partial enclosures, such as overhead lines, cost less but may not exclude all bird species such as terns. Additionally, some areas in need of protection are too large to be protected with netting or overhead wires.

Other Exclusionary Methods. Entrance barricades of various kinds are used to exclude several bird species such as starlings, pigeons, and house sparrows from dwellings, storage areas, gardens, or other areas. Heavy plastic strips hung vertically in open doorways (Figure 9) have been successful in some situations in excluding birds from buildings used for indoor feeding or housing of livestock (Johnson and Glahn 1994). Plastic strips, however, can prevent or substantially hinder the filling of feed troughs or feed platforms at livestock feeding facilities. Such strips can also be covered up when the feed is poured into the trough by

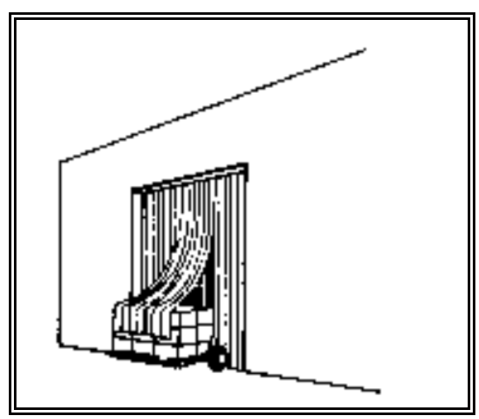

Figure 9. Entrance barricade to deter birds.

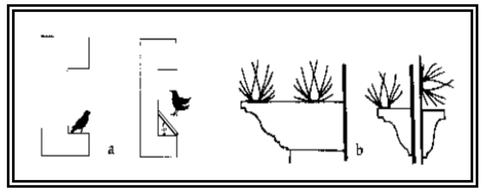

Figure 10. Porcupine wire on ledge to deter birds.

the feed truck. They are not practical for open-air feedlot operations that are not housed in buildings. Metal flashing or hardware cloth may be used to prevent entry of wildlife into buildings or roosting areas. Floating plastic balls called Euro-Matic Bird Balls™ have successfully been used at airports and settling ponds to keep birds from landing on ponds. Porcupine wire (Figure 10) such as Nixalite™ and Catclaw™ is a mechanical repellent method that can be used to exclude pigeons and other birds from ledges and other roosting surfaces (Williams and Corrigan 1994). The sharp points inflict temporary discomfort on the birds as they try to land which deters them from roosting. Drawbacks of this method are that some pigeons will build nests on top of porcupine wire and it can be expensive to implement when large areas are involved. Electric shock bird control systems are available from commercial sources and, although expensive, can be effective in deterring pigeons and other birds from roosting on ledges, window sills and other similar portions of structures (Williams and Corrigan 1994). There are many more examples of these types of exclusionary devices to keep wildlife from entering or landing on areas where they are unwanted.

Wildlife Management

Reducing wildlife damage through wildlife management is achieved using a myriad of techniques. The objective of this approach is to alter the behavior of or repel the target species, remove specific individuals from the population, reduce local population densities, or suppress/extirpate exotic species populations to eliminate or reduce the potential for loss or damage to property and natural resources.

Frightening Devices. Frightening devices are used to repel wildlife from an area where they are a damage risk (i.e., airport, crops) or at risk of being contaminated (e.g., oil spill, settling ponds). The success of frightening methods depends on an animal's fear of, and subsequent aversion to, offensive stimuli (Shivak and Martin 2001). A persistent effort is usually required to effectively apply frightening techniques and the techniques must be sufficiently varied to prolong their effectiveness. Over time, animals often habituate to commonly used scare tactics and ignore them (Arhart 1972, Rossbach 1975, Pfeifer and Goos 1982, Conover 1982 Shirota et al. 1983, Schmidt and Johnson 1984, Mott 1985, Dolbeer et al. 1986, Graves and Andelt 1987, Tobin et al. 1988, Bomford 1990). In addition, in many cases birds frightened from one location become a problem at another. Scaring devices, for the most part, are directed at specific target species by specialists working in the field. However, several of these devices, such as scarecrows and propane exploders can be automated and work without the presence of an operator.

Harassment and other scaring devices and techniques to frighten birds are probably the oldest methods of combating wildlife damage. These devices may be either auditory or visual and generally only provide short-term relief from damage. However, a number of sophisticated techniques have been developed to scare or harass birds from an area. The use of noise-making devices is the most popular and commonly used. Other methods include harassment with visual stimuli (e.g., scarecrows, human effigies, balloons, Mylar® tape, and wind socks), vehicles, lasers, people, falcons, or dogs. These are used to frighten mammals or birds from the immediate vicinity of the damage prone area. As with other WDM efforts, these techniques tend to be more effective when used collectively in a varied regime rather than individually. However, the continued success of these methods frequently requires reinforcement by limited shooting (see Shooting). These techniques are generally only practical for small areas. Scaring devices such as distress calls, helium filled eye spot balloons, raptor effigies and silhouettes, mirrors, and moving disks can be effective but usually for only a short time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Graves and Andelt 1987, Mott 1985, Shirota et al. 1983, Conover 1982, Arhart 1972). Finally, it must be noted that sound-scare devices can also scare livestock when they are used in their vicinity.

Visual scaring techniques such as use of Mylar® tape (highly reflective surface produces flashes of light that startles birds), eye-spot balloons (the large eyes supposedly give birds a visual cue that a large predator is present), flags, effigies (scarecrows), sometimes are effective in reducing bird damage. Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, and Tobin et al. 1988). Birds quickly learn to ignore visual and other scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

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

Propane exploders (Figure 11) operate on propane gas and designed to produce loud explosions at controllable intervals. They are strategically located (i.e., elevated above the vegetation, if possible) in areas of high wildlife use to frighten wildlife from the problem site. Because animals are known to habituate to sounds, exploders must be moved frequently and used in conjunction with other scare devices. Exploders can be left in an area after dispersal is complete to discourage animals from returning.

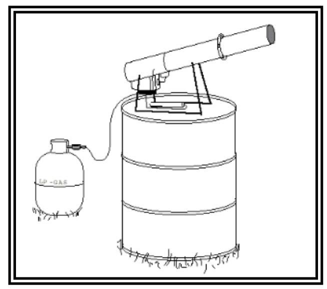

Figure 11. Propane exploder.

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

Noise, whistle, racket and rocket bombs are fired from 15 millimeter flare pistols. They are used similarly to shell-crackers but are projected for shorter distances. Noise bombs (also called bird bombs) are firecrackers that travel about 25 yards before exploding. Whistle bombs are similar to noise bombs, but whistle in flight rather than exploding. They produce a noticeable response because of the trail of smoke and fire, as well as the whistling sound. Racket bombs make a screaming noise in flight and do not explode. Rocket bombs are similar to noise bombs but may travel up to 150 yards before exploding.

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

Lights, such as strobe, barricade, and revolving units, are used with mixed results to frighten waterfowl. Brilliant lights, similar to those used on aircraft, are most effective in frightening night-feeding birds. These extremely bright-flashing lights have a blinding effect, causing confusion that reduces the bird's ability to see. Flashing amber barricade lights, like those used at construction sites, and revolving or moving lights may also frighten birds when these units are placed on raceway walls, fish pond banks, or ingress corridors. However, most birds rapidly become accustomed to such lights and their long-term effectiveness is questionable. In general, the type of light, the number of units, and their location are determined by the size of the area to be protected and by the power source available.

Lasers (the term of "laser" is an acronym for Light Amplification by Simulated Emission of Radiation) to alter bird behavior was first introduced nearly 35 years ago (Lustick 1973), but are a relatively new technique used to frighten and disperse birds from their roosts. The laser received very little attention, until recently, when it had been tested by NWRC. Results have shown that several bird species, such as Double-crested Cormorants, Canada Geese, other waterfowl, gulls, vultures, and American Crows have all exhibited avoidance of laser beams during field trails (Glahn et al. 2001, Blackwell et al. 2002). The repellent or dispersal effect of a laser is due to the intense and coherent mono-wavelength light that, when targeted at birds, can have substantial effects on behavior and may illicit changes in physiological processes (APHIS 2001). Best results are achieved under low-light conditions (i.e., sunset through dawn) and by targeting structures or trees in proximity to roosting birds, thereby reflecting the beam. In field situations, habituation to lasers has not been observed (APHIS 2001). Lasers are directional by the user and, therefore, will have little effect on nontarget species.

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

Physical harassment with radio controlled airplanes is effective in several situations for dispersing damage-causing birds. This tool is effective in removing raptors from areas that are not accessible by other means. Radio controlled airplanes allow for up close and personal harassment of birds, while combining visual (e.g., eyespots painted on the wings) and auditory (e.g., engine noise and whistles attached to the aircraft) scare devices. Disadvantages of method are birds in large flocks do not respond well to the plane, training is required to become efficient, a good working relationship is required by the operator and air traffic controllers at airports where they are most commonly used, weather conditions may restrict the usefulness of the plane, and the planes require frequent mechanical up-keep.

Avitrol® (Avitrol Corporation, Tulsa, OK), 4-aminopyridine, is primarily used as a chemical frightening agent (repellent) for blackbirds in corn and sunflower fields and can be effective in a single dose when mixed with untreated baits. However, Avitrol is not completely a frightening agent because most birds that consume the bait die (Johnson and Glahn 1994). Avitrol comes preformulated with treated baits mixed with untreated baits (1:99) and applied to crop fields for birds to ingest. After ingesting the bait, the bird becomes ill, flies erratically, emits distress calls, and then dies. This behavior is intended to frighten the remaining blackbirds from the treated fields. NWRC research and producers have had mixed and inconsistent results with the technique's effectiveness. As a result, this formulation of Avitrol has not been used widely. Avitrol is more often used as a toxicant for other species of birds such as pigeons and it will be discussed further under chemical toxicants. Avitrol is a restricted-use pesticide that can only be sold to certified applicators. It is available in several bait formulations with only a small portion of the individual grains carrying the chemical. It can be used during anytime of the year, but is used most often during fall and winter just prior to harvest of a crop. Any granivorous bird associated with the target species could be affected by Avitrol. Avitrol is water soluble, but laboratory studies demonstrated that Avitrol is strongly absorbed onto soil colloids and has moderately low mobility. Biodegradation is expected to be slow in soil and water, with a half-life ranging from three to 22 months. However, Avitrol may form covalent bonds with humic materials, which may serve to reduce its bioavailability in aqueous media, is non-accumulative in tissues, and is rapidly metabolized by many species (Schafer 1991). Avitrol is acutely toxic to avian and mammalian species; however, blackbirds are more sensitive to the chemical with little evidence of chronic toxicity for many species. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning, and during field use only magpies and crows appeared to have been affected (Schafer 1991). However, a laboratory study by Schafer et al. (1974) showed that magpies exposed to two to 3.2 times the published LD_{50} (Lethal Dose required to kill 50% of the test subjects of a given species) in contaminated prey for 20 days were not adversely affected and three American Kestrels were fed contaminated blackbirds for seven to 45 days were not adversely affected. Therefore, no probable risk is expected, based on low concentrations and low hazards quotient value for nontarget indicator species tested on this compound. No probable risk is expected for pets and the public, based on low concentrations and low hazards quotient value for nontarget indicator species tested on this compound.

Relocation. Translocation may be appropriate in some situations (i.e., if the problem species' population is at very low levels, a suitable relocation site is known, and the additional dollars required for relocation can be obtained.) However, those species that often cause damage problems (e.g., blackbirds, Canada Geese) are relatively abundant and relocation is not necessary for the maintenance of viable populations. Relocation may also result in future depredations if the relocated animal encounters protected resources again and, in some cases, could require payment of damage compensation claims. Any decisions on relocation of wildlife are coordinated with State game and fish agencies and, in many instances, State laws require consultation with appropriate land management agencies/manager before relocating wildlife to these lands. Finally, some state agencies require veterinary examinations and disease tests prior to relocation.

The American Veterinary Medical Association, The National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists all oppose the relocation of mammals because of the risk of disease transmission (Centers for Disease Control 1990). Although relocation is not necessarily precluded in all cases, it would in many cases be logistically impractical and biologically unwise. Relocation to other areas following live capture would not generally be effective or cost –effective because problem bird species are highly mobile and can easily return to damage sites from long distances, habitats in other areas are generally already occupied, and relocation would most likely result in bird damage problems at the new location. Relocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats. However, there may be exceptions for relocating certain bird species. Relocation of damaging birds might be a viable solution and acceptable to the public when the birds were considered to have high value such as migratory waterfowl, raptors, or T&E species. In these cases, WS would consult with the USFWS or NMDGF to coordinate capture, transportation, and selection of suitable relocation sites.

Chemical Repellents. Chemical repellents are nonlethal chemical formulations used to discourage or disrupt particular behaviors of wildlife. There are three main types of chemical repellents: olfactory, taste, and tactile. Olfactory repellents must be inhaled to be effective. These are normally liquids, gases or granules, and require application to areas or surfaces needing protecting. Taste repellents are compounds (i.e., liquids, dusts, granules) that are normally applied to trees, shrubs and other materials that are likely to be ingested or gnawed by the target species. Tactile repellents are normally thick, liquid-based substances which are applied to areas or surfaces to discourage travel of wildlife by irritating the feet or making the area undesirable for travel. Most repellents are ineffective or short-lived in reducing or eliminating damage caused by wildlife, therefore, are not used very often by WS.

Effective and practical chemical repellents should be nonhazardous to wildlife; nontoxic to plants, seeds, and humans; resistant to weathering; easily applied; reasonably priced; and capable of providing good repellent qualities. The reaction of different animals to a single chemical formulation varies and this variation in repellency may be different from one habitat to the next. Development of chemical repellents is expensive and cost prohibitive in many situations. Chemical repellents are strictly regulated, and suitable repellents are not available for many wildlife species or wildlife damage situations. Chemical repellents are commercially available for birds and include active ingredients such as methyl anthranilate which is grape soda flavoring (i.e., Rejex-it®), anthraquinone (Flight Control®Plus, Avipel®), methiocarb (i.e., Mesurol), or polybutenes (i.e., Tanglefoot® - Tanglefoot Co., Grand Rapids, MI). These compounds are relatively nontoxic to the environment with the amount of active ingredient used in the different formulations, especially following label instructions (some problems have been brought forth regarding anthraquinone, but it should be relatively safe if used according to label). The active ingredients in many repellents are listed on the EPA's 25b exempt list and, as such, are considered to have relatively low risk to the environment. Registration requirements for these chemicals are reduced because they are relatively nontoxic. Most repellents have only "Caution" on the labels because they are relatively nontoxic. These can typically be purchased by the public. An exception is methiocarb which is discussed below. Applied in accordance with label directions, none of the other repellents discussed are expected to have an effect on nontarget species.

Methyl anthranilate (MA), an artificial grape flavoring used in foods and soft drinks for human consumption, could be used or recommended by WS as a bird repellent. MA has been shown to be an effective repellent for many bird species, including waterfowl (Dolbeer et al. 1993). It is equivalent in birds as capsaicin (hot peppers) is to mammals. It is registered under the brand name RejexIt® (Natural Forces LLC, Davidson, NC) or applications to turf or to surface water areas used by unwanted birds. The material has been shown to be nontoxic to bees (LD_{50} > 25 micrograms/bee[5]), nontoxic to rats in an inhalation study (LC_{50} > 2.8 mg/L[6]), and of relatively low toxicity to fish and other invertebrates. MA is a naturally occurring chemical in concord grapes and the blossoms of several species of flowers which is used as a food additive and perfume ingredient (Dolbeer et al. 1992). It has been listed as "Generally Recognized as Safe" by the FDA (Dolbeer et al. 1992). Water surface and turf applications of MA are generally considered expensive. For example, the least intensive application rate required by label directions is 20 lbs. of product (8 lbs. active ingredient) per acre of surface water at a cost of about $64/lb. with retreating required every 3-4 weeks; a golf course in Rio Rancho, New Mexico estimated that treating four watercourse areas would cost in excess of $25,000 per treatment for material alone. MA completely degrades in about 3 days when applied to water which indicates the repellent effect is short-lived. Cost of treating turf areas would be similar on a per acre basis.

Another, potentially more cost-effective, MA application is with the use of a fog-producing machine (Vogt 1997). The fog drifts over the area to be treated and is irritating to the birds while being nonirritating to any humans that might be exposed. Fogging applications must generally be

[5] An LD_{50} is the dosage in milligrams of material per kilogram of body weight, or, in this case in micrograms per individual bee, required to cause death in 50% of a test population of a species.

[6] An LC_{50} is the dosage in milligrams of material per liter of air required to cause death in 50% of a test population of a species through inhalation.

repeated 3-5 times after the initial treatment before the birds abandon a treatment site. Applied at a rate of about .25 lb./ acre of water surface, the cost is considerably less than when using the turf or water treatment methods. However, the fog method is currently not registered for use in New Mexico and, therefore, cannot legally be used to meet the goals of the proposed action.

Methiocarb is a chemical repellent used for nonlethal taste aversion and was first registered as a molluscicide, but found to have avian repellent properties. Mesurol®, the trade name, is registered with EPA (EPA Reg. No. 56228-33) as an aversive-conditioning egg treatment to reduce predation from Common Ravens, Chihuahuan Ravens, and American Crows on the eggs of T&E species or other wildlife species determined to be in need of special protection. Mesurol is registered for WS use only. The active ingredient is methiocarb which is a carbamate pesticide which acts as a cholinesterase inhibitor. Species which feed upon treated eggs may show signs of toxicity (e.g., regurgitation, lethargy, or temporary immobilization). Occasionally, birds may die after feeding upon treated eggs, but most birds exposed to treated eggs survive. Avery et al. (1995) examined the potential of using eggs injected with 30mg of methiocarb to condition common ravens from preying on eggs of endangered California Least Terns. Results showed that proper deployment of treated eggs can be a useful, nonlethal method for reducing raven predation at Least Tern colonies. Avery and Decker (1993) evaluated whether predation might be reduced through food avoidance learning. They used captive Fish Crows to examine avoidance response from methiocarb (18mg/egg) and methyl anthranilate (100mg/egg). Their study showed that some crows displayed persistence to the 5-day exposure and that successful application may require an extended period of training for target predators to acquire an avoidance response. During the spring of 2001, WS conducted a field test on the Sterling Wildlife Management Area in Idaho, where Mesurol treated eggs were exposed to Black-billed Magpies to evaluate aversive conditioning to eggs of waterfowl and upland game birds. The number of magpies feeding on treated eggs decreased after a period. However, their feeding behavior switched to pecking holes in eggs, possibly trying to detect treated eggs before consuming them. This behavior may suggest that at least some magpies experienced the ill effects of Mesurol, but the *"tasting"* of eggs may result in increased predation (Maycock and Graves 2001).

Capture or Take Methods. Several methods are available to capture or take offending animals. The appropriateness and efficacy of any technique will depend on a variety of factors.

Leghold traps are versatile and widely used by WS for capturing many species. These traps can be utilized to live-capture a variety of animals but are most often used by WS to capture mammals. Birds are rarely targeted with leg-hold traps, except padded jaw leg-hold pole traps (discussed below). Traps are effectively used in both terrestrial and shallow aquatic environments. Traps placed in the travel lanes of the targeted animal, using location to determine trap placement rather than attractants, are known as *"blind sets."* Three advantages of the leg-hold trap are: 1) they can be set under a wide variety of conditions, 2) nontarget captures can be released or relocated, and 3) pan-tension devices can be used to reduce the probability of capturing smaller nontarget animals (Turkowski et al. 1984, Phillips and Gruver 1996). Disadvantages of using leg-hold traps include: 1) the difficulty of keeping them in operation during rain, snow, or freezing weather, 2) the lack of selectivity where nontarget species are of a similar or heavier weight as the target species, and 3) the additional time and labor necessary over other methods to keep them functional.

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

Cage traps usually work best when baited with foods attractive to the target animal. They are used to capture birds ranging in size from sparrows to vultures. Cage traps do have a few drawbacks. Some individual target animals avoid cage traps. Some nontarget animals become “trap happy” and purposely get captured to eat the bait, making the trap unavailable to catch target animals. These behaviors can make a cage trap less effective. Cage traps must be checked frequently to ensure that captured animals are not subjected to extreme environmental conditions. For example, an animal may die quickly if the cage trap is placed in direct summertime sunlight. Another potential problem with the use of cage traps is that some animals fight to escape and injure themselves in the process. WS SOPs when conducting bird trapping operations is to ensure that an adequate supply of food and water is in the trap to sustain decoy and captured birds for several days. Active traps are checked regularly to replenish bait and water and to remove captured birds. Nontarget species are released during trap checks. USFWS BOs (USDA 1997) had no concerns with impacts to T&E species from the use of these traps.

Decoy traps, modeled after the Australian crow trap, are used to capture several species of birds, including crows, starlings, sparrows, magpies, gulls, and vultures. They are large screen enclosures with the access modified to suit the target species. A few live birds are maintained in the baited trap to attract birds of the same species and, as such, act as decoys. Non-target species are mostly released unharmed (as discussed above birds can injure themselves lethally or birds may be killed by a predator that gains access into the trap).

Nest box traps are used for a variety of damage situations to capture birds (DeHaven and Guarino 1969, Knittle and Guarino 1976). Traps are made of nylon netting, hardware cloth, and wood, and come in many different sizes and designs, depending on the species of birds being captured. The entrances of traps also vary greatly from swinging-door, one-way door, funnel entrance, to tip-top sliding doors. Traps can be baited with grains or other feed, but mainly need to appear to be ideal nesting sites to attract the target birds.

Clover, funnel, and pigeon traps are enclosure traps made of nylon netting or hardware cloth and come in many different sizes and designs, depending on the species of birds being captured. The entrance of the traps also vary greatly from swinging-door, one-way door, funnel entrance, to tip-top sliding doors. Traps are baited with grains or other feed which attract the target birds. WS standard procedure when conducting trapping operations is to ensure that an adequate supply of food and water is in the trap to sustain captured birds for several days. Active traps are checked daily, every other day, or as appropriate, to replenish bait and water and to remove captured birds.

Cannon and rocket nets are normally used for larger birds such as waterfowl, but can be used to capture a wide variety of avian species. Cannons use mortar projectiles to propel a net up and over birds which have been baited to a particular site. Birds are taken from the net and disposed of appropriately.

Net guns have occasionally been used by WS to catch target waterfowl. These shoot from a “rifle with prongs,” go about 20 yards, and wrap around the target animal.

Mist nets are very fine mesh netting used to capture several species of birds. Birds cannot see the netting when it is in place because the mesh is very fine and overlapping “pockets” in the net assure birds will become entangled. They typically become entangled after striking the net. Net mesh size determines the birds that can be caught (Day et al. 1980). These nets can be used for capturing small-sized birds such as House Sparrows and finches entrapped in warehouses and other structures. They can also be used to capture some larger birds such as blackbirds and starlings when they are going to a roost or feeding area. Mist nets are monitored closely, typically watched from a discreet location. Mist nets when used outdoors are often monitored at least hourly to ensure that any captured nontarget species, especially T&E species, can be released quickly and unharmed. Mist nets are more often used in buildings to catch birds such as sparrows and finches, but have been used recently by WS to capture birds to be sampled for disease and released.

Bow nets are small circular net traps used for capturing birds and small mammals. The nets are hinged and spring loaded so that when the trap is set it resembles a half moon. The net is set over a food source and triggered by an observer using a pull cord.

Hand nets are used to catch birds and small mammals in confined areas such as homes and businesses. These nets resemble fishing dip nets with the exception that they are larger and have long handles. A variant on the hand net is a round throw-net with weights at the edges of the net, similar to that used for fishing. This net is also used for capturing birds in urban areas.

Drive traps are used to herd some animals into pens where they are captured. Drive traps have been used for species such as Canada Geese, domestic waterfowl, jackrabbits (*Lepus* spp.), and ungulates. A drive-trap consists typically of wire panels that are erected into a 15 ft^2 to 100 ft^2 pen, depending on the number of geese or other target species, with two wings made of 2-3 ft high plastic fencing extending 60-200 ft in a 'V' from the pen. Target species are herded to the pen at each site with people on foot or in boats, depending on the target species and the existing conditions. WS uses the standard "drive-trap" (Addy 1956) to capture Canada Geese or domestic waterfowl during the molt when they are flightless (May-July) for relocation or euthanasia.

Raptor traps come in a variety of styles such as the bal-chatri, Swedish goshawk trap, and purse traps. These have been used by WS at airports to capture raptors to remove them from the airfield. Most raptors captured in these have been banded and relocated. Raptor traps are also used to remove birds from areas around nesting T&E shorebirds. Disposition of captured raptors is determined after consultation with the local USFWS office.

Padded-jaw pole traps (Figure 12) are modified No. 0 or 1 coil spring leg-hold traps used to capture specific target birds such as raptors, magpies and crows. These are placed on top of poles or typical roosting spots frequented by targeted birds. These traps are monitored frequently and nontarget species can be released unharmed. Target species can be relocated or euthanized, mostly depending on the species to be captured and the desires of NMDGF and USFWS.

Snap traps are modified rat snap traps used to remove individual woodpeckers, starlings, and other cavity use birds. The trap treadle is baited with peanut butter or other taste attractants and attached near the damage area, such as on the exterior wall of a home that is being damaged by a species such as a woodpecker. These traps pose no imminent danger to pets or the public.

Shooting is used selectively for target species, but may be relatively expensive because of the staff hours sometimes required.

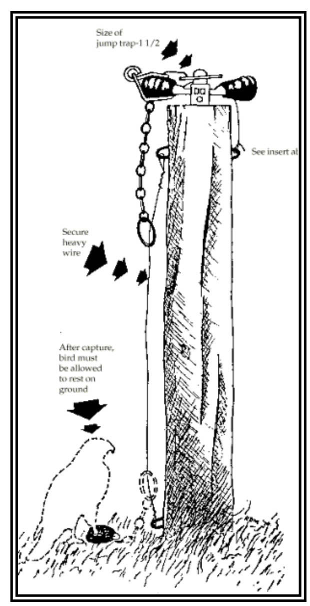

Figure 12. Padded-jaw pole trap.

Nevertheless, shooting is an essential WDM method. Removal of feral pigeons may be achieved by night shooting with an air rifle and be quite effective in a short period. Shooting can also be a good method to target individual birds. However, shooting is mostly ineffective for flocking birds.

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

The risk of lead poisoning to birds was analyzed in Section 2.3.2. WS personnel do use lead based ammunition in rifles and sometimes shotguns. WS personnel retrieve carcasses where possible to reduce the risk of lead poisoning. This has been discussed with the USFWS. Because of the recognized potential hazard associated with lead, WS often uses steel or other non-toxic shot as necessary to minimize the risk of lead poisoning to scavengers.

Sport hunting is sometimes recommended by WS as a viable BDM method when the target species can be legally hunted. A valid hunting license and other licenses or permits may be required by NMDGF and USFWS for certain species. This method provides sport and food for hunters and requires no cost to the landowner. Sport hunting is occasionally recommended if it can be conducted safely for pigeon damage management around feedlots and dairies and for Sandhill Cranes, Canada Geese, Snow Geese, and other damage causing waterfowl.

Egg, nest, and hatchling removal and destruction can be a means of maintaining populations of a damaging avian species at a static level. Nesting populations of Canada Geese and gulls, especially if located near airports, may pose a threat to public health and safety, as well as equipment. Pigeons and starlings can also cause extensive damage to public facilities. Egg and nest destruction is used mainly to control or limit the growth of a nesting population in a specific area through limiting reproduction of offspring or removal of nest to other locations. Egg and nest destruction is practiced by manual removal of the eggs or nest.

Some species frequently attack people to guard their nests. In New Mexico, species that will actually hit people are Canada Geese and Mississippi Kites. This causes concern when the nest is located near a door or exit to a residential house or business. Of greatest concern is the threat to elderly people or bicyclist who may fall in response to the attack. Where these are creating a significant nuisance, WS may remove the nest, eggs, or hatchlings.

Egg addling or oiling is the practice of destroying the embryo prior to hatching. Egg addling is conducted by vigorously shaking an egg numerous times which causes detachment of the embryo from the egg sac. Egg oiling (a liquid spray) does not allow an egg to breathe or get oxygen, which prohibits the embryo from developing. Eggs are oiled and addled so that birds do not renest at least for an extended period; for example, Canada Geese will set on eggs an average of 14.2 days beyond the expected hatch date for addled eggs. Egg destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them. This method is practical only during a relatively short time interval and requires skill to properly identify the eggs and hatchlings of target species. Some species may persist in nesting and the laying of eggs, making this method ineffective.

Chemical immobilizing and euthanizing drugs are important tools for managing wildlife. Under certain circumstances, WS personnel are involved in the capture of animals where the safety of the animal, personnel, or the public are compromised and chemical immobilization provides a good solution to reduce these risks. For example, chemical immobilization has often been used to capture aggressive Canada Geese in residential areas where public safety is at risk. It is also used to take nuisance waterfowl that cannot be easily captured with other methods. WS employees that use immobilizing drugs are certified to use these following the guidelines established in the WS Field Operational Manual under "Use of Immobilization and Euthanasia Drugs." A-C is an immobilizing agent used by WS to capture and remove waterfowl, coots, pigeons, and gulls. These are typically used in urban, recreational, and residential areas where the safe removal of a problem animal is most easily accomplished with a drug delivery system, hand-fed baits. Immobilization is usually followed by relocation when appropriate (i.e., mainly waterfowl) or euthanasia. Euthanasia is usually performed with drugs such as Beuthanasia-D® or Fatal-Plus® which contain forms of sodium phenobarbital. Euthanized animals are disposed of by incineration or deep burial to avoid secondary hazards. Drugs are monitored closely and stored in locked boxes or cabinets according to WS policies, and Department of Justice, Drug Enforcement Administration or FDA guidelines. Most drugs fall under restricted-use categories and must be used under the appropriate license from the U.S. Department of Justice, Drug Enforcement Administration which WS does hold. A-C is currently regulated by FDA.

Alpha-chloralose is an immobilizing agent used to capture and remove nuisance birds. The drug is currently approved for use by WS as an FDA Investigational New Animal Drug (Registration #6602) rather than a pesticide. It has been typically used A-C in industrial and residential areas. Single bread or corn baits are fed directly to target birds and those treated are monitored until the drug takes effect. WS personnel remain at the application site until the immobilized birds are retrieved. Unconsumed baits are removed from the site following each treatment. A-C may be used only by WS personnel who have been trained and certified in its use. Pursuant to FDA restrictions, pigeons and waterfowl (during the hunting season) captured with A-C for subsequent euthanasia must be killed and buried or incinerated, or be held in captivity for at least 30 days, at which time the birds may be killed and processed for human consumption. Use of this drug is labor intensive and, therefore, not always cost effective (Wright 1973, Feare et al. 1981). A-C is typically delivered in small quantities contained in baits with minimal hazards to pets and humans because the single bread or corn baits are fed directly to the target birds. A-C was eliminated from more detailed analysis in USDA (1997) based on critical element screening, therefore, environmental fate properties of this compound were not rigorously assessed. However, the solubility and mobility are believed to be moderate and environmental persistence is believed to be low. Bioaccumulation in plants and animal tissue is believed to be low. A-C is used in other countries as an avian and mammalian toxicant. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about 2 to 30 times lower than the LD_{50}. LD_{50} values are typically much higher for mammals than birds. Toxicity to aquatic organisms is unknown (Wornecki et al. 1990), but the compound is not generally soluble in water and, therefore, probably remains unavailable to aquatic organisms. Since A-C is monitored at the application site, fed directly to target species, and uneaten baits are retrieved, the potential effect to nontarget species is low. Factors supporting the determination of this low potential impact included the lack of exposure to pets, non-target species and the public, and the low toxicity of the active ingredient. In addition, most A-C projects are conducted in urban-type environments. Other supporting rationale for this determination included relatively low total annual use by WS and a limited number of potential exposure pathways. However, because A-C is given in baits that the target species could drop or in a free-feeding condition, rather than injected into the animal, a nontarget species could be exposed to its sedative affects.

Euthanasia can be accomplished with several methods. Several drugs and methods are available to euthanize captured animals. Euthanasia methods include registered drugs such as Beuthanasia-D®, Fatal Plus®, cervical dislocation, decapitation, a shot to the brain, or asphyxiation with CO or CO_2. These methods are completely species specific and animals euthanized with drugs are buried or incinerated.

Chemical pesticides have been developed to reduce or prevent wildlife damage and are widely used because of their efficiency. Although some pesticides are fairly group specific to certain of species (e.g. birds vs. mammals), pesticides are typically not species specific and their use may be hazardous unless used with care by knowledgeable personnel. The proper placement, size, type of bait, and time of year are keys to selectivity and successful use of pesticides for WDM. When a pesticide is used according to its EPA registered label, it poses minimal risk to people, the environment, and non-target species. Neither EPA nor NMDA would register a chemical that had not undergone rigorous environmental testing to determine its potential effects on humans and the environment including risks to nontarget species. Since the tests required by EPA to register a chemical, development of appropriate pesticides is expensive, and the path to a suitable end product is filled with legal and administrative hurdles. Few private companies are inclined to undertake such a venture. Most pesticides are aimed at a specific target species, yet suitable pesticides are not available for most animals. Available delivery systems make the use of pesticides unsuitable in many wildlife damage situations. This section describes the pesticides used by WS in BDM.

DRC-1339 (EPA. Reg. Nos. 56228-10, 56228-17, 56228-28, 56228-29, and 56228-30), 3-chloro-4-methylbenenamine hydrochloride, is an avian pesticide registered with EPA. For more than 30 years, DRC-1339 has proven to be an effective method of starling, blackbird, gull, crow, raven, magpie, and pigeon damage management (West et al. 1967, West and Besser 1976, Besser et al. 1967, and DeCino et al. 1966). DRC-1339 is a slow acting avicide that is rapidly metabolized into nontoxic metabolites and excreted after ingestion. This chemical is one of the most extensively studied and evaluated pesticides ever developed. Because of its rapid metabolism, DRC-1339 poses little risk of secondary poisoning to non-target 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 many pest birds, but low-to-moderate toxicity to most raptors with almost no toxicity to mammals (DeCino et al. 1966, Palmore 1978, Schafer 1981). For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/ bird to cause death (Royall et al. 1967); many other bird species such as raptors, House Sparrows, and eagles are classified as non-sensitive (USDA 1997) requiring a much higher dose (Oral LD_{50}s doses for Golden Eagles = 450 mg, Northern Harrier = 45 mg, and House Sparrow = 9mg), usually at least 10-fold increase. Numerous studies have shown that DRC-1339 poses minimal risk of primary poisoning to non-target and T&E species (USDA 1997). Secondary poisoning has not been observed with DRC-1339 treated baits. During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1979). This can be attributed to relatively low toxicity to species that might scavenge on birds killed by DRC-1339 and its tendency to be almost completely metabolized in target birds leaving little residue for scavengers to ingest. Secondary hazards of DRC-1339 are almost non-existent. DRC-1339 acts in a humane manner producing a quiet, painless death. Prior to the application of DRC-1339, pre-baiting is required to monitor for non-target species that may consume the bait. If non-target species are observed, then the use of DRC-1339 would be postponed or not applied. Research studies and field observations suggest that DRC-1339 treatments kill about 75% of the blackbirds and starlings at treated feedlots (Besser et al. 1967). The inherent safety features of DRC-1339 help avoid negative impacts to T&E species as well as preclude hazards to most species other than the target species listed.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultra violet radiation. DRC-1339 is highly soluble in water but does not hydrolyze and degradation occurs rapidly in water. DRC-1339 tightly binds to soil and has low mobility. The half life is about 25 hours, which means it is nearly 100% broken down within a week, and identified metabolites (i.e., degradation chemicals) have low toxicity. Aquatic and invertebrate toxicity is low (USDA 1997). USDA (1997, Appendix P) contains a thorough risk assessment of DRC-1339 and that assessment concluded that no adverse effects to T&E species are expected from use of DRC-1339.

DRC-1339 concentrate is used effectively under five EPA registered labels to reduce damage by specific bird species. Hard-boiled eggs and meat baits are injected with DRC-1339 and used to reduce raven, crow, and magpie damage for the protection of newborn livestock, the young or eggs of threatened, endangered, or sensitive species, human health and safety, and silage and fodder bags. It is also registered for application on grain, poultry pellets, raisins, and cull French fries to reduce damage caused by blackbirds and starlings at livestock and poultry feedlots. A similar label allows DRC-1339 to be used at blackbird and starling staging areas associated with nighttime roosts with similar baits. The label has been supplemented in New Mexico under a Special Local Need to reduce crow damage to pecans. Another label allows DRC-1339 to be used on whole kernel corn to reduce health, nuisance, or economic problems caused by pigeons in and around structures in non-crop areas. A fifth label allows the use of DRC-1339 on bread cube baits to reduce damage caused by several species of gulls that, during their breeding season, prey on other colonially nesting bird species, or damage property and crops. The specified gull species can be managed to reduce damage or damage threats on their breeding grounds or several other areas including airports and landfills and for T&E species and human health and safety protection.

The use of DRC-1339 as per label instructions will have little effect on nontarget species in New Mexico. DRC-1339 baits cannot be used in areas where potential consumption of treated baits by T&E species could occur. Observation of sites to be treated with or without prebaiting is necessary to determine the presence of nontarget species. DRC-1339 baits cannot be used directly in water or areas where runoff is likely.

Avitrol® (Avitrol Corp., Tulsa, OK), 4-aminopyridine, discussed as a chemical frightening agent (repellent) for blackbirds and starlings above, is often used as a toxicant at a 1 treated:9 untreated ratio for pigeons, house sparrows, and other commensal birds. Avitrol treated baits are placed in an area where the targeted birds are feeding and most all birds that consume treated baits normally die (Johnson and Glahn 1994). Birds display abnormal flying behavior after ingesting treated baits and emit distress vocalization (pigeons do not). This chemical is not normally used at airports because the abnormal flying behavior could cause affected birds to fly into the path of aircraft. Avitrol is a restricted use pesticide that can only be sold to certified applicators and is available in several bait formulations with only a small portion of the individual grains carrying the chemical. Any granivorous bird associated with the target species could be affected by Avitrol which none of the T&E species in the United States are. Blackbirds and corvids are slightly more sensitive to the chemical than other species of mammals and birds. In addition, chronic toxicity has not been demonstrated (Schafer 1991). Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning. However, in a field study, magpies and crows may have been affected secondarily (Schafer 1991). A laboratory study showed, though, that magpies which fed for 20 days on birds killed with 2 to 3.2 times the lethal dose of active ingredient were not affected (Schafer et al. 1974). Similarly, American Kestrels that fed on blackbirds for 7 to 45 days which had died from a lethal dose of Avitrol were not adversely affected (Schafer 1991). Therefore, no probable secondary risk is expected with use of this compound, even for pets and the public. Avitrol is water soluble, but laboratory studies demonstrated that Avitrol is strongly absorbed onto soil colloids and has moderately low mobility. Biodegradation is expected to be slow in soil and water, with a half-life ranging from 3 to 22 months. Avitrol may form covalent bonds with humic materials, which may serve to reduce its bioavailability in aqueous media. Avitrol is non-accumulative in tissues and rapidly metabolized by many species (Schafer 1991). WS has used Avitrol in the last 5 FYs (FY03 - FY07) for urban bird damage situations. Use of Avitrol by WS is not likely to have an adverse affect on T&E species, especially because it will be used according to label restrictions and primarily in urban environments by WS.

Chemosterilants and Contraception. Contraceptive measures can be grouped into four categories: surgical sterilization, oral contraception, hormone implantation, and immunocontraception (i.e., the use of contraceptive vaccines). These techniques require that each individual animal receive either single, multiple, or possibly daily treatment to successfully prevent conception. The use of oral contraception, hormone implantation, or immunocontraception is subject to approval by Federal and State regulatory agencies. Surgical sterilization and hormone implantation are generally impractical because it requires that each animal be captured, sterilization conducted by licensed veterinarians, and, thus, would be extremely labor intensive and expensive. As alternative methods of delivering sterilants are developed, sterilization may prove to be a more practical tool in some circumstances (DeLiberto et al. 1998). Reduction of local populations could conceivably be achieved through natural mortality combined with reduced fecundity. No animals would necessarily be killed directly with this sterilization, however, and sterilized animals could continue to cause damage. Thus, sometimes culling the population to the desired level and then implementing a sterilization program would be the optimal solution to overabundant bird populations. Populations of dispersing animals would probably be unaffected. Potential environmental concerns with chemical sterilization would still need to be addressed, including safety of genetically engineered vaccines to humans and other wildlife. Several formulations of drugs have been and are being tested by NWRC and other researchers including nicarbazin, diazacon, and immunocontraceptives. These would have to be registered for use in New Mexico before WS would use them. The only EPA approved contraceptive available is OvoControl™ G for Canada Geese in urban areas (population greater than 50,000) and FAA certificated airport environments. The active ingredient in OvoControl™ G is nicarbazin which was developed by WS NWRC researchers (WS 2004). Nicarbazin, a drug approved by FDA for use to control coccidiosis in chickens for the last 45 years, reduces the hatchability of eggs. This reduction only occurs while the bait is being consumed and, thus, primary and secondary hazards to other bird species and mammals are minimized or nullified. Following label directions further minimizes nontarget hazards. In New Mexico, the use of this bait would have no effect on T&E or sensitive species, people, pets, or the environment. WS has not used OvoControl™ G, but could if registered with NMDA. It is expected that this chemical would have minimal effect on the resident Canada Goose population in New Mexico in the short-term because geese are long-lived. However, combined with culling, it would be effective at keeping local populations at manageable numbers.

3.3.2 Alternative 2 - Nonlethal BDM by WS Only

This alternative would require that WS use only nonlethal methods in addressing bird damage problems. For lethal BDM activities, producers, state agency personnel, or others could conduct BDM activities including the use of trapping, shooting, avicides, and any other lethal method. The basis of method selection may not be biologically sound or prudent. The chemicals DRC- 1339 and A-C are currently only available for use by WS employees. Therefore, the use of these chemical by private individuals would not be available. The only avian toxicants registered are Avitrol and Starlicide Complete® (PM Resources, Bridgeton, MO) which contains formulated DRC-1339 and these could be used to resolve some bird damage problems.

3.3.3 Alternative 3 - WS Provides Technical Assistance Only for BDM

Under this alternative, WS would only provide technical assistance and make recommendations when requested to resolve bird damage problems. This alternative would not allow WS operational BDM. Producers, state agency personnel, or others could conduct BDM activities including the use of traps, shooting, avicides, and any lethal or nonlethal methods they wish. The chemicals DRC-1339 and A-C are currently only available for use by WS employees and could be the optimal method to resolve a bird damage situation. However, these chemical could not be used by private individuals or State personnel, but Avitrol and Starlicide Complete could be.

3.3.4 Alternative 4 - No Federal WS BDM

This alternative would consist of no federal involvement in BDM in the State -- neither direct operational management assistance nor technical assistance to provide information on nonlethal or lethal management techniques would be available from WS. Information on future developments in nonlethal and lethal management techniques that culminate from research efforts by WS' research branch would not be as accessible to affected resource owners or managers, as WS would not be a direct source of such information. Producers, state agency personnel, or others would be left with the option to conduct BDM activities including the use of trapping, shooting, and any lethal or nonlethal methods. The basis of method selection may not be biologically sound or prudent. The chemicals DRC-1339 and A-C are currently only available for use by WS employees. Therefore use of these chemicals by private individuals would be illegal, and private and commercial applicators would be left only with using an extremely narrow choice of legal or effective alternatives if chemical control was needed, (i.e. Avitrol, etc.).

3.4 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered but not analyzed in detail. The prior EA (WS 1999) discussed several alternatives that were not discussed in detail and the discussion in this EA would be the same. The reader is referred to WS (1999) for a detailed discussion of these alternatives; these will only be listed here.

- Lethal BDM only
- Compensation for Bird Damage Losses
- Short Term Eradication and Long Term Population Suppression
- Use of Bird-Proof Feeders in Lieu of Lethal Control at Dairies and Cattle Feeding Facilities

Additionally a few other alternatives will not be analyzed in detail and are given with a discussion of why they were not considered for detailed analysis in Chapter 4.

3.4.1 Relocation Rather Than Killing Problem Wildlife

Translocation may be appropriate in some situations (i.e., if the problem species' population is at very low levels such as the Ferruginous Hawk, suitable relocation sites are available, and the additional dollars required for relocation can be obtained). However, those species that often cause damage problems (e.g.

Canada Geese, Great-tailed Grackles) are relatively abundant or are not native (e.g. starlings) and relocation is not necessary for the maintenance of viable populations. Relocation may also result in future depredations if the relocated animal encounters protected resources, and in some cases could require payment of damage compensation claims. Any decisions on relocation of wildlife by WS are coordinated with NMDGF or USFWS and consultation with the appropriate land management agency(ies) or manager associated with proposed release sites. Additionally, animals that are relocated become stressed and there is a potential for disease transmission into healthy populations. WS considers translocation for some species and conducts such, but does not relocate all damaging species.

3.4.2 Biological Control

The introduction of a species or disease to control another species has occurred throughout the world. Unfortunately, many of the introduced species become pests themselves. For example, in Hawaii, the Indian mongoose (*Herpestes auropunctatus*) was brought in to control rats (*Rattus* spp.), but wound up causing declines in many native Hawaiian bird species. Though many people think that this is a good idea for small flocking birds, WS dismissed it from further consideration because technology has not advanced to the point that biological control, even for non-native species such as the starling, is feasible and safe.

3.5 WS SOPs INCORPORATED INTO BDM TECHNIQUES

An SOP is any aspect of an action that serves to prevent, reduce, or compensate for negative impacts that otherwise might result from that action. The current program, nationwide and in New Mexico, uses many such SOPs. Many WS SOPs are discussed in depth in USDA (1997, Chapt. 5). The key SOPs are incorporated into all alternatives as applicable, except the no federal program alternative (Alternative 4). Most SOPs are instituted to abate specific issues while some are more general and relate to the overall program. SOPs include those recommended or required by regulatory agencies such as EPA and these are listed where appropriate. Additionally, specific measures to protect resources such as T&E species that are managed by WS's cooperating agencies (USFWS and NMDGF) are included in the lists below.

3.5.1 General SOPs Used by WS in BDM

- WS BDM activities in New Mexico are consistent with USDA (1997) SOPs.

- WS complies with all applicable laws and regulations that pertain to conducting BDM on private and public lands.

- WS coordinates with agency officials for work on public lands to identify and resolve any issues of concern with BDM.

- WS coordinates with tribal officials for work on tribal lands to identify and resolve any issues of concern with BDM.

- The use of BDM methods such as traps and avicides conform to applicable rules and regulations administered by the State.

- WS personnel adhere to all label requirements for toxicants. EPA approved labels provide information on preventing exposure to people, pets, and T&E species along with environmental considerations that must be followed. WS personnel abide by these. These restrictions invariably preclude or reduce exposure to nontarget species, the public, pets, and the environment.

- The WS Decision Model (Slate et al. 1992) thought process as discussed in Section 1.6.5 which is designed to identify effective WDM and their impacts, is consistently used.

3.5.2 WS SOPs Specific to the Issues

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

3.5.2.1 Effects on Target Bird Species Populations.

- BDM is directed toward localized populations or individual offending animals, depending on the species and magnitude of the problem, and not an attempt to eradicate any native wildlife population in a large area or region.

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

- WS BDM kill is monitored. Both "Total Harvest" and estimated population numbers of key species are used to assess cumulative effects of harvest. WS BDM is designed to maintain the level of harvest below that which would impact the viability of populations of native species (see Chapter 4) as determined by WS in consult with USFWS and NMDGF, as appropriate. WS provides data on total take of target animal numbers to other agencies (i.e., USFWS, NMDGF) as appropriate.

- WS currently has agreements for BDM on less than 5% of the land area in New Mexico. This could be increased several-fold, but target bird take would be monitored to ensure that harvest remains below a level that would impact viability of a species. However, WS will not impact bird species populations on more than 95% of the lands in New Mexico.

3.5.2.2 Effects on Nontarget Species Populations, Including T&E Species.

- WS personnel are highly experienced and trained to select the most appropriate BDM method(s) for taking problem birds with little impact on nontarget species.

- WS personnel work with research programs such as NWRC to continually improve and refine the selectivity of management devices, thereby reducing nontarget take.

- Nontarget animals captured in traps or with any other BDM method are released at the capture site unless it is determined by WS Specialists that the animal is not capable of self maintenance.

- When working in an area that has T&E or sensitive species or has the potential for T&E species to be exposed to BDM methods, WS personnel will know how to identify the target and T&E species (e.g., Turkey Vulture vs. juvenile Bald Eagle), and apply BDM methods accordingly. However, BDM in New Mexico has little potential to impact T&E species.

- Avian predators of T&E or sensitive species such as the Lesser Prairie-Chicken (a candidate species) could be captured, moved, or euthanized to enhance recruitment of the sensitive species. These actions would be conducted where they would provide a positive benefit to sensitive species with no significant negative impacts to target or nontarget populations.

- ***Measures to Reduce the Potential Take of Specific T&E or Sensitive Species***

  The Piping Plover and Least Tern. These species could be accidentally caught in mist nets or noose mats used to capture shorebirds for disease monitoring. These devices are monitored closely and species taken in them are released unharmed. Where these methods are used with a potential to take T&E species, WS has consulted nationally with USFWS under Section 7 of the ESA. WS SOPs to avoid impacts include ensuring WS Specialists are trained in plover and tern species identification, not working in areas known to be inhabited by these T&E species, monitoring mist nets and traps frequently, and pulling equipment if either species is seen in the vicinity of the trapping operations.

  Bald Eagle. Even though the Bald Eagle was delisted in 2007 (remains on the New Mexico T&E list), WS continues to implement all reasonable and prudent alternatives and measures and their terms and conditions to protect Bald Eagles as identified by USFWS in their 1992 BO (USDA 1997, Appendix F). Most of these were directed toward other facets of WDM and not BDM.

3.5.2.3 Impacts on Public Safety, Pets, and the Environment.

- A formal risk assessment (USDA 1997, Appendix P and Q) concluded that hazards to the public from BDM devices and activities are low.

- All pesticides are registered with EPA and NMDA. WS employees will comply with each pesticide's directions and labeling and any additional EPA and NMDA rules and regulations.

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

- WS Specialists who use firearms and pyrotechnics are trained and certified by experts in the safe and effective use of these materials. WS policy has requirements for training, safe use, storage and transportation of firearms as prescribed by the WS Firearms Safety Training Manual (WS Directive 2.615, 05/03/02). WS Policy also has the same for pyrotechnics.

- Conspicuous, bilingual warning signs, alerting people to the presence of traps, avicides, and other BDM methods, are placed at major access points when they are set in the field.

3.5.2.4 Effects of BDM on Aesthetics

- WS take is minimal compared with overall bird species populations, and, thus, does not impact the opportunity of the public to enjoy these species.

- WS could conduct BDM projects that protect T&E and sensitive species which could offer the public the potential opportunity to view these rarer species.

- WS conducts most BDM projects in areas where the public has little access, and therefore, that portion of the public that finds certain BDM methods as objectionable will not be upset by visually viewing that action.

3.5.2.5 Humaneness of Methods Used by WS

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

- WS personnel attempt to kill captured target animals that are slated for lethal removal as quickly and humanely as possible. In most field situations, cervical dislocation is performed which causes rapid unconsciousness followed by cessation of heart function and respiration which is in concert with the American Veterinary Medical Association's (1987) definition of euthanasia (Beaver et al. 2001). In some situations, accepted chemical immobilization and euthanasia methods are used.

- Cage and padded-jaw leghold traps are set and inspected according to WS policy. Water and food are replenished frequently as necessary in decoy traps.

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

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose and need of the proposed action. This chapter analyzes the environmental consequences of each alternative discussed in Chapter 3 in relation to the issues identified for detailed analysis in Chapter 2. The environmental consequences of each alternative are compared with the proposed action to determine if the real or potential impacts would be greater, lesser, or the same. Therefore, the proposed action or current program alternative serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. The background and baseline information presented in the analysis of the current program alternative, therefore, may also apply to the analysis of each of the alternatives.

4.1 ISSUES ANALYZED IN DETAIL

NEPA requires federal agencies to determine whether their actions have a "*significant impact on the quality of the human environment*." The environmental consequences of the 4 alternatives are discussed below with emphasis on the issues presented in Chapter 2. The comparison of alternatives will be used to make a selection of the most appropriate alternative for WS BDM activities. The alternatives selected for detailed assessment provide the best range of alternatives that could potentially meet the purpose and the need of BDM in New Mexico as identified in Chapter 1.

4.1.1 Effects of BDM on Target Bird Species Populations

To adequately determine the magnitude of impacts in relation to birds and their populations, WS data and known cumulative or "other" take (sportsmen harvest and permitted depredation take) will be analyzed. The authority for management of migratory birds is USFWS and of resident bird species is NMDGF. NMDGF regulates hunting of migratory game species under the direction of USFWS and monitors migratory nongame.

An aspect, perhaps overriding, that is germane to the determination of "significance" under NEPA is the effect of a federal action on the *status quo* for the environment. States have the authority to manage populations of wildlife species as they see fit, but for migratory and T&E bird species with oversight from USFWS. However, management direction for a given species can vary among states, and state management actions are not subject to NEPA compliance. Therefore, the *status quo* for the environment with respect to state-managed wildlife species is the management direction established by the States. Federal actions that are in accordance with state management have no effect on the *status quo*. Wildlife populations are typically dynamic and can fluctuate without harvest or control by humans. Therefore, the *status quo* for wildlife populations is fluctuation, both within and among years, which complicates determining the significance of human impact on such populations.

4.1.1.1 Alternative 1 - Continue the Current Federal BDM Program. Under the Current Federal Program Alternative, WS conducts BDM on bird species in New Mexico causing problems or concerns with lethal and nonlethal BDM methods. Lethal take by WS and others will be considered Statewide providing a more comprehensive picture of impacts to bird populations. The prior EA (WS 1999) determined that BDM had no significant impacts to starling, blackbird, feral pigeon, and House Sparrow populations in New Mexico. This EA has been expanded to include all bird species in New Mexico to determine the magnitude of impacts for other species as well. Analyzing impacts of bird species at the Statewide and Central/Pacific Flyways area provides a more comprehensive and statistically sound look at cumulative impacts because population estimates and take is statistically more credible on a statewide or regional scale, and impacts of BDM often involve a regional population because most birds are migratory.

BDM targets specific species and cumulative effects on those species populations from BDM and other actions are analyzed to determine the relative significance of impacts. In addition, management direction from the responsible agency (USFWS and NMDGF) is a determining factor. From a NEPA standpoint, justification for a finding of "*no significant impact on the quality of the human environment*" with respect to WS's take of most birds in New Mexico is the fact that WS's involvement has no adverse effect on the *status quo* because, if WS was not available, under USFWS or NMDGF authority, virtually the same birds that are killed by WS could be taken by other agency or private actions. This suggests that, if WS stopped its involvement in most bird management, there would be virtually no change in environmental effects or in cumulative environmental effects. Additionally, landowners that are given assistance with damage problems are much more likely to have a favorable view of wildlife (International Association of Fish and Wildlife Agencies 2004, Treves and Naughton-Treves 2005).

A "viable" wildlife population can exist at many levels between one that is at carrying capacity (the maximum number of a species that a particular habitat can support) and one that is at only a fraction of carrying capacity. Because rates of increase are density dependent (i.e., the population grows at a faster rate as the population is reduced in relation to carrying capacity), bird populations have the ability to recover from declines that might result from mistakes in management. History has born this out by the fact that efforts in the early half of the 20th century to eradicate some of the larger mammalian predator species (i.e., coyotes, black bears, and mountain lions) failed to do so. However, the larger predators' numbers were most likely reduced substantially (Evans 1983). Density dependent rates of increase are a built-in mechanism of most wildlife populations that serve to reduce effects of population reductions whether by harvest, localized control, or non-man-induced mortality. This provides additional assurance that a viable population of a target species would be maintained in New Mexico, even if a sustainable harvest rate is exceeded in the short term in areas where the objective is to maintain the population.

The methods used by WS to take target bird species under the current program are the same as those that have been used in recent years and were described in Section 3.3.1.3 as well as the prior EA (WS 1999). The methods used in each damage situation depend on the species causing damage and other factors including location (public versus private lands), weather, and time of year as discussed in section 3.2. The methods include physical exclusion, frightening devices, shooting, cage traps, padded-jaw pole traps, and avicides. Many BDM methods, especially those that can be safely implemented, may only be recommended by WS personnel and incorporated by the resource owner.

WS uses lethal and nonlethal methods as needed for appropriate biologically sound, effective BDM. Analysis of this issue is limited primarily to those species most often killed during WS BDM; however, nonlethal BDM will be analyzed for potential impacts as well. The analysis for magnitude of impact generally follows the process described in USDA (1997, Chapt. 4). Magnitude is described in USDA (1997) as " . . . *a measure of the number of animals killed in relation to their abundance.*" Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. In general, WS conducts most BDM on species whose population densities are high and usually only after they have caused damage. WS conducts both lethal and nonlethal BDM for birds. Lethal and nonlethal take will be given and then a discussion will follow regarding the impacts to species.

Impacts on Bird Populations from Lethal Take in BDM

WS conducted lethal BDM from FY03 to FY07 for 15 bird species in New Mexico, but had the potential for taking 2 others (Rusty Blackbird and Bronzed Cowbird) in response to damage caused by birds (Table 7). In addition to responding to damage complaints, WS also conducted disease monitoring; birds can be taken lethally for disease monitoring, but WS conducted disease monitoring with capture and release methods and did not lethally take any species (see Section 4.1.1.1 Impacts on Bird Populations from Nonlethal Methods in BDM). WS lethally took an estimated 17 species that caused damage from FY03 to FY07 (Table 7), but WS only took ten species where more than 100 were taken in a single year. The species that have caused damage from FY05 to FY07 are listed in Table 1 (Section 1.3.1) with general information about them given in Section 2.1.1.1 and the agency, USFWS, NMDGF, or WS, that has primary responsibility for responding to damage complaints involving them. The primary target species taken in New Mexico are introduced commensal species (feral pigeons, Eurasian Collared-Doves, and European Starlings), blackbirds (6 species as discussed with 2 others taken minimally, if at all), American Crows, and Common Ravens. Additionally, WS has taken 4 species, but only minimal numbers (Canada Geese, Turkey Vultures, Prairie Falcon, and Cooper's Hawk). From FY92 to FY02, additional species taken have included feral ducks, American Coots, Black-crowned Night-Herons, Northern Flickers, and House Sparrows. Of the annual take of birds from FY03 to FY07, 98% of the take were 6 species: feral pigeons (18%), starlings (22%), Red-winged Blackbirds (30%), Brewer's Blackbirds (9%), Brown-headed Cowbirds (14%), and Great-tailed Grackles (5%). The remaining 11 species combined accounted for about 2% of WS's lethal take.

Table 7. Birds killed by WS in BDM from FY03 to FY07.

Species	FY03	FY04	FY05	FY06	FY07	Ave
Introduced Commensal Birds						
Feral Rock Pigeon*	9,580	13,303	8,176	17,763	11,859	9,736
Eurasian Collared-Dove	-	-	-	308	239	109
European Starling*	29,914	-	14,972	-	-	12,136
Blackbirds**						
Red-winged Blackbird*	83,218	-	-	11	-	16,646
Yellow-headed Blackbird*	942	-	-	-	-	188
Brewer's Blackbird*	26,373	-	-	-	-	5,275
Rusty Blackbird*	4	-	-	-	-	1
Common Grackle*	1,276	-	-	-	-	255
Great-tailed Grackle*	15,029	-	-	-	-	3,006
Brown-headed Cowbird*	37,977	-	-	-	-	7,595
Bronzed Cowbird*	38	-	-	-	-	8
Other Species						
Canada Goose	-	-	-	-	6	1
Turkey Vulture	-	-	3	-	-	1
Cooper's Hawk	1	-	-	-	-	0
Prairie Falcon	-	1	-	-	-	0
Common Raven*	83	48	-	-	-	26
American Crow*	-	3,680	-	-	-	736

*Take was estimated for birds taken with toxicants.

**Typical blackbird species composition in New Mexico [for winter (12/01 to 03/31) projects according to CBC data (NAS 2008a), and for the remainder of the year by the average between BBS (Sauer et al. 2008) and CBC (NAS 2008a) data] was used to estimate numbers taken for those recorded as mixed blackbirds in the MIS and is discussed further in Appendix B.

WS uses several BDM methods that result in the lethal take of birds. The greatest number of birds is lethally taken with chemical methods. WS used 2 chemicals on birds from FY03 to FY07, DRC-1339 and Avitrol. Table 6 (Section 2.1.3) gives the amount of chemical used by WS. Take with DRC-1339 and Avitrol needed to be estimated because only dead birds found were mostly recorded in the MIS (Appendix B). The MIS does not record wastage (chemicals disposed of by deep burial because birds did not take all of the bait or the project failed due to birds not being present; the shelf-life of DRC-1339, once a bait is mixed, is about 3 to 7 days depending on environmental factors such as heat and humidity and baits from projects not completed in this time are remade, and thus, the baits disposed; and finally, precipitation and harsh weather conditions can decrease a project's effectiveness because bait loses its effectiveness more quickly). Thus, bird take estimates with DRC-1339 and Avitrol from Appendix B are estimated mostly at an "ideal" level and are likely high because many factors can reduce the success of projects, especially DRC-1339.

Take with DRC-1339 can conservatively be estimated for each species based on daily consumption and the bait applied by WS; this is discussed thoroughly in Appendix B. When a species was specified, the chemical take was estimated for that species. Blackbird take, including starlings, is often combined as blackbird (mixed species) in the MIS. Projects involving mixed blackbirds in feedlots have been estimated to be 40% starlings and 60% other blackbirds by WS Specialists in New Mexico. The other blackbirds were divided to species by the typical composition of birds found in New Mexico during the time of year the project took place. Other than starlings, WS Specialists see mostly Red-winged and Brewer's Blackbirds, and Great-tailed Grackles during BDM projects at CAFOs. However, to analyze impacts for mixed blackbird projects, species composition for blackbirds other than starlings was estimated. For projects conducted from April 1 to November 30, species composition was averaged from BBS (Sauer et al. 2008) and CBC (NAS 2008a) data for the blackbird species found in New Mexico. For mixed blackbird projects from December 1 to March 31, an estimate of species composition was derived from CBC data (NAS 2008a). These percentages are used to estimate take for the different species. The estimated take is added to other take to determine impacts to the species taken in BDM in Table 7. It should be noted that the take of Rusty Blackbirds, though minimal, is likely a high estimate because they mostly forage in wet woodlands away from other blackbirds and not in feedlots and urban areas where most projects occur.

To analyze impacts, blackbird take was estimated for all WS projects in the RMS region. The take for mixed blackbird projects is estimated by the species composition found in BBS and CBC data for each of the core states in the Central and Pacific Flyway (Figure 6) where BDM is conducted by WS, including New Mexico, for analysis purposes. It should be noted that DRC-1339 treated baits are often greased, primarily to target starlings which are prevalent at feedlots during winter throughout the United States and especially in states north of New Mexico when insects are relatively unavailable; starlings, requiring a high protein diet, favor the greased treated baits over the other blackbirds found in feedlots, and will seek them out, whereas the other blackbirds will eat what is available searching more for grain (Twedt 1985). Thus, fewer blackbirds, but more starlings are likely taken by WS than estimated as discussed in Appendix B. Overall, it was estimated that starlings make up at least 40% of the flocks found at feedlots in New Mexico, but typically higher than 90% in states north of New Mexico, mostly because starlings are not as apt to migrate long distances.

In addition to WS take, private landowners and others can take birds to resolve damage problems. This take is needed for a cumulative impact analysis. Nonnative species such as the feral pigeon, starling, and house sparrow and those under a USFWS Depredation Order such as blackbirds, magpies, and crows can be taken without a permit. Thus, take for these species can only be estimated. However, most other migratory birds require a USFWS permit with reporting requirements and resident birds require a NMDGF permit. USFWS (K. McKeever, USFWS, Albuquerque, NM, *unpubl. data*) provided permitted take from 2003 to 2007. Permits were issued for few species and take during this time only involved Common and Chihuahuan Ravens.

Impacts on Bird Populations from Nonlethal Methods in BDM

WS hazed or captured and released (disease monitoring) or relocated 25 species that had the potential to cause or were causing damage, or were involved in disease monitoring from FY03 to FY07. WS could potentially conduct nonlethal BDM for many more species (Appendix C: Tables C1 and C3). Operationally, WS conducts most all hazing activities for the MRGV project and at an airport where birds are an aviation strike hazard. The bird species that caused damage in New Mexico are listed in Section

1.2 with general information about them and the agency, USFWS, NMDGF, or WS, that has the primary responsibility to assist with damage complaints from these species.

WS averaged hazing about 41,000 birds annually from FY03 to FY07 (Table 8); it should be noted that many birds that are hazed are hazed several times before they are successfully moved and are reported every time they are hazed (e.g., WS averaged 94,000 cranes hazed annually, but the population of cranes in the MRGV is only a third, about 30,000). WS conducted most hazing in conjunction with the MRGV crane and goose hazing program to reduce crop loss as described in Section 3.3.1.2. Additional hazing efforts were concentrated on reducing property damage and human health concerns for roosting starlings and Great-tailed Grackles. The primary target species hazed by WS annually in New Mexico have been Sandhill Cranes (67%), Great-tailed Grackles (29%), and starlings (4%). The remaining 7 species combined accounted for 0.1% of the nonlethal hazing conducted by WS. Hazing birds by WS employees may negatively impact birds in the short term, especially if weather is particularly cold, because the birds are expending energy that they would otherwise not normally expend to search for food elsewhere. However, it is likely that the energy spent is minimal and not enough to cause impacts. For example, birds hazed from an area such as a crop field or an airport typically find alternate feeding, roosting, or loafing areas close by and actually benefit from being hazed. Birds hazed from an air operating area benefit from being less likely to be killed by aircraft and birds hazed to protect crops or other resources likely benefit because removing them from damage situations probably increases the tolerance of agricultural producers and other resource owners to their presence elsewhere (International Association of Fish and Wildlife Agencies 2004, Treves and Naughton-Treves 2005). This means that they should be less inclined to seek political help in reducing populations through increased sport hunting or direct population management.

Table 8. Birds hazed (scared with frightening devices or other nonlethal method) from damage situations from FY03 to FY07 by WS.

Species	FY03	FY04	FY05	FY06	FY07	Ave
Waterfowl						
Canada Goose	-	-	390	-	151	108
Snow Goose	275	-	300	-	-	115
Sandhill Crane	155,114	91,680	26,614	35,863	161,654	94,185
Starlings/Blackbirds						
European Starling*	-	-	27,500	-	-	5,500
Mixed Blackbird*	-	-	50	-	-	10
Great-tailed Grackle	-	-	-	-	200,000	40,000
Other Birds						
Turkey Vulture	-	-	-	305	-	61
Cattle Egret	300	-	-	-	-	60
Black-crowned Night-Heron	37	-	-	-	-	7
Common Raven	350	-	-	-	-	70

Capture with relocation is done for relatively few birds and only involved Barn Owls from FY03 to FY07. Barn Owls trapped inside a warehouse were relocated outdoors. This has also occurred with other species in the past. Cooper's Hawks often get entrapped inside warehouses, chasing birds in through open bay doors and not able to find their way back out. WS also has caught Cooper's Hawks and nighthawks in nets indoors and released them outside prior to FY03. Species that would most likely be involved in relocation would be several raptors and other rarer species, and species at the request of NMDGF and USFWS.

WS conducted disease surveillance in FY06 and FY07. The primary focus of the disease surveillance work was to monitor for the presence of H5N1 AI. WS collected 207 samples in FY06 and 1,562 samples in FY07 for testing from fecal droppings (142 and 726, respectively) and cloacal and oral swabs (65 and 836, respectively) of birds being monitored, primarily waterfowl and shorebirds. WS collected bird samples from a few birds taken lethally (5) during BDM projects and at waterfowl hunter check stations. Several samples were collected from birds captured and released (685) with rocket/cannon nets, mist nets, and cage traps, or from birds observed to collect fecal droppings. Birds captured with mist nets and released following sampling in FY06 included 19 Least Sandpipers, 15 Western Sandpipers, 1 Willet, and 1 Greater Yellowlegs. Birds captured with nets or traps, sampled, and released in FY07 included: 94 Mallards, 344 Northern Pintails, 6 Northern Shovelers, 89 Blue-winged Teals, 61 Green-winged Teals, 16 American Wigeons, 7 Wood Ducks, 5 Canada Geese, 2 Killdeer, 7 Least Sandpiper, 1 Western Sandpipers, 1 Greater Yellowlegs, and 12 Wilson's Snipes. In addition, 3 American Coots and 1 Gadwall (these species were not the focus of disease monitoring) were captured as nontargets with rocket nets, sampled since they were in hand, and then released. Disease sampling could have had take associated with it (intentional because some birds could be taken with lethal means such as shooting or unintentional from birds being killed by the methods in use), but did not in FY06 and FY07. WS does not anticipate lethal take to be great for disease monitoring.

WS concludes that the nonlethal BDM activities have been beneficial in reducing damage or monitoring for disease and not created environmental concerns. However, nonlethal efforts do have a minimal potential to result in the take of a target bird.

Impacts of Lethal and Nonlethal BDM on Bird Species in New Mexico

Pigeons and Doves

Two introduced and 4 native species of pigeons and doves are found in New Mexico. The two introduced species, the Rock Pigeon and Eurasian Collared-Dove have had BDM conducted to reduce damage associated with them. These species can cause common damage problems, especially associated with roosting and feeding at CAFOs. The take of these species by WS is considered to be of no significant impact on the human environment since they are not native components of ecosystems in New Mexico. WS has also received requests for assistance with two native species, the Mourning and White-winged Doves.

Feral Pigeon. The feral domestic pigeon, also known as the Rock Pigeon, is an introduced (nonnative) species in North America not protected by federal or state law. BBS data indicate that the species has experienced a nonsignificant (*Probability (P)* =0.70) increasing trend in New Mexico from 1980 to 2006 at 1.6%/year (Sauer et al. 2008). The breeding feral pigeon population in New Mexico could be estimated from BBS data (Sauer et al. 2008) using corrective parameters (Rich et al. 2004, RMBO 2007) at 290,000 (Table 4). As with starlings, most BBS routes are conducted in rural areas, and, thus, BBS data most likely represent rural numbers of feral pigeons. Larger urban areas have significant numbers of feral pigeons that would not be counted. Even so, an impact analysis can be conducted with the above information, but is likely to be conservative.

Most pigeons breed their first year where habitat is available. For the purposes of impacts, it is assumed that 75% of females breed in a given year and that the sex ratio is 1:1 males to females. Pigeons usually lay 2 eggs per nest, and average 6.5 clutches per year. Fledgling success was found to average 43% (Johnston 1992). Using these parameters, a breeding population of 290,000 in New Mexico would have about 109,000 breeding females that fledge 610,000 pigeons annually, raising the post-fledgling population to about 900,000 feral pigeons in New Mexico. WS's impact to feral pigeons can then be calculated averaging less than 2% of the annual mortality with the highest impact in FY06 at 3%. WS cannot determine the number of feral pigeons cumulatively taken because no data is available. However, WS can make a conservative estimate (estimating a higher number taken than believed to be taken). Of the commensal species, the pigeon is probably taken more than any other species because take is associated with pest control operators to resolve damage problems and sport hunters for consumption. It is assumed for the purposes of this analysis that local pest control operators, private individuals, and hunters take about 200,000 pigeons annually. WS takes minimal numbers of pigeons averaging about 10,000 annually from FY03 to FY07. With this information, Table 9 provides a cumulative impact analysis of WS and other feral pigeon take. FY06 had the greatest cumulative take with an estimated 24% of the post-breeding population in New Mexico taken and 36% of the annual mortality. This would be a low magnitude of impact on the population. Additionally, the BBS trend for New Mexico (Sauer et al. 2008) indicates that the population has not been impacted because it continues to increase.

Any BDM involving lethal control actions by WS for this species would be restricted to isolated individual sites or communities. In those cases where feral pigeons are causing damage or are a nuisance, complete removal of the local population could be achieved. This would be considered a beneficial impact on the human environment because the affected property owner or administrator would request the action to stop or reduce damage at their site. Regional population impacts would be minor and most likely unnoticeable. Even if significant regional or nationwide reductions could be achieved, this would not be considered an adverse impact on the human environment because the species is not part of native ecosystems. However, some individuals who experience aesthetic enjoyment from watching or feeding pigeons may consider a widespread reduction in the population as a negative impact. Thus far, though, impacts from FY03 to FY07 were minimal from WS BDM and cumulative impacts would have amounted to, at most, just over a third of the estimated annual mortality. Take would have to be about 0.5 million before the level would rise to a moderate level of impact. Additionally, we believe that the pigeon population in New Mexico is greater than that analyzed.

Table 9. Cumulative impact analysis for feral pigeons killed in New Mexico by WS and others (estimated) from FY03 to FY07.

FERAL PIGEON IMPACT ANALYSIS IN NEW MEXICO						
	FY03	FY04	FY05	FY06	FY07	Ave.
Est. NM Breeding Pop.	290,000	290,000	290,000	290,000	290,000	290,000
Breeding Females	109,000	109,000	109,000	109,000	109,000	109,000
Ave. Clutch	2	2	2	2	2	2
Ave. Nests	6.5	6.5	6.5	6.5	6.5	6.5
% Fledge	43%	43%	43%	43%	43%	43%
Young Produced/ Stable Pop. Ann. Mort.	610,000	610,000	610,000	610,000	610,000	610,000
Total Population	900,000	900,000	900,000	900,000	900,000	900,000
NM WS Take	9,580	13,303	8,176	17,763	11,859	9,736
Other Take	200,000	200,000	200,000	200,000	200,000	200,000
Total Take	209,580	213,303	208,176	217,763	211,859	209,736
% of New Mexico Post-breeding Population	23%	24%	23%	24%	24%	23%
% of Ann. Mortality	34%	35%	34%	36%	35%	34%

Eurasian Collared-Doves. The Eurasian Collared-Dove, a recent invasive species, is becoming abundant in New Mexico and WS has already been requested to conduct BDM for them. Doves are smaller than pigeons, but they possess many of the same physical characteristics. They are fast-flying grayish-brown birds with a whitish tail band. Eurasian Collared-Doves were introduced to the Bahamas in the 1970s and, following self-introduction into Florida, their population rapidly expanded throughout the Southeast and further. BBS observers first recorded the doves in New Mexico in 2002 and have documented increased numbers since. In that short time, using detectability parameters established for Mourning Doves because RMBO (2007) did not establish them for the 1990s, New Mexico would have a population of 170,000 (Table 4). The doves have become frequent problems at CAFOs where they feed on and contaminate livestock feed. In FY06 and FY07, an average of 274 Eurasian Collared-Doves were taken by WS in New Mexico to resolve problems at CAFOs (about 0.2% of their estimated breeding population). Like starlings, feral pigeons, and House Sparrows, Eurasian Collared-Doves are considered by many wildlife biologists, ornithologists, and naturalists to be an undesirable component of North American native ecosystems because they could potentially have negative impacts on resources and compete with native bird species. Thus, any reduction in their population would likely be considered beneficial on the human environment. Even so, WS has had minimal impact on the doves.

Eurasian Collared-Doves are not protected by USFWS, but are by NMDGF. It is unknown how many collared-doves were harvested by sport hunters during the 2006-07 season, but with the current expansion of the population, it was likely not a significant amount. The sport hunting season is very liberal with no bag limit because the collared-doves are invasive. Sport harvest by hunters was not monitored, but will be in the future. Most collared-dove mortality from WS BDM activities takes place at CAFOs. WS takes, on average from FY06 to FY07, 276 doves per year (Table 7) which is likely much less than the annual harvest by hunters. Thus, WS has had a very minor impact on dove populations in New Mexico. The anticipated number of doves killed by WS will be so low in comparison to sport hunter harvest that WS take will be insignificant in their overall mortality.

Mourning, White Winged, and Inca Doves. Doves are smaller than pigeons, but possess many of the same physical characteristics. They are fast-flying grayish-brown birds that usually feed on seeds or spilled grain. The Mourning and White-winged Doves are abundant in New Mexico and would mostly be involved in BDM at airports, and for the protection of some agricultural crops and property. Inca Doves are much less abundant, and found primarily in the southeastern corner of the State. The Inca Doves are not as likely to be the focus of a BDM project, but possibly could be (it is most likely that a few Inca Doves would be in mixed feeding flocks of birds that were the focus of a BDM project).

The Mourning Dove population increased in the United States with the westward expansion of settlers. The White-winged Dove has been increasing too, but confined to southern states. Recent data suggest that the breeding population of Mourning and White-winged Doves are abundant and have populations of 114 and 4.5 million survey-wide, 21 and 3.5 million in the RMS region, and 3.9 million and 200,000 in New Mexico, respectively (RMBO 2007). Inca Doves have a population of 39,000 in the RMS area (Arizona and New Mexico), and only 2,000 in New Mexico. Mourning Dove BBS data from 1980 to 2007 shows a nonsignificant (P=.97 and .17) neutral trend of 0.0%/year survey-wide and an increasing trend of 1.2 %/year in New Mexico. White-winged Dove BBS data from 1980 to 2007 shows significant (P=.04 and .02), survey-wide increasing trend of 1.7%/year and a New Mexican increasing trend of 13.1 %/year. Inca Doves show an increasing trend, but are nonsignificant. The Mourning Dove is ranked high in relative abundance on BBS routes and is among the top ten most abundant species in the United States (Mirarchi and Baskett 1994). However, as suggested by BBS trends, populations have declined in recent years likely as a result of land-use changes such as cleaner farming, removal of shelterbelts and fencerows, shifts in land use such as from agriculture to intensive forestry, grain crops to cotton, shrubland to grazing lands, or natural habitats to urban areas, and other sources of habitat loss (Mirarchi and Baskett 1994). Even so, Mourning Doves are still abundant. The White-winged Dove is not as abundant as Mourning Doves, but still a common species in New Mexico.

Doves are classified as migratory game birds that are managed by state game departments, but the Inca Dove has full protection with no hunting seasons. Estimated take of Mourning Doves and White-winged Doves nationwide by sport hunters during 2006 and 2007 hunting seasons was 19.9 million and 1.6 million birds (USFWS 2008a). Hunters in New Mexico harvested an average of 210,000 and 65,000 Mourning and White-winged Doves in the 2006 and 2007 hunting seasons (USFWS 2008a). Most Mourning Dove mortality from WS BDM activities would take place at airports, but WS has not lethally taken these species of doves. However, it is possible that WS will take them at an airport while conducting wildlife hazard management to reduce strikes. However, even if WS were to take thousands of Mourning Doves, hundreds of White-winged Doves, and 20 Inca Doves, an impact would not likely occur. It is expected that WS take for these species will be less than 1% of their estimated annual mortality and less than 10% of hunter harvest. Thus, WS would have a very minor impact on dove populations in New Mexico. Harassment is not likely to have more than a temporary impact on any of these species.

Starling and Blackbirds

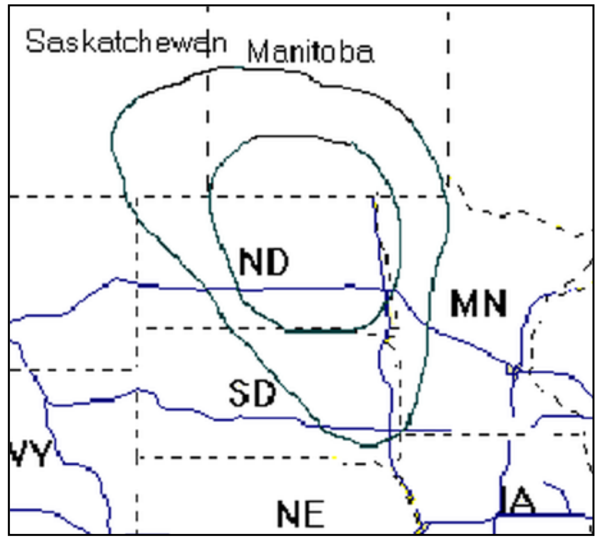

Figure 13. The Northern Prairie-Pothole region used by Peer et al. (2003) to make an estimate of the population of 3 blackbird species.

Precise counts of starling and blackbird populations do not exist but one estimate placed the United States summer population of the blackbird group, which includes starlings, at over 1 billion (USDA 1997) and the winter population at over 500 million (Meanley and Royal 1976, Royall 1977). The majority of wintering blackbirds and starlings occur in southeastern United States roosts where their numbers were estimated to be 350 million (Bookhout and White 1981). The northwest and southwest regional population of the blackbird group was estimated at 111 million (Meanley and Royall 1976). An intensive study from 1996 to 1998 in the Northern Prairie-Pothole Region (Peer et al. 2003) including areas in North and South Dakota, Minnesota, Saskatchewan, and Alberta (Figure 13) found 61 million breeding Red-winged and Yellow-headed Blackbirds, and Common Grackles (Table 10) indicating the potential numbers breeding in a relatively small area. Data from BBS indicate that the blackbird population (excluding starlings) survey-wide is about 400 million and about 35 million in the RMS region (Figure 6). This EA will use the population estimated for RMS to determine impacts in Table 4 (Appendix A).

Meanley (1971) analyzed band return data which showed that blackbirds wintering in Arkansas, Mississippi, and Louisiana in the Mississippi Flyway, and Texas in the Central Flyway came from 13, 16, 14, and 15 different states and provinces, respectively, ranging east to west from Alberta to New England and Quebec. Thus, it is probable that blackbirds wintering in New Mexico come from a much broader area than just RMS. This means that the mortality of blackbirds at New Mexico CAFOs during winter months would not just be focused on the RMS population of blackbirds, but would be distributed across much of the northern part of the United States and Canada. This factor would serve to lessen the effects of BDM-induced mortality in New Mexico on the breeding population of blackbirds. It would also mean population impacts, including cumulative impacts as discussed herein, would be distributed across a broad segment of the North American population of blackbirds. However, population estimates from this area will be used to determine impacts to the various populations of blackbirds because it is likely that the majority of birds come from the RMS.

Table 10. Estimate of the breeding and fall blackbird population sizes in the Northern Prairie-Pothole region (Peer et al. 2003).

	Red-winged Blackbird	Common Grackle	Yellow-headed Blackbird
Breeding Population	27,076,061	13,069,332	11,610,860
Fall Population	39,260,288	18,950,531	16,835,747

Based on observations of WS personnel at several affected New Mexico feedlots where WS starling and blackbird damage management operations are concentrated, the species composition of the birds causing damage has recently been estimated to be about 40% starlings, 30% Red-winged Blackbirds, 15% Great-tailed Grackles, 10% Brewer's Blackbirds, 4% Brown-headed Cowbirds, and 1% Common Grackles. A few Yellow-headed Blackbirds are seen periodically, but few BDM operations have been conducted when they were present. Two other species, the Rusty Blackbird and Bronzed Cowbird, could potentially be present in New Mexico, but neither was seen at sites where BDM was conducted. However, take for the

EA was estimated from species composition from bird surveys, namely the BBS (Sauer et al. 2008) and CBC (NAS 2007).

Starlings are not protected under State or federal laws and can be taken at any time. USFWS established a standing depredation order for use by the public to take blackbirds causing or about to cause damage. This suggests that USFWS believes that native blackbird populations are healthy enough, and the problems they cause great enough, to allow such activities. Under this “order” (50 CFR 21.43), no federal permit is required by anyone to remove blackbirds if they are committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance. Thus, it appears that previous human-caused mortality or other factors have not resulted in major declines in the blackbird populations. It must be noted that USFWS will likely take the Rusty Blackbird off the list of species that can be taken under the Depredation Order. In all likelihood, WS in New Mexico has not taken a Rusty Blackbird and does not anticipate such. Further information is discussed in this Section.

Starlings. The nationwide European Starling population was estimated at 140 million (Johnson and Glahn 1994). Feare (1984) estimated the starling population in North America at 200 million. A more recent estimate of the population is 122 million breeding starlings BBS-wide (Rich et al. 2004, RMBO 2007). BBS data survey-wide have shown a significant (P<0.01) decreasing population trend of -0.8%/year from 1980 to 2005, but a nonsignificant (P=0.25) decreasing trend in New Mexico of -2.0%/year from 1980 to 2005 (Sauer et al. 2008). BBS data (2003-2007) indicate a relatively small population in New Mexico. Other states, particularly to the north have larger populations (e.g., 350,000 in New Mexico *vs.* 1.6 million in Colorado). It must be noted that large numbers of starlings are located in urban areas and BBS routes often do not account for these populations because most BBS routes are run in areas that are more rural. Thus, BBS data are more likely to reflect the number of starlings in rural areas, not including urban populations which would likely make it higher. The breeding starling population in New Mexico could be estimated from BBS data (Sauer et al. 2008) using corrective parameters (Rich et al. 2004, RMBO 2007) at 350,000, but is likely higher (Table 4).

Even so, with a population of 350,000 breeding starlings, the population would increase following the nesting season. Not all starlings may breed their first year, but it was estimated that at least 66% of females did. In many populations of starlings, the males outnumber the females 2:1. Starlings lay an average of 4-6 eggs with the average being 4.28 in the Midwest and have two clutches each year below 48° latitude (Cabe 1993). Fledgling success was found to average 76.1% in New York (higher in Ontario) for both clutches with the first being about 10% more successful (Cabe 1993). Using these parameters, a breeding population of 350,000 in New Mexico would have about 77,000 breeding females that fledge 0.5 million starlings, raising the post-fledgling population to about 850,000. Additionally, during winter months, when the majority of BDM projects are conducted, an influx of starlings is seen in New Mexico with birds migrating into the State from northern areas (band return data reflect these movements). Some starlings may leave the state, but it is likely that New Mexico has many more entering the state rather then leaving.

Not considering the migrant population, an estimate of take by WS and others is needed to determine cumulative impacts. WS has not conducted BDM for starlings annually, but took an estimated 30,000 in FY03 or 6% of the expected annual mortality for a stable population. WS and other agencies have no idea how many starlings are taken by private efforts to reduce their damage because they are unprotected and private individuals and others can take them without a permit. Thus, resource owners suffering damage can take starlings with available BDM methods. WS believes that other individuals or agencies might possibly take up to 100,000 starlings in control projects (up to 20 projects statewide annually) in New Mexico, primarily with shooting, trapping, and commercially available products for certified pesticide applicators, Avitrol and Starlicide Complete. This would result in a cumulative impact averaging a 13% take on the post-breeding population or 22% of the expected annual mortality. With this information, Table 11 provides a cumulative impact analysis of WS and other starling take in New Mexico. FY03 had the highest estimated take at 15% of the post-breeding population, or 26% of the annual mortality. This would not be enough to cause the population to decline and would be a low magnitude of take. Take could likely triple before the magnitude of impact would rise to a high level for the currently estimated population.

Table 11. Cumulative impact analysis for European Starlings killed in New Mexico by WS and others (estimated) from FY03 to FY07.

STARLING IMPACT ANALYSIS IN NEW MEXICO						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated NM Breeding Population	350,000	350,000	350,000	350,000	350,000	350,000
Breeding Females (66% w/ 2/3 pop males)	77,000	77,000	77,000	77,000	77,000	77,000
Ave. Clutch	4.3	4.3	4.3	4.3	4.3	4.3
Ave. Nests	2	2	2	2	2	2
% Fledge	76%	76%	76%	76%	76%	76%
Young Produced/ Stable Pop. Ann. Mort.	500,000	500,000	500,000	500,000	500,000	500,000
Total Population	850,000	850,000	850,000	850,000	850,000	850,000
NM WS Take	29,914	-	14,972	-	-	12,136
Other Take	100,000	100,000	100,000	100,000	100,000	100,000
Total Take	129,914	100,000	114,972	100,000	100,000	112,136
% of New Mexico Post-breeding Population	15%	12%	14%	12%	12%	13%
% of Ann. Mortality	26%	20%	23%	20%	20%	22%

WS Specialist that conduct starling and blackbird damage management in feedlots, where almost all lethal control of these species is conducted, have estimated species composition at about 40% starlings and 60% blackbirds. Even if the percentage of starlings taken in projects at feedlots with DRC-1339 were increased to 100% (which is possible given that baits are often greased to target them), it would raise the estimated total take to 35% of their annual mortality in FY03. This would still not be enough to cause the population to decline and would be a low magnitude of take. Therefore, WS has determined that WS BDM has not added to a cumulative impact to the starling population. It should be noted that take between years by WS mostly reflects the availability of WS to conduct projects and cooperative funding from requestors.

In addition to the above analysis, it must be reiterated that starlings are not indigenous to North America and are not protected by federal or state law. Therefore, the take of starlings by the WS program is considered to be of no significant impact on the human environment since starlings are not an indigenous component of ecosystems in New Mexico. In fact, the removal of starlings could be beneficial for many native species such as the Eastern Bluebird that declined significantly earlier this century with the spread of European Starlings across the United States as discussed in Section 1.3.7.

Red-winged Blackbirds. Red-winged Blackbirds are one of the most abundant breeding birds in North America and had the highest relative abundance between 1966 and 2005 on BBS routes (Sauer et al. 2008). It only followed the Brown-headed Cowbird and Mourning Dove in the number of routes where it was recorded. The survey-wide BBS data show a significant (P<.01) downward trend in the Red-winged Blackbirds population of -0.9%/year from 1980 to 2006. However, BBS data (Sauer et al. 2008) show the Red-winged Blackbird population trend has been increasing in New Mexico at 1.9%/year, but this increase has not been significant (P=.29). The national decline mirrors the loss of wetland nesting habitat, primarily from changing agricultural practices and development (Dolbeer 2003). The combined United States and Canadian population of Red-winged Blackbirds has been estimated at nearly 190 million birds, based on winter roost surveys (Meanley and Royall 1976) and BBS data in the 1990s (Rich et al. 2004, RMBO 2007)). The RMS population (Figure 6) was estimated at about 16 million (Table 4; Appendix A: Table A1).

Female Red-winged Blackbirds breed as yearlings (second year); males do not breed until their third year. For the sake of estimating the population for this EA, it is assumed that 75% of the female Red-winged Blackbirds breed, the sex ratio is 1:1 males to females, females lay 3-5 eggs with the average of 3.3, and they have an average of 1.7 nests annually (Yasukawa and Searcy 1995). Fledgling success was found to range from 40% to 88% for the first clutch varying with climatic conditions; for the analysis of population impacts it will be assumed, to be conservative, that only 40% fledge. Far fewer nestlings were found to be successfully fledged from a second clutch, 4%, which will be used in this analysis (Yasukawa and Searcy 1995). Using these parameters, the estimated RMS breeding population of 16 million would have about 6 million breeding females that successfully fledge about 8.5 million nestlings, raising the post-fledgling population to about 24.5 million Red-winged Blackbirds. This would be an increase in the population by a factor of 1.53. Peer et al. (2003) used a factor of 1.45 to estimate the fall population (Table 10). Thus, about 5% of the population would die from fledging to fall, presumably mostly juveniles, which would be expected.

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997). Based on population modeling, Dolbeer (1998) showed that the effect of reducing survival of two blackbird species by 50% (additional loss following natural mortality prior to breeding) was only a 41% reduction in the population by the end of three years. For a population of 190 million Red-winged Blackbirds with an assumed average annual survival of 50%, cutting the survival in half would require the mortality of an additional 47 million per year over the natural mortality level. Assuming that human-induced mortality is mostly compensatory, instead of additive, to natural mortality, this level of impact is well within the extent of normal mortality levels and thus well within the ability of the population to withstand. To further illustrate the minor degree of impact, Sawin et al. (2003) found that the removal of all males over a large area that did not breed during a given year because they were unsuccessful in establishing a territory (floaters) did not have any effect on the population or the number of floaters the following year. This suggests that recruitment and immigration replaced those blackbirds lost to the population and the population remains stable for the available habitat.

WS conducts few BDM projects for Red-winged Blackbirds specifically, but mostly for starlings with some of them in mixed flocks. The take of Red-winged Blackbirds by WS was estimated to be about 17,000 annually from FY03 to FY07 with a high of almost 100,000 in FY03. The WS Program cumulatively in the RMS region takes an average of 260,000 Red-winged Blackbirds. Because the public is permitted to take Red-winged Blackbirds that are causing depredations or are a health nuisance under a depredation order by USFWS, depredation permits are not required to be obtained by private individuals or agencies to take them. The public conducts control of Red-winged Blackbirds to protect crops such as sunflower, corn, and wheat and livestock feed and health at CAFOs in the RMS region and much of this is done with trapping, shooting, and the use of Avitrol. However, WS has no way of determining how many blackbirds are taken by private efforts. It is expected that this effort occurs, especially to protect crops such as corn and wheat, but the numbers actually taken are probably minimal. However, for the purposes of this analysis, it is estimated that up to 0.5 million Red-winged Blackbirds would be taken by private efforts (this would be a significant number of blackbirds taken by private individuals using the available methods and believed to be an overestimate, to be conservative). With this information, Table 12 provides a cumulative impact analysis for Red-winged Blackbird take by WS, other Rocky Mountain State WS Programs, and private individuals and entities. The cumulative impact to the Red-winged Blackbird population from FY03 to FY07 averaged about 3% of the post-breeding population and up to 9% of their expected annual mortality. This would not be enough to cause the population to decline. Doubling the percentage of blackbirds other than starlings taken in DRC-1339 projects at feedlots did not appreciably elevate take percentages. In fact, take would have to be in the millions before an impact would likely start to occur. Under the Proposed Action (Alternative 1), potentially up to a million Red-winged Blackbirds could be taken by WS. However, WS does not anticipate taking such a level, but if this occurred, it would not impact the population. Habitat loss, primarily a decline in breeding habitat, over the last 60 years has been the most likely contributor to their decline.

WS in the RMS region (Figure 6) has killed an average of about 260,000 Red-winged Blackbirds in BDM activities from FY03 to FY07 with a high of almost 620,000 in FY03. This was about 8% of the natural annual mortality expected to occur. New Mexico, depending on the severity of the winter, can have a high percentage of the wintering blackbirds form northern regions. The estimated take of Red-winged Blackbirds in New Mexico and the RMS region is expected to remain somewhat low because WS and other state WS programs that conduct BDM at CAFOs primarily target starlings rather than blackbirds because they frequent them often and cause more damage. Even so, take of Red-winged Blackbirds by WS and the WS Program in the RMS region is not anticipated to have more than a temporary minor effect on the population. Even if all of the DRC-1339 used by WS in the RMS region for "Mixed Blackbirds" targeted only Red-winged Blackbirds, WS's take would increase to 6% of the expected annual mortality and the cumulative impact to less than 15%. Thus, WS believes that BDM has only had a relatively minor impact on the Red-winged Blackbird population in New Mexico and the RMS region and that, even under the worst case scenario (all DRC-1339 and Avitrol targeting mixed blackbird flocks taking only Red-winged Blackbirds) this would not be elevated to a level of significance.

Table 12. Cumulative impact analysis for Red-winged Blackbirds killed in New Mexico by WS, other WS Programs in the RMS region, and private individuals and entities (estimated) from FY03 to FY07.

RED-WINGED BLACKBIRD IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated RMS Breeding Population	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000	16000,000
% Breeding Females in Population	37.5%	37.5	37.5%	37.5%	37.5%	37.5%
Estimated Number Breeding Females	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000
Ave. Clutch	3.3	3.3	3.3	3.3	3.3	3.3
Ave. Nests	1.7	1.7	1.7	1.7	1.7	1.7
% Fledge 1st Nest/2nd Nest	40%/4%	40%./4%	40%/4%	40%/4%	40%./4%	40%/4%
Young Produced/ Stable Pop. Ann. Mort.	8,500,000	8,500,000	8,500,000	8,500,000	8,500,000	8,500,000
Total RMS Population	24,500,000	24,500,000	24,500,000	24,500,000	24,500,000	24,500,000
NM WS Take	83,218	-	-	11	-	16,646
Other RMS WS Take	621,208	347,964	93,931	68,877	178,538	262,104
WS Take % of RMS Ann. Mort.	8.3%	4.1%	1.1%	0.8%	2.1%	3.3%
Private Take in RMS Region	500,000	500,000	500,000	500,000	500,000	500,000
Total Take	1,121,208	847,964	593,931	568,877	678,538	762,104
% RMS Post-breeding Pop.	4.9%	3.5%	2.4%	2.3%	2.8%	3.2%
% of RMS Ann. Mortality	14.2%	10.0%	7.0%	6.7%	8.0%	9.2%

Brown-headed Cowbirds. Brown-headed Cowbirds are an abundant species that have been estimated to have a population of more than 90 million nationwide (Meanley and Royall 1976). Recent data (Rich et al. 2004) suggest that the population is 51 million. BBS data from 1980 to 2005 show a significant declining trend pattern for Brown-headed Cowbirds of -1.1%/year and -2.3%/year survey-wide (P<.01) and in New Mexico (P=.01). These declines are thought to have occurred because of habitat loss that has affected host species (being a parasitic nester – lays eggs in other bird species' nests). This is an abundant species in the RMS region and the population has been estimated at 5.2 million (Table 4; Appendix A: Table A2).

Brown-headed Cowbirds breed as yearlings (second year). For the sake of estimating the population for this EA, it is assumed that 75% of the cowbird females breed, the sex ratio is 1:1 males to females, females lay an average of 41 eggs/season, and an average of 13% fledge with 3 (7%) cowbirds developing to maturity from other species rearing them (Lowther 1993). Using these parameters, a breeding population of 5.2 million in the RMS region would have about 2 million breeding females that successfully fledge about 5.7 million nestlings, raising the post-fledgling population to about 10.9 million Brown-headed Cowbirds. This would be an increase in the population by a factor of 2.1. It would be expected that the mortality rate through the course of a year for Brown-headed Cowbirds would be higher than other species of blackbirds because of the higher population increase factor as well as smaller body size.

New Mexico WS from FY03 to FY07 took an average of 7,600 Brown-headed Cowbirds, with a high of 38,000 in FY03 (Table 13). Under the proposed action (Alternative 1), it is estimated that up to 100,000 might be taken by WS. WS in a few other states, primarily Arizona, took an average of just over 22,000 with a high of 54,000 in FY03 (Table 13). The cumulative impact from all RMS WS Programs averaged 1% of the annual mortality of Brown-headed Cowbirds with a high of 2% in FY02. It is anticipated that the cumulative take of Brown-headed Cowbirds in the RMS region, including New Mexico, could take up to 1 million for the protection of a variety of resources, but primarily for livestock feed and the protection of other song birds from nest parasitism. This cumulative take was about 0.4% of the estimated annual mortality for Brown-headed Cowbirds in the RMS region which is well within the ability of the overall population to withstand. Additionally, private individuals and other agencies take Brown-headed Cowbirds and it is estimated that these entities could take an additional 100,000 cowbirds, especially because several agencies and organizations have programs to protect T&E bird species from Brown-headed Cowbirds. With this information, Table 13 provides a cumulative impact analysis for Brown-headed Cowbird take by WS, other RMS WS Programs, and private individuals and entities in the RMS region, south of the BBS limits. The cumulative impact from all sources from FY03 to FY07 has averaged about 1% of the post-breeding population or about 2% of the expected annual mortality. Thus, this level of take would have little impact on the population. WS concludes that the current and potential level of take is not expected to have an effect on the Brown-headed Cowbird population.

Table 13. Cumulative impact analysis for Brown-headed Cowbirds killed in New Mexico by WS, other RMS WS Programs, and private individuals and entities (estimated) from FY03 to FY07.

BROWN-HEADED COWBIRD IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated RMS Breeding Population	5,200,000	5,200,000	5,200,000	5,200,000	5,200,000	5,200,000
% Breeding Females in Population	2,000,000	2,000,000	2,000, 000	2,000,000	2,000,000	2,000, 000
Estimated Number Breeding Females	1	1	1	1	1	1
Ave. Clutch	41	41	41	41	41	41
Ave. # Fledge from Eggs Produced	7%	7%	7%	7%	7%	7%
Young Produced/Stable Pop. Ann. Mort.	5,700,000	5,700,000	5,700,000	5,700,000	5,700,000	5,700,000
Total RMS Population	10,900,000	10,900,000	10,900,000	10,900,000	10,900,000	10,900,000
NM WS Take	37,977	0	0	0	0	7,595
Other RMS WS Take	54,274	28,658	7,463	5,675	14,707	22,155
WS Take % of RMS Ann. Mort.	1.0%	0.5%	0.1%	0.1%	0.3%	0.4%
Private Take in RMS Region	100,000	100,000	100,000	100,000	100,000	100,000
Total Take	192,251	128,658	107463	105,675	114,707	129,750
% RMS Post-breeding Pop.	1.8%	1.2%	1.0%	1.0%	1.1%	1.2%
% of RMS Ann. Mortality	3.4%	2.3%	1.9%	1.9%	2.0%	2.3%

Brewer's Blackbirds. The Brewer's Blackbird breeds in western and northern North America, mostly south of the Rusty Blackbird. Its population's range expanded in the early 1900s eastward and northward facilitated by human habitat modifications, principally forest clearing for farming, logging, and railroad and highway development. Its winter range includes parts of the RMS in Colorado, New Mexico, and Arizona. However, its population increase has been followed by a decrease. Estimated trends from 1980 to 2005 have been negative, significantly survey-wide at -1.5%/year (P<.01), but not significantly (P=.16) in New Mexico at -2.5%/year (Sauer et al. 2008). The population of Brewer's Blackbirds was estimated at 35 million based on BBS data from the 1990s (Rich et al. 2004). The estimated population for the RMS region from BBS data (2003-2007) is 7.7 million (Table 4; Appendix A: Table A3).

Brewer's Blackbirds breed as yearlings (second year). For the sake of estimating the population for this EA, it is assumed that 75% of the blackbird females breed, the sex ratio is 1:1 males to females, females lay 1-8 eggs with an average eggs/nest of 5.0, and an average nests/season of 1 (Martin 2002). About 63% of the eggs hatch with subsequent fledgling success 63%, for an egg to fledgling success of 40%.

Using these parameters, a breeding population of 7.7 million in the RMS region would have about 2.9 million breeding females that successfully fledge about 5.8 million nestlings, raising the post-fledgling population to about 13.5 million Brewer's Blackbirds. This would be an increase in the population by a factor of 1.75, similar to other blackbirds.

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997) and a stable population of Brewer's Blackbirds would have a 75% mortality rate under the current assumptions (includes nestlings that die before fledging). The numbers that might be taken by WS under the proposed action or Alternative 1 have been negligible averaging 5,300 annually from FY03 to FY07 (potentially up to 100,000 in any one year, about 2% of the annual mortality - Table 14). These numbers are very minor and well within normal mortality levels for this species. Other WS mortality averaged almost 110,000 from FY03 to FY07, but potentially could be 400,000. This would bring the average total take by WS in the RMS region to 115,000, about 2% of the estimated annual mortality (Table 14), but as high as 500,000 or 9% of the estimated annual mortality. Additional human-induced mortality of this species occurs from private individuals and could potentially be 200,000 annually (Brewer's Blackbirds are not as much the focus of large-scale projects and likely to even be less taken). However, WS has no way of knowing what the level of take is by private individuals since permits are not required. With this information, Table 14 provides a cumulative impact analysis for Brewer's Blackbird take by WS, other RMS WS Programs, and private individuals and entities in the RMS region. This would bring the total take in the RMS region to 700,000, about 5% of the RMS total population or 12% of the estimated annual mortality (Table 14). WS concludes that this is a minor level of take and would not impact the population. It should be noted that Brewer's Blackbirds are not as likely to be taken when insects are available because of their preference for feeding on them over waste grain, when available (Martin 2002). Thus, it is likely that the estimates of take are highly conservative, that is, higher than they are in actuality.

Table 14. Cumulative impact analysis for Brewer's Blackbirds killed in New Mexico by WS, other RMS WS Programs, and private individuals and entities (estimated) from FY03 to FY07.

BREWER'S BLACKBIRD IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated RMS Breeding Population	7,700,000	7,700,000	7,700,000	7,700,000	7,700,000	7,700,000
Breeding Females	2,900,000	2,900,000	2,900,000	2,900,000	2,900,000	2,900,000
Ave. Clutch	5.0	5.0	5.0	5.0	5.0	5.0
Ave. Nests	1	1	1	1	1	1
% Fledge	40%	40%	40%	40%	40%	40%
Young Fledged/ Stable Pop. Ann. Mort.	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000	5,800,000
Total RMS Population	13,500,000	13,500,000	13,500,000	13,500,000	13,500,000	13,500,000
NM WS Take	26,373	0	0	0	0	5,275
Other RMS WS Take	251,247	149,427	40,688	29,595	76,683	109,528
WS Take % of RMS Ann. Mort.	4.8%	2.6%	0.7%	0.5%	1.3%	2.0%
Private Take in RMS Region	200,000	200,000	200,000	200,000	200,000	200,000
Total Take	477,620	349,427	240,688	229,595	276,683	314,803
% RMS Post-breeding Pop.	3.5%	2.6%	1.8%	1.7%	2.0%	2.3%
% of RMS Ann. Mortality	8.2%	6.0%	4.1%	4.0%	4.8%	5.4%

Great-tailed Grackles. The Great-tailed Grackle population has expanded its range in recent history, especially north and west of their historic boundaries, and has increased in abundance within its historic range. Estimated trends from 1980 to 2006 have been positive with significant (*P*=.01) increases in New Mexico of +7.9%/year, but not significant (*P*=.69) increases survey-wide of +0.6%/year (Sauer et al. 2008). Their range expansion has been credited to their adaptability to altered habitats such as urban and agricultural landscapes with irrigation (Johnson and Peer 2001). The United States population of Great-tailed Grackles has been estimated at 7.8 million birds, based on BBS data from the 1990s (Rich et al. 2004, RMBO 2007). Recent data (2003-2007) for just the RMS population rendered a population estimate of 1.5 million (Table 4; Appendix A: Table A4).

Great-tailed Grackles breed as yearlings (second year). For the sake of estimating the population for this EA, it is assumed that 75% of the Great-tailed Grackle females breed, the sex ratio is 1:1 males to females, females lay 1-5 eggs with an average eggs/nest of 3.2, and an average nests/season of 1.37 (Johnson and Peer 2001). About 75% of the eggs hatch, but fledgling success was high and found to be 93% in Texas once hatched for a rate from egg to fledgling of 70% (Johnson and Peer 2001). Using these parameters, the RMS breeding population of 1.5 million would have about 560,000 breeding females that successfully fledge about 1.7 million nestlings, raising the post-fledgling population to about 3.2 million Great-tailed Grackles. This would be an increase in the population by a factor of 2.1.

Table 15. Cumulative impact analysis for Great-tailed Grackles killed in New Mexico by WS, other RMS WS Programs, and private individuals and entities (estimated) from FY03 to FY07.

GREAT-TAILED GRACKLE IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated RMS Breeding Population	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Breeding Females	560,000	560,000	560,000	560,000	560,000	560,000
Ave. Clutch	3.2	3.2	3.2	3.2	3.2	3.2
Ave. Nests	1.37	1.37	1.37	1.37	1.37	1.37
% Fledge	70%	70%	70%	70%	70%	70%
Young Fledged/ Stable Pop. Ann. Mort.	1,700,000	1,700,000	1,700,000	1,700,000	1,700,000	1,700,000
Total RMS Population	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000
NM WS Take	15,029	0	0	0	0	3,006
Other RMS WS Take	70,581	41,634	27,194	9,060	24,061	34,506
WS Take % of RMS Ann. Mort.	5.0%	2.4%	1.6%	0.5%	1.4%	2.2%
Private Take in RMS Region	50,000	50,000	50,000	50,000	50,000	50,000
Total Take	135,610	91,634	77,194	59,060	74,061	87,512
% RMS Post-breeding Pop.	4.2%	2.9%	2.4%	1.8%	2.3%	2.7%
% of RMS Ann. Mortality	8.0%	5.4%	4.5%	3.5%	4.4%	5.1%

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997) and a stable population of Great-tailed Grackles would have a 53% mortality rate under the current assumptions. At the rate of expansion and increase in the grackle's population, it would be expected that the population has even had a lower mortality rate with more surviving annually. This is reflected in New Mexico. For example, the population has increased in relative abundance from an average of 0.83/count in 1973-1977 to 3.22/count in 2003-2007, a 390% increase in 30 years (Sauer et al. 2008). The numbers that might be taken by WS under the proposed action or Alternative 1 are relatively minor (potentially up to 50,000 in any one year, but between FY03 and FY07 it averaged 3,000), about 0.2% of the RMS population annual mortality (Table 15). These numbers are well within normal mortality levels for this species. Other WS mortality in the RMS region averaged 35,000 from FY03 to FY07, but potentially could be 150,000. This would bring the RMS WS take total to 200,000 or about 11% of the RMS estimated annual mortality for this species. Additional human-induced mortality of this species occurs from private individuals and could potentially be 50,000 annually. However, WS has no way of knowing what the level of take is by private individuals since permits are not required. With this information, Table 15 provides a cumulative impact analysis for Great-tailed Grackle take by WS, other RMS WS Programs, and private individuals and entities in the RMS region. The estimated cumulative impact from all sources averaged almost 3% of the estimated population and just more than 5% of the expected annual mortality, well within a level of take that would not cause declines in the population. WS concludes that this is a minor level of take and would not impact the population.

Common Grackles. Common Grackles are abundant in central and eastern North America which is reflected in their high estimated population survey-wide (Table 4). Trend data for 1980 to 2006 shows declines survey-wide that are significant (-.0.9%/year (*P*<.01)) and in New Mexico that are not significant (-2.5%/year (*P*=.16)). These downward trends are almost identical to the Brown-headed Cowbird trends. These declines are thought to have occurred to habitat loss and, in some areas, the spread of Great-tailed Grackles. Control efforts, especially in eastern United States, have been also theorized as a reason for decline (Peer and Bollinger 1997). The North American population of Common Grackles has been estimated at 100 million birds, based on winter roost surveys (Meanley and Royall 1976) and 97 million based on BBS data (Rich et al. 2004, RMBO 2007). BBS data for the RMS region from 2003-2007 provided an estimate of 2.4 million (Table 4; Appendix A: Table A5).

Common Grackles breed as yearlings (second year). For the sake of estimating the population for this EA, it is assumed that the Common Grackle sex ratio is 1:1 males to females, 75% of the females breed laying 3-7 eggs with the average of 4.8, and have an average of 1 nest/season (Peer and Bollinger 1997). Grackles renest if their initial attempt fails. Fledgling success was found to be 49%. Using these parameters, an RMS breeding population of 2.4 million would have about 0.9 million breeding females that successfully fledge about 2.1 million nestlings, raising the post-fledgling population to about 4.5 million Common Grackles. This would be an increase in the population by a factor of 1.9. Peer et al. (2003) used a factor of 1.45 to estimate the fall population of three blackbird species (Table 10). Thus, about 50% of the population would die from fledging to fall, presumably mostly juveniles. This would be a high mortality rate from early summer to fall, but could possibly occur.

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997). Under the current assumptions, the Common Grackle population would have a 64% mortality rate. The RMS breeding population has been estimated at 2.4 million (Table 4, Appendix A: Table A5) and is much lower than the estimated population in the Plains States (Peer et al 2003). The numbers that might be taken by WS under the proposed action or Alternative 1 are relatively minor (potentially up to 10,000 in any one year, from FY03 to FY07 WS averaged 255), but up to 1% of the RMS population (Table 16). These numbers are well within normal mortality levels for this species. Other WS mortality in the RMS region averaged 215 from FY03 to FY07, but potentially could be 15,000 which, if this occurred, would primarily be in the Central Flyway States. This would bring the RMS WS total to 25,000 or about 1% of RMS estimated annual mortality. Additional human-induced mortality of this species occurs from private individuals for this species and could potentially be 25,000 annually. However, WS has no way of knowing what the level of take is by private individuals since permits are not required. With this information, Table 16 provides a cumulative impact analysis for Common Grackle take by WS, other WS RMS Programs, and other private individuals and entities in the RMS region. The cumulative take would be about 1% of the expected annual mortality, well within a level of take that would not cause declines in the population. WS concludes that this is a minor level of take and such take would not impact the population.

Table 16. Cumulative impact analysis for Common Grackles killed in New Mexico by WS, other RMS WS Programs, and private individuals and entities (estimated) from FY03 to FY07.

COMMON GRACKLE IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated RMS Breeding Population	2,400,000	2,400,000	2,400,000	2,400,000	2,400,000	2,400,000
Breeding Females	900,000	900,000	900,000	900,000	900,000	900,000
Ave. Clutch	4.8	4.8	4.8	4.8	4.8	4.8
Ave. Nests	1	1	1	1	1	1
% Fledge	49%	49%	49%	49%	49%	49%
Young Fledged/ Stable Pop. Ann. Mort.	2,100,000	2,100,000	2,100,000	2,100,000	2,100,000	2,100,000
Total RMS Population	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000
NM WS Take	1,276	0	0	0	0	255
Other RMS WS Take	480	301	79	60	155	215
WS Take % of RMS Ann. Mort.	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Private Take in RMS Region	25,000	25,000	25,000	25,000	25,000	25,000
Total Take	26,756	25,301	25,079	25,060	25,155	25,470
% RMS Post-breeding Pop.	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
% of RMS Ann. Mortality	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%

Yellow-headed Blackbirds. The Yellow-headed Blackbird breeds in north central western states including the northern states in the RMS region. It requires emergent wetland habitat for breeding and is limited by its distribution. The Yellow-headed Blackbird begins migration to its wintering grounds in southern Arizona, New Mexico and southwest Texas south into Mexico starting in July and finishes by mid-September, mostly coinciding with the completion of its pre-basic molt (their migration is missed by both CBC and BBS). Yellow-headed Blackbirds mostly miss BDM activities conducted by WS in the RMS region, except for those that linger prior to heading for their wintering grounds. However, its migration coincides with the ripening of some sunflowers and other crops, and therefore, it may be involved in some BDM activities. Estimated trends from 1980 to 2006 have been slightly positive survey-wide (0.4%/year), but not significant (P=0.71) (Sauer et al. 2008). However, in New Mexico, the trend reflected a large decrease from 1980 to 2006 at -11.9%/year, but again not significant (P=0.09). Reductions in breeding populations for this species have primarily been attributed to the loss of nesting habitat from drought and development (Twedt and Crawford 1995). The population of Yellow-headed Blackbirds was estimated at 23 million based on BBS data from the 1990s (Rich et al. 2004, RMBO 2007). A detailed study in the northern prairie pothole region (Peer et al. 2003) estimated 11.6 million Yellow-headed Blackbirds in that area. Recent BBS data (2003-2007) estimated the RMS population at 2.2 million (Table 4; Appendix A: Table A6). This will be the population estimate used for this EA.

Yellow-headed Blackbirds breed as yearlings (second year). For the sake of estimating the population for this EA, it is assumed that 75% of the blackbird females breed, the sex ratio is 1:1 males to females, females lay 1-5 eggs with an average of 3.2-4.0 eggs/nest (3.2 will be used for the EA), and average 3 nests/season (Twedt and Crawford 1995). Averages of 2.1 nestlings fledge the first nest, 1.0 from the second, and 0.9 from the third for an egg to fledgling success of 42%. Using these parameters, a breeding population of 2.1 million in the RMS region would have about 800,000 breeding females that successfully fledge about 3.2 million nestlings, raising the post-fledgling population to about 5.3 million Yellow-headed Blackbirds. This would be an increase in the population by a factor of 2.5, somewhat higher than other blackbirds.

Table 17. Cumulative impact analysis for Yellow-headed Blackbirds killed in New Mexico by WS, other RMS WS Programs, and private individuals and entities (estimated) from FY03 to FY07.

YELLOW-HEADED BLACKBIRD IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated RMS Breeding Population	2,200,000	2,200,000	2,200,000	2,200,000	2,200,000	2,200,000
Breeding Females	800,000	800,000	800,000	800,000	800,000	800,000
Ave. Clutch	3.2	3.2	3.2	3.2	3.2	3.2
Ave. Nests	3	3	3	3	3	3
% Fledge	42%	42%	42%	42%	42%	42%
Young Fledged/ Stable Pop. Ann. Mort.	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000
Total RMS Population	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000
NM WS Take	942	0	0	0	0	188
Other RMS WS Take	201,180	119,957	31,230	23,756	61,560	87,537
WS Take % of RMS Ann. Mort.	6.3%	3.7%	1.0%	0.7%	1.9%	2.7%
Private Take in RMS Region	100,000	100,000	100,000	100,000	100,000	100,000
Total Take	302,122	219,957	131,230	123,756	161,560	187,725
% RMS Post-breeding Pop.	5.6%	4.1%	2.4%	2.3%	3.0%	3.5%
% of RMS Ann. Mortality	9.4%	6.9%	4.1%	3.9%	5.0%	5.9%

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997). However, a stable population of Yellow-headed Blackbirds, as described in this section, would have a 78% mortality rate under the current assumptions (includes nestlings that die before fledging) which is somewhat high. However, mortality following fledging would be 60%, thus, 18% die between hatching and fledging. The numbers that might be taken by NM WS under the proposed action or Alternative 1 are relatively minor (potentially up to 5,000 in any one year, FY03-FY07 averaged 188), less than 0.1% of the RMS population annual mortality (Table 17). The numbers are very minor and mostly unnoticeable at the population level. Other WS mortality in the RMS region is higher, particularly in Arizona, where a high number winter, coinciding with BDM operations. WS take totaled for the RMS region averaged 3% of their annual mortality with a high of just over 6% from FY03 to FY07 (Table 17), but potentially could be 250,000 (Yellow-headed Blackbirds are not the focus of most WS BDM projects and less likely to be taken in most of the RMS region because most work is done at CAFOs). Additional human-induced mortality of this species occurs from private individuals and could potentially be 100,000 annually. However, WS has no way of knowing what the level of take is by private individuals since permits are not required. With this information, Table 17 provides a cumulative impact analysis for Yellow-headed Blackbird take by WS, other RMS WS Programs, and other private individuals and entities in the RMS region. The cumulative impact was less than 10% of the expected annual mortality, well within a level of take that would not cause the population to decline. WS concludes that this level of take is a negligible impact on the population well within the normal mortality level.

Bronzed Cowbirds. The Bronzed Cowbird, like other cowbirds, is a brood parasite that breeds in southern portions of Arizona and New Mexico. It prefers open habitats and human settlement of the West created habitats favorable for range expansion for the Bronzed Cowbird. However, the BBS survey-wide and New Mexico trends are negative at -4.4%/year (*P*=.04, significant) and -4.6%/year (*P*=.70, nonsignificant). Recent declines are thought to have occurred because of habitat loss that has affected host species (being a parasitic nester – lays eggs in other bird species' nests). This species is most abundant in Texas in its range in the southern United States, but has an estimated population of 19,000 in the RMS region in New Mexico and Arizona (Table 4; Appendix A: Table A7).

Not much is known about the reproduction parameters for Bronzed Cowbirds (Lowther 1995). They breed as yearlings (second year). For the sake of estimating the population for this EA, it is assumed that 75% of the cowbird females breed and the sex ratio is 1:1 males to females. Assuming that they are similar to Brown-headed Cowbirds, females would lay an average of 41 eggs/season, and an average of 13% fledge with 3 (7%) cowbirds developing to maturity from other species rearing them (Lowther 1993). Using these parameters, a breeding population of 19,000 in the RMS region would have about 7,100 breeding females that successfully fledge about 21,000 nestlings (3 that reach adult per female), raising the post-fledgling population to about 39,000 Bronzed Cowbirds. This would be an increase in the population by a factor of 2.1. It would be expected that the mortality rate through the course of a year for Bronzed Cowbirds would be higher than other species of blackbirds because of the higher population increase factor as well as smaller size.

New Mexico WS from FY03 to FY07 took an average of 8 Bronzed Cowbirds, with a high of 38 in FY03 (Table 18). Under the proposed action (Alternative 1), it is estimated that up to 100 might be taken by WS. In the RMS region outside New Mexico, only Arizona WS potentially took Bronzed Cowbirds and it was estimated that an average of 153 were taken from FY03 to FY07. The cumulative impact from all RMS WS Programs averaged 1% of the annual mortality of Bronzed Cowbirds with a high of 3% in FY03. It is anticipated that the cumulative take of Bronzed Cowbirds in the RMS region, including New Mexico, could take up to 1,000 for the protection of primarily livestock and feed in CAFOs. Additionally, private individuals and entities potentially take Bronzed Cowbirds, but this would likely be very low considering their range. For the sake of a cumulative impact, it is possible that an additional 500 Bronzed Cowbirds could be taken for a combined impact of 4% of their annual mortality. Thus, this level of take would have little impact on the population. WS concludes that the current and potential level of take is not expected to have an effect on the Bronzed Cowbird population.

Table 18. Cumulative impact analysis for Bronzed Cowbirds killed in New Mexico by WS, other RMS WS Programs, and private individuals and entities (estimated) from FY03 to FY07.

BRONZED COWBIRD IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated RMS Breeding Population	19,000	19,000	19,000	19,000	19,000	19,000
% Breeding Females in Population	7,100	7,100	7,100	7,100	7,100	7,100
Estimated Number Breeding Females	1	1	1	1	1	1
Ave. Clutch	41	41	41	41	41	41

Ave. # Fledge from Eggs Produced	7%	7%	7%	7%	7%	7%
Young Produced/Stable Pop. Ann. Mort.	21,000	21,000	21,000	21,000	21,000	21,000
Total RMS Population	40,000	40,000	40,000	40,000	40,000	40,000
NM WS Take	38	0	0	0	0	8
Other RMS WS Take	624	298	78	59	153	242
WS Take % of RMS Ann. Mort.	3.2%	1.4%	0.4%	0.3%	0.7%	1.2%
Private Take in RMS Region	500	500	500	500	500	500
Total Take	1,124	798	578	559	653	742
% RMS Post-breeding Pop.	2.8%	2.0%	1.4%	1.4%	1.6%	1.9%
% of RMS Ann. Mortality	5.4%	3.8%	2.8%	2.7%	3.1%	3.5%

Rusty Blackbirds. Rusty Blackbirds breed in Alaska and Canada, and winter in the southeastern United States. Its winter range includes the eastern portions of the southeastern states, South Dakota and south, in the Great Plains States. Very few Rusty Blackbirds winter in western States and are documented in NAS Christmas Counts. This is true for New Mexico. WS expects that very few, if any, Rusty Blackbirds will be taken in the RMS region.

Rusty Blackbirds primarily feed on invertebrates in wet woodlands and near streams throughout the year. Even though they will roost with other blackbirds, Rusty Blackbirds usually will not feed with them. Thus, few are likely ever taken by WS during BDM. Estimated trends from 1980 to 2005 have been significantly (*P*=.02) negative survey-wide at -14.4%/year. Declines have been linked to a loss of wet woodland breeding habitat (Avery 1995). The population of Rusty Blackbirds was estimated at 2.0 million based on BBS data from the 1990s (Rich et al. 2004, RMBO 2007). Rusty Blackbirds do not breed in the RMS region and, therefore, do not have an estimated population in this area.

Even though Rusty Blackbirds do not breed in the RMS, its population can be estimated. This species has been declining for a number of years. If it declined 15% annually from 2000 to 2007, its population, using the RMBO (2007) estimate of 2 million, would be about 650,000 in 2008. Rusty Blackbirds breed as yearlings (second year). For the sake of estimating the population in this EA, it is assumed that 75% of the blackbird females breed, the sex ratio is 1:1 males to females, and females lay an average of 4.5 eggs/nest with 1 nest/season (Avery 1995). No other data was available, but it assumed that from egg to fledgling, success is 40% (using Brewer's Blackbird parameters). Using these parameters, a breeding population of 640,000 would have about 240,000 breeding females that successfully fledge about 430,000 nestlings, raising the post-fledgling population to about 1.1 million Rusty Blackbirds. This would be an increase in the population by a factor of 1.7, similar to other blackbirds.

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997) and a stable population of Rusty Blackbirds would have a 53% mortality rate under the current assumptions and an assumption that 67% of the eggs in a nest hatch (the mortality rate includes nestlings that die before fledging). Take has been limited to 4 estimated to be taken in New Mexico in FY03. Take was estimated to be zero in the other RMS WS Programs. It is likely that private take is few, if any (feeding behavior would likely preclude the take of many). The numbers that might be taken by the NM WS Program under the proposed action or Alternative 1 would be relatively minor (likely much less than 10 in any one year, FY03-FY07 averaged 1), 0.002% of the annual mortality. This would be very minor and well within normal mortality levels for this species. Other WS mortality averaged about 0 from FY03 to FY07, but potentially could an additional 10. This would bring the total to 20 by WS in the RMS region, about 0.005% of the population's estimated annual mortality. Additional human-induced mortality of this species occurs from private individuals in the RMS region and could potentially be another 10 annually (Rusty Blackbirds, similar to the Brewer's Blackbird, are not as much the focus of BDM projects and likely to even fewer taken than the given estimate especially considering its feeding behavior). However, WS has no way of knowing what the level of take is by private individuals since permits are not required. Additionally, it should be noted that Rusty Blackbirds are the species not likely to be taken protecting crops because during winter they mostly feed in wet woodland bottoms on acorns, pine seeds, fruits, and animal matter, but sometimes will be found in feedlots (Avery 1995). WS concludes that current levels of take in the RMS region are likely very low, if any, and not at a level of take that would not impact the population. The loss of wetland nesting habitat is attributed to their decline.

Corvids

All species of corvids (crows, ravens, magpies, and jays) have the potential to cause damage to resources, but only a few species do routinely in New Mexico, crows and ravens. The American Crow, Common and Chihuahuan Ravens, and Black-billed Magpie are found in New Mexico and the species most likely to cause damage resulting in requests for assistance from WS. All 4 species cause damage, but the Common Raven causes the most consistent problems (mostly livestock predation, but also crop damage) and has been the focus of several BDM projects. American Crows have only periodically been the focus of BDM projects because they often damage crops and congregate in large numbers that are a nuisance or cause damage at feedlots, for example. Periodically, crows are also responsible for livestock predation. Large numbers can be taken during a single BDM project, primarily during winter when large flocks form. Finally, the Chihuahuan Raven causes problems, intermediate to the others. Magpies cause similar damage to these species and have caused requests for assistance, but WS has not conducted BDM for them. None of the other corvids have elicited complaints nor been the focus of a BDM project in New Mexico from FY92 to FY07. WS does not anticipate that this will change and would only expect to take a few individuals of the different species if BDM were conducted for them. However, many corvid populations are increasing with increasing urbanization (Marzluff et al. 2001), and damage and subsequent BDM actions could increase.

American Crows. The American Crow population has increased throughout their range, especially in more urbanized environments and western states (Marzluff et al. 2001). American Crows are year-round residents in New Mexico, but migration into the State during fall and winter raises the local populations each year as historical winter roosts are re-occupied or new roost sites are established. During summer months, they are most common in north-central New Mexico and less abundant elsewhere, often absent from the southern part of the State. Numbers are variable from year to year as seen in NAS CBC data (NAS 2008a). Winter numbers likely are affected by climatic conditions such as colder winters in states further north. Estimates on historical roosts showed millions of crows concentrated in communal roosts (Johnson 1994) throughout the southern tier of states. The arrival of wintering crows in New Mexico coincides with the harvest of several important agricultural commodities (e.g. pecans and peanuts) that are damaged by crows. Efforts to control depredation to these commodities include a variety of non-lethal and lethal methods. Lethal methods employed by WS include shooting, DRC-1339, and cage traps with euthanasia. Lethal strategies are intended to reduce the population of crows feeding on these valuable commodities that have not successfully been deterred by non-lethal measures. The damage threat from crows, along with their abundance, was significant enough that a Depredation Order was issued by the USFWS to allow the take of crows "*when found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance*" with no Federal permit (50 CFR 21.43).

In addition to WS's take, crows are taken by the public under the authority of the standing Depredation Order to protect resources. However, WS has no measure of the number of crows taken for such actions, similar to blackbirds, because reporting of take is not required. It is expected that some are taken, but not likely a substantial number because the public likely uses shooting as the primary method for control. Another cause of mortality for crows is hunting. New Mexico does not have an open hunting season for crows, but other states in the RMS region do such as Colorado. However, not all states collect harvest information for crows. In spite of these pressures from sport hunting and for resource protection, estimated trends from 1980 to 2006 have been positive with significant (P<.01) increases survey-wide of

+0.7%/year, but not significant (*P*=.50) increases in New Mexico of +1.9%/year (Sauer et al. 2008). Their range expansion has been credited to their adaptability to altered habitats such as urban and agricultural landscapes (Verbeek and Caffrey 2002). The BBS survey-wide population of American Crows has been estimated at 31 million based on BBS data from the 1990s (Rich et al. 2004, RMBO 2007). Recent data (2003-2007) for just the RMS population rendered a population estimate of 7.7 million (Table 4, Appendix A: Table A9). Since crows are increasing significantly survey-wide, this suggests that the population is not being impacted from hunting harvest and control throughout the survey area. Because most take would have to be estimated for states in the RMS region, including sportsmen harvest in some states, impacts are going to be considered only at the statewide level instead of for the RMS region. It is expected that the take of crows in New Mexico is similar to other states in the RMS region with the exception that New Mexico has no hunting harvest. New Mexico WS conducted 1 lethal BDM project from FY03 to FY07 for crows. Table 19 considers take for this project along with an estimate of take from other sources

American Crows breed when they are two years old (third year). A population has been found to consist of 34% juveniles, many that form flocks with other nonbreeders or assist adults in raising nestlings (Verbeek and Caffrey 2002). For the sake of estimating the population for this EA, it is assumed that 66% of the estimated population breeds, the sex ratio is 1:1 males to females, females lay 3-7 eggs with an average eggs/nest of 4.5, and the average nests/season is 1 (Verbeek and Caffrey 2002)). About 37% of the eggs hatch and fledge. Using these parameters, the New Mexico breeding population of 110,000 would have about 36,000 breeding females that successfully fledge about 60,000 nestlings, raising the post-fledgling population to about 170,000 American Crows. This would be an increase in the population by a factor of 1.5.

Table 19. Cumulative impact analysis for American Crows killed in New Mexico by WS, and private individuals and entities (estimated) from FY03 to FY07.

AMERICAN CROW IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated NM Breeding Population	110,000	110,000	110,000	110,000	110,000	110,000
% Adult/Females in Population	66%/50%	66%/50%	66%/50%	66%/50%	66%/50%	66%/50%
Breeding Females	36,000	36,000	36,000	36,000	36,000	36,000
Ave. Clutch	4.5	4.5	4.5	4.5	4.5	4.5
Ave. Nests	1	1	1	1	1	1
% Fledge	37%	37%	37%	37%	37%	37%
Young Fledged/ Stable Pop. Ann. Mort.	60,000	60,000	60,000	60,000	60,000	60,000
Total NM Population	170,000	170,000	170,000	170,000	170,000	170,000
NM WS Take	0	3,680	0	0	0	736
NM WS Take % of NM Ann. Mort.	0%	6.1%	0%	0%	0%	2.2%
Private Take in NM	5,000	5,000	5,000	5,000	5,000	5,000
Total Take	5,000	8,680	5,000	5,000	5,000	5,736
% RMS Post-breeding Pop.	2.9%	5.1%	2.9%	2.9%	2.9%	3.4%
% of RMS Ann. Mortality	8.3%	14.5%	8.3%	8.3%	8.3%	9.6%

The numbers that might be taken by WS under the proposed action or Alternative 1 are relatively minor. WS anticipates that it could potentially take up to an estimated 10,000 in a year, but the take between FY03 and FY07 would likely be more realistic which averaged less than 750 with a high of 3,680 or 6% of the expected annual mortality (Table 19). Cumulatively, WS anticipates that private individuals would take potentially up to 5,000. This would be higher if hunting were allowed in New Mexico. In total, cumulative take would represent about 10% of the expected annual mortality. These numbers are well within normal mortality levels for this species. It should be noted that West Nile virus has been documented in New Mexico and probably took a toll on the corvid population. Since it has been in the state for a few years, it is expected that corvids will develop some resistance to the disease. WS has no way to determine the level of impact this disease has had, but looking at BBS trend data, it is believed that it has not been a significant limiting factor.

WS take in the RMS region is similar to New Mexico with sporadic control projects. WS in the RMS region averaged an estimated 1,381 crows taken annually with a high in FY04 of 4,232. WS would have taken 0.1% of the annual mortality in FY04, and less on average, with an estimated population of 7.7 million crows in the RMS, a population that would have an estimated 4.2 million fledge. Thus, take in the RMS region by WS would be much less. Additional human-induced mortality of this species in the RMS region occurs from hunters, and private individuals and others conducting control. WS has no way of knowing what the level of take is by private individuals. Some hunter harvests are available. For example, an average of about 1,700 crows was harvested in Colorado during the 2002-03 to 2004-05 hunting seasons annually. However, take in the RMS region would have to be substantially higher, 2 million or more, to have had an impact on the overall population. WS concludes that this is a minor level of take and would not impact the population.

It should be noted that American Crows can experience substantial reductions to their populations and show no effect at the population level. From 1934 to 1945, in an organized effort by the Oklahoma Game and Fish Commission, 127 crow roosts were removed in Oklahoma during winter. Almost 4 million crows were killed, but no evidence was obtained indicating an influence on total population levels during the period (Dolbeer 1986). In addition to this campaign, the hunting seasons for crows continued. Despite the attitudes of the day that encouraged the complete extirpation of the American Crow, the birds continued to thrive.

Common Ravens. The Common Raven, the largest bodied of the passerines, is widely distributed throughout the Holarctic Regions of the world including Europe, Asia, and North America (Goodwin 1986, Boarman and Heinrich 1999). In New Mexico, Common Ravens are most abundant in the western half of the State, but can be found statewide except the east-central portion. In some parts of its range, the Common Raven population is rapidly expanding along with a dramatic increase in raven damage, and programs have been implemented to reduce population size. In other parts of its range, populations declined so drastically in the past that reintroduction programs were implemented. The raven is an omnivorous species known to feed on carrion, crops, eggs and birds, small mammals, amphibians, reptiles, fish, and insects. Ravens are attracted to and concentrate around livestock birthing grounds. Ravens will attack young lambs, calves, and goats, and even adult ewes, nannies, and cattle in certain situations, by pecking the eyes and other vulnerable spots such as the anus, nose, or umbilical cord which results in the animal going into shock and dying (Larsen and Dietrich 1970, Wade and Bowns 1982). Other agriculturally related raven complaints received by WS have included eating livestock feed and feeding on grains, pecans, and other crops. Non-agricultural property damage complaints received by WS have included damage to electrical lines, power outages, buildings, landscaping, and other structures. Health related complaints have included turning garbage containers over and strewing its trash, and carrying trash from landfills into nearby residential areas. Additionally, high raven numbers potentially represent a threat to nesting waterfowl, upland gamebirds, Neotropical songbirds, and T&E species or other sensitive wildlife. The raven has been implicated as a causative factor in the declines of several T&E species, including desert tortoise (*Gopherus agassizi*), California Condor, Marbled Murrelet (*Brachyramphus marmoratus*), and Least Tern (Boarman and Heinrich 1999, Liebezeit and George 2002). Thus, a reduction of ravens in some areas of the country is seen as desirable to protect the T&E species such as the desert tortoise.

In many areas of the West, the Common Raven is seen as an indicator of human disturbance, being closely associated with garbage dumps, sewage ponds, highways, agricultural fields, urbanization, and other human-altered landscapes (Boarman 1993, Restani and Marzluff 2001). Adaptability, predacious habits, and ability to use resources provided by human activities have benefitted the raven population. Supplemental feeding sources such as garbage, crops, and road-killed animals have afforded ravens an advantage over other not-so-opportunistic feeders and has allowed the raven population to increase precipitously in some areas (Liebezeit and George 2002). In some areas of the West, the raven population has increased as much as 7000%. As a result, WS has seen an increase in raven complaints over the last several decades.

In most areas, ravens are year-round residents with little evidence of migration from radio-tagged or marked populations in North America (Goodwin 1986, Boarman and Heinrich 1999). However, the species has been known to move into areas just outside its range during non-breeding season. Further, there is some question as to whether some of the birds in flocks of floaters may be migrants (Boarman and Heinrick 1999). Floaters are primarily immature and non-breeding birds (i.e., fledgling, 1 and 2 year old birds) that typically will band together in flocks of 50 or more. These flocks tend to be loose-knit and wide-ranging (Goodwin 1986). Ravens do not breed until their third years, though some unsuccessful attempts to nest have been documented for 2-year old birds (Boarman and Heinrich 1999). Common Ravens have one nest per year, renesting if the first attempt fails, with a typical clutch size of 3 to 7, averaging 5.3 (Boarman and Heinrich 1999). Age structure in raven populations is unknown, but it is assumed for this analysis that "floaters" or subadult birds make up 34% of the population as with crows. Fledgling success (number fledged/egg) varied, but the lowest in a Wyoming study was found to be 31% (Boarman and Heinrich 1999). Using these parameters, an estimated breeding population of 270,000 in New Mexico (Table 4; Appendix A: Table 8) would annually fledge about 150,000 ravens. However, to be more conservative, the population was estimated to be half that of the RMBO (2007) estimate (BBS data count an area double the size), an estimated population of 140,000 ravens in New Mexico would fledge 76,000 young annually (Table 20).

Table 20. Cumulative impact analysis for Common Ravens killed in New Mexico by WS, and private individuals and entities (estimated) from FY03 to FY07.

COMMON RAVEN IMPACT ANALYSIS						
	FY03	FY04	FY05	FY06	FY07	Ave.
Estimated NM Breeding Population	140,000	140,000	140,000	140,000	140,000	140,000
% Adult/Females in Population	66%/50%	66%/50%	66%/50%	66%/50%	66%/50%	66%/50%
Breeding Females	46,000	46,000	46,000	46,000	46,000	46,000
Ave. Clutch	5.3	5.3	5.3	5.3	5.3	5.3
Ave. Nests	1	1	1	1	1	1
% Fledge	31%	31%	31%	31%	31%	31%
Young Fledged/Stable Pop. Ann. Mort.	76,000	76,000	76,000	76,000	76,000	76,000
Total NM Population	220,000	220,000	220,000	220,000	220,000	220,000
NM WS Take	83	48	0	0	0	26
NM WS Take % of NM Ann. Mort.	0.1%	0.1%	0%	0%	0%	0.03%
Private Take in NM	104	42	39	25	2	43
Total Take	187	90	39	25	2	69
% NM Post-breeding Pop.	0.09%	0.04%	0.02%	0.01%	0.00%	0.03%
% of NM Ann. Mortality	0.24%	0.12%	0.05%	0.03%	0.00%	0.09%

The numbers that might be taken by WS under the proposed action or Alternative 1 are relatively minor. WS anticipates that it could potentially take up to an estimated 3,000 annually especially because the population has increased (<5% of the expected annual mortality), but the take between FY03 and FY07 would likely be more realistic which averaged 26 with a high of 83 or 0.1% of the expected annual mortality (Table 20). Cumulatively, WS anticipates that private individuals would take potentially up to 1,000, but USFWS recorded an average of 43 between 2003 and 2007. In total, potential cumulative take would represent about 5% of the expected annual mortality. These numbers are well within normal mortality levels for this species. It should be noted, as with crows, that West Nile virus has been documented in New Mexico and probably caused additional mortality on the corvid population. Now that it has been in the state for a few years, it is expected that corvids will develop some resistance to the disease. WS has no way to determine the level of impact this disease has had, but looking at BBS trend data, it is believed that it has not been a significant limiting factor because the population has been increasing significantly at 2.6% and 1.9 /year from 1980 to 2007 in New Mexico and survey-wide (Sauer et al. 2008). WS believes that the Common Raven population has not been impacted at the population level by WS BDM in New Mexico and that take will continue to be very minor portion of their expected annual mortality.

Chihuahuan Ravens. Chihuahuan Ravens tend to be more gregarious, even during the breeding season, than Common Ravens. Chihuahuan Ravens are not as widely distributed as the Common Raven. They can be found from southern Arizona to southeast Colorado south through Texas and New Mexico into Mexico. They inhabit all of New Mexico except the northwest quarter. The Chihuahuan Raven tends to inhabit lower elevations than Common Ravens. Ravens are migratory birds and managed under the Migratory Bird Treaty Act by USFWS. WS responds to requests from livestock operators and others who experience depredation problems from ravens and work with USFWS to resolve damage complaints. WS in New Mexico did not take any Chihuahuan Ravens from FY03 to FY07, but has in the past. USFWS issued one permit in 2003 that resulted in the take of 11, but none from 2004-2007. These ravens are often taken for similar reasons as Common Ravens. It is anticipated that WS will take them in the future in BDM activities, but somewhat less than Common Ravens.

Similar to Common Ravens, Chihuahuan Ravens are abundant in those areas occupied in New Mexico. Estimated trends from 1980 to 2007 have been negative, but with nonsignificant ($P=0.50$ and 0.09) decreases for New Mexico at -0.6%/year and survey-wide at -1.4%/year (Sauer et al. 2008). The BBS survey-wide population of Chihuahuan Ravens has been estimated at 370,000 based on BBS data from the 1990s (Rich et al. 2004, RMBO 2007). Recent data (2003-2007) for the New Mexico population rendered a population estimate of 250,000 (Table 4; Appendix A: Table A10). Since populations are decreasing survey-wide and in New Mexico, but not significantly, it is harder to judge whether BDM has impacted them. Looking at the population data, WS can estimate the annual mortality. Much is unknown about the Chihuahuan Raven natural history (Bednarz and Raitt 2002). However, Chihuahuan Ravens have one nest per year, renesting if the first attempt fails, with a typical clutch size of 3 to 7, averaging 4.9 (Bednarz and Raitt 2002). Age structure in raven populations is unknown, but it is assumed for this analysis that “floaters” or subadult birds make up 34% of the population as with crows. Fledgling success (number fledged/egg) varied, but was found to be 30% (Bednarz and Raitt 2002). Using these parameters, an estimated breeding population of 250,000 in New Mexico would annually fledge about 120,000 nestlings, the estimated annual mortality rate. WS could take many thousands of Chihuahuan Ravens before a moderate magnitude impact would be reached. WS concludes, that even with implementation of lethal control for these ravens, WS will have a minor impact on them, at most.

Black-billed Magpies. Magpies frequently invoke requests for assistance from WS in states with large magpie populations, similar to complaints caused by ravens, including predation of livestock and poultry. Magpies are found in northern New Mexico with a population estimated at 50,000 (RMBO 2007). Magpie BBS data reflect nonsignificant (P=0.50 and 0.12) increases annually between 1980 and 2006 in New Mexico and survey-wide of +1.4%/year and +0.6%/year (Sauer et al. 2008). Magpies have an average of 3.6 eggs/nest and 1 nest/season with about a 60% fledging success (Trost 1999). This would increase the population by 54,000 annually. However, WS did not conduct lethal BDM for magpies from FY92 to FY07 but received a few requests for assistance during this time. Magpie populations are apparently healthy enough, and the losses they cause are great enough that the USFWS has established a standing depredation order. Under this “Order” (50 CFR 21.43), no Federal permit is required by anyone to remove magpies if they are committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance. WS has not contributed to a decline in the Black-billed Magpie population, but anticipates that possibly a few to a few hundred could be taken to reduce losses associated with them, mostly from a winter roost situation or where they were responsible for resource losses. This would amount to less than 1% of their expected annual mortality which would not have an effect on their population.

Jays. New Mexico hosts 4 species of jays that are fairly common and have the potential to cause damage. Three additional species could invoke damage requests, but are found in isolated populations of low numbers (1,500 or less) in different parts of the State. None of the jays has been the focus of a WS BDM project nor has WS recorded damage for any of these species. Despite having no damage recorded for these species, the potential exists as these species have invoked requests for assistance to WS in neighboring states, but lethal take has been very low for these species. From FY02 to FY06, WS nationally took no more than 200 jays in a single year with Steller's Jays, Western Scrub-Jays, and Blue Jays being the only jays taken. None of the other species (Pinyon, Mexican, and Gray Jays and Clark's Nutcrackers) was taken and New Mexico WS believes that it will not take any others as well. In general, WS believes that no jays will be taken in New Mexico except potentially a few in isolated cases involving one or two birds. WS anticipates that it would take no more than a few in any given year, but possibly up to 10% of their expected annual mortality which for most of these species would be 50 or more. This level of take would not impact any of their populations.

Waterfowl

Many species of waterfowl are present during some portion of the year in New Mexico with most during winter arising from northern breeding grounds. New Mexico only has 3 species of waterfowl that commonly breed in the State, the Canada Goose, Mallard, and American Coot. A few other species can be found in lesser numbers in New Mexico, but typically are not associated with damage situations, except potentially at airports. Conservation efforts over the last several decades such as closely regulating hunter harvest, slowing the loss of wetlands, and improving the quality of wetland habitat have helped reverse the decline of many waterfowl species. In response to the efforts by wildlife managers, sportsmen, conservationists, and others, waterfowl populations, particularly Canada Geese, Snow Geese, Ross's Geese, and Mallards, have flourished in recent years. As a result, these species of waterfowl, especially the midcontinent populations of geese, are considered overabundant and cause extensive damage to agricultural crops, property, and other resources, and can pose a threat to human health and safety, especially at airports.

Of the 24 species that breed in the BBS survey-wide area (including Sandhill Crane, American Coot, and Common Moorhen) that are commonly found in New Mexico during some time of the year, 9 have exhibited nonsignificant negative trends and 13 have showed positive trends (9 significant) from 1980 to 2007 (Sauer et al. 2008). With this upward trend for most species of waterfowl, hunting seasons and bag limits have become more liberal for many. WS conducted lethal BDM for only 1 species of waterfowl from FY03 to FY07, the Canada Goose, with 6 taken in FY07. WS also conducted extensive nonlethal BDM for Sandhill Cranes, Canada Geese, and Snow Geese in the MRGV. In prior years, American Coots, Feral Ducks, and American Wigeons have also been the focus of BDM projects. It is anticipated that WS could take other species of waterfowl, especially if WS begins additional operational work at airports in New Mexico or needs to conduct disease sampling requiring waterfowl to be taken lethally (WS has collected disease samples from waterfowl, but thus far from trap and release programs using rocket nets or at hunter check stations). However, WS has no way of knowing what these needs will be and if waterfowl are going to be involved.

Most waterfowl in New Mexico are hunted. Waterfowl harvest across North America, north of Mexico, averaged 16.7 million harvested annually in the 2005-06 and 2006-07 hunting seasons (Table 21). In New Mexico, harvest averaged 53,000 illustrating the harvest potential for these species. However, this take is within levels that can be withstood by the populations considering their breeding and subsequent fall populations. This take added to take by WS would provide a cumulative impact. Thus far, WS lethal take of waterfowl has been minimal or nonexistent for most species and a minor percentage of hunter harvest, 0.2% for Canada Geese in FY07 (using the 2005-06 hunter harvest average from Table 21). It should be noted that some Canada Geese subspecies populations and the mid-continent populations of

Ross's and Snow Geese are considered overabundant. USFWS has established a Depredation Order for "resident" Canada Geese because resident populations in the continental U.S. have surpassed historic population levels and management objectives. The light geese have had liberal hunting seasons as allowed by USFWS in coordination with the Canadian government including spring hunting with the use of electronic calls and no bag limits in an attempt to reduce their population because they are severely damaging their nesting grounds. The number of waterfowl taken by WS is low in comparison to mortality from hunter harvest and WS anticipates that take in BDM would not likely be higher than 10% of that harvest (with the exception American Coots which are not harvested in great numbers). WS does not anticipate any substantial increases in take of waterfowl species, except potentially "resident" Canada Geese and some Mallards, primarily because these species are often most prone to cause damage. Additionally, American Coots and American Wigeons often cause localized damage and could be taken.

Mortality for waterfowl from other sources such as disease can be high to local populations, but typically occurs in isolated areas and infrequently. Botulism, caused from toxins produced by bacteria, is a common disease in waterfowl and can have devastating effects on local waterfowl populations. It occurs in all parts of the nation but is most prevalent in western and northern Plains States. In certain years, mortality due to botulism in the West has been estimated at several million waterfowl (Locke and Friend 1989).

Table 21. Estimated waterfowl populations for the United States and Canada (USFWS 2008b), hunter harvest (USFWS 2008a), and potential WS take.

Species	Ave. Est. North American Midcontinent Breeding Pop. 2006-2007	Ave. Annual Canada/U.S. Hunter Harvest 2006-2007	Ave. Annual NM Hunter Harvest 2005-2006	Potential WS Maximum Annual Lethal Take
Greater White-fronted Goose	764,000	330,000	13	2
Snow Goose	2,455,000	520,000	1,870	200+
Ross' Goose		81,000	817	100+
Cackling Goose	193,000	3,300,000	4,952	200+ migrants and 500 "resident"
Canada Goose	692,000			
Wood Duck	N/A	120,000	825	50
Gadwall	2,728,000	1,500,000	3,748	50
American Wigeon	2,487,000	820,000	3,718	300
Mallard	7,723,000	5,100,000	14,033	1,000
Blue-winged Teal	6,640,000	860,000	3,554	50
Cinnamon Teal	N/A			
Northern Shoveler	3,508,000	620,000	2,579	50
Northern Pintail	2,613,000	470,000	1,512	50
Green-winged Teal	2,980,000	1,700,000	10,220	50
Canvasback	489,000	90,000	367	10
Redhead	1,056,000	200,000	584	10
Ring-necked Duck	N/A	270,000	753	10
Lesser Scaup	3,738,000	230,000	420	10
Bufflehead	N/A	180,000	140	10
Goldeneyes	N/A	100,000	404	10
Hooded Merganser	N/A	100,000	84	10
Other Mergansers	N/A	41,000	298	30
Ruddy Duck	N/A	34,000	213	10
American Coot*	3,000,000	199,000	1,000	200
Sandhill Crane	490,000	34,000**	677	10
TOTAL		16,666,000	53,122	2,922

N/A – not available
*The American Coot has only minor hunting pressure on it, especially in New Mexico compared to some other states. WS maximum lethal take could likely be much higher than hunter harvest, though none was taken from FY03-FY07.
**Harvest data for the 2005 hunting season only and includes cranes lost.

Sandhill Cranes. Sandhill cranes are abundant from fall through spring in New Mexico and damage crops. Their population BBS-wide has significantly ($P<.01$) increased from 1980 to 2007 at +5.0%/year

(Sauer et al. 2008). In many states, Sandhill cranes can be hunted. In the 2005-06 hunting season, 18,263 were harvested in the Central Flyway (USFWS 2006b). Harvest in New Mexico averaged about 1,000 from 1976 to 2001 (NMDGF 2003). However, WS has not taken any lethally. WS became involved in a project to haze cranes from agricultural fields in the MRGV. WS cooperates with USFWS and NMDGF to conduct a program to protect crops from cranes which was discussed in Sections 3.3.1.2 and 1.3.4. From FY03 to FY07, WS averaged annually hazing 94,000 cranes from damage situations (this total adds all cranes hazed on a daily basis and represents cranes that were likely hazed several times during the course of a season) minimizing damage. If WS needed to lethally take a few cranes, primarily to reinforce hazing techniques to protect crops or airplanes, it would not be a noticeable effect on the population. It is likely that WS would never exceed 5% of the hunter harvest in New Mexico. However, it is most likely that WS will not take any.

Canada and Cackling Geese. Canada Geese were recently split into 2 species, the Canada Goose and smaller Cackling Goose. BBS and other data did not separate these species until just recently. Thus, data for the 2 species are mostly combined and will be for the purposes of this analysis (the "residents" are Canada Geese only). Of the waterfowl species, a significant increase has occurred with Canada Geese (Figure 14) at +7.3% /year (P<.01) from 1980 to 2007 (Sauer et al. 2008) survey-wide. This is mirrored in New Mexico with a significant (P=.01) +5.0%/year increase. The establishment of Canada Geese has occurred throughout the United States, primarily from introduction and transplant programs (Oberheu 1973, Blandin and Heusmann 1974, Ankney 1996). These programs were very successful and Canada Geese established large "resident" populations in many urban centers in the continental United States, creating an increased number of conflicts between human interests and the geese (Conover and Chasko 1985, Hindman and Ferrigno 1990, Ankney 1996). WS has conducted BDM to reduce overabundant population of "resident" Canada Geese, primarily in urban areas where they were causing excessive damage. If WS became more involved with reducing wildlife hazards at airports in New Mexico, it is possible that more effort would be given to "resident" geese. Canada Geese have caused catastrophic incidents at airports such as that at Elmendorf Air Force Base. In 1995, a Boeing 700 AWACS jet taking off from Elmendorf Air Force Base in Alaska ingested geese into 2 engines and crashed, killing all 24 crew members and destroying the $180 million aircraft. The removal of geese in urban areas will not have significant on their population, as the population because it is above the desired number in the RMS region (USFWS 2004, 2005, 2006a). USFWS identifies "resident" Canada Geese as those nesting in any of the months from March to June or residing in any months from April to August within the lower 48 states and the District of Columbia (Fed. Reg. Notice 71(154):45964-45993). USFWS has provided a depredation order for Canada Geese and landowners that register with USFWS can take nests and eggs of Canada Geese to resolve or prevent injury to people, property, agricultural crops, or other interests (50 CFR 20 and 21). WS could be requested at any time to remove a significant portion of a "resident" population that has become too abundant and associated with excessive damage and health concerns such as in parks, at golf courses, and in residential areas. These geese are typically euthanized and could increase WS take. WS in many other State WS Programs have removed hundreds of geese to resolve conflicts.

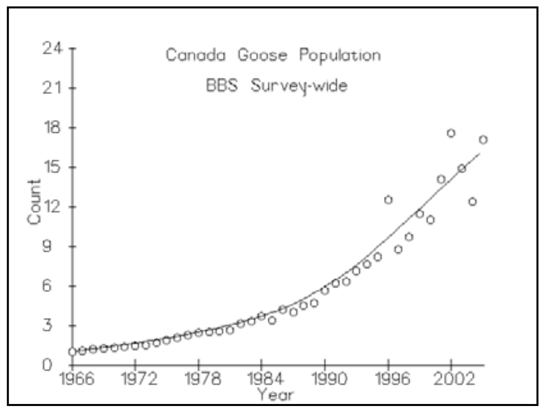

Figure 14. BBS survey-wide Canada Goose population trend (*from* Sauer et al. 2008).

Of all waterfowl, WS anticipates that BDM could be conducted most for "resident" Canada Geese with WS possibly taking up to 500 (many WS programs have been requested to cull a few thousand as the populations have increased exponentially). With the increasing population, WS could be requested to conduct "culling" to reduce populations considered overabundant, especially in parks with considerable damage. The estimated population in New Mexico is 4,800. Canada Geese have 1 nest per year, average 5.6 eggs per nest, start breeding as 2 year olds (3rd year), with 2 year olds having 0.58 goslings fledge/female and 4 year olds or older having 2.1 goslings fledge/female (Mowbray et al. 2002). Data was unavailable on age structure, but assuming that 20% of the population are nonbreeding 1 year olds, 10% of the population are 2 year olds, and 70% of the population are 3+ year olds (Canada Geese are long-lived with the oldest banding record at just over 30 years old (Klimkiewicz 2008)), and that 3 year olds are similar to 4 year olds in gosling number, then a population of 4,800 Canada Geese would recruit 3,600 goslings into the population annually. This would be about 43% and 57% goslings and adults in the population. In Nevada, a translocation program captured 11,400 geese from 1986 to 2001 with 40% of these goslings and 60% adults captured (Hall and Groninger 2002). However, recent data from Nevada showed that as the population of geese was reduced in urban areas, the number of goslings in the population increased to over 50% (T. Hall, WS, *unpubl. data*). Thus, the take of 500 geese would represent 11% of the annual mortality or 5% of the total population. It should be noted that at the current estimated population level, over the course of a year, and assuming the current 5% growth rate, the annual mortality would be 3,400. Assuming these parameters, the take of up to 500 resident geese is not expected to impact the population. WS would coordinate removal efforts with NMDGF to determine if they wanted to translocate the Canada Geese to a wildlife management area as this has been shown to be successful, but could move problems to other areas of the state (e.g., Canada Geese damage urban landscaping could be moved to a wildlife management area where close by crops would become damaged). However, WS believes that it will take few geese to resolve problems unless the Canada Goose population continues to grow in urban areas and near airports.

In addition to lethal take, WS has been involved in hazing migratory geese from crops annually in the MRGV project. From FY03 to FY07, an average of 108 Canada Geese was hazed from crop fields. This had no impact on their population because WS has not used lethal reinforcement. Geese were intentionally hazed to leave areas in search of new areas to feed. It is possible that geese could habituate to such actions (this is not as likely with hunted populations which include these migrants) and a few could be lethally taken to reinforce hazing techniques. Take of up to 10% of hunter harvest (about 270) of migratory geese would not impact their population. However, WS does not anticipate taking this number of migratory geese.

Snow and Ross's Geese. These two species are very similar in appearance and are separated by size with the Ross's Goose being smaller. These species breed primarily in the arctic tundra. The west Central Flyway population of these geese is considered abundant, but the Mid-continent population is considered overabundant (USFWS 2004). Their populations have had serious ecological impacts on their nesting grounds and USFWS has instituted very liberal hunting seasons for them. WS did not take either species lethally, but conducted nonlethal hazing activities to reduce damage From FY03 to FY07, WS hazed an average of 115 snow geese from crop fields. It is anticipated that WS could take some lethally, especially to reinforce hazing programs protecting crops and airplanes. However, the take of several hundred to thousand of either species would not have an impact on their population considering that they are overabundant.

Feral Ducks and Feral Geese. Several species of domestic waterfowl are common in parks and lakes in New Mexico (Appendix C: Table C4). These species are often released at parks and other areas intentionally by the owner as ornamentals or without permission from people who can no longer keep them (they are often received as gifts for different holidays by people who cannot raise them fully). Their numbers grow and often surpass the carrying capacity of the area. These can create severe problems including damage to landscaping and grass, water contamination, disease, and hybridizing with wild ducks. WS did not take any from FY03 to FY07, but has in the past. The effect of feral duck or goose removals is likely positive, with the exception of at parks where people feed them. These people could see control as negative, but most likely opportunities to feed ducks are close by. Many parks have "No Feeding" policies, but these are often disregarded and not enforced. However, the take of feral waterfowl by WS is considered to be of no significant impact on the human environment since feral ducks and geese are not an indigenous component of ecosystems in New Mexico.

American Coots, Mallards, American Wigeons, and Other Waterfowl. Coots, Mallards and wigeons cause similar damage, primarily to landscaping, greens on golf courses, and water quality. Mallards, in particular, use swimming pools and other landscaped water features and can foul these impoundments. Generally, these are hazed from damage situations, but Mallards and coots in particular, habituate rapidly to hazing methods without lethal reinforcement.

WS has lethally taken American Coots for the protection of property in several projects in FY98, FY99, and FY02 (23, 52, and 39, respectively). They are common in New Mexico. The take of a few coots will have no effect on their population, and while coot hunting is limited, a liberal bag limit is set for them suggesting that their population can maintain such take. BBS data found that survey-wide the coot population was non-significantly (P= .30) declining at -0.6% annually from 1980 to 2007 (Sauer et al. 2008). Their decline, though it has been stable recently, likely mirrors the loss of wetland habitat in the United States (Brisbin and Mobray 2002). WS in New Mexico has not taken a coot since FY02 when 39 were taken. WS in the RMS region has averaged the take of 123 from FY05 to FY07, but did not take any in FY03-FY04. If the population parameters (Brisbin and Mowbray 2002) for coots were that females are half the population, 20% of the females do not breed (floaters), 2.81 chicks/female survive, and they have only 1 brood/season (number of broods highly variable by latitude with anywhere from no second brood to breed year-round, likely averaging about 33% in New Mexico breed 2 times), and a PIF adjustment of 2.4 (2 for pair, 1 distance, and 1.2 for time of day), an estimated population of 170,000 in the RMS region would produce 190,000 young. This would be similar to the 45% overall survival rate (Brisbin and Mowbray 2002) for coots during the year (47%). USFWS estimated the coot breeding population at 3 million in 1999 (Brisbin and Mowbray 2002), thus our estimate is likely fairly conservative, but reasonable to determine impacts. From FY05-FY07 WS took an average of 123 coots, thus the impact on the annual mortality was minimal (<0.1%). Sport hunters in the RMS region averaged taking over 18,000 coots annually in the 2006 and 2007 hunting seasons (USFWS 2008a). The cumulative impact was about 9% of the estimated annual mortality, well within a reasonable level of take and a minimal level of impact. In New Mexico, using the same parameters, the population would be estimated at 19,000 with 21,000 offspring for a total population of 40,000. Take in FY02 of 39 equaled 0.2% of the estimated annual mortality. Hunter harvest is sporadic, but typically low and averaged 1,000 in the 2006 and 2007 hunting seasons (USFWS 2008a, Table 21) or 5% of the expected annual mortality. WS in New Mexico could take several thousand (near 10,000) before a low magnitude impact might occur (about 50% of the annual mortality). It is doubtful that WS in New Mexico will ever remove more than a few hundred where they were concentrated on a golf course or other turf location. This would only be done where a coot population could not be hazed.

WS has not lethally taken Mallards or American Wigeons in New Mexico, but has hazed both species from damage situations prior to FY03. WS has not taken any other species of waterfowl in New Mexico. Therefore, WS has had no impact on these two species or any other species of waterfowl. WS has hazed Mallards and American Wigeons in the past, primarily from golf courses. WS could potentially haze many other species for other types of damage and protection of aircraft and passengers at airports. Additionally, WS could potentially take any of these species, especially where they were a hazard at an airport. WS, though, anticipates that some could be taken in BDM activities with a maximum given in Table 21, but that this is not likely to occur. Even if WS did take the numbers estimated, the cumulative impact on these species populations from any potential WS take and hunter harvest would be a low magnitude impact, at most, on these species populations. WS expects that the one species that could be the target of BDM with the highest take would be Mallards in urban areas and at airports where this species often concentrates and potentially a few hundred. However, WS is more likely to haze most and only take just a few.

<u>Raptors</u>

New Mexico has many species of raptors (eagles, hawks, falcons, vultures, owls, and shrikes). Most species rarely cause damage, except that most are a strike risk at airports and others take livestock and poultry (see Appendix C: Table C1 for a list of species and those that cause damage). The most common problems involve Turkey Vultures and Great Horned Owls (ave. 6 and 4 requests/year from FY05 to FY07). The remaining 7 species of eagles, hawks, and owls that caused damage requests from FY05 to FY07 combined averaged 4 requests per year (Table 1). It should be noted that the Western Screech-Owl caused 1 damage request; this was an owl struck by a vehicle which was picked up by the Wildlife Specialist and transferred to a rehabilitator (owls are frequently struck by passing cars while they are hunting, struck, and injured). "Damage" for this type of activity is often recorded as human health and safety because of the distress it causes for persons seeing the injured owl, but there was no damage per se.

Raptors are the most difficult birds to haze from air operating areas because most pay little attention to pyrotechnics and other sound-scare devices. Often, they must be trapped and relocated or killed to minimize strike risks. Raptors are a leading hazard at airports and cause significant damage to aircraft with most raptor strikes occurring at heights less than 500 feet above the ground (Dolbeer 2006), often at or near the airfield

Of the species that occur in the BBS survey area and reside in New Mexico during some part of the year, the species that declined significantly from 1980-2007 are the American Kestrel (-1.1%/year, P<.01), Great Horned Owl (-1.9%/year, *P*<.01), and Loggerhead Shrike (-2.9%/year, *P*<.01) (Sauer et al. 2008). In addition, the Northern Harrier (-1.2%/year, P=.02), Harris's Hawk (-5.0%/year, P<.01), and Short-eared Owl (-1.9%/year, P<.01) declined significantly from 1966-2007, but only show a nonsignificant decline more recently. Seven species have increased significantly from 1980-2007. WS in New Mexico responds to requests for assistance mostly with just a few species and on a minimal basis. Declines, especially in the mid 1900s, in many species or raptors caused concern among biologists and most species became protected under state and federal laws. It should be noted that the Western Screech-Owl is a species that is declining significantly (-7.3%/year, *P*=.03 (Sauer et al. 2008)), but is not likely to be involved in damage requiring their take. WS anticipates taking few raptors to abate damage situations, but will give those with the highest probability.

Turkey Vultures. Turkey Vultures are common throughout the continental United States. They are found throughout much of New Mexico from spring through fall. Turkey Vultures are common in most areas of the State including open plains, desert, woodlands, and human settlements. Turkey Vultures are very good at detecting carrion by smell when soaring. They periodically will kill injured or newborn livestock, but are a much lesser target of control than Black Vultures where the two species are found together because the latter often kills livestock. Much of the BDM conducted for Turkey Vultures is for property protection because their roosts are in undesirable locations such as an electrical substation or residential neighborhoods.

BBS data indicates that the Turkey Vulture population from 1980 to 2007 increased significantly (P<0.00) at 2.2%/year survey-wide, but decreased non-significantly (*P*=0.17) in New Mexico. This suggests that habitat conditions benefit the Turkey Vulture allowing their population to expand in the United States. This alone also suggests that Turkey Vulture control and other mortality over the past several years throughout the United States did not have more than a minimal impact on their population. However, to further consider the impacts of WS, the population in New Mexico has been estimated at 130,000 (Table 4). If 60% of the population were subadult (vultures exhibit delayed-onset breeding and this would equate a 25% mortality rate) and 80% of the estimated adult Turkey Vulture population bred (21,000 breeding females) with the average number of eggs at 1.9 and fledglings at 0.95 (Kirk and Mossman 1998), annual production could be conservatively estimated at 20,000. Of this, WS in FY05 took 3 Turkey Vultures which equates to less than 0.1% of the expected annual mortality. This level of take would have no noticeable impact on the population. WS would have to take several thousand before a moderate impact would occur and WS does not anticipate taking this number. Thus, WS has not had an impact on the Turkey Vulture population and does not anticipate taking more than a few hundred ever. In addition to lethal take, WS hazed 305 Turkey Vultures from damage situations in FY06 with no known resulting impacts on their population.

Owls. New Mexico is home to 13 species of owls with 5 potentially causing damage. The Great Horned Owl is the primary species that causes damage to poultry and property. The Barn Owl causes damage primarily to structures where they nest; they nest in cracks and crevices often in structures such as barns. The other 3 species (Appendix C: Table C1) are mostly a strike risk at airports. Owls that are strike risks at airports often frequent open fields for hunting. However, the Burrowing Owl lives among burrowing rodents where it will occupy a burrow which can be within an air operating area. Three species of owls are found year-round in New Mexico, the Great Horned Owl, Barn Owl, and Long-eared Owl and two are seasonal, the Short-eared Owl winters and the Burrowing Owl summers in New Mexico. BBS data (Sauer et al. 2008) shows that three of these species are declining from 1980 to 2007 (Short-eared Owl -9.3%/year at P=0.15, Barn Owl -3.0%/year at P=0.08, and Great Horned Owl -1.9%/year at P<0.01) and one increasing ((Burrowing Owl 2.0%/year at P=0.18).

WS has not lethally taken any of these species, but has captured and relocated Barn Owls from warehouses and other buildings. Additionally as discussed, WS has picked up injured owls from people to transfer to rehabilitators (1 Western Screech-Owl in FY06), but this would be beneficial for these species as rehabilitators can sometimes treat and release these individuals back to where they were injured. It is likely that WS will eventually take a Great Horned Owl causing damage, and possibly a Barn Owl, but this did not occur from FY92-FY07. The estimated breeding population of these two species in New Mexico is 56,000 Great Horned Owls and 24,000 Barn Owls. With both species likely fledging over a third of their population annually (minimum annual mortality level), take would have to be in the thousands before a moderate impact would occur. Thus, even if WS took up to 100 annually, the population would be impacted at a minor level. WS concludes that the populations of owls in New Mexico have not been impacted by BDM in New Mexico and the take of an anticipated few would not impact their populations.

Eagles. Golden Eagles are distributed at low densities across much of the western United States. In New Mexico, the greatest densities of golden eagles occur in winter. During summer months, their greatest densities occur in western New Mexico. On the other hand, Bald Eagles are mostly winter visitors in New Mexico with few breeding. USFWS has management responsibility for these species which are protected under the Bald and Golden Eagle Protection Act. Under an MOU with USFWS, WS responds to complaints involving Bald and Golden Eagles. BBS data show a nonsignificant decline (P=0.92) of -0.7%/year in New Mexico and nothing for the Bald Eagle (Sauer et al. 2008). However, survey-wide data for Golden Eagles shows a significant increase in the population (P=<0.01) of 3.3%/year from 1980-2007. Survey-wide data for the Bald Eagle (not significant for 1980 to 2007) has shown a significant increase of 5.5%/year from 1966-2007.

Golden Eagles are typically found in open mountainous or hilly terrain where they hunt for small mammals, snakes and carrion. Golden Eagles will take lambs, kid goats, and other small livestock. They nest mostly on cliffs, but sometimes in trees and on power lines. Eagles have large bulky nests sometimes 8 feet across and 4 feet deep. Nestlings fledge at 9-10 weeks, but are dependent on their parents for another 30 days or more. Golden Eagles breed at about 5 years of age, mate for life, and a pair needs up to 35 square miles of territory in which to hunt (range 12-110 mi^2, and high as 400 mi^2 in eastern Canada), and average about 2 eggs/nest with 0.83 eaglets fledge/nest (Kochert et al. 2002). Percentages of ages is not known, but it can be assumed that about 50% of the population is of breeding age or older (Good et al. (2007) found adults comprised 7=67% of the population in their study). RMBO (2007) estimated the 1990s population of Golden Eagles in New Mexico to be 1,300 and 19,000 in the RMS region. Using the same parameters (RMBO (2007) used a distance parameter for BBS counts double the standard which suggests that 4 times the area is counted during BBS counts – this is likely to be closer to 2), we estimated a population in New Mexico of 600 and an RMS region count of 16,000 (Good et al. (2007) estimated 27,000 for an area just bigger than the RMS area suggesting that the distance factor should likely be closer to 2). While many Golden Eagles migrate into the State during winter, we will just look at the resident population. If 80% of the adult breeding population bred and 50% of the population was of breeding age, then a population of 600 eagles would have 100 fledglings. If WS took up to 5% of the expected annual mortality for eagles (5), it would likely result in a minimal impact on the population. However, WS anticipates that it would take few, if any, Golden Eagles annually and would only conduct such an activity with the appropriate eagle permit from USFWS. WS did not haze any Golden Eagles either, but would with the appropriate USFWS permit (a permit is required to haze eagles). WS anticipates that it would be possible to take a few Golden Eagles annually to abate severe livestock depredation problems, but believes that this will likely not occur because WS did not take or haze any eagles from FY92 to FY07. However, limited take of Golden Eagles (up to 20) would be a very low magnitude impact on their population and not a significant impact.

Bald Eagles damage problems include killing livestock, causing damage at aquaculture facilities, and representing a significant strike risk (size) at airports. They are mostly found in New Mexico in winter, but a few nest. The species has made a remarkable recovery from precariously low numbers to numbers currently surpassing 7,000 nesting pairs in North America. During the winter, the average number of Bald Eagles seen in CBC was 112 from the 2002-03 to 2006-07 surveys (NAS 2008a), suggesting a fair number of wintering birds. Most requests for assistance have resulted from a loss of livestock with a report of predation of sheep verified in August of 2006. WS primarily gets cooperators information on obtaining permits to haze Bald Eagles from USFWS. WS has not taken a Bald Eagle in New Mexico from FY92-FY07, and does not anticipate such an occurrence. However, if this occurred it would be conducted with the appropriate permit from USFWS. The take of a few Bald Eagles in New Mexico would not impact their population. A permit would likely only be issued for severe ongoing depredation problems, and likely only following an intensive hazing program.

WS anticipates that the program will probably haze eagles from damage situations, especially where they are found on an airfield (this would be a beneficial effect because it would reduce the likelihood of the eagle being struck and killed by aircraft) and possibly trap and relocate some eagles, again mostly from airports. However, WS anticipates that only a few eagles will ever be the focus of lethal control projects. If WS did take an eagle, it would be conducted under the appropriate permit and not have more than a negligible impact on their population.

Other Hawks and Shrikes. Seventeen other species of hawks and two species of shrikes are commonly found in New Mexico year-round or seasonally (Appendix C: Table C1). Most of these species are only a wildlife hazard for aircraft in the air operating area, especially Red-tailed and Swainson's Hawks because of hunting styles. However, a few cause other types of damage. Osprey periodically will take fish at an aquaculture facility or fish hatchery and are typically hazed, but possibly could be taken. Mississippi Kites are very aggressive nest protectors and will often strike people causing lacerations and the people to seek medical attention; this is a concern when they nest in urban or other areas frequented by people that unknowingly get close to the nest, but is resolved by removing the nest. This has occurred a few times in New Mexico prior to FY03. Finally, Sharp-shinned Hawks, Cooper's Hawks, and Prairie Falcons, and to a lesser extent Peregrine Falcons and Merlins will take poultry and could be taken lethally if hazing and other nonlethal efforts failed. However, most damage problems with these species, other than at airports, occurs infrequently and are typically very minor.

Several of these species are considered species of concern. Many raptor populations have been increasing with conservation efforts directed towards them, but some species populations are declining, primarily a result of habitat loss for that species coupled with other factors (declining prey species, drought, historic declines from DDT). None show significant declines for the breeding population from BBS data (Sauer et al. 2008) for 1980-2007 in New Mexico, except the Loggerhead Shrike (-2.1%/year with P=0.03). The Swainson's Hawk is the only species showing a significant increase (+2.9%/year with P=0.01) from 1980-2007, following a downward trend in the mid 1900s. Survey-wide data for 1966-2007 shows 3 hawks declining significantly as discussed in the introduction, the Northern Harrier, Harris's Hawk, and American Kestrel from 1966 to 2007. Several show significant increases from 1980 to 2007 including the Osprey, Sharp-shinned Hawk, Cooper's Hawk, Peregrine Falcon, and Prairie Falcon. The Ferruginous Hawk has shown a significant increase from 1966 to 2007.

From FY03 to FY07, WS lethally took a Prairie Falcon and Cooper's Hawk. The Prairie Falcon is a good example of a species with a low population in New Mexico to illustrate the minimal potential impact from lethal take. The estimated population of Prairie Falcons in New Mexico is 2,100 (Table 4), up from the RMBO (2008) estimate for the 1990s of 1,100. The survey-wide population increased significantly from 1966 to 2007 (P=.05) at 3.6% annually. Adults will breed as 1 year olds, but more often have been found to breed as 2 year olds. Assuming that 50% of the population is female, that 66% breed, and that 3.89 nestlings fledge per nest (Steenhof 1998), a population of 2,100 would fledge 2,700, the annual mortality rate for a stable population. Thus, the cumulative take of less than 10% of the expected annual mortality rate would be a low magnitude impact on the population. USFWS did not document any take by parties other the WS (includes all raptors), thus cumulative impacts were minimal. Therefore, the take of 1 over 5 years would be a negligible impact and not noticeable at the population level. The take of 1 Cooper's Hawk would be similar to the take of Prairie Falcons, but limited take would even have less of an impact since its population is estimated to be 14,000 in New Mexico. The Cooper's Hawk has similar breeding parameters to the Prairie Falcon (females 50% of population, 66% breed, and 3.3 young per nest (Curtis et al. 2006)) and the breeding population would produce 15,000 young. This is equivalent to their estimated annual mortality and just slightly above their estimated population. Thus, the estimated breeding population provides a good baseline for comparison of potential take because for most species of hawks the annual mortality is likely similar to their population number.

The two species most likely to be controlled at airports are the Red-tailed and Swainson's Hawks with estimated populations in New Mexico of 46,000 and 60,000. Thus, intuitively, the take of a few would not cause problems for their populations. For example, at the current rate of growth for the Swainson's Hawk (+2.9%/year (Sauer et al. 2008), 1,740 would have to be removed from the population for a stable population, illustrating the potential for take as well as the current rate of growth.

Finally, shrikes could potentially be controlled at airports, although this would likely be a rarity. They have high reproductive potential which makes their declining population a mystery. Several causes have been suggested for their decline (those stated above), but none have completely explained the decline (Yosef 1996). However, the take of a few would not hurt the population because recruitment would replace those. We have estimated their population to be 28,000. RMBO (2007) using 1990s data estimated the population in New Mexico at 320,000. The number counted per route has dropped about ten-fold. WS did not conduct BDM for this species and is unaware of any take. It is believed that habitat degradation and other factors unrelated to BDM are responsible for the decline. WS does not anticipate the need for taking shrikes and will avoid taking them.

House Sparrow

House Sparrows are found in nearly every habitat in New Mexico except dense forest, alpine, and desert environments. It prefers human-altered habitats, and is abundant on farms and in cities and suburbs. BBS data indicate that the species has seen a significant ($P<0.01$) increase in New Mexico from 1966 to 2006 at 2.2%/year, but a nonsignificant increase ($P=0.07$) from 1980-2006 (Sauer et al. 2008). This is not reflective of the survey-wide population which has seen a significant decrease of -3.5%/year ($P<0.01$) for House Sparrows from 1980-2006 (Sauer et al. 2008). The survey-wide decrease is likely due to a number of factors that have reduced their feed supply – reduced seeds form the replacement of horses with internal combustion engines (House Sparrows pick seeds from horse manure), reduced insects in urban areas and on farms from the use of insecticides, reduced grain from spillage from more efficient harvesters, and reduced weed seeds from weed control (Lowther and Cink 2006). The breeding population in New Mexico is abundant and increasing. The breeding House Sparrow population in New Mexico could be estimated from BBS data using corrective parameters 960,000 (Rich et al. 2004, RMBO 2007). Most House Sparrows breed their first year with available habitat. For the purposes of impacts, it is assumed that 75% of females breed in a given year and that the sex ratio is 1:1 males to females. House Sparrows lay an average of 5.1 eggs per nest and average 1.6 clutches per year, with fledgling success averaging 40% (Lowther and Cink 2006). Using these parameters, the breeding population in New Mexico would have about 1.2 million fledglings, raising the post-fledgling population to about 2.2 million in New Mexico. Thus, a stable House Sparrow population more than doubles following the nesting season, but is reduced back to this number by the next nesting season.

WS conducts minimal BDM for House Sparrows in New Mexico, averaging none taken from FY03 to FY07. However, minimal numbers of this species have been lethally taken in the past by WS. From FY97 to FY02, 510 House Sparrows were estimated to be taken or an average of 102 annually taken by WS during that time. Because House Sparrows are not afforded protection by federal or state laws, depredation permits are not required for private individuals to take them. It is expected that the public conducts some control for House Sparrows, but much less than starlings and pigeons. House Sparrow control is probably conducted at a few CAFOs such as dairies and possibly for some urban damage situations by private pest control operators. These individuals and entities may conservatively take up to 50,000 House Sparrows annually, most with Avitrol. A cumulative impact analysis, combining all WS take, would show that this would possibly take 4% of the expected annual mortality. Thus, this would be a minor impact on the population and not enough to cause the population to decline. In fact, take would have to be in the hundreds of thousands in New Mexico before an impact would likely start to occur. Additionally, take of this species could be considered beneficial since it is not a native component of the ecosystem.

Woodpeckers

WS is periodically requested to assist with woodpecker damage, most always for damage to structures (an average of 2 requests annually from FY05 to FY07 for all woodpecker species). They can also damage crops such as pecans. Some woodpeckers are abundant in New Mexico (RMBO 2007). Those with populations numbering over 50,000 include Northern Flicker, Hairy Woodpecker, Ladder-backed Woodpecker, and Red-naped Sapsucker. Those with populations from 10,000-50,000 are Lewis's Woodpecker, Acorn Woodpecker, Williamson's Sapsucker, and Downy Woodpecker. Those with populations under 10,000 (Red-headed Woodpecker, Yellow-bellied Sapsucker, American Three-toed Woodpecker, Gila Woodpecker, and Arizona Woodpecker) are mostly on the edge of their range in New Mexico with higher populations in adjacent areas.

Most woodpecker species are solitary (Acorn and possibly Lewis's Woodpeckers may live in colonies) and requests usually involve individual birds or nesting pair. To illustrate potential impacts, the Lewis's

Woodpecker (a more conservative breeder) will be used. Most woodpeckers breed at 1 year of age and have more than 1 brood per season, but a few, such as the Lewis's Woodpecker has only 1 brood. Most have 4 or more eggs per nest and fledge 1 or more young (Lewis's averages 5.88 eggs/nest and 0.59-2.9 (1.2 will be used) fledglings/nest). RMBO (2007) used a corrective factor for detectability of 11.52 and estimated their population in the 1990s at 14,000, but current BBS data (Sauer et al. 2008) reflects the non-significant (*P*=0.26) downward BBS trend for New Mexico (-9.5%/year) from 1980 to 2007 and suggests a population of 6,100. The downward trend for local populations of Lewis's Woodpeckers has mostly been determined to be loss of nesting habitat and competition for nest sites with European Starlings (Tobalske 1997). However, the survey-wide BBS data shows a nonsignificant increase from 1980 to 2007 (+0.8%/year at *P*=0.80). The current annual mortality, assuming 80% females breed in a 50:50 male: female population, could be estimated at 3,000. Thus, if WS were to take 10% of the expected annual mortality of Lewis's Woodpeckers, 300 would be taken. WS does not anticipate taking any Lewis's Woodpeckers, but the take of few in any given year would not significantly impact their population. Similarly, the take of other woodpeckers is expected to be, at most, a minimal percentage of their expected annual mortality and will not likely surpass 1% of this number. WS did not lethally take any woodpecker from FY03 to FY07. In prior years, WS took 1 Northern Flicker from FY92 to FY02, the most abundant woodpecker in New Mexico with an estimated population of 300,000 (RMBO (2007). WS will continue to conduct limited control for woodpeckers and will not cause a significant impact to any of their populations. WS will discuss the take of any Gila Woodpecker (confined to southwest New Mexico) with NMDGF, since it is a State threatened species.

Wading Birds

Nine species of wading birds are regularly found in New Mexico with an additional 7 that are rare or accidental (Appendix C). The most common requests for assistance involving these species are to protect aquaculture produced fish (individual wading birds preying on fish at an aquaculture facility) and property in urban residential areas where they are a human health and safety concern (roosts). These conflicts can require the take of some individuals to reinforce hazing efforts, but often do not involve the take of many. Thus, the impact to these species populations would be negligible under the proposed action. To illustrate the small scope of the conflicts with wading birds in New Mexico, WS received only 1 request for assistance for wading birds from FY05 to FY07. WS did not take any wading birds from FY03 to FY07, but killed 4 Black-crowned Night-Herons to resolve a problem in the past, the only wading birds targeted with lethal removal from FY92 to FY02.

The 9 wading birds regularly found seasonally in New Mexico are relatively common in the RMS area. The species most likely to be the focus of BDM are the Great Blue Heron, Great Egret, Cattle Egret, and Black-crowned Night-Heron. These species, respectively, have estimated continental populations (NAS 2008b) of 130,000, 270,000, unknown (has the highest relative abundance of any wading bird in BBS survey-wide data (Sauer et al. 2008)), and unknown (global population 2 million). Survey-wide BBS data (Sauer et al. 2008) from 1966 to 2007 show significant increases for Great Blue Heron and Great Egret, a nonsignificant increase for Black-crowned Night-Herons, and a nonsignificant slight decrease for Cattle Egrets (a self-introduced species into North America in the 1950s starting from Africa (Telfair 2006); Cattle Egrets rapidly expanded their range which is still expanding, but the population has dropped some in New Mexico). WS anticipates that in a given season, potentially up to 100 of any of the wading bird species in Appendix C: Table C1. This would likely be conducted for a significant problem that developed at an airport or a significant urban roost that created a nuisance or health and safety concerns. Urban roosts would be relocated prior to nesting using hazing devices (lasers have proven successful in some situations). WS believes that few wading birds will ever be taken and that WS will have no impact on any species' population. Wading birds, their nests, eggs and young are protected by the Migratory Bird Treaty Act; any form of take requires a permit from the USFWS. WS's take of egrets and herons would be conducted with the appropriate USFWS permit and not exceed 100 for any of these species (potential take). The take of 100 is not expected to impact any of these species' populations. Lethal shooting is generally used to reinforce harassment methods and is conducted at airports where there is great potential for damage to occur or in residential areas where a roost has formed. WS's actual take will likely be minor in comparison to the estimated potential take. WS will have no more than a negligible impact to any wading bird species population.

Gulls

Four species of gulls commonly migrate through or winter in New Mexico coming from their northern breeding grounds. None of these species have been the focus of a WS BDM project or taken during BDM in New Mexico, but could, primarily at airports. They are often struck by aircraft which can cause extensive damage to the aircraft because of their size and flocking behavior (Dolbeer 2006). They have been found to be quite attracted to airports for loafing and feeding, especially on earthworms on runways following heavy rains. The Ring-billed Gull, Herring Gull, Franklin's Gull, and Bonaparte's Gull are the species that would most likely be encountered in New Mexico during migration and winter. Few gull colonies are found breeding in New Mexico. Survey-wide BBS trends from 1980 to 2007 for Ring-Billed and Franklin's Gulls were nonsignificant (P=.94 and .14) at 0.0%/year and 8.7%/year (Sauer et al. 2008). The Herring Gull, though, has seen a significant (P<.01) decrease of -3.2%/year have been significant increases of 6.3%/year (P<.01) and 5.5%/year (P=.01). However, their population, decimated in the early 1900s, is believed to have increased beyond their historical numbers by the 1960s (Pierotti and Good 1994). Ring-billed Gulls increased significantly earlier in the century which was attributed to their ability to use supplemental food sources and expand their breeding habitat (Ryder 1993). From data in the 1980s, the population was estimated at 3-4 million (Ryder 1993). For the Franklin's Gull, the population BBS survey-wide (Sauer et al. 2008) has increased from about 4/count in 1966 to 40/count in 2005, a ten-fold increase. The Bonaparte's Gull primarily nests in areas north of the BBS limits, thus limited data is available for them, but CBC data from 1966 to 2005 for winter populations in the United States appear to have been fairly stable around 1/party hour observed (Burger and Gochfeld 2002, NAS 2007). The continental breeding populations of Ring Billed, Bonaparte's and Herring Gulls have been estimated at 2.6 million, 390,000, and 370,000 (NAS 2008b). Franklin's Gulls are also abundant and considering the high upward trend, are becoming increasingly more common (Burger and Gochfeld 1994).

Throughout the United States, gulls are primarily taken for depredation management primarily at airports, landfills, and aquaculture facilities with WS nationally responsible for the bulk of their take for depredation purposes. WS nationally took an average of 7,700 Ring-billed Gulls, 2,700 Herring Gulls, 600 Franklin's Gulls, and 50 Bonaparte's Gulls (<1% of their populations) in FY06 and FY07. Available data reflect stable to increasing populations of gulls in the BBS region and, thus, it appears that the limited take from WS and other permitted activities elsewhere, have not had a negative impact on these species' populations. WS anticipates possibly taking some gulls in New Mexico, but it would not be more than a few hundred of any one these species and just a few of any of the other species found in Appendix C. This take would be a minor percentage of their expected annual mortality and within a level that would have an unnoticeable effect on their populations. It is anticipated that WS would haze many more birds than would be taken lethally. Nationally, for the same 4 species during FY06 and FY07, respectively, WS hazed an annual average of 610,000, 2.8 million, 23,000, and 25,000 illustrating the wide difference between hazing and take for gulls (gulls are typically conducive to being hazed except where the problem is ongoing). It is concluded that the minor take by WS has and will not have an effect on the gull populations and WS does not believe that, from looking at the best available data, even the take of a few hundred gulls would cause declines in their populations.

Shorebirds

New Mexico hosts 25 species of shorebirds regularly (Appendix C: Table C1). Only a few of these species breed in New Mexico, with most only migrating through the State. Shorebirds would only be controlled at airports with most being hazed. WS does monitor shorebirds for disease, primarily monitoring for human pathogens such as HP H5N1 AI, especially those species that breed in areas such as Alaska where other species breed that wintered the prior year in areas where HP H5N1 AI has been discovered. Most disease work involves the use of nonlethal methods followed by release after sampling, thus no lethal take occurs. In FY06 and FY07, WS collected 36 and 23 samples for disease monitoring from shorebirds. All were released following sampling. It is possible to accidentally kill these species during sampling such as with a mist net, but none was.

If WS provided more assistance at airports, a few could be taken. Those that are taken are usually species that are not hazed easily such as the Killdeer and Upland Sandpiper. However, take would likely be very minimal and well within these species expected annual mortality. Several shorebirds are T&E or SMC species (9 of the 25 commonly found in New Mexico and 7 of the accidental or rare species), including the federally endangered Piping Plover and Audubon red species the Mountain Plover and Buff-breasted Sandpiper (NAS 2007). WS is aware of these species and adjusts methods to avoid take. A consultation was conducted with USFWS on the Piping Plover for conducting disease monitoring.

Impacts to Other Birds

WS did not take or haze any birds from the other groups of species discussed in Section 2.1.1.1 (fish-eating birds, swallows, swifts, gallinaceous birds, frugivorous birds, and grassland birds) from FY92 to FY07 and anticipates that few other birds will ever be taken. The primary exception would be taking birds at airports to reduce wildlife hazards. Currently, WS is conducting wildlife hazard management at one airport in New Mexico and has mostly hazed birds from the air operating area. WS anticipates that no more than 100 birds of any species would be taken of the other bird species listed in Appendix C: Table C1. The exceptions to this would be the take of SMC species including the Black Swift, Bendire's Thrasher, and Sprague's Pipit, WS anticipates that it will likely never take these species, but possibly 1 in any given year. Additionally, Appendix C: Table C3 and, possibly, Table C2 list species that WS does not anticipate taking, but possibly could. Few, if any, of the species listed in these two Tables will ever be taken. The take of a few these species would be a very minor impact on any of their populations. Federally listed T&E species will not be taken except with the appropriate permit from and consultation with USFWS. WS is involved in sampling different migratory birds, primarily shorebirds and waterfowl as discussed, for the H5N1 strain of AI as part of a national surveillance program, and could possibly be required to collect samples from different species. Samples will be collected through nonlethal means, as appropriate. However, it should be noted that the use of any nonlethal trapping devices can result in the unintended death of the target animal. However, none of the bird populations is expected to be impacted by such activities. WS does not anticipate taking more than a few other species annually than those already discussed. It is concluded that the minor take by WS has and will not have an effect on the other species' populations.

4.1.1.2 Alternative 2 - Nonlethal BDM by WS Only. Under this alternative, WS would not take any target species because lethal methods would not be used. NMDGF would likely provide some level of professional BDM assistance for lethal activities, but this would be limited by resources (i.e., personnel, funding, etc.) without federal assistance. Nonlethal activities conducted by WS would likely intensify, but result in similar levels of nonlethal activities as conducted under Alternative 1 with similar numbers of birds hazed or captured and released or relocated (Table 16). Nonlethal harassment, could be ineffective on some bird species, in particular pigeons, and some birds would quickly become habituated to harassment techniques, and, thus, where lethal techniques would be implemented to reinforce hazing efforts, WS would continue to conduct nonlethal control but with less success. This could be ineffective, especially at airports and for crop protection, and resource owners could become frustrated by WS's apparent lack of success. Therefore, private entities would conduct BDM, more than under Alternative 1 resulting in similar levels of take. Additionally, many nonlethal techniques cannot be used in certain situations (use of pyrotechnics in some residential areas to move roosts and at livestock feeding facilities such as dairies where their use can cause agitation of the livestock and loss of production). The primary difference between BDM under the current program and that conducted by private entities would be the use of chemicals and a reduced take of migratory birds requiring a depredation permit from USFWS. Private entities would rely on Avitrol, and potentially Starlicide Complete which contains the chemical in DRC-1339, to control starlings, feral pigeons, House Sparrows, and blackbirds. Technical grade DRC-1339 and A-C are currently available for use only by WS and could not be used by the public. This would likely lead to less species being taken under this alternative with chemical BDM methods. Additionally, not all private individuals would want to obtain a depredation permit from USFWS, and, thus, less migratory birds requiring a permit would likely be taken. As a result, this alternative would likely lead to private entities having similar or somewhat less impacts to target bird species populations as described under Alternative 1. For the same reasons shown in the population impacts analysis in section 4.1.1.1, it is unlikely that starlings, feral pigeons, House Sparrows, blackbirds, Canada Geese, or other target bird populations would be impacted significantly by implementation of this alternative. Impacts and hypothetical risks of illegal chemicals and other methods under this alternative as described in Sections 2.1.3 and 2.2.3 would probably be greater than the proposed action, similar to Alternative 3, but less than Alternative 4. The use of illegal methods would lead to unknown risks to target species populations.

4.1.1.3 Alternative 3 - WS Provides Technical Assistance Only for BDM. Under this alternative, WS would have no impact on any bird species population in New Mexico because the program would not conduct any operational BDM activities. WS would offer advice on the BDM techniques that could be used to resolve different damage problems. NMDGF would likely provide some level of professional BDM assistance, but this would be limited by resources (i.e., personnel, funding, etc.) without federal assistance. Private efforts to reduce or prevent bird damage and perceived disease transmission risks would increase under this alternative and take would be similar to, but likely less than, the proposed action which would result in similar impacts on bird populations. DRC-1339 and A-C could not be used by private individuals or entities, and thus, take with these chemicals would be nil, but other BDM methods, primarily Avitrol, would likely be used to make up for this loss. For the same reasons shown in the population impacts analysis in section 4.1.1.1, however, it is unlikely that starlings, feral pigeons, blackbirds, or other target bird populations would be impacted significantly by implementation of this alternative. Under this alternative, the hypothetical use of illegal methods for BDM would be high because frustrations from the inability of resources owners to reduce losses would be higher than under the proposed action because WS would not provide assistance in many situations. The use of illegal chemicals and other methods under this alternative as described in Sections 2.1.3 and 2.2.3 could lead to real but unknown impacts on target bird populations. Impacts and hypothetical risks of illegal chemical toxicant use under this alternative would probably be more than under Alternative 2 and less than under Alternative 4.

4.1.1.4 Alternative 4 - No Federal WS BDM. Under this alternative, WS and other federal agencies would have no impact on any bird species populations in New Mexico. NMDGF would likely provide some level of professional BDM assistance, but this would be limited by resources (i.e., personnel, funding, etc.) without federal assistance. Private efforts to reduce or prevent depredations would increase which would result in impacts on target species populations similar to those that would occur under Alternative 1. However, impacts on target species under this alternative could be the same, less, or more than those of the proposed action depending on the level of effort expended by private persons. For the same reasons shown in the population impacts analysis in section 4.1.1.1 it is unlikely that any target bird populations would be impacted significantly by implementation of this alternative. Technical grade DRC-1339 and A-C are currently only available for use by WS employees and, therefore, take with these chemicals would be nil. Use of Avitrol and Starlicide Complete, which contains the same chemical that is in DRC-1339, would likely increase. Under this alternative, the hypothetical use of illegal methods for BDM would be greatest of the alternatives because frustrations from the inability of resources owners to reduce losses would be highest. The use of illegal chemicals and other methods under this alternative as described in Sections 2.1.3 and 2.2.3 could lead to real but unknown impacts on target bird populations.

4.1.2 Effects of BDM on Nontarget Species Populations, Including T&E Species

Nontarget species can be impacted by BDM whether implemented by WS, other agencies, or the public. Impacts can range from direct take while implementing BDM methods to indirect impacts resulting from implementing BDM methods (e.g., birds entangled in netting meant only to keep them out of an area) and reduction of a bird species in a given area (positive impact on nesting song birds from the removal of brow-headed cowbirds where nest parasitism is high as discussed in Section 1.3.7). Measures are often incorporated into BDM to reduce impacts to nontarget species. Various factors may, at times, preclude use of certain methods, so it is important to maintain the widest possible selection of BDM tools for resolving bird damage problems. However, the BDM methods used to resolve damage must be legal and biologically sound. Often, but not always, impacts to nontarget species can be minimized. Where impacts occur, they are mostly of low magnitude in terms of nontarget species populations. Following is a discussion of the various impacts under the alternatives.

4.1.2.1 Alternative 1 - Continue the Current Federal BDM Program. From FY03 to FY07, WS lethally took a total of 7 nontarget White-winged Doves and a nontarget Brewer's Blackbird during BDM activities (take of these species was analyzed in Section 4.1.1.1 under target take). Nontarget take has been very low, annually averaging 2 taken lethally. Although it was possible that some nontarget birds were unknowingly killed by use of DRC-1339 or Avitrol for starling, blackbird, pigeon, or House Sparrow control, the method of application is designed to minimize or eliminate that risk. For example, during projects where DRC-1339 was used, the appropriate type and size of bait material was selected to be the most acceptable to the target species. The treated bait is only applied after a period of prebaiting with untreated bait material and observation in which nontarget birds are not observed coming to feed at the site. In some cases, DRC-1339 is applied on elevated stands, platforms or other restricted locations to further minimize potential impacts to ground feeding birds or any other animals. While every precaution is taken to safeguard against taking nontarget birds, at times changes in local flight patterns and other unanticipated events can result in the incidental take of unintended species. This is particularly true for bait substrates preferred by nontarget species such as rice, which is not used by WS. However, even hazards to nontarget species with rice baits were found to be low (Cummings et al. 2003). These occurrences are rare and should not affect the overall populations of any species under the current program. WS did not document any such occurrences from FY03 to FY07. Additionally, bait substrates highly attractive to nontarget species such as rice were not used.

WS has the potential to provide beneficial impacts to species by conducting BDM for bird species that impact other wildlife species. The take of starlings and brown-headed cowbirds, as discussed in Section 1.3.7, could be beneficial at a very local level, but as described in Section 4.1.1.1, WS does not anticipate that populations of either species has been effected by BDM. BDM for these species would have to be focused during the nesting period when and where WS could reduce these species breeding populations during a critical time period, for example during the nesting season of the Southwestern Willow Flycatcher. The take of gulls invading a nesting colony of Interior Least Terns or Snowy Plovers could also be beneficial for these species. However, it would have to be focused specifically on gulls impacting a nesting colony. WS is not currently conducting such activities, but WS nationally conducts many BDM projects for the benefit of other wildlife species with many successes.

T&E Species Impacts**.** ***W***S has not had an impact on any federally listed T&E or candidate species (Table 5) in New Mexico from FY92 to FY07. T&E species and potential impacts were discussed in Section 2.1.2 and mitigation measures to avoid T&E impacts were described in Section 3.5.2.2. The inherent safety features of most BDM methods such as DRC- 1339 has precluded or minimized hazards to listed species. A formal risk assessment was conducted on the use of DRC 1339 and other methods used in BDM and found minimal hazards to nontarget species (USDA 1997, Appendix P and Q). Those measures and characteristics should assure there would be no jeopardy to T&E species or adverse impacts on mammalian or non-T&E bird scavengers from the proposed action. None of the other control methods described in the proposed action alternative pose any hazard to nontarget or T&E species. Examples of potential benefits to a listed T&E species would be the reduction of local cowbird populations which could reduce nest parasitism on the endangered Southwestern Willow Flycatcher, or the management of birds that could directly predate on adult Interior Least Terns, their nests, eggs or young, as discussed above.

Other sensitive species in New Mexico were given in Section 2.1.2.3 and those bird species are denoted in Appendix C. Other than the sensitive species targeted during BDM, discussed in Section 4.1.1.1, WS has not had any impacts on them from FY98 to FY07. WS does anticipate that BDM will have more than a minor impact on any such species, and are more likely to be taken as targets in BDM with the appropriate permits and consultations.

4.1.2.2 Alternative 2 - Nonlethal BDM by WS Only. Under this alternative, WS would kill few nontarget animals because lethal methods would not be used. Some nonlethal BDM methods have the potential to take nontarget species such as entanglement in netting, but even so, nontarget take would be minimal and less than under the proposed action. However, WS did took few nontarget species from FY03 to FY07, and therefore, nontarget take would not differ substantially from the current program. NMDGF would likely provide some level of professional BDM assistance with lethal control activities, but this would be limited by resources (i.e., personnel, funding, etc.) without federal assistance. NMDGF take of nontarget species would likely be similar to WS’s and be minimal. On the other hand, individuals and organizations whose bird damage problems were not effectively resolved by nonlethal control methods alone would likely resort to other means of lethal control such as use of shooting by private persons or use of chemical toxicants. This could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than the proposed action. For example, shooting by persons not proficient at bird and damage identification could lead to killing of nontarget birds. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could lead to unknown impacts on local nontarget species populations, including T&E species. Hazards to raptors, including Bald Eagles and falcons, could therefore be greater under this alternative if chemicals, that are less selective or that cause secondary poisoning, are used by frustrated private individuals. Therefore, it is likely that nontarget take under this alternative would be greater than under the proposed action and could include T&E and sensitive species.

4.1.2.3 Alternative 3 – WS Provides Technical Assistance Only for BDM. Alternative 3 would not allow WS to conduct any direct operational BDM in New Mexico and, therefore, WS would not have an impact on nontarget or T&E species. NMDGF would likely provide some level of professional BDM assistance, but this would be limited by resources (i.e., personnel, funding, etc.) without federal assistance. Their BDM efforts would likely result in similar levels of nontarget species take as that of WS which has been minimal. WS would provide technical assistance or self-help information at the request of producers and others. This technical support might lead to selective use of control methods by private parties, more than that which might occur under Alternative 4, but private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods leading to greater take of nontarget wildlife than under the proposed action. The take of nontarget species would likely be more than under Alternative 2 because WS would not provide any operational support to resolve damage problems. It is hypothetically possible that, probably to a greater extent than under Alternative 2, frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could lead to unknown impacts on local nontarget species populations, including some T&E species. Hazards to raptors, including Bald Eagles, fish, aquatic species, and other nontarget species could therefore be greater under this alternative if chemicals are used by frustrated private individuals that cause secondary poisoning, leach into wetlands, and kill indiscriminately.

4.1.2.4 Alternative 4 - No Federal WS BDM. Alternative 4 would not allow WS or any other federal agency to conduct BDM in the State and, therefore, no impact would occur on nontarget or T&E species by WS BDM activities. NMDGF would likely provide some level of professional BDM assistance, but this would be limited by resources (i.e., personnel, etc.) without federal assistance. Individuals and organizations with bird damage problems would likely conduct control themselves and use methods such as use of shooting more often or increase the use of available toxicants, thereby increasing nontarget take over that which already occurs. Since private efforts to reduce or prevent depredations would increase and less experienced persons would likely implement control methods, nontarget take of wildlife would likely be greater than under the proposed action or the other 2 alternatives. This is partially due to the lack of using SOPs to minimize nontarget take such as WS's self-imposed restrictions and policies to minimize or nullify nontarget take. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants as described in Sections 2.1.3 and 2.2.3 which could impact local nontarget species populations, including some T&E and sensitive species. Hazards to raptors, including Bald Eagles, could therefore be greater under this alternative if chemicals, that are less selective or that cause secondary poisoning, are used by frustrated private individuals suffering damage that they cannot abate. USDA (1997) demonstrated that under the no federal program alternative, more nontarget animals would be affected. The hypothetical use of chemical toxicants and illegal BDM methods could impact nontarget species populations, including T&E species, under this alternative. It is, therefore, likely that more impacts to nontarget species would occur under this alternative than the current program and the other alternatives. Use of illegal chemicals and other methods could lead to significant, but unknown, impacts, especially to sensitive species.

4.1.3 Effects of BDM on Public and Pet Safety and the Environment

The public, pets, and the environment can be impacted by BDM whether implemented by WS, other agencies, or the public. Impacts can range from direct injury while implementing BDM methods to indirect impacts resulting from implementing BDM methods (e.g., impacts to water quality from chemicals used in BDM leaching into the system). Measures are often incorporated into BDM to minimize or nullify risks to the public, pets, and the environment. Various factors may, at times, preclude use of certain methods, so it is important to maintain the widest possible selection of BDM tools for resolving bird damage problems. However, the BDM methods used to resolve bird damage must be legal and biologically sound. Following is a discussion of the various impacts under the Alternatives.

4.1.3.1 Alternative 1 - Continue the Current Federal BDM Program. BDM methods that might raise safety concerns include the use of firearms, pyrotechnics for hazing, traps, cage traps, and chemical repellents, toxicants, drugs, and reproductive inhibitors. WS poses minimal threat to people, pets and the environment with BDM methods such as shooting, hazing with pyrotechnics, trapping, and use of chemicals (USDA 1997-Appendix P and Q). All firearm and pyrotechnic safety precautions are followed by WS when conducting BDM and WS complies with all applicable laws and regulations governing the lawful use of firearms. Shooting with shotguns or rifles is used to reduce bird damage when lethal methods are determined to be appropriate. Shooting is selective for target species. Firearms are only used by WS personnel who are experienced in handling and using them. Firearm use is very sensitive and a public concern because firearms can be misused. To ensure safe use and awareness, WS employees who use firearms to conduct official duties "*will be provided safety and handling training as prescribed in the WS Firearms Safety Manual and continuing education training on firearms safety and handling will be taken biennially by all employees who use firearms*." (WS Directive 2.615). WS Specialists, who use firearms as a condition of employment, are required to certify that they meet the criteria as stated in the Lautenberg Amendment. WS also follows safety precautions and WS Policies when using pyrotechnics. WS uses a variety of traps for birds such as decoy cage traps. These are strategically placed to minimize exposure to the public and pets. Appropriate signs are posted on all properties where traps are set to alert the public of their presence. WS has had no accidents involving the use of firearms, pyrotechnics or traps in which a member of the public or a pet was harmed. A formal risk assessment of WS' operational management methods found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no significant impact on human safety from WS' use of non-chemical BDM methods is expected.

WS personnel that use avian toxicants are certified through NMDA. Two toxicants are used in BDM, DRC-1339 and Avitrol. Immobilization and euthanasia drugs are used only by WS personnel trained and certified to use them per WS policy. WS personnel abide by WS policies and SOPs, and federal and state laws and regulations when using BDM methods that have potential risks. The same would apply to immunocontraceptives should they become registered for use in New Mexico. USDA (1997) conducted a risk assessment on WS's use of BDM methods and concluded that they had minimal hazards to the public, pets, and the environment.

DRC-1339 (3-chloro-p-toluidine hydrochloride). DRC-1339 is the primary lethal chemical BDM method that would be used under the current program alternative. WS used an average of about 0.8 pounds of DRC-1339 from FY03 to FY07 with a high of 2.4 pounds used in FY03 (Table 6). There has been some concern expressed by a few members of the public that unknown but significant risks to human health may exist from DRC-1339 used for BDM.

DRC-1339 is one of the most extensively researched and evaluated pesticides ever developed in the field of wildlife management. Over 30 years of studies have demonstrated the safety and efficacy of this compound. USDA (1997, Appendix Q) provides detailed information on this chemical and its use in BDM. Factors that virtually eliminate any risk of public health problems from use of this chemical are:

- Federal label and State law requires that the chemical be applied only by an individual trained and certified in its use; that the chemical be applied under strict guidelines in regard to suitable locations and bait materials to be used.

- DRC-1339 is highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation. The half-life is about 25 hours, which means that the chemical on treated bait material generally is nearly 100% broken down within a week.

- The chemical is more than 90% metabolized in target birds within the first few hours after they ingest the bait. Therefore, little material is left in bird carcasses that may be found or retrieved by people.

- The application rates are extremely low (< 0.1 lb. of active ingredient per acre) (EPA 1995).

- People or pets would need to ingest the internal organs of birds found dead from DRC-1339 to have any chance of receiving even a minute amount of the chemical or its metabolites into their system. This is highly unlikely to occur with people and pets could not likely eat enough dead birds to receive a lethal dose.

- EPA concluded that, based on studies of mutagenicity (the tendency to cause gene mutations in cells), this chemical is not a mutagen or a carcinogen (i.e., cancer-causing agent) (EPA 1995). Regardless, however, the extremely controlled and limited circumstances in which DRC-1339 is used would prevent any exposure of the public to this chemical.

The above analysis indicates that human health risks from DRC-1339 use would be virtually nonexistent under any alternative.

Avitrol® (Avitrol Corp., Tulsa, OK). Avitrol is another chemical method that is used by WS in BDM. WS used an average of 1 ounce of prepared bait materials from FY03 to FY07 with a high of 6 ounces in FY03 (the only FY that it was used). Although this chemical was not identified as being one of concern for human health effects, analysis of the potential for adverse effects is presented here. USDA (1997, Appendix Q) provides more detailed information on this chemical.

Avitrol is available as a prepared grain bait mixture that is mixed in with clean bait at no greater than a 1:1 and 1:9 treated to untreated mixture fro pigeons and blackbirds, respectively. Recent use has been extremely limited by WS. In addition to this factor, other factors that virtually eliminate health risks to members of the public from use of this product are:

- Federal label and State law requires that the chemical be applied only by an individual trained and certified in its use; that the chemical be applied under strict guidelines.

- It is readily broken down or metabolized into removable compounds that are excreted in urine in the target species (Extension Toxicology Network 1996). Therefore, little of the chemical remains in killed birds to present a hazard to humans.

- A human would need to ingest the internal organs of birds found dead from Avitrol ingestion to have any chance of receiving even a minute amount of the chemical or its metabolites into his/her system. This is highly unlikely to occur. Furthermore, secondary hazard studies with mammals and birds have shown that there is virtually no hazard of secondary poisoning.

- Although Avitrol has not been specifically tested as a cancer-causing agent, though it is plausible, the chemical was found not to be mutagenic in bacterial organisms (EPA 1997). Therefore, the best scientific information available indicates it is not a carcinogen. Regardless, however, the extremely controlled and limited circumstances in which Avitrol is used would prevent exposure of members of the public and pets to this chemical.

The above analysis indicates that human health risks from Avitrol use would be virtually nonexistent under any alternative.

Other BDM Chemicals. Other nonlethal BDM chemicals that might be used or recommended by WS include repellents such as methyl anthranilate (MA is the artificial grape flavoring used in foods and soft drinks sold for human consumption), which has been used as an area repellent and is currently being researched as a livestock feed additive, methiocarb (used in eggs), tactile polybutene repellents, nicarbazin (OvoControlTM G) reproductive inhibitor, and A-C (WS did not use any of these chemicals from FY03 to FY07 in New Mexico, but these have the potential for use). Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or FDA. Any operational use of these chemicals would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health.

Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997). WS did not have any known incidents involving the public or pets conducting BDM from FY03 to FY07.

Thus, WS poses minimal risks to public and pet health and safety when implementing BDM. In fact, WS can reduce public safety hazards. Many WS BDM projects have been to reduce the potential for bird strikes with aircraft at airports and a reduction in roosting birds that pose a threat to people from disease. Several BDM projects have been conducted to remove roosting birds such as pigeons from residential areas where the birds and their droppings are a potential disease source. Thus, this alternative would reduce threats to public health and safety by removing birds from sites where they pose a potential strike hazard to aircraft or have the potential of transmitting a disease.

4.1.3.2 Alternative 2 - Nonlethal BDM by WS Only. Alternative 2 would not allow for any lethal methods use by WS. WS would only implement nonlethal methods such as harassment with shooting firearms and pyrotechnics, live traps, repellents (e.g., methiocarb, MA, and polybutene tactile repellents), tranquilizing drugs (A-C), and reproductive inhibitors (nicarbazin). As discussed under Alternative 1, use of these BDM devices is not anticipated to have more than minimal risks to the public, pets, and the environment. The public is often especially concerned with the use of chemicals. The nonlethal chemicals that could be used by WS in BDM, excluding toxicants, were discussed above and not expected to impact the public, pets, or the environment. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or FDA. Any operational use of chemical repellents and tranquilizer drugs would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations and FDA rules which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions is a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health.

NMDGF would likely provide some level of professional BDM assistance with lethal control activities, but this would be limited by resources (i.e., personnel, funding, etc.) without federal assistance. The impact on human and pet health and safety from NMDGF activities would likely be similar to WS's and be minimal. Excessive cost or ineffectiveness of nonlethal techniques could result in some individuals or entities to reject WS's assistance and resort to lethal BDM methods. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing lethal BDM methods such as use of firearms and leading to greater risks than under Alternative 1. However, because some of these private parties would be receiving advice and instruction from WS, concerns about human health risks from firearms and chemical BDM methods use should be less than under Alternative 3 or 4. Commercial pest control services would be able to use Avitrol and Starlicide Complete (where available) and such use would likely occur more often in the absence of WS's assistance than under Alternative 1. Use of these chemicals in accordance with label requirements should avoid any hazard to members of the public. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain methods such as toxicants that, unlike WS's controlled use of DRC-1339 and Avitrol, could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program alternative.

4.1.3.3 Alternative 3 - WS Provides Technical Assistance Only for BDM. Alternative 3 would not allow any direct operational BDM assistance by WS in the State. WS would only provide advice and, in some cases, equipment or materials (i.e., by loan or sale) to other persons who would then conduct their own damage management actions. Concerns about human health risks from WS implementing BDM under this alternative would be nullified. Additionally, DRC-1339 and A-C are only registered for use by WS personnel and would not be available for use by private individuals; Starlicide Complete may be available to private pesticide applicators in some areas. NMDGF would likely provide some level of professional BDM assistance with BDM and use methods that have risks associated with them. The impact on human and pet health and safety from NMDGF activities would likely be similar to WS's and be minimal. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and leading to a greater risk than the Proposed Action Alternative. However, because some of these private parties would be receiving advice and instruction from WS, people, pets, and the environment may not be as at great a risk compared to persons using hazardous BDM methods with no instruction, similar to that discussed under Alternative 4. NMDGF may provide some services and risks from BDM method use would be similar to the proposed action for projects they completed. Commercial pest control services would be able to use Avitrol and such use would likely occur to a greater extent in the absence of WS's assistance. Use of Avitrol in accordance with label requirements should avoid any hazard to members of the public. It is hypothetically possible that frustration caused by the inability to alleviate bird damage, as discussed in Sections 2.1.3 and 2.2.3, could lead to illegal use of certain toxicants that, unlike WS's controlled use of firearms, pyrotechnics, traps, and chemicals, could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects to humans and the environment, than those used under the Current Program Alternative. Therefore, risks to people, pets, and the environment would be expected to be greater under this alternative than the proposed action, but similar and possibly greater than Alternative 2. Risks, though, would be less than under Alternative 4.

4.1.3.4 Alternative 4 - No Federal WS BDM. Alternative 4 would not allow WS or any other federal agency to conduct BDM in the State. Therefore, concerns about risks to people, pets, and the environment from WS would be nullified. In addition, DRC-1339 and A-C, registered for use only for WS personnel, would not be available for use by private individuals. NMDGF possibly could provide some level of professional BDM, and their actions and associated risks would be similar to Alternative 1. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing BDM methods and potentially leading to greater risks to people, pets, and the environment as has been described under the alternatives. Commercial pest control services would be able to use Avitrol and other available pesticides and requests for such use would likely be greater than present in the absence of WS's assistance. However, use of Avitrol or other BDM chemicals in accordance with label requirements should avoid any hazard to members of the public. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to the use of illegal methods such as certain toxicants that could pose risks to people, pets, and the environment and these risks would likely be highest under this alternative compared to the other three. Therefore, BDM methods and their associated risks, and illegal activities would be greater under this alternative than under Alternatives 1, 2, and 3.

4.1.4 Effects of BDM on Aesthetics

Aesthetics is the philosophy dealing with the nature or appreciation of beauty. Therefore, aesthetics is truly subjective in nature and wholly dependent on what an observer regards as beautiful. On the one hand, birds are often regarded as being aesthetic. In addition, birds can provide economic and recreational benefits (Decker and Goff 1987), and the mere knowledge that they exist is a positive benefit to many people. Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (i.e. wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (i.e., reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (i.e., ecological, existence, bequest values) (Bishop 1987). These positive traits of wildlife generally become incorporated into their overall aesthetic value.

On the other hand, aesthetics also includes the environment in which people live including public and private lands. The same wildlife populations that are enjoyed by many also create conflict with a number of land uses and human health and safety. The activities of some wildlife, such as starlings and blackbirds, result in economic losses to agriculture and damage to property. Human safety is jeopardized by wildlife collisions with aircraft, and wild animals may harbor diseases transmissible to humans. Damage by, or to, wildlife species that have special status, such as T&E species, is a public concern. Certain species of wildlife are regarded as nuisances in certain settings. Some people do not enjoy viewing the local environment with excessive bird excrement covering walkways, lawns and structures. These are negative values associated with birds and damages they can inflict.

Public reaction is variable and mixed because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to manage conflicts and problems between humans and wildlife. The population management (capture and euthanasia) method provides relief from damage or threats to human health or safety to urban people who would have no relief from such damage or threats if nonlethal methods were ineffective or impractical. Many people directly affected by problems and threats to human health or safety caused by birds insist upon their removal from their property or public location when the wildlife acceptance capacity is exceeded. Some people have the view that birds should be captured and relocated to a rural area to alleviate damage or threats to human health or safety. Some people directly affected by the problems caused by birds strongly oppose the removal of the birds regardless of the amount of damage. Individuals not directly affected by the harm or damage may be supportive, neutral, or totally opposed to any removal of birds such as pigeons from specific locations or sites. Some of the totally opposed people want to teach tolerance for bird damage and threats to human health or safety, and that birds should never be captured or killed. Some of the people who oppose removal of birds do so because of human-affectionate bonds with individual birds such as pigeons or magpies. These human-affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment.

Human dimensions of wildlife management include identifying how people are affected by conflicts between them and wildlife, attempting to understand people's reactions, and incorporating this information into policy and management decision processes and programs (Decker and Chase 1997). Wildlife acceptance capacity is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations. Wildlife acceptance capacity is also known as the cultural carrying capacity. This primarily involves wildlife aesthetics and acceptance of their management. These terms are important in urban areas because they define the sensitivity of a local community to a specific wildlife species. For any given damage situation, thresholds for those directly and indirectly affected by the damage will vary. This damage threshold is a primary factor in determining the wildlife acceptance capacity. Once this wildlife acceptance capacity is met or exceeded, people will begin to implement population control methods, including capture and euthanasia, to alleviate property damage and human health or safety threats related to the accumulation of fecal droppings.

4.1.4.1 Alternative 1 - Continue the Current Federal BDM Program. Some people who routinely view or feed individual birds such as feral domestic pigeons or urban waterfowl would likely be disturbed by removal of such birds under the current program. WS is aware of such concerns and considers this issue seriously prior to implementing BDM. In some projects, mitigation measures can be incorporated into BDM to reduce or nullify impacts. For example, in urban situations where waterfowl are damaging resources, WS could selectively capture the target species (coots, ducks, geese, etc.) utilizing A-C or trapping without disturbing the other waterfowl species that are present and deemed enjoyable to the public. This strategy could also be utilized on individual birds that could be creating a damage problem. This type of consideration can help to mitigate adverse effects on local peoples' enjoyment of certain individual birds or groups of birds.

Some people have expressed opposition to the killing of any birds during BDM activities. Under the current program, lethal and nonlethal control of birds would continue and these persons would continue to be opposed. However, many persons who voice opposition have no direct connection or opportunity to view or enjoy the particular birds that would be killed by WS's lethal control activities. Lethal control actions would generally be restricted to local sites and to small, unsubstantial percentages of overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would, therefore, continue to remain available for viewing by persons with that interest.

Some people do not believe that cranes, geese, herons, and egrets or nuisance blackbird or starling roosts should even be harassed to stop or reduce damage problems. Some people who enjoy viewing birds could feel their interests are harmed by WS's nonlethal bird harassment activities. Mitigating any such impact, however, is the fact that overall numbers of birds in the area would not be diminished by the harassment program and people who like to view these species could still do so on State wildlife management areas, National Wildlife Refuges, or on numerous private property sites where the owners are not experiencing damage to the birds and are tolerant of their presence.

Under this alternative, operational assistance in reducing nuisance pigeon and other bird problems in which droppings from the birds cause unsightly mess would improve aesthetic values of affected properties in the view of property owners and managers.

Relocation of nuisance roosting or nesting populations of birds (e.g., blackbird/starling roosts, vulture roosts) with harassment can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities to monitor the birds' movements is generally conducted to assure they do not reestablish at other undesirable locations.

4.1.4.2 Alternative 2 - Nonlethal BDM by WS Only. Under this alternative, WS would not conduct any lethal BDM but would still conduct harassment of birds that cause damage. Some people who oppose lethal control of wildlife by government but are tolerant of government involvement in nonlethal BDM would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS's activities under this alternative because the individual birds would not be killed by WS. However, other private entities would likely conduct similar BDM activities as those that would no longer be conducted by WS which means the impacts would then be similar to the current program alternative.

Under this alternative, WS would be restricted to nonlethal methods only. Nuisance pigeon problems would have to be resolved by nonlethal barriers and exclusion methods. Assuming property owners would choose to allow and pay for the implementation of these types of methods, this alternative would result in nuisance pigeons and other birds relocating to other sites where they would likely cause or aggravate similar problems for other property owners. Thus, this alternative would most likely result in more property owners experiencing adverse effects on the aesthetic values of their properties than the current program alternative. Many of the current materials for used barriers (netting, metal flashing, wire, etc) could, in some cases, reduce the aesthetic property value.

4.1.4.3 Alternative 3 - WS Provides Technical Assistance Only for BDM. Under this alternative, WS would not conduct any direct operational BDM but would still provide technical assistance or self-help advice to persons requesting assistance with bird damage. WS would also not conduct any harassment of cranes, geese, egrets, herons and other birds that were causing damage. Some people who oppose direct operational assistance in BDM by the government but favor government technical assistance would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS activities under this alternative because the individual birds would not be killed or harassed by WS. However, other private entities would likely conduct similar BDM activities as those that would no longer be conducted by WS which means the impacts would then be similar to the current program alternative.

Under this alternative, the lack of operational assistance in reducing nuisance pigeon and other bird problems would mean aesthetic values of some affected properties would continue to be adversely affected but this would not occur to as great a degree as under the No Program Alternative. This is because some of these property owners would be able to resolve their problems by following WS's technical assistance recommendations.

Relocation of birds damaging crops (e.g., Mid-Rio Grande Valley crane and geese hazing program) and nuisance roosting or nesting population of birds (e.g., blackbird/starling roosts, vulture roosts) through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. If WS has only provided technical assistance to local residents or municipal authorities, coordination with local authorities to monitor the birds' movements to assure the birds do not reestablish in other undesirable locations might not be conducted. In such cases, limiting WS to technical assistance only could result in a greater chance of adverse impacts on aesthetics of property owners at other locations than the current program alternative.

4.1.3.4 Alternative 4 - No Federal WS BDM. Under this alternative, WS would not conduct any lethal removal of birds nor would the program conduct any harassment of cranes, geese, egrets, herons and other birds. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS under this alternative. However, other private entities would likely conduct similar BDM activities as those that would no longer be conducted by WS which means the impacts would then be similar to the current program alternative.

Under this alternative, the lack of WS support in BDM in reducing nuisance pigeon and other bird problems where droppings cause unsightly messes would mean aesthetic values of some affected properties would continue to be adversely affected if the property owners were not able to achieve BDM some other way. In many cases, this type of aesthetic "damage" would worsen because property owners would not be able to resolve their problems and bird numbers would continue to increase.

4.2 SUMMARY AND CONCLUSION

The environmental effects of implementing BDM correspond with those raised and discussed in detail in Chapter 4 of USDA (1997). Impacts associated with activities under consideration here are not expected to be "significant." Based on experience, impacts of the BDM methods and strategies considered in this document are very limited in nature. The addition of those impacts to others associated with past, present, and reasonably foreseeable future actions, as described in USDA (1997), will not result in cumulatively significant environmental impacts. Monitoring the impacts of the program on the populations of both target and nontarget species will continue. All bird control activities that may take place will comply with relevant laws, regulations, policies, orders, and procedures, including the Endangered Species Act, Migratory Bird Treaty Act, and FIFRA. A summary of the overall effects of the BDM alternatives relative to the issues is given in Table 17. The current program alternative provides the lowest overall negative environmental consequences combined with the highest positive effects.

Table 17. A summary of the environmental consequences of each program alternative relative to each issue.

ISSUE	POTENTIAL IMPACT	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Target Spp,	Non-Sensitive	0	0	0	0
	Sensitive	0	0	0	-/0
Nontarget Spp.	Non-Sensitive	0	0	0	0
	Sensitive	0/++	-/+	-/0	-/0
Risks – Adverse	People & Pets	-/0	--/0	--/0	--/0
	Environment	-/0	--/0	--/0	--/0
- Beneficial	People & Pets	++	+	+	0/+
Aesthetics	Enjoyment	-	-	-	-
	Damage	++	+	+	0/+

Ratings: "- -" = High Negative; "-" = Low Negative; "0" = None; "+" = Low Positive, and "++" = High positive.

Note: While a control action or removal might have a negative effect on that individual animal or issue, removing the individual bird could also have a positive effect on a T&E species.

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APPENDIX A – POPULATION ESTIMATES

Population estimates for all species taken lethally by WS in BDM in New Mexico for the more migratory species in the Rocky Mountain States (RMS) of Arizona, Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming and all species in New Mexico.

Table A1. Breeding Red-winged Blackbird population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	46.378	9.04	4,867,396
Colorado	104,100	30.361	9.04	2,909,536
Idaho	83,574	22.915	9.04	1,762,982
Montana	147,046	19.958	9.04	2,701,638
New Mexico	121,598	5.543	9.04	620,481
Utah	84,904	8.144	9.04	636,536
Wyoming	97,818	26.048	9.04	2,345,579
Population Estimate for Rocky Mountain States				15,844,148

Table A2. Breeding Brown-headed Cowbird population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	5.738	9.44	628,852
Colorado	104,100	5.366	9.44	536,985
Idaho	83,574	7.973	9.44	640,551
Montana	147,046	15.360	9.44	2,171,226
New Mexico	121,598	3.105	9.44	362,951
Utah	84,904	3.651	9.44	297,989
Wyoming	97,818	6.486	9.44	609,897
Population Estimate for Rocky Mountain States				5,248,451

Table A3. Breeding Brewer's Blackbird population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	0.974	9.84	111,268
Colorado	104,100	11.626	9.84	1,212,732
Idaho	83,574	15.008	9.84	1,256,833
Montana	147,046	15.742	9.84	2,319,513
New Mexico	121,598	1.809	9.84	220,419
Utah	84,904	9.615	9.84	818,015
Wyoming	97,818	18.013	9.84	1,765,682
Population Estimate for Rocky Mountain States				7,704,461

Table A4. Breeding Great-tailed Grackle population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	10.854	10.56	1,330,679
Colorado	104,100	0.377	10.56	15,999
Idaho	83,574	-	10.56	0
Montana	147,046	-	10.56	0
New Mexico	121,598	3.224	10.56	159,687
Utah	84,904	0.010	10.56	913
Wyoming	97,818	0.017	10.56	1,788
Population Estimate for Rocky Mountain States				1,509,043

Table A5. Breeding Common Grackle population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	-	11.12	0
Colorado	104,100	11.220	11.12	1,322,625
Idaho	83,574	0.0232	11.12	2,177
Montana	147,046	2.030	11.12	338,020
New Mexico	121,598	0.671	11.12	92,394
Utah	84,904	0.010	11.12	913
Wyoming	97,818	6.199	11.12	686,647
Population Estimate for Rocky Mountain States				2,442,825

Table A6. Breeding Yellow-headed Blackbird population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	1.133	11.60	152,582
Colorado	104,100	1.500	11.60	184,454
Idaho	83,574	5.463	11.60	539,323
Montana	147,046	2.894	11.60	502,688
New Mexico	121,598	0.234	11.60	33,612
Utah	84,904	5.269	11.60	528,449
Wyoming	97,818	1.832	11.60	211,685
Population Estimate for Rocky Mountain States				2,152,793

Table A7. Breeding Bronzed Cowbird population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	0.150	10.32	17,972
Colorado	104,100	-	10.32	0
Idaho	83,574	-	10.32	0
Montana	147,046	-	10.32	0
New Mexico	121,598	0.007	10.32	895
Utah	84,904	-	10.32	0
Wyoming	97,818	-	10.32	0
Population Estimate for Rocky Mountain States				18,866

Table A8. Breeding Common Raven population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	8.232	2.60	248,482
Colorado	104,100	4.282	2.60	118,021
Idaho	83,574	4.849	2.60	107,296
Montana	147,046	3.659	2.60	142,455
New Mexico	121,598	8.516	2.60	274,173
Utah	84,904	11.700	2.60	263,012
Wyoming	97,818	4.582	2.60	118,669
Population Estimate for Rocky Mountain States				1,272,108

Table A9. Breeding American Crow population estimate for the RMS region from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

State	Size (mi^2)	2003-2007 Ave Count	PIF Adjust	Est. Breeding Population
Arizona	114,006	1.258	6.20	90,550
Colorado	104,100	4.563	6.20	299,903
Idaho	83,574	5.259	6.20	277,495
Montana	147,046	4.799	6.20	445,537
New Mexico	121,598	2.059	6.20	158,075
Utah	84,904	0.623	6.20	33,396
Wyoming	97,818	3.736	6.20	230,731
Population Estimate for Rocky Mountain States				1,535,687

Table A10. Breeding population estimates for selected species in New Mexico from BBS surveys conducted between 2003 and 2007 (Sauer et al. 2008).

Species	Size (mi^2) New Mexico	2003-2007 Ave Birds/Count	PIF Adjust	Est. Breeding Population 2003-2007
Canada Goose	121,598	0.9572	2.00	23,705
Rock Pigeon	121,598	1.8717	12.72	294,807
Eurasian Collared-Dove	121,598	1.3026	10.48	169,039
European Starling	121,598	2.9539	9.52	348,215
Common Raven*	121,598	8.5164	0.65	68,546
	121,598	8.5164	1.30	137,093
Chihuahuan Raven	121,598	7.3191	2.80	253,764
Cooper's Hawk	121,598	0.0855	27.40	29,009
Prairie Falcon	121,598	0.0658	2.58	2,102
Turkey Vulture*	121,598	4.1513	1.31	67,340
	121,598	4.1513	2.61	134,165
Red-winged Blackbird	121,598	5.5428	9.04	620,458
Brown-headed Cowbird	121,598	3.1053	9.44	362,987
Brewer's Blackbird	121,598	1.8092	9.84	220,443
Great-tailed Grackle	121,598	3.2237	10.56	421,535
Common Grackle	121,598	0.6711	11.12	92,407
Yellow-headed Blackbird	121,598	0.2336	11.60	33,554
Bronzed Cowbird	121,598	0.0066	10.32	843
American Crow	121,598	2.0592	3.10	79,045

* PIF's adjustment included a count area that was 4 times the area counted during a BBS point count and was adjusted – first population estimate is with PIF adjustment and second for just the count area (BBS observers only count everything in a quarter mile radius circle).

APPENDIX B - ESTIMATED BIRD TAKE IN NEW MEXICO BY WS

Precise information on bird mortality due to WS control operations involving toxicants is not available. The MIS requires WS Specialists to record only the dead birds found following a control operation which may only be a small percentage of the birds actually taken, especially for projects involving the use of DRC-1339. However, some WS State Directors or District Supervisors may require Specialists to estimate the number of birds such as starlings and blackbirds taken during a control operation. Since recording data in the MIS has been variable from one operation to another and one state to the next, MIS data for birds taken with toxicants are not used for determining total take, unless take has been estimated for all projects. However, potential take can be estimated with a basic knowledge of the toxicant used, bait type (e.g., cracked corn), and basic bird species biology for those birds targeted. This appendix provides estimates of birds taken with DRC-1339 and Avitrol by WS in New Mexico for species being analyzed at the statewide level. Additionally, take in the Central Flyway including eastern New Mexico has been analyzed (WS 2008) and found not to be a significant impact. New Mexico is split between the Central and Pacific Flyways. Many more blackbirds are taken in Central Flyway and, therefore, it could be assumed that impacts would be more noticeable. However, impacts were found not to be significant and, therefore, only impacts in New Mexico (combined for both Flyways) will be considered in this EA and not the Flyways.

Most bird mortality by WS operations involving toxicants in New Mexico has been limited and conducted almost entirely with the use of DRC-1339 treated baits. Glahn and Avery (2001) described methods to estimate bird mortality from using assessments of bait consumption and calculations. Homan et al. (2005) developed an empirical model based on bioenergetics for starlings at feedlots and the model predicted that 93 starlings would be killed for every pound of treated cattle ration pellet baits used (116 starlings/g DRC-1339). However, field studies testing the model found that the baits only killed an average of 67 starlings per pound used (72.5% of the “ideal” model). This would equate to 84 starlings taken for every gram of DRC-1339 used. Packham (1965) found that an average of 57 starlings were killed per pound of DRC-1339 treated French fries (a larger bait size) used at feedlots or 71 starlings taken per gram of DRC-1339. Thus, a difference exists between what models predict for results to that which actually occurs under field conditions and take with different baits. Most models predict the maximum number of target species that can be taken or the “ideal.” However, ideal conditions rarely exist in the field and take is typically only a fraction of the expected results (Glahn and Avery 2001).

Part of the problem with predicting take with DRC-1339 treated baits is that breakdown of the chemical starts relatively quickly once baits are prepared. Within hours to several days after baits are prepared and once the baits are exposed to environmental conditions (e.g., precipitation, heat, and sunlight), baits degrade, lose potency, and discolor turning dark gray which are often not selected by the target species. Thus, baits may be consumed and not be toxic (degraded) or discolored and not selected making them less effective. Additionally, baits may be made for a set number of birds seen during prebaiting operations and this number may not return when baits are placed out. Thus, baits may remain following treatments which then are disposed according to the label. The MIS system does not capture this “wastage” (bait placed in the field and not consumed, and, hence, disposed), but only the amount placed in the field. These factors (degradation, discoloration, and wastage) inherently would increase the estimated target species take using WS MIS data because all DRC-1339 used in operations is recorded whether or not it was successful. Homan’s et al. (2005) field trials, compared to the empirical model, accounted for most problems with discoloration and degradation (did not likely include precipitation because all trials had an estimated take) problems (72.5% efficacy from predicted to actual field trial take), but did not account for wastage because the amount of bait consumed was recorded for each field trial (baits placed less baits picked up after treatment). For WS projects using DRC-1339, wastage likely averages between 10% and 25% of the baits placed. Thus, realistically the baits used that are successful in typical field conditions (from preparation to take of the target species) are probably closer to 60% of the estimated “ideal” or modeled take for the grams of DRC-1339 used, instead of the 72.5%. To conservatively estimate the number of target starlings taken for a given project, the Homan et al. (2005) field trial data multiplied by a factor of 90% to account for wastage, thus assuming wastage of 10%, or 76 starlings taken per gram of DRC-1339 used.

WS also targets blackbirds in the family Icteridae in New Mexico at mostly feedlots. Take would be different for each species of blackbird, as well as sex with most males weighing much more than females, based on the target species weight and daily feed consumption. Average weights for a species including females and males are 54 grams for Red-winged Blackbirds, 76 grams for Yellow-headed Blackbirds, 66 grams for Brewer's and Rusty Blackbirds, 107 for Common Grackles, 169 for Great-tailed Grackles, 40 grams for Brown-head Cowbirds, and 63 grams for Bronzed Cowbirds. It is expected that these species, respectively, would consume an average of 11g, 13g, 12g, 12g, 18g, 24g, 23 g, 9g, and 12 g of baits when feeding. DRC-1339 treated baits for feedlots are not broadcast, but put in feeding lanes and so birds have easier access to large quantities of baits whereas more searching is required for baits that are broadcast. It is estimated that blackbirds will get 12.5% of their daily intake needs from baited sites. Take for each species is estimated for feedlot baits in Table B1. For blackbirds, because of varying weights, Table B1 estimates the number taken with the different baits and formulations based on their daily consumption. Blackbirds move around in feedlots and fallow fields and, thus, could get much of their diet from non-baited areas. It is assumed that blackbirds get an eighth of their daily dietary needs from treated areas whereas starlings, pigeons, and House Sparrows, also discussed herein, which are much more sedentary in feedlots than blackbirds, would probably get at least 25% (likely much higher for these species). These are likely conservative estimates, but adequate for determining impacts.

Cummings et al. (unpubl data, NWRC, pers. comm. 2006) found that treated baits at feedlots would take an estimated 400 blackbirds per gram of DRC-1339 used. Table B1 estimates that take would range from 163 per gram of DRC 1339 used for baits used in feedlots or similar areas (take for rice baits are higher) for Great-tailed Grackles to 434 for Brown-headed Cowbirds. Estimates in Table B1 included an assumed 10% wastage loss which would make the estimates very close to those found by researchers (species composition in treated feedlots for Cummings et al. (unpubl data, NWRC, pers. comm. 2006) had high percentages of Red-winged Blackbirds and Brown-headed Cowbirds). The predicted take estimates from Table B1 will be used to calculate the take of each species taken in Table B3. Take in the Central Flyway also included take to protect rice fields and the predicted take for rice baits using the same species weights and daily consumption were very close to what researchers had found for rice. Thus, we believe that these are modeled estimates, but fairly close to field conditions of the use of this product.

WS in New Mexico uses DRC-1339 to mostly target feral pigeons. Per label directions, WS uses whole kernel corn for these projects with 1.7 g DRC-1339 for 1 pound of treated bait which once prepared is cut at 1 treated:5 untreated. Baits can be cut up to 1 treated:1 untreated depending on the needs of the project and the length of time birds are observed feeding during prebaiting. The standard average number of whole corn kernels in a pound is 1,300 (Ontario Corn Producer Association 2007), but this is variable depending on variety of corn (1,600 by J. Homan, NWRC Bismarck, ND, pers. comm. 2007 and 1,700 by M. Marlow, Okla. WS, pers. comm. 2007). However, lower or higher weights for kernels would not change the outcome. Assuming that 1,300 kernels equals one pound and are treated, each kernel (350 mg) would have about 1.3 mg DRC-1339 (prior to being cut with untreated baits). The oral LD_{50} for pigeons is 18 mg/kg (Timm 1994, Eisemann et al. 2003). Thus, it likely takes more than 18 mg for 100% efficacy (acute doses for all) and only 50% of the pigeons would be killed at this level. At an estimated average weight of 310 g (270 g (Sibley 2000) or 350 g (Johnston 1992) equals 4.9 mg to 6.3 mg – website searches came up with similar weights)) it would take 5.6 treated baits to kill 50% or 6 baits (rounded up). Pigeons eat about 36 gm of feed per day (British Columbia Ministry of Environment 2001) or, with whole corn, about 103 kernels at 1,300/pound. It is likely that when feed is put out, pigeons will consume between a quarter and half their daily consumption (depending on the number of pigeons feeding, the distribution of baits, and the length of time the pigeons are exposed to the baits), or about 26 to 52 kernels. This would be enough for about half of the birds to get a lethal dose averaging about 4 to 9 treated baits for cut baits (1:5 ratio of treated:untreated). Assuming pigeons feed on whole kernel corn baits that have 1,300 kernels per pound and consume a third of their daily intake (34 kernels) while baits are placed out, one pound of cut bait would take 19 pigeons (each pigeon would get an average of 5.7 treated baits – the level for 50% to be killed). This would equate to taking 67 pigeons per gram of DRC-1339. Using a similar factor to account for wastage in field use (10%) as above, would result in a conservatively estimated 60 pigeons taken with each gram of DRC-1339 used. It should be noted that baits can be cut at 1:1 to 1:5 for pigeons depending on how much bait is required at a site for the number of pigeons present; WS Specialists use the 1:1 treated to untreated baits for projects with very few pigeons or when there are a lot of pigeons present to ensure they get enough toxicant. A lower ratio of treated to untreated would reduce the number of birds that could be taken. However, for the purposes of this EA, it is assumed that all baits are cut at the 1:5 rate which would increase the number of birds taken, but be a more conservative estimate for the purposes of analysis. Additionally, baits are often left out for pigeons as long as they are feeding. It is likely that pigeons would consume at least half their dietary needs, if not 100%. If pigeons consumed 100% of their daily consumption requirements and this reached a level of LD100, then 13 pigeons would be killed per pound of bait or 40 per gram of DRC-1339 (taking wastage into account). It is likely that the latter is closer to the estimate. However, to be conservative, the first estimate will be used in the EA.

Avitrol is another toxicant used by WS in BDM for House Sparrows, starlings, pigeons, and blackbirds in New Mexico and other states, and comes prepackaged by the pound formulated at 0.5% 4-aminopyridine (the active ingredient) on mixed grain or corn chops. WS then mixes the bait with the same untreated bait at 1:9. The number of birds taken with an ounce of bait depends on the species targeted, the ratio of treated to untreated baits in the formulation (WS almost always cuts treated baits at the suggested 1:9 ratio, but this can be lowered to 1:5 for House Sparrows), and precipitation. WS uses mostly the mixed grain bait, but also uses some corn chops. The number of grain particles per pound varies by type and size of the bait, but would likely be from 6,000 to 23,000 particles per pound for mixed grain and cracked corn. Cracked corn sifted for particle sizes between 40mg to 50mg results in about 9,000 to 12,000 particles per pound (between #5 and #7 U.S. Standard Sieves). House Sparrows eat at least 6 grams of feed per day based on kilocalorie requirements of 20 Kcal/day to 28 Kcal/day assuming that 3.5 Kcal are produced from a gram of grain (Cabe 1993). Starlings, with a high caloric diet, eat on average 23 grams/day (Twedt 1985) and pigeons likely require about 36 grams of feed per day (British Columbia Ministry of Environment 2001). Assuming that these 3 species eat at least 25% of the necessary daily intake at one feeding before other individuals react to the Avitrol (House Sparrows and starlings, especially, would likely stop feeding after a few individuals reacted to the chemical because of their vocalizations), that the bait is mixed at 1 treated:9 untreated which is WS's standard application rate, and each pound of bait has 10,000 treated particles, then House Sparrows would eat about 33 particles (3 treated), starlings 127 particles (13 treated), and pigeons 198 particles (20 treated). It takes 20 minutes or more before a bird reacts to Avitrol. Avitrol is formulated at 0.5% which would mean that at these consumption rates, House Sparrows would get 7 mg of Avitrol, starlings 29 mg, and pigeons 45 mg. The acute oral LD50 for House Sparrows is 3.00-7.70 mg/kg and for starlings is 4.90-6.00 mg/kg. The acute oral LD50 for hydrochloride salt of 4-aminopyridine for pigeons is 20 mg/kg. The oral LD50 for the average weight House Sparrow would be met with 0.2 mg Avitrol, for starling 0.5 mg, and for pigeons 7.1 mg. Therefore, all species would likely receive a toxic dose by consuming the estimated amounts. These amounts would then dictate the number that could be taken with an ounce of Avitrol treated baits (the MIS records the ounces of Avitrol® used and does not include the added untreated baits). Thus, it would be theoretically possible to take 189 House Sparrows, 49 starlings, and 32 pigeons. It is likely that fewer issues such as degradation and discoloration would occur with the use of Avitrol because it is more stable than DRC-1339. Using 10% loss or wastage, similar factor as discussed for DRC-1339, would result in the take of 170 House Sparrows, 44 starlings, and 28 pigeons per ounce of Avitrol used.

Blackbird take with Avitrol is given in Table B1. Take of blackbirds with Avitrol ranged from 85 to 226 depending on the consumption rates of the different species.

The calculations of take can be used to estimate the number of target birds taken by WS with DRC-1339 and Avitrol. However, the MIS allows WS Specialists to use a code, "Mixed Blackbirds," for sites where several species of blackbirds (starlings, blackbirds, cowbirds, and grackles) are present. Thus, species composition at operation sites also needs to be estimated where this code was used.

Starlings are the most prevalent species at feedlots in the United States. Starlings require a high protein, high calorie diet, and livestock feed such as cattle ration, pelleted feed are a great source. Unlike most blackbirds, starlings eat little grain due to their poor assimilation efficiency (turning feed into energy) for grain (Twedt 1985). Starlings prefer insects and eat them as available. As insects wane in cold weather, starlings turn to feedlots to acquire the necessary energy to survive. Thus, starlings can be found in abundance at feedlots during winter which is the case in the Great Plains and Rocky Mountain states. On the other hand, blackbirds efficiently assimilate grains into energy and have more opportunity to find them in harvested and fallow fields (spillage) and rangeland (weed seeds), and, therefore, may forage more in these areas rather than in feedlots (Twedt 1985).

Table B1. Estimated blackbird take with DRC-1339 and Avitrol treated baits. These estimates will be used to determine impacts.

Species	RWBB	YHBB	BRBB	RUBB	CGRK	GTGK	BTGK	BHCB	BRCB
Spp. Ave. Weight (g)	54	76	66	66	107	169	157	40	63
Daily Ave. Consumpt.(g)	11	13	12	12	18	24	23	9	12
% Daily Ave. Cons. Eaten	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Wastage	10%	10%	10%	10%	10%	10%	10%	10%	10%
DRC-1339 Feedlot Baits									
Std g DRC Used for Bait	92	92	92	92	92	92	92	92	92
Pounds bait made	110	110	110	110	110	110	110	110	110
Lbs. bait/1 g DRC	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
# birds/g DRC	355	300	325	325	197	163	170	434	325
Avitrol Baits									
Std. Pounds Avitrol Mixed	1	1	1	1	1	1	1	1	1
Pounds Bait Made	10	10	10	10	10	10	10	10	10
Lbs. bait/1 oz Avitrol	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625
# birds/oz. Avitrol	185	157	170	170	113	85	89	226	170

In States where WS used DRC-1339 and Avitrol®, the percentage of starlings at feedlots was estimated by the WS Specialists. The following percentages for the MIS "Mixed Blackbirds" were determined by WS Specialists at feedlots that were treated. Their percentages were used for feedlot work in the Central Flyway with Kansas, Nebraska, Oklahoma, and Texas having an estimated 95% starlings, Colorado at 85%, and New Mexico at 40% with the remaining percentages distributed to blackbird percentages found in the states at different times of the year using BBS and CBC data. Homan (NWRC, pers. comm. 2007) stated that during his research in Kansas, starling flocks in feedlots constituted 99% or more of the birds in feedlots with few other species ever present. He also stated that a graduate student trapping birds in feedlots in the winter and spring of 2006-2007 caught only starlings in traps and no other bird species. Thus, an estimate of 95% would be considered conservative for blackbird species, but believed to be within reason for starlings. The composition of starlings in the Rocky Mountain States (RMS) was not determined for all states because WS did not conduct BDM at feedlots in several. However, based on discussions with WS personnel, the composition of starlings in RMS will be estimated at 40% for New Mexico, 30% for Arizona, 85% for Colorado, and 90% for Idaho, Montana, Utah, and Wyoming. The actual numbers of starlings in the last 4 states is between 95% to 99%, but to be conservative for the native species, the lower percentage of starling will be used.

Under the "Mixed Blackbird" category, the species composition of blackbirds taken in control operations will be calculated using the species composition from USGS Breeding Bird Survey (BBS) data averaged with NAS Christmas Bird Count (CBC) data for projects occurring from April 1 to November 30, and from CBC data for projects occurring from December 1 to March 31. Table B2 provides the percentages used for blackbird species (excluding starlings) for estimating take with toxicants. With species composition determined (Table B2), WS take of birds with toxicants in New Mexico can be estimated. It should be noted that the CBC and BBS counts miss the migration of Yellow-headed Blackbirds through New Mexico from northern breeding areas where they are more abundant because of the timing of these counts (BBS=May-June, CBC=December-January). A few projects could occur while these birds are migrating from July to September, but their migration is during a relatively short time period with only a few birds lingering between breeding (northern parts of the Central and Pacific Flyways) and wintering grounds (in Mexico from the Texas border south) as seen in the count numbers. If a project occurred during their migration, the percentage of Yellow-headed blackbirds would be increased.

Table B2. Species composition of blackbirds in New Mexico used to estimate take for BDM projects using chemical toxicants where WS Specialists recorded "Mixed Blackbirds" as the target species. The percentage of starlings was estimated at 40% of the species composition at flocks in feedlots and will be used to determine take.

State	Species	BBS ave. adjusted birds/count 2003-07	BBS %	CBC Ave. Total 2002/03-2006/07	CBC %	Winter Factor	BBS/CBC ave	Migrating Factor
New Mexico	RWBB	5.54	42.26%	19,864	53.73%	32.24%	48.00%	28.80%
	YHBB	0.23	2.23%	383	1.04%	0.62%	1.64%	0.98%
	BRBB	1.81	14.63%	6,876	18.60%	12.90%	13.77%	9.97%
	RUBB	-	-	1	0.003%	0.002%	0.001%	0.001%
	CGRK	0.67	6.13%	100	0.27%	0.16%	3.20%	1.92%
	GGRK	3.22	10.60%	8,358	22.61%	13.57%	16.61%	9.96%
	BHCB	3.11	24.10%	1,381	3.74%	2.24%	13.92%	8.35%
	BZCB	0.01	0.06%	7	0.02%	0.01%	0.04%	0.024%
Total		24.66	100.00%	36,970	100.01%	60.000%	100.00%	60.00%

Rusty Blackbirds winter in the southeastern United States, but could potentially be found in New Mexico during migration and winter months. Their habitat preference is wet woodlands where they typically are found feeding, away from other blackbirds. Though, it is possible that they may be found at a confined animal feeding operation (feedlot), it is unlikely. However, to consider impacts, this species is included, but it should be noted that none are likely ever taken.

WS Specialists also target American Crows under a Special Local Need label to protect pecans and other crops with whole kernel corn and pecan baits. Take would be similar to pigeons, except that crows would likely take fewer baits when they feed. The average crow in the Central BBS area weighs about 515 grams (Verbeek and Caffrey 2002) and consumes about 52 grams of feed per day. The oral LD_{50} for crows is 1.33-1.78 mg/kg and they are likely to get a lethal dose consuming low quantities of bait (1 kernel would likely be enough to kill a crow). If crows consume a fourth of their daily diet at a treated site (similar to pigeons because would tend to remain at a feeding station longer), they would consume 13 grams of prepared baits. Assuming that baits are made with whole kernel corn (about 1300 kernels/pound), crows would consume about 37 kernels or about 6 treated baits. At this consumption rate, a pound of prepared bait would take 35 crows. This would equate to taking 45 crows per gram of DRC-1339. Using the same wastage percentage (10%) as discussed, WS expects that it could take 40 crows per gram of DRC-1339 used.

Table B3. Estimate of birds taken in New Mexico with chemicals along with other methods for species being analyzed in the New Mexico BDM EA.

State- Method	FY03	FY04	FY05	FY06	FY07	%	Take/g, /oz, /egg	FY03	FY04	FY05	FY06	FY07
(w-winter, m-migr)	Quantity of DRC-1339 (g), Avitrol (oz)							Estimated Take				
Feral Pigeon												
NM DRC-1339	154	206	102	119	101	100%	60	9,240	12,360	6,120	7,140	6,060
NM Avitrol	6	-	-	-	-	100%	28	168	0	0	0	0
NM Other Methods								172	943	2,056	10,623	5,799
TOTAL NM								9,580	13,303	8,176	17,763	11,859
Common Raven												
NM DRC-1339 eggs	134	48	-	-	-	100%	1/4	34	12	0	0	0
NM DRC 1339 meat	-	290	-	-	-	100%	1/8	0	36	0	0	0
NM Other Methods								49	0	0	0	0
TOTAL NM								83	48	0	0	0
American Crow												
NM DRC-1339	-	92	-	-	-	100%	40	0	3,680	0	0	0
TOTAL NM								0	3,680	0	0	0
European Starling												
NM DRC-1339	90	-	197	-	-	100%	76	6,840	0	14,972	0	0
NM DRC Mix BB	759	-	-	-	-	40%	76	23,074	0	0	0	0
TOTAL NM								29,914	0	14,972	0	0
Red-winged Blackbird												
NM DRC Mix BB w	460	-	-	-	-	32.24%	355	52,648	0	0	0	0
NM DRC Mix BB m	299	-	-	-	-	28.80%	355	30,570	0	0	0	0
NM Other Methods								0	0	0	11	0
TOTAL NM								83,218	0	0	11	0
Yellow-headed Blackbird												
NM DRC Mix BB w	460	-	-	-	-	0.62%	163	465	0	0	0	0
NM DRC Mix BB m	299	-	-	-	-	0.98%	163	478	0	0	0	0
TOTAL NM								942	0	0	0	0
Brewer's Blackbird												
NM DRC Mix BB w	460	-	-	-	-	11.16%	325	16,684	0	0	0	0
NM DRC Mix BB m	299	-	-	-	-	9.97%	325	9,688	0	0	0	0
TOTAL NM								26,373	0	0	0	0
Rusty Blackbird												
NM DRC Mix BB w	460	-	-	-	-	0.002%	325	3	0	0	0	0
NM DRC Mix BB m	299	-	-	-	-	0.001%	325	1	0	0	0	0
TOTAL NM								4	0	0	0	0
Common Grackle												
NM DRC Mix BB w	460	-	-	-	-	0.16%	197	145	0	0	0	0
NM DRC Mix BB m	299	-	-	-	-	1.92%	197	1,131	0	0	0	0
TOTAL NM								1,276	0	0	0	0
Great-tailed Grackle												
NM DRC Mix BB w	460	-	-	-	-	13.57%	163	10,1750	0	0	0	0
NM DRC Mix BB m	299	-	-	-	-	16.34%	163	4,854	0	0	0	0
TOTAL NM								15,029	0	0	0	0
Brown-headed Cowbird												
NM DRC Mix BB w	460	-	-	-	-	13.57%	434	27,091	0	0	0	0
NM DRC Mix BB m	299	-	-	-	-	8.35%	434	10,835	0	0	0	0
NM Other Methods								50	0	0	0	0
TOTAL NM								37,977	0	0	0	0
Bronzed Cowbird												
NM DRC Mix BB w	460	-	-	-	-	0.01%	325	15	0	0	0	0
NM DRC Mix BB m	299	-	-	-	-	0.02%	325	23	0	0	0	0
TOTAL NM								38	0	0	0	0

Ravens are also targeted for livestock protection with egg and meat baits. Fifty eggs or 267 meat baits are made with each gram of DRC-1339. Ravens consume the meats and contents of eggs, and will cache them. It is assumed that 4 eggs (Coates 2006) or 8 meat baits (1/2" cubes) take one raven or 17 or 33 per gram of DRC-1339. However, this may be an overestimate (Coates and Delehanty 2004) because caching and consumption of more than 4 eggs by targeted ravens and consumption by nontarget species, especially ground squirrels (not affected by the baits) reduces the number of eggs for targeted individual ravens. Thus, our belief that a crow or a raven would be taken with 4 eggs is likely an overestimate, but to be conservative, this estimate will be used to determine take by WS.

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APPENDIX C - BIRD SPECIES OF NEW MEXICO

The New Mexico Ornithological Society (NMOS) lists 516 species of wild birds that have been documented in New Mexico (NMOS 2007). Of these, two grouse species have been extirpated for some time and are not listed. New Mexico has just over 300 species that reside for some part of the year in New Mexico. Additionally, almost 200 more species have been accidentally seen inside the state from outside their normal range. Most will not be the focus of a BDM project, but all are listed in the following tables to let readers know the diversity of birds in the state. New Mexico WS expects to conduct BDM for relatively few of these species and anticipates that BDM will have minimal effect on any given species in New Mexico and the Central and Pacific BBS Regions.

Table C1. Common and scientific names are given for the 192 wild bird species that typically reside for some part of the year in New Mexico that have the potential of being a BDM project target. Even though all species with the potential to invoke a request are listed, the majority will not be involved in BDM in New Mexico. About half of the species would only be involved in BDM at airports (88) where they are a strike risk. If the species has the potential to be involved in a request for assistance other than BDM at airports, it is noted (104). Shaded species are mostly outside their normal range and rare in New Mexico, and not likely to cause a damage request.

Species	*Scientific Name*
Order Anseriformes - Waterfowl	
Greater White-fronted Goose[2]	*Anser albifrons*
Snow Goose[2]	*Chen caerulescens*
Ross' Goose[2]	*Chen rossii*
Cackling Goose[2]	*Branta hutchinsii*
Canada Goose[2,4,5,6]	*Branta canadensis*
Tundra Swan[2]	*Cygnus columbianus*
Wood Duck[2]	*Aix sponsa*
Gadwall	*Anas strepera*
American Wigeon[6]	*Anas americana*
Mallard[2,4,5,6]	*Anas platyrhynchos*
Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Northern Shoveler	*Anas clypeata*
Northern Pintail	*Anas acuta*
Green-winged Teal	*Anas crecca*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Ring-necked Duck[1]	*Aythya collaris*
Lesser Scaup	*Aythya affinis*
Bufflehead[1]	*Bucephala albeola*
Common Goldeneye[1]	*Bucephala clangula*
Hooded Merganser[1]	*Lophodytes cucullatus*
Common Merganser[1]	*Mergus merganser*
Ruddy Duck	*Oxyura jamaicensis*
Order Galliformes – Pheasants, Grouse, Turkey, & Quail	
Ring-necked Pheasant[2]	*Phasianus colchicus*
Wild Turkey [ST* 2]	*Meleagris gallopavo*
Gambel's Quail	*Callipepla gambelii*
Northern Bobwhite[2]	*Colinus virginianus*
Order Gaviiformes - Loons	
Common Loon[1]	*Gavia immer*
Order Podicipediformes - Grebes	
Pied-billed Grebe[1]	*Podilymbus podiceps*
Horned Grebe[1]	*Podiceps auritus*
Eared Grebe[1]	*Podiceps nigricollis*
Western Grebe[1]	*Aechmophorus occidentalis*
Clark's Grebe [BCC AY 1]	*Aechmophorus clarkii*
Order Pelecaniformes – Pelicans & Cormorants	
American White Pelican[1]	*Pelecanus erythrorhynchos*
Neotropic Cormorant [ST 1]	*Phalacrocorax brasilianus*
Double-crested Cormorant[1]	*Phalacrocorax auritus*
Order Ciconiiformes –Bitterns, Herons, Egrets, Ibises	
American Bittern[1]	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Great Blue Heron[1]	*Ardea herodias*
Great Egret[1,4,6]	*Casmerodius alba*
Snowy Egret[1,4,6]	*Egretta thula*
Cattle Egret[1,4,6]	*Bubulcus ibis*
Green Heron[1]	*Butorides virescens*
Black-crowned Night-Heron[1,4,6]	*Nycticorax nycticorax*
White-faced Ibis	*Plegadis chihi*
Order Falconiformes –Vultures, Eagles, Kites, Hawks, & Falcons	
Turkey Vulture[3,4,6]	*Cathartes aura*
Osprey[1]	*Pandion haliaetus*
Mississippi Kite[4]	*Ictinia mississippiensis*
Bald Eagle[ST1,3]	*Haliaeetus leucocephalus*
Northern Harrier [BCC]	*Circus cyaneus*
Sharp-shinned Hawk[3]	*Accipiter striatus*
Cooper's Hawk[3]	*Accipiter cooperii*
Northern Goshawk [BCC]	*Accpiter gentilis*
Common Black-Hawk[ST BCC]	*Buteogallus anthracinus*
Harris's Hawk	*Parabuteo unicinctus*
Swainson's Hawk [BCC AY]	*Buteo swainsoni*
Zone-tailed Hawk	*Buteo albonotatus*
Red-tailed Hawk[3]	*Buteo jamaicensis*
Ferruginous Hawk [BCC]	*Buteo regalis*
Rough-legged Hawk	*Buteo lagopus*
Golden Eagle [BCC 3]	*Aquila chrysaetos*
American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Peregrine Falcon [ST BCC]	*Falco peregrinus*
Prairie Falcon [BCC]	*Falco mexicanus*
Order Gruiformes – Rails & Cranes	
Common Moorhen	*Gallinula chloropus*
American Coot[6]	*Fulica americana*
Sandhill Crane[2]	*Grus canadensis*
Order Charadriiformes – Shorebirds, Gulls, & Terns	
Snowy Plover [BCC AY]	*Charadrius alexandrinus*
Semipalmated Plover	*Charadrius semipalmatus*
Killdeer	*Charadrius vociferus*
Mountain Plover [BCC AR]	*Charadrius montanus*
Black-necked Stilt	*Himantopus mexicanus*
American Avocet	*Recurvirostra americana*
Spotted Sandpiper	*Actitus macularia*
Solitary Sandpiper [BCC]	*Tringa solitaria*
Greater Yellowlegs	*Tringa melanoleuca*
Willet	*Tringa semipalmata*
Lesser Yellowlegs	*Tringa flavipes*
Upland Sandpiper	*Bartramia longicauda*

Long-billed Curlew[BCC AY]	*Numenius americanus*
Marbled Godwit[BCC AY]	*Limosa fedoa*
Sanderling[AY]	*Calidris alba*
Semipalmated Sandpiper[AY]	*Calidris pusilla*
Western Sandpiper[AY]	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
Baird's Sandpiper	*Calidris bairdii*
Dunlin	*Calidris alpina*
Stilt Sandpiper[AY]	*Calidris himantopus*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Wilson's Snipe	*Gallinago delicata*
Wilson's Phalarope[BCC]	*Phalaropus tricolor*
Red-necked Phalarope	*Phalaropus lobatus*
Franklin's Gull[1,4]	*Larus pipixcan*
Bonaparte's Gull[1,4]	*Larus philadelphia*
Ring-billed Gull[1,4,6]	*Larus delawarensis*
California Gull[1,4,6]	*Larus californicus*
Herring Gull[1,4]	*Larus argentatus*
Least Tern[F/SE]	*Sternula antillarum*
Black Tern[1]	*Childonias niger*
Common Tern[1]	*Sterna hirundo*
Forster's Tern[1]	*Sterna forsteri*
Order Columbiformes – Doves & Pigeons	
Rock Pigeon[2,3,4,5,6]	*Columba livia*
Band-tailed Pigeon[2]	*Patagioenas fasciata*
Eurasian Collared-Dove[2,6]	*Streptopelia decaocto*
White-winged Dove[2]	*Zenaida asiatica*
Mourning Dove	*Zenaida macroura*
Inca Dove	*Columbina inca*
Common Ground-Dove[SE]	*Columbina passerina*
Order Cuculiformes – Cuckoos & Roadrunners	
Greater Roadrunner[5]	*Geococcyx californianus*
Order Strigiformes - Owls	
Barn Owl[4,6]	*Tyto alba*
Great Horned Owl[3]	*Bubo virginianus*
Burrowing Owl[BCC]	*Athene cunicularia*
Long-eared Owl	*Asio otus*
Short-eared Owl[BCC AY]	*Asio flammeus*
Order Caprimulgiformes - Goatsuckers	
Lesser Nighthawk	*Chordeiles acutipennis*
Common Nighthawk	*Chordeiles minor*
Order Apodiformes - Swifts	
Black Swift[BCC AY]	*Cypseloides niger*
Chimney Swift[4,6]	*Chaetura pelagica*
White-throated Swift	*Aeronautes saxatilis*
Order Coraciiformes - Kingfishers	
Belted Kingfisher[1]	*Ceryle alcyon*
Order Piciformes - Woodpeckers	
Lewis's Woodpecker[BCC AR 6]	*Melanerpes lewis*
Red-headed Woodpecker[AY 2,6]	*Melanerpes erythrocephalus*
Acorn Woodpecker[2,6]	*Melanerpes formicivorus*
Gila Woodpecker[ST 6]	*Melanerpes uropygialis*
Williamson's Sapsucker[BCC 6]	*Sphyrapicus thyroideus*
Yellow-bellied Sapsucker[2,6]	*Sphyrapicus varias*
Red-naped Sapsucker[2,6]	*Sphyrapicus nuchalis*
Ladder-backed Woodpecker[2,6]	*Picoides scalaris*
Downy Woodpecker[2,6]	*Picoides pubescens*
Hairy Woodpecker[2,6]	*Picoides villosus*
Amer. Three-toed Woodpecker[6]	*Picoides dorsalis*
Northern Flicker[2,6]	*Colaptes auratus*
Order Passeriformes – Perching Birds	
Family Tyrannidae - Flycatchers	
Eastern Phoebe	*Sayornis phoebe*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Cassin's Kingbird	*Tyrannus vociferans*
Western Kingbird	*Tyrannus verticalis*
Eastern Kingbird	*Tyrannus tyrannus*
Scissor-tailed Flycatcher	*Tyrannus forficatus*

Family Laniidae - Shrikes	
Loggerhead Shrike[BCC]	*Lanius ludovicianus*
Northern Shrike	*Lanius excubitor*
Family Corvidae – Crows & Jays	
Steller's Jay[4,6]	*Cyanocitta stelleri*
Blue Jay[2,4,5,6]	*Cyanocitta cristata*
Western Scrub-Jay[4]	*Aphelocoma californica*
Pinyon Jay[BCC AY]	*Gymnorhinus cyanocephalus*
Clark's Nutcracker	*Nucifraga columbiana*
Black-billed Magpie[2,3,4,5,6]	*Pica hudsonia*
American Crow[2,3,4,6]	*Corvus brachyrhynchos*
Chihuahuan Raven[2,3,4,5,6]	*Corvus cryptoleucus*
Common Raven[2,3,4,5,6]	*Corvus corax*
Family Alaudidae - Larks	
Horned Lark[2]	*Eremophila alpestris*
Family Hirundinidae - Swallows	
Purple Martin[6]	*Progne subis*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Bank Swallow	*Riparia riparia*
Cliff Swallow[6]	*Petrochelidon pyrrhonota*
Cave Swallow[6]	*Petrochelidon fulva*
Barn Swallow[3,6]	*Hirundo rustica*
Family Muscicapidae – Robins & Thrushes	
American Robin[2,4]	*Turdus migratorius*
Family Mimidae – Mockingbirds & Thrashers	
Northern Mockingbird[4]	*Mimus polyglottos*
Bendire's Thrasher[BCC AR]	*Toxostoma bendirei*
Curve-billed Thrasher	*Toxostoma curvirostre*
Family Sturnidae - Starlings	
European Starling[2,3,4,5,6]	*Sturnus vulgaris*
Family Motacillidae - Pipits	
American Pipit	*Anthus rubescens*
Sprague's Pipit[BCC AY]	*Anthus spragueii*
Family Bombycillidae - Waxwings	
Cedar Waxwing[2]	*Bombycilla cedrorum*
Family Emberizidae –Towhees & Sparrows	
White-crowned Sparrow[2,6]	*Zonotrichia leucophrys*
McCown's Longspur[BCC]	*Calcarius mccownii*
Family Cardinalidae – Cardinals, Grosbeaks, & Buntings	
Northern Cardinal[4]	*Cardinalis cardinalis*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Family Icteridae – Blackbirds, Meadowlarks, & Orioles	
Red-winged Blackbird[2,3,4,6]	*Agelaius phoeniceus*
Eastern Meadowlark	*Sturnella magna*
Western Meadowlark	*Sturnella neglecta*
Yellow-headed Blackbird[2,3]	*Xanthocephalus xanthocephalus*
Rusty Blackbird[AY 4,6]	*Euphagus carolinus*
Brewer's Blackbird[2,3,4,6]	*Euphagus cyanocephalus*
Common Grackle[2,3,4,6]	*Quiscalus quiscula*
Great-tailed Grackle[2,3,4,6]	*Quiscalus mexicanus*
Bronzed Cowbird[2,3]	*Molothrus aeneus*
Brown-headed Cowbird[2,3,4,5,6]	*Molothrus ater*
Bullock's Oriole	*Icterus bullockii*
Scott's Oriole	*Icterus parisorum*
Family Fringillidae - Finches	
Cassin's Finch[6]	*Carpodacus cassinii*
House Finch[2,4,,6]	*Carpodacus mexicanus*
Red Crossbill[2]	*Loxia curvirostra*
Lesser Goldfinch[2]	*Carduelis psaltria*
American Goldfinch[2]	*Carduelis tristis*
Evening Grosbeak	*Coccothraustes vespertinus*
Family Passeridae – Old World Sparrows	
House Sparrow[2,3,4,6]	*Passer domesticus*

F = Federal S = State
E = Endangered T = Threatened C = Candidate
BCC = Birds of Conservation Concern (USFWS 2002
AY/AR - Audubon's Watch List (NAS 2007) Yellow/Red Species where Yellow = Concern, Red = High Concern

1 = Aquaculture; 2 = Crops; 3 = Livestock and feed; 4= Human Health and Safety; 5 = Natural resources; 6 = Property
* Gould's Wild Turkey (*M. g. mexicana*)

Table C2. Common and scientific names are given for the 137 bird species commonly occurring in New Mexico that have little or no potential to be the target of a WS BDM project including BDM projects at airports because these species are mostly limited in their distribution in New Mexico, not associated with any type of damage, and are typically not found in habitat associated with areas of potential damage (e.g., urban areas, croplands, airport operating areas). Thus, WS does not anticipate that it will conduct BDM for these species, but the possibility could always arise. Shaded species are rare in New Mexico.

Species	*Scientific Name*
White-tailed Ptarmigan [SE]	*Lagopus leucura*
Dusky Grouse	*Dendragapus obscurus*
Lesser Prairie-Chicken[FC]	*Tympanuchus pallidicinctus*
Scaled Quail [AY]	*Callipepla squamata*
Montezuma Quail [AY]	*Cyrtonyx montezumae*
Virginia Rail	*Rallus limicola*
Sora	*Porzana carolina*
Yellow-billed Cuckoo[FC]	*Coccyzus americanus*
Flammulated Owl[BCC AY]	*Otus flammeolus*
Western Screech-Owl	*Megascops kennicottii*
Whiskered Screech-Owl[ST BCC]	*Megascops trichopsis*
Northern Pygmy-Owl	*Glaucidium gnoma*
Elf Owl [BCC AY]	*Micrathene whitneyi*
Spotted Owl[FT]	*Strix occidentalis*
Boreal Owl[ST]	*Aegolius funereus*
Northern Saw-whet Owl	*Aegolius acadicus*
Common Poorwill	*Phalaenoptilus nuttallii*
Whip-poor-will	*Caprimulgus vociferus*
Black-chinned Hummingbird	*Archilochus alexandri*
Calliope Hummingbird [AY]	*Stellula calliope*
Broad-tailed Hummingbird	*Selasphorus platycercus*
Rufous Hummingbird	*Selasphorus rufus*
Olive-sided Flycatcher [AY]	*Contopus cooperi*
Western Wood-Pewee	*Contopus sordidulus*
Willow Flycatcher [F/SE*]	*Empidonax traillii*
Least Flycatcher	*Empidonax minimus*
Hammond's Flycatcher	*Empidonax hammondii*
Gray Flycatcher	*Empidonax wrightii*
Dusky Flycatcher	*Empidonax oberholseri*
Cordilleran Flycatcher	*Empidonax occidentalis*
Black Phoebe	*Sayornis nigricans*
Vermillion Flycatcher	*Pyrocephalus rubinus*
Bell's Vireo [ST BCC AR]	*Vireo bellii*
Gray Vireo [ST BCC AY]	*Vireo vicinior*
Plumbeous Vireo	*Vireo plumbeus*
Cassin's Vireo	*Vireo cassinii*
Hutton's Vireo	*Vireo huttoni*
Warbling Vireo	*Vireo gilvus*
Red-eyed Vireo	*Vireo olivaceus*
Black-capped Chickadee	*Poecile atricapillus*
Mountain Chickadee	*Poecile gambeli*
Bridled Titmouse	*Baeolophus wollweberi*
Juniper Titmouse	*Baeolophus ridgwayi*
Verdin	*Auriparus flaviceps*
Bushtit	*Psaltriparus minimus*
Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta carolinensis*
Pygmy Nuthatch	*Sitta pygmaea*
Brown Creeper	*Certhia americana*
Cactus Wren	*Campylorhynchus brunneicapillus*
Rock Wren	*Salpinctes obsoletus*
Canyon Wren	*Catherpes mexicanus*
Bewick's Wren	*Thryomanes bewickii*
House Wren	*Troglodytes aedon*
Winter Wren	*Troglodytes troglodytes*
Marsh Wren	*Cistothorus palustris*
American Dipper	*Cinclus mexicanus*
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Regulus calendula*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Black-tailed Gnatcatcher	*Polioptila melanura*
Eastern Bluebird	*Sialia sialis*
Western Bluebird	*Sialia mexicana*
Mountain Bluebird	*Sialia currucoides*
Townsend's Solitaire	*Myadestes townsendi*
Veery	*Catharus fuscescens*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
Gray Catbird	*Dumetella carolinensis*
Sage Thrasher	*Oreoscoptes montanus*
Crissal Thrasher [BCC]	*Toxostoma crissale*
Phainopepla	*Phainopepla nitens*
Orange-crowned Warbler	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
Virginia's Warbler[BCC AY]	*Vermivora virginiae*
Lucy's Warbler [AY]	*Vermivora luciae*
Yellow Warbler	*Dendroica petechia*
Chestnut-sided Warbler	*Dendroica pensylvanica*
Black-throated Blue Warbler	*Dendroica caerulescens*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Gray Warbler [BCC]	*Dendroica nigrescens*
Townsend's Warbler	*Dendroica townsendi*
Grace's Warbler[BCC AY]	*Dendroica graciae*
Black-and-white Warbler	*Mniotilta varia*
American Redstart	*Setophaga ruticilla*
Ovenbird	*Seiurus aurocapillus*
Northern Waterthrush	*Seiurus noveboracensis*
MacGillivray's Warbler	*Oporornis tolmiei*
Common Yellowthroat	*Geothlypis trichas*
Wilson's Warbler	*Wilsonia pusilla*
Red-faced Warbler[BCC AY]	*Cardellina rubrifrons*
Painted Redstart	*Myioborus pictus*
Yellow-breasted Chat	*Icteria virens*
Hepatic Tanager	*Piranga flava*
Summer Tanager	*Piranga rubra*
Western Tanager	*Piranga ludoviciana*
Green-tailed Towhee	*Pipilo chlorurus*
Spotted Towhee	*Pipilo maculatus*
Canyon Towhee	*Pipilo fuscus*
Abert's Towhee[ST AY]	*Pipilo aberti*
Cassin's Sparrow[BCC]	*Aimophila cassinii*
Rufous-crowned Sparrow	*Aimophila ruficeps*
American Tree Sparrow	*Spizella arborea*
Chipping Sparrow	*Spizella passerina*
Clay-colored Sparrow	*Spizella pallida*
Brewer's Sparrow [AY]	*Spizella breweri*
Field Sparrow	*Spizella pusilla*
Black-chinned Sparrow[BCC AR]	*Spizella atrogularis*
Vesper Sparrow	*Pooecetes gramineus*
Lark Sparrow	*Chondestes grammacus*
Black-throated Sparrow	*Amphispiza bilineata*
Sage Sparrow[BCC AY]	*Amphispiza belli*
Lark Bunting[BCC AY]	*Calamospiza melanocorys*
Savannah Sparrow	*Passerculus sandwichensis*
Grasshopper Sparrow[SE]	*Ammodramus savannarum*

Baird's Sparrow[ST]	*Ammodramus bairdii*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
Swamp Sparrow	*Melospiza georgiana*
White-throated Sparrow	*Zonotrichia albicollis*
Harris's Sparrow	*Zonotrichia querula*
Dark-eyed Junco	*Junco hyemalis*
Chestnut-collared Longspur[BCC]	*Calcarius ornatus*
Pyrrhuloxia	*Cardinalis sinuatus*
Blue Grosbeak	*Passerina caerulea*
Lazuli Bunting	*Passerina amoena*
Indigo Bunting	*Passerina cyanea*
Varied Bunting[ST]	*Passerina versicolor*
Painted Bunting[BCC]	*Passerina ciris*
Orchard Oriole	*Icterus spurius*
Hooded Oriole [BCC]	*Icterus cucullatus*
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*
Black Rosy-Finch[AY]	*Leucosticte atrata*
Brown-capped Rosy-Finch [AY]	*Leucosticte australis*
Pine Grosbeak	*Pinicola enucleator*
Pine Siskin	*Carduelis pinus*

F = Federal S = State
E = Endangered T = Threatened C = Candidate
BCC = Birds of Conservation Concern (USFWS 2002
AY/AR - Audubon's Watch List (NAS 2007) Yellow/Red Species where Yellow = Concern, Red = High Concern
*Southwestern Willow Flycatcher (*E. t. extimus*)

Table C3. Common and scientific names are given for the 185 bird species that are infrequently or accidentally seen in New Mexico (does not include extinct or extirpated species). Most of the following species have been designated by NMOS (2007) as review species because they have been documented to occur in New Mexico only a few times. Some of these species have the potential of being the focus of a BDM project. Shaded species will not be or are not likely to ever be involved in a BDM project. These species are not discussed in the EA because they occur so infrequently or in such remote areas on the border, especially southwest New Mexico, that it is highly unlikely in any given span of years that these would be the focus of a single BDM project. These are given to let the reader know that WS is aware of the other species potentially present in New Mexico.

Species	*Scientific Name*
Black-bellied Whistling-Duck	*Dendrocygna autumnalis*
Fulvous Whistling-Duck	*Dendrocygna bicolor*
Brant	*Branta bernicla*
Trumpeter Swan [AY]	*Cygnus buccinator*
Eurasian Wigeon#	*Anas penelope*
Garganey	*Anas querquedula*
Greater Scaup#	*Aythya marila*
Harlequin Duck	*Histrionicus histrionicus*
Surf Scoter	*Melanitta perspicillata*
White-winged Scoter	*Melanitta fusca*
Black Scoter	*Melanitta nigra*
Long-tailed Duck#	*Clangula hyemalis*
Barrow's Goldeneye#	*Bucephala islandica*
Red-breasted Merganser#	*Mergus serrator*
Red-throated loon	*Gavia stellata*
Pacific Loon#	*Gavia pacifica*
Yellow-billed Loon [AY]	*Gavia adamsii*
Red-necked Grebe	*Podiceps grisegena*
Least Storm-Petrel [AR]	*Oceanodroma* microsoma
Brown Pelican[F/SE]#	*Pelecanus occidentalis*
Anhinga	*Anhinga anhinga*
Magnificent Frigatebird [AR]	*Fregata magnificens*
Little Blue Heron#	*Egretta caerulea*
Tricolored Heron#	*Egretta tricolor*
Reddish Egret [AR]	*Egretta rufescens*
Yellow-crowned Night-Heron	*Nyctanassa violacea*
White Ibis	*Eudocimus albus*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Wood Stork	*Mycteria americana*
Black Vulture	*Coragyps atratus*
Swallow-tailed Kite [AY]	*Elanoides forficatus*
White-tailed Kite#	*Elanus leucurus*
Red-shouldered Hawk	*Buteo lineatus*
Broad-winged Hawk#	*Buteo platypterus*
Gray Hawk[BCC]	*Buteo nitidus*
Short-tailed Hawk	*Buteo brachyurus*
Crested Caracara	*Caracara cheriway*
Aplomado Falcon[F/SE]	*Falco femoralis*
Yellow Rail [AR]	*Coturnicops noveboracensis*
King Rail [AY]	*Rallus elegans*
Purple Gallinule	*Porphyrula martinica*
Black-bellied Plover#	*Pluvialis squatarola*
American Golden-Plover [AY]	*Pluvialis dominica*
Piping Plover[FE/ST]	*Charadrius melodus*
Wandering Tattler [AY]	*Tringa incana*
Whimbrel	*Numenius phaeopus*
Hudsonian Godwit [AY]	*Limosa haemastica*
Ruddy Turnstone	*Arenaria interpres*
Red Knot [AY]	*Calidris canutus*
Little Stint	*Calidris minuta*
White-rumped Sandpiper [AY]#	*Calidris fuscicollis*
Pectoral Sandpiper#	*Calidris melanotos*
Sharp-tailed Sandpiper	*Calidris acuminata*
Curlew Sandpiper	*Calidris ferruginea*
Buff-breasted Sandpiper [AR]	*Tryngites subruficollis*
Ruff	*Philomachus pugnax*
Short-billed Dowitcher	*Limnodromus griseus*
American Woodcock	*Scolopax minor*
Red Phalarope	*Phalaropus fulicarius*
Laughing Gull	*Larus atricilla*
Little Gull	*Larus minutus*
Heerman's Gull [AY]	*Larus heermanni*
Mew Gull	*Larus canus*
Thayer's Gull [AY]	*Larus thayeri*
Lesser Black-backed Gull	*Larus fuscus*
Western Gull	*Larus occidentalis*
Glaucous-winged Gull	*Larus glaucescens*
Glaucous Gull	*Larus hyperboreus*
Sabine's Gull#	*Xema sabini*
Black-legged Kittiwake	*Rissa tridactyla*
Caspian Tern#	*Hydroprognea caspia*
Arctic Tern	*Sterna paradisaea*
Royal Tern	*Thalasseus maximus*
Elegant Tern [AY]	*Thalasseus elegans*
Black Skimmer [AY]	*Rhynchops niger*
Pomarine Jaeger	*Stercorarius pomarinus*
Parasitic Jaeger	*Stercorarius parasiticus*
Long-tailed Jaeger	*Stercorarius longicaudus*
Ancient Murrelet [AY]	*Synthliboramphus antiquus*
Ruddy Ground-Dove	*Columbina talpacoti*
Black-billed Cuckoo#	*Coccyzus erythropthalmus*
Groove-billed Ani	*Crotophaga sulcirostris*
Eastern Screech-Owl	*Megascops asio*
Barred Owl	*Strix varia*
Chuck-will's-widow	*Caprimulgus carolinensis*
Buff-collared Nightjar[SE]	*Caprimulgus ridgwayi*
Green Violet-ear	*Colibri thalassinus*
Broad-billed Hummingbird[ST BCC] #	*Cynanthus latirostris*
White-eared Hummingbird[ST]	*Hylocharis leucotis*
Berylline Hummingbird	*Amazilia beryllina*

Cinnamon Hummingbird	*Amazilia rutila*
Violet-crowned Hummingbird [ST]#	*Amazilia violaceps*
Blue-throated Hummingbird[AY]#	*Lampornis clemenciae*
Magnificent Hummingbird#	*Eugenes fulgens*
Lucifer Hummingbird[ST BCC]#	*Calothorax lucifer*
Ruby-throated Hummingbird	*Archilochus colubris*
Anna's Hummingbird#	*Calypte anna*
Costa's Hummingbird [ST BCC AY] #	*Calypte costae*
Allen's Hummingbird [AY]	*Selasphorus sasin*
Elegant Trogon[SE BCC AY]#	*Trogon elegans*
Red-bellied Woodpecker	*Melanerpes carolinus*
Arizona Woodpecker[BCC AY]#	*Picoides arizonae*
Northern Beardless-Tyrannulet[SE BCC] #	*Camptostoma imberbe*
Greater Pewee [BCC] #	*Contopus pertinax*
Eastern Wood-Pewee	*Contopus virens*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Acadian Flycatcher	*Empidonax virescens*
Pacific-slope Flycatcher	*Empidonax difficilis*
Buff-breasted Flycatcher [BCC]	*Empidonax fulvifrons*
Dusky-capped Flycatcher#	*Myiarchus tuberculifer*
Great Crested Flycatcher#	*Myiarchus crinitus*
Brown-crested Flycatcher#	*Myiarchus tyrannulus*
Great Kiskadee	*Pitangus sulphuratus*
Sulphur-bellied Flycatcher	*Myiodynastes luteiventris*
Piratic Flycatcher	*Legatus leucophaius*
Couch's Kingbird	*Tyrannus couchii*
Thick-billed Kingbird[SE AY] #	*Tyrannus crassirostris*
White-eyed Vireo	*Vireo griseus*
Black-capped Vireo[FE]	*Vireo atricapillus*
Yellow-throated Vireo	*Vireo flavifrons*
Blue-headed Vireo	*Vireo solitarius*
Philadelphia Vireo	*Vireo philadelphicus*
Yellow-green Vireo	*Vireo flavoviridis*
Gray Jay #	*Perisoreus canadensis*
Mexican Jay#	*Aphelocoma ultramarina*
Mexican Chickadee[AY]#	*Poecile sclateri*
Carolina Wren	*Thryothorus ludovicianus*
Sedge Wren	*Cistothorus platensis*
Gray-cheeked Thrush	*Catharus mimimus*
Wood Thrush[AY]	*Hylocichla mustelina*
Clay-colored Robin	*Turdus grayi*
Rufous-backed Robin	*Turdus rufopalliatus*
Varied Thrush[AY]	*Ixoreus naevius*
Brown Thrasher#	*Toxostoma rufum*
Long-billed Thrasher	*Toxostoma longirostre*
White Wagtail	*Motacilla alba*
Bohemian Waxwing	*Bombycilla garrulus*
Olive Warbler [BCC] #	*Peucedramus taeniatus*
Blue-winged Warbler[AY]	*Vermivora pinus*
Golden-winged Warbler [AR]	*Vermivora chrysoptera*
Tennessee Warbler	*Vermivora peregrina*
Northern Parula#	*Parula americana*
Magnolia Warbler	*Dendroica magnolia*
Cape May Warbler	*Dendroica tigrina*
Black-throated Green Warbler	*Dendroica virens*
Hermit Warbler #	*Dendroica occidentalis*
Blackburnian Warbler	*Dendroica fusca*
Yellow-throated Warbler	*Dendroica dominica*
Pine Warbler	*Dendroica pinus*
Prairie Warbler[AY]	*Dendroica discolor*
Palm Warbler	*Dendroica palmarum*
Bay-breasted Warbler[AY]	*Dendroica castanea*
Blackpoll Warbler	*Dendroica striata*
Cerulean Warbler[AY]	*Dendroica cerulea*
Prothonotary Warbler[AY]#	*Protonotaria citrea*
Worm-eating Warbler	*Helmitheros vermivorum*
Swainson's Warbler[AY]	*Limnothylpis swainsonii*
Louisiana Waterthrush	*Seiurus motacilla*
Kentucky Warbler[AY]	*Oporornis formosus*
Mourning Warbler	*Oporornis philadelphia*
Hooded Warbler#	*Wilsonia citrina*
Canada Warbler[AY]	*Wilsonia canadensis*

Slate-throated Redstart	*Myioborus miniatus*
Golden-crowned Warbler	*Basileuterus culicivorus*
Scarlet Tanager	*Piranga olivacea*
Eastern Towhee	*Pipilo erythrophthalmus*
Botteri's Sparrow [BCC] #	*Aimophila botterii*
Worthen's Sparrow	*Spizella wortheni*
Henslow's Sparrow[AR]	*Ammodramus henslowii*
Le Conte's Sparrow[AY]	*Ammodramus leconteii*
Nelson's Sharp-tailed Sparrow[AY]	*Ammodramus nelsoni*
Golden-crowned Sparrow#	*Zonotrichia atricapilla*
Yellow-eyed Junco[ST]#	*Junco phaeonotus*
Lapland Longspur#	*Calcarius lapponicus*
Snow Bunting	*Plectrophenax nivalis*
Yellow Grosbeak	*Pheucticus chrysopeplus*
Rose-breasted Grosbeak#	*Pheucticus ludovicianus*
Dickcissel#	*Spiza americana*
Bobolink	*Dolichonyx oryzivorus*
Streaked-backed Oriole	*Icterus pustulatus*
Baltimore Oriole	*Icterus galbula*
Purple Finch	*Carpodacus purpureus*
White-winged Crossbill	*Loxia leucoptera*
Lawrence's Goldfinch[AY]	*Carduelis lawrencei*

# - Rare species in New Mexico that are not NMOS review species, but restricted to small areas of the state or outside their normal range.
F = Federal S = State
E = Endangered T = Threatened C = Candidate
BCC = Birds of Conservation Concern (USFWS 2002)
AY/AR - Audubon's Watch List (NAS 2007) Yellow/Red Species where Yellow = Concern, Red = High Concern
Species not likely to cause damage are shaded

Table C4. Several species of waterfowl, gallinaceous birds, and parrots have been released into the wild from captivity and periodically are the focus of a BDM project (feral poultry) with the most prevalent species seen given. The most common species involved in feral poultry damage management projects are the domestic Mallard, Muscovy Duck, Greylag and Chinese Goose, peafowl, and feral chickens. Several other species of birds escape from private collections and have the possibility of being seen and the focus of a BDM project.

Species	*Scientific Name*
Domestic Greylag Goose	*Anser anser*
Domestic Swan (Chinese) Goose	*Anser cygnoides*
Barnacle Goose	*Branta leucopsis*
Mute Swan	*Cygnus olor*
Domestic Mallard	*Anas platyrhynchos*
Domestic Muscovy Duck	*Cairina moschata*
Indian Peafowl	*Pavo cristatus*
Green Peafowl	*Pavo muticus*
Helmeted Guineafowl	*Numida meleagris*
Feral Chicken (Red Junglefowl)	*Gallus gallus*
Monk Parakeet	*Myiopsitta monachus*