

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

ENVIRONMENTAL ASSESSMENT

For the

Statewide
Bird Damage Management
In Missouri

Prepared by:

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TABLE OF CONTENTS

1.0 Chapter 1: PURPOSE AND NEED FOR ACTION

- 1.1 Introduction
- 1.2 Purpose
- 1.3 Need for Action
 - 1.3.1 Summary of Proposed Action
 - 1.3.2 Objective for the Wildlife Services BDM Program within MO
 - 1.3.3 Need for Bird Damage Management to Protect Property
 - 1.3.4 Need for Bird Damage Management to Protect Human Health and Safety
 - 1.3.5 Need for Bird Damage Management to Protect Crops
 - 1.3.6 Need for Bird Damage Management caused by Canada and Snow Geese
 - 1.3.7 Need for Bird Damage Management to Protect Aquaculture
 - 1.3.8 Need for Bird Damage Management to Protect Livestock
- 1.4 Current and Projected Work
- 1.5 Relationship of the Environmental Assessment to other Environmental Documents
- 1.6 Decision to be made
- 1.7 Scope of the Environmental Assessment Analysis
 - 1.7.1 Actions Analyzed
 - 1.7.2 Period for Which this EA is Valid
 - 1.7.3 Site Specificity
 - 1.7.4 Public Involvement/Notification
- 1.8 Authority and Compliance
 - 1.8.1 Authority of Federal and State Agencies in Wildlife Damage Management on MO Airports
 - 1.8.1.1 WS Legislative Mandate
 - 1.8.1.2 U.S. Fish and Wildlife Service (USFWS)
 - 1.8.1.3 Missouri Department of Conservation Legislative Mandate
 - 1.8.1.4 Missouri Department Of Agriculture
 - 1.8.2 Compliance with other Federal Laws
 - 1.8.2.1 National Environmental Policy Act (NEPA)
 - 1.8.2.2 Endangered Species Act (ESA)
 - 1.8.2.3 Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711' 40 Stat. 755), as amended
 - 1.8.2.4 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
 - 1.8.2.5 National Historic Preservation Act (NHPA) of 1966 as amended
 - 1.8.2.6 Environmental Justice and Executive Order 12898- "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."
 - 1.8.2.7 Protection of Children from Environmental Health and Safety Risks (Executive Order 13045)
 - 1.8.2.8 Executive Order 13112 – Invasive Species
 - 1.8.2.9 Occupational Safety and Health Act of 1970
 - 1.8.2.10 The Clean Water Act
 - 1.8.3 Compliance with other State Laws.
 - 1.8.3.1 Owner May Protect Property 3CSR10-4.130

2.0 Chapter 2- Issues

- 2.1 Affected Environment
- 2.2 Issues
 - 2.2.1 Effects on Target Wildlife Species Populations
 - 2.2.2 Effects on Non-target Species populations, including T&E Species

- 2.2.3 Economic Losses to Property as a Result of Bird Damage
- 2.2.4 Effects on Human Health and Safety
 - 2.2.4.1 Safety and efficacy of chemical control methods
 - 2.2.4.2 Impacts on Human safety of non-chemical BDM methods
 - 2.2.4.3 Effects on Human Health and Safety from not Conducting BDM to Reduce Human/Aggressive Bird Confrontations, Disease Threats or Outbreaks
- 2.2.5 Effects on Aesthetics
 - 2.2.5.1 Effects on Human Affectionate-Bond with Individual animals and on Aesthetic Values of Wildlife species
 - 2.2.5.2 Effects on Aesthetic Values of Property Damaged by Birds
- 2.2.6 Humanness and Animal Welfare Concerns of Lethal Methods Used by WS.
- 2.3 Issues Considered But Not in Detail with Rationale
 - 2.3.1 Appropriateness of Preparing an EA for Such a Large Area
 - 2.3.2 WS Impacts on Biodiversity
 - 2.3.3 Wildlife Damage is a Cost of Doing Business
 - 2.3.4 Wildlife Damage Management Should Not Occur at Taxpayer Expense, But Should be Fee Based.
 - 2.3.5 Lethal BDM for Blackbirds and Starlings is futile Because 50-60% of Them Die Each Year Anyway
 - 2.3.6 Cost Effectiveness of BDM
- 3.0 Chapter 3: Alternative Including the Proposed Action
 - 3.1 Description of the Alternatives
 - 3.1.1 Alternative 1- Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 3.1.2 Alternative 2- Non-lethal BDM Only By WS
 - 3.1.3 Alternative 3- Lethal BDM Only by WS
 - 3.1.4 Alternative 4- No Federal WS BDM
 - 3.2 BDM Strategies and Methodologies Available to WS
 - 3.2.1 Integrated Wildlife Damage Management (IWDM)
 - 3.2.2 Technical Assistance Recommendations
 - 3.2.3 Direct Damage Management Assistance
 - 3.2.4 WS Decision-Making
 - 3.2.5 Wildlife Damage Management Methods
 - 3.2.5.1 Non-chemical, Non-lethal Methods
 - 3.2.5.2 Chemical, Non-lethal Methods
 - 3.2.5.3 Mechanical, Lethal Methods
 - 3.2.5.4 Chemical, Lethal Methods
 - 3.2.6 Examples of WS Operational Technical Assistance in BDM in MO
 - 3.3 Alternatives Considered But Not Analyzed in Detail with Rationale
 - 3.3.1 Technical Assistance Only
 - 3.3.2 Compensation for Bird Damage Loss
 - 3.3.3 Short Term Eradication and Long Term Population Suppression
 - 3.4 Mitigation and Standard Operation Procedures for Wildlife Damage Management Techniques
 - 3.4.1 Mitigation in Standard Operation Procedures (SOP)
- 4 Chapter 4: Environmental Consequences
 - 4.1 Environmental Consequences for Issues Analyzed in Detail
 - 4.1.1 Effects on Target Species Wildlife Populations
 - 4.1.1.1 Alternative 1 – Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.1.2 Alternative 2 – Non-lethal BDM Only by WS
 - 4.1.1.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.1.4 Alternative 4 –No Federal WS BDM

- 4.1.2 Effects on Non-target Species Populations, including Threatened and Endangered Species.
 - 4.1.2.1 Alternative 1- Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.2.2 Alternative 2- Non-lethal BDM Only by WS
 - 4.1.2.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.2.4 Alternative 4 – No Federal WS BDM
- 4.1.3 Economic Losses to Property as a Result of Wildlife Damage
 - 4.1.3.1 Alternative 1 – Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.3.2 Alternative 2- Non-lethal BDM Only by WS
 - 4.1.3.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.3.4 Alternative 4- No Federal WS BDM
- 4.1.4 Effects on Human Health and Safety
 - 4.1.4.1 Impacts of chemical BDM methods on human health
 - 4.1.4.1.1 Alternative 1 – Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.4.1.2 Alternative 2- Non-lethal BDM Only by WS
 - 4.1.4.1.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.4.1.4 Alternative 4- No Federal WS BDM
 - 4.1.4.2 Impacts on human safety of non-chemical methods
 - 4.1.4.2.1 Alternative 1 – Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.4.2.2 Alternative 2- Non-lethal BDM Only by WS
 - 4.1.4.2.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.4.2.4 Alternative 4- No Federal WS BDM
 - 4.1.4.3 Effects on Human Health and Safety From Not Conducting BDM to Reduce Human/Aggressive Bird Confrontations, Disease Threats or Outbreaks
 - 4.1.4.3.1 Alternative 1 – Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.4.3.2 Alternative 2- Non-lethal BDM Only by WS
 - 4.1.4.3.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.4.3.4 Alternative 4- No Federal WS BDM
- 4.1.5 Effects on Aesthetics
 - 4.1.5.1 Effects on Human Affectionate-Bonds with Individual Animals and on Aesthetic Values of Wildlife Species
 - 4.1.5.1.1 Alternative 1 – Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.5.1.2 Alternative 2- Non-lethal BDM Only by WS
 - 4.1.5.1.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.5.1.4 Alternative 4- No Federal WS BDM
 - 4.1.5.2 Effects on Aesthetic Values of Property Damage by Birds
 - 4.1.5.2.1 Alternative 1 – Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.5.2.2 Alternative 2- Non-lethal BDM Only by WS
 - 4.1.5.2.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.5.2.4 Alternative 4- No Federal WS BDM
- 4.1.6 Humanness and Welfare Concerns of Lethal Methods Used By WS
 - 4.1.6.1 Alternative 1 –Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action)
 - 4.1.6.2 Alternative 2- Non-lethal BDM Only by WS
 - 4.1.6.3 Alternative 3- Lethal BDM Only by WS
 - 4.1.6.4 Alternative 4- No Federal WS BDM

4.2 Cumulative Impacts

Appendix A	Literature Cited
Appendix B	Bird Damage Management Methods Available for Use or Recommendations by the Missouri Wildlife Services Program
Appendix C	List of Consulting People, Reviewer and Prepares

List Of Acronyms

A-C	Alpha-Chloralose
ADC	Animal Damage Control
APHIS	Animal Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BDM	Bird Damage Management
BBS	Breeding Bird Survey
CFR	Code of Federal Regulations
CY	Calendar Year
EA	Environmental Assessment
EEE	Eastern Equine Encephalomyelitis
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EPP	Eastern Prairie Population
ESA	Endangered Species Act
FAA	Federal Aviation Agency
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	Fiscal Year
HSUS	Humane Society of the United States
IWDM	Integrated Wildlife Damage Management
MASS	Missouri Agriculture Statistics Service
MBTA	Migratory Bird Treaty Act
MDA	Missouri Department of Agriculture
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
MIS	Management Information System
MOU	Memorandum of Understanding
NASS	National Agriculture Statistics Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWRC	National Wildlife Research Center
OSHA	Occupational Safety and Health Administration
SOP	Standard Operating Procedure
TA	Technical Assistance
T&E	Threatened and Endangered
USDA	United States Department of Agriculture
USDI	U.S. Department of Interior
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Services
WS	Wildlife Services

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 Introduction

The United States Department of Agriculture (USDA) is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services (WS) program is the Act of March 2, 1931, as amended (7 U.S. C. 426-426c; 46 Stat. 1468) and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (P.L. 100-202). WS activities are conducted in cooperation with other federal, state and local agencies; and private organizations and individuals. Federal agencies, including the United States Department of Interior, Fish and Wildlife Service, recognize the expertise of WS to address wildlife damage issues related to migratory birds.

Wildlife damage management, or control, is defined as the alleviation of damage or other problems caused by or related to the presence of wildlife. It is an integral component of wildlife management (Leopold 1933, the Wildlife Society 1990, Berryman 1991). The WS program uses an Integrated Wildlife Damage Management (IWDM) approach (sometimes referred to as Integrated Pest Management or IPM) in which a combination of methods may be used or recommended to reduce wildlife damage. IWDM is described in Chapter 1, 1-7 of The Animal Damage Control Program Final Environmental Impact Statement (USDA 1997). These methods include the alteration of cultural practices as well as habitat and behavioral modification to prevent damage. The control of wildlife damage may also require that the offending animal(s) be removed or that populations of the offending species are reduced through lethal methods.

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

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

This Environmental Assessment (EA) evaluates ways by which this responsibility can be carried out to resolve conflicts associated with birds in the State of Missouri.

WS is a cooperatively funded and service oriented program. Before any operational wildlife damage management is conducted, WS and the land owner/administrator must complete Agreements for Control or WS Work Plans. 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.

Individual actions on the types of sites encompassed by this analysis may be categorically excluded under the APHIS Implementing Regulations for compliance with the National Environmental Policy Act (NEPA) (7 CFR 372.5(c)). APHIS Implementing Regulations also provide that all technical assistance furnished by WS is categorically excluded (7 CFR 372.5(c)) (60 Federal Register 6,000, 6,003 (1995)). WS has decided to prepare this EA to assist in planning bird damage management (BDM) activities and to clearly communicate with the public the analysis of cumulative impacts for a number of issues of concern in relation to alternative means of meeting needs for such management within Missouri. This analysis covers WS's plans for current and future BDM actions wherever they might be requested for resolving bird conflicts in the state of Missouri.

This environmental assessment (EA) documents the analysis of the potential environmental effects of the proposed program. This analysis relies mainly on existing data contained in published documents, primarily the Animal Damage Control Final Environmental Impact Statement (USDA 1997) to which this EA is tiered. These WS

activities will be undertaken in compliance with relevant laws, regulations, policies, orders, and procedures including the Endangered Species Act.

1.2 Purpose

The purpose of this EA is to analyze the effects of WS activities in Missouri to manage damage caused by bird species or species groups that include, but are not necessarily limited to the following: red winged black birds (*Agelaius phoeniceus*), European starlings (*Sturnus vulgaris*), brown headed cowbirds (*Molothrus ater*), common grackles (*Quiscalus quiscula*), American crow (*Corvus brachyrhynchos*), rock dove (*Columba livia*), English house sparrows (*Passer domesticus*), Canada goose (*Branta Canadensis*), snow goose (*Chen caerulescens*), mallard (*Anas platyrhynchos*), ducks (family Anatidae, subfamily Anatinae) double crested cormorant (*Phalacrocorax auritus*), turkey vultures (*Cathartes aura*), northern flickers (*Colaptes auratus*), great blue heron (*Ardea herodias*), greenback heron (*Butorides striatus*), American white pelican (*Pelecanus erythrorhynchos*), great egret (*Casmerodius albus*), ring-billed gull (*Larus delawarensis*), herring gulls (*Larus argentatus*), ospreys (*Pandion haliaetu*), mourning dove (*Zenaida macroura*), red-tailed hawk (*Buteo jamaicensis*), great-horned owl (*Bubo virginianus*), American robins (*Turdus migratorius*) American goldfinch (*Carduelis tristis*), horned larks (*Eremophila aplestris*), meadow lark (*Sturnella* sp), swallows (family Hirundinidae) and woodpeckers (family Picidae).

Resources protected by such activities include property, crop damage, livestock, aquaculture, natural resources, and human health and safety.

1.3 Need For Action

1.3.1 Summary of Proposed Action

The proposed action is to continue the current portion of the WS program in Missouri that responds to requests for Bird Damage Management (BDM) to protect human health and safety, property, agricultural crops, turf, livestock feed, livestock, livestock health, threatened and endangered species, other wildlife and aquaculture in the state of Missouri. An Integrated Wildlife Damage Management (IWDM) approach would be implemented which would allow use of any legal technique or method (See Appendix B), used singly or in combination, to meet request or needs for resolving conflicts associated with birds on public and private property. Landowners or the agents requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Lethal methods used by WS would include shooting, trapping, egg addling/destruction, DRC-1339 (Starlicide, Avitrol), or euthanasia following live capture by trapping or use of the tranquilizer alpha-chloralose (A-C). Non-lethal methods used and/or recommended by WS may include habitat alteration, porcupine wire deterrents, wire barriers and deterrents, the tranquilizer A-C, chemical repellents (e.g., methyl anthranilate), wire barriers and deterrents, netting, and harassment and scaring devices. The implementation of non-lethal methods such as habitat alteration and exclusion-type barriers would be the responsibility of the landowner to implement. BDM by WS would be allowed at an affected site, when requested, where a need has been documented and upon completion of an Agreement for Control. All management actions would comply with appropriate federal, state, and local laws.

1.3.2 Objective for the Wildlife Services BDM Program in Missouri

A component of BDM in the MO WS program has the goal of minimizing loss or the risk of agricultural crops from birds across the state. 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 damage or the risk of damage to agriculture, aquaculture, other wildlife species, property, human health and safety, or other resources caused by birds. 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 control assistance in which professional WS Specialists conduct damage management actions.

1.3.3 Need for Bird Damage Management to Protect Property

Birds occasionally damage structures on private property or public facilities 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. Corrosion damage to metal structures and painted finishes, including those of aircraft and parked automobiles, can occur because of uric acid from bird droppings. Pigeons, starlings and house sparrows sometimes cause structural damage to the inside of hangers and buildings. These birds often roost or nest in the rafters of the buildings where they damage the insulation, and wiring. Also, birds build their nest in engines and other compartments of parked aircraft. Aircraft are damaged in Missouri as a result of bird aircraft strikes (USDA 2001). At power plants birds have been the cause of power outages and electrical fires. Persons and businesses concerned about these types of damage may request WS assistance. The total value of property damage by birds reported to WS in Missouri for the five-year period CY 97-01 was more than 2 million dollars, with the annual average being \$477,578. This included property damage reported for aircraft, residential and non-residential buildings, general property and other human property. (USDA-WS MIS Database).

Feral domestic and wild waterfowl sometimes congregate at golf courses, parks, other recreational areas and business complexes that have ponds or watercourses and cause damage by grazing on turf and by deposition of droppings. In Missouri, WS responded to 595 requests for assistance during CY 97-01 to address 1.8 million dollars in damaged caused by waterfowl. Damage included \$24,250 in damages at golf courses and \$35,870 in damages to other facilities (USDA WS MIS Database). Economic damages have been in the form of cleanup of parking lots, beaches, pools, sidewalks, patios, and lawns at business, residential and recreational locations. Members and the club's management were also concerned about possible health hazards from exposure to the droppings. WS has provided technical assistance to these facilities, and operational BDM to live capture and relocate offending waterfowl, as well as egg/nest destruction. WS could be requested to provide BDM assistance on any of these types or similar damage situations in the State.

1.3.4 Need for Bird Damage Management to Protect Human Health and Safety

Birds often pose risks to human health and safety when their populations reach relatively high numbers or then concentrate in a localized area. These risks include but are not limited to items such as transmission of diseases, injury or death to persons involved in wildlife/aircraft strikes and injury from aggressive behavior of birds.

1.3.4.1 Bird Damage Management to Protect Human Health and Safety

Bird/aircraft strikes are a common hazard when birds occupy the same space as aircraft. The risk of injury is great in these incidents and the loss of life has happened many times. At MO airports, these threats come in many shapes and sizes (USDA 2001). One airfield has also had a severe problem with blackbirds (red-winged blackbirds, European starlings, grackles, etc.) which have established a roost on or near the airfield. This roost has been estimated to exceed 250,000 birds. These large flocks of birds pose such risks to aircraft and the health and safety of pilots that there have been restrictions on the hours that flying is allowed. In addition to the threats to aircrews, MO landowners have requested assistance with feral domestic pigeon, American crows, nuisance blackbird or starling roost problems in relation to potential disease risks and the mess associated with droppings left by concentrations of birds is aesthetically displeasing and results in continual clean-up costs. Furthermore, MO WS has been working with the [REDACTED] to

monitor the presence and movement of wildlife born diseases and viruses such as St. Louis encephalitis and West Niles virus.

Feral domestic pigeons and starlings have been suspected in the transmission of 29 different diseases to humans, (Rid-A-Bird 1978, 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 trypanosomiasis and toxoplasmosis; and rickettsial/chlamydial diseases such as chlamydiosis and Q fever. As many as 65 different diseases transmittable to humans or domestic animals have been associated with pigeons, starlings, and English sparrows (Weber 1979). Table 1-1 shows the more typical diseases affecting humans that can be transmitted by pigeons, sparrows and starlings. 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. Thus, it is the risk of disease transmission that is the primary reason for requesting and conducting BDM. Situations in Missouri where the threat of disease associated with European starlings, feral domestic pigeon or English sparrow populations might occur could be:

- Exposure by the public to a feral domestic pigeons roost for several years.
- Disturbance of a large deposit of droppings in and on public buildings where a flock of feral domestic pigeons routinely roosts or nests.
- Accumulated dropping from roosting European starlings, feral domestic pigeons or English sparrows on structures at several industrial sites where employees must work in areas of accumulation.
- English sparrows or European starlings nesting or loafing around a food court area of a recreational facility or other site where humans eat in close proximity to concentrated numbers of these birds.
- English sparrows are known host the of St. Louis encephalitis and West Niles virus, which human infection is by mosquito,

Many times, individuals or property owners that request assistance with feral domestic pigeon, American crows 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 mess associated with droppings left by concentrations of birds is aesthetically displeasing and can result in continual clean-up costs. Under the proposed action, WS could agree to assist in resolving these types of problems.

WS could provide operation BDM involving virtually any bird species that poses a threat to human health and safety to any requester experiencing such damage anywhere in Missouri.

Table 1-1. Information on some diseases transmittable to humans and livestock that are associated with feral domestic pigeons, starlings, and English sparrows. Information taken from Weber (1979).

Disease	Human Symptoms	Effects on Domestic Animals	Potential for Human Fatality
Bacterial:			
Erysipeloid	Skin eruption with pain, itching; headaches, chills, joint pain, prostration, fever, vomiting	Serious hazard for the swine industry	Sometimes - particularly to young children, old or infirm people

Salmonellosis	Gastroenteritis, septicemia, persistent infection	Causes abortions in mature cattle, possible mortality in calves, decrease in milk production in dairy cattle	Possible, especially in individuals weakened by other disease or old age
Pasteurellosis	Respiratory infection, nasal discharge, conjunctivitis, bronchitis, pneumonia, appendicitis, urinary bladder inflammation, abscessed wound infections	May fatally affect chickens, turkeys and other fowl	Rarely
Listeriosis	Conjunctivitis, skin infections, meningitis in newborns, abortions, premature delivery, stillbirth	In cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles	Sometimes - particularly with newborns
Viral:			
Meningitis	Inflammation of membranes covering the brain, dizziness, and nervous movements	Causes middle ear infection in swine, dogs, and cats	possible — can also result as a secondary infection with listeriosis, salmonellosis, cryptococcosis
Encephalitis (7 forms)	Headache, fever, stiff neck, vomiting, nausea, drowsiness, disorientation	May cause mental retardation, convulsions and paralysis	Mortality rate for eastern equine encephalomyelitis may be around 60%
Mycotic (fungal):			
Aspergillosis	Affects lungs and broken skin, toxins poison blood, nerves, and body cells	Causes abortions in cattle	Not usually
Blastomycosis	Weight loss, fever, and cough, bloody sputum and chest pains.	Affects horses, dogs and cats	Rarely
Candidiasis	Infection of skin, fingernails, mouth, respiratory system, intestines, and argental tract	Causes mastitis, diarrhea, vaginal discharge and aborted fetuses in cattle	Rarely
Cryptococcosis	Lung infection, cough, chest pain, weight loss, fever or dizziness, also causes meningitis	Chronic mastitis in cattle, decreased milk flow and appetite loss	Possible especially with meningitis
Histoplasmosis	Pulmonary or respiratory disease. May affect vision	Actively grows and multiplies in soil and remains active long after birds have departed	Possible, especially in infants and young children or if disease disseminates to the blood and bone marrow
Protozoal:			
American trypanosomiasis	Infection of mucous membranes of eyes or nose, swelling	Caused by the conenose bug found on pigeons	Possible death in 2-4 weeks
Toxoplasmosis	Inflammation of the retina, headaches, fever, drowsiness, pneumonia, strabismus, blindness, hydrocephalus, epilepsy, and deafness	May cause abortion or still birth in humans, mental retardation	Possible
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	In cattle, may result in abortion, arthritis, conjunctivitis, and enteritis	Occasionally, restricted to old, weak or those with concurrent diseases
Q fever	Sudden pneumonitis, chills, fever, weakness,	May cause abortions in sheep	Possible

	severe sweating, chest pain, severe headaches and sore eyes	and goats	
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1.3.5 Need for BDM to Protect Crops

Birds often feed on grain crops prior to farmers harvesting crops with minimal effects to farmers. However, during migration periods flock sizes often increase to numbers in the hundred of thousands, and crop damage often occurs. Types of damage that occur from problem birds include consumption of grain seed, plant damage or destruction, seeds knocked from the plant and fecal contamination. Several studies have shown that blackbirds and European starlings can pose a great economic threat to agricultural producers (Besser et. al. 1968, Dolbeer et. al. 1978, Feare 1984). Fruit or nut crops, especially pecans, can be severely damaged by the songbirds (passerine family), blackbirds, and American crows. In CY97-01 WS has reported \$13,850 in damage to fruit and nut producers. One of many crops grown in Missouri is that of rice, which is farmed on some 205,000 acres annually. In 1997 Missouri rice farmers produced approximately 7.5 millions dollars in rice, of which 1.8 millions dollars was damaged or destroyed by birds. (USDA-NRC-RC&D 1997). This is roughly 24 percent of the annual yield. Other crops that have be damage by birds include wheat, milo and soybeans.

1.3.6 Need For BDM caused by Canada and Snow Geese

Canada goose populations are near record high numbers in Missouri with estimated resident populations of more that 50,000 in 2001 (MDC 2001 Humburg, Graber, Raedeke, and Brunet). Geese rely on a variety of agricultural crops such as wheat, corn and soybeans. These birds feed on waste grain in harvested fields during late fall and winter and little damages result from these activities. However, in addition to feeding on grain, young shoots of agricultural crops and grasses are favored by geese. As a result, feeding birds sometimes heavily damage winter wheat, early spring crops, and pasture lands. On the other hand, some information suggests that such damage may be partially offset by the effect that droppings left by these birds has on increasing the nitrogen content of crop soils and thus enhancing yields (Bell and Klimstra 1970). In the United States, legal hunting has proven successful in mitigating damage to crops in some instances (W.K. Pfeifer, 1983).

1.3.6.1 Management of Canada and Snow Goose Damage to Agricultural Resources

Canada geese are found in Missouri throughout the year and must constantly seek adequate food, while snow geese are present only during winter months and migratory seasons, and they cause damage to crops and pastures throughout the State. During CY 97-01 WS received 40 complaints of damage caused to agricultural resources by Canada and snow geese. The results of this damage was in excess of \$20,000 to crops. WS addresses most of these problems through technical assistance, which involves advice, and loaning of non-lethal birds scare equipment and materials. In some cases, the facility might need to obtain a depredation permit from the USFWS to kill a few of the birds to reinforce visual and noise harassment. Under the proposed action, WS could also be requested to provide on-site operational assistance involving the use of non-lethal and lethal means of resolving bird damage problems at these or similar facilities. Lethal methods would generally be restricted to taking only few birds to reinforce harassment.

1.3.6.2 Management of Canada and Snow Goose Damage to Property

Threats to property throughout Missouri have become an issue of concern. Geese pose threats and have caused damage to a multitude of resources, which include but are not limited to: gardens, golf courses, grasses and turf, beaches and recreation areas. During CY 97-01, WS received 278 complaints for \$1,714,220 in property damaged by Canada and snow geese. WS addresses most of these problems through technical assistance, which involves advices, and loaning of non-lethal birds scare equipment and materials. In some cases, the facility might need to obtain a depredation permit from the USFWS to kill a

limited number of the birds to reinforce visual and noise harassment. Under the proposed action, WS could also be requested to provide on-site operational assistance involving the use of non-lethal and lethal means of resolving bird damage problems at these or similar facilities. Lethal methods would be restricted to taking a limited number of birds permitted by the USFWS to reinforce harassment.

1.3.7 Need For BDM to Protect Aquaculture

Aquaculture in Missouri consists of both commercial fish production for the consumer market and by private industry and sport fish production in hatcheries operated by MDC and the USFWS. The commercial aquaculture industry is steadily growing in size and production. In 1998 Missouri had 49 aquaculture farms that generated 5.374 million dollar of income. In 2001, sixty-one aquaculture farms on 2,090 acres of land producing more than 7.364 million dollars in income (USDA-NASS 2001).

Some fish-eating birds such as various species of herons and egrets (order *Ciconiiformes*, family *Ardeidae*), double-crested cormorants (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), greenback heron (*Butorides striatus*), American white pelican (*Pelecanus erythrorhynchos*), ring-billed gull (*Larus delawarensis*), herring gulls (*Larus argentatus*), ospreys (*Pandion haliaetu*), and others prey on young fry and fingerlings, adult fish ready for stocking or sale, or brood fish at these fish rearing facilities (Salmon and Conte. 1981 and Schaeffer 1992). In CY 97-01 Missouri aquaculture facilities reported nearly \$755,000 in damage from fish-eating birds, principally great blue herons and cormorants. Although not a widespread problem in the state, WS could be requested to assist in resolving such problems. In most cases like these, WS only provides technical assistance to the facility operators on how to resolve such problems through primarily non-lethal methods such as barrier/deterrent wires or harassment. In some cases, the facility might need to obtain a depredation permit from the USFWS to kill a few of the birds to reinforce noise harassment. Under the proposed action, WS could also be requested to provide on-site operational assistance involving the use of non-lethal and lethal means of resolving bird damage problems at these or similar facilities. Lethal methods would generally be restricted to taking only few birds to reinforce harassment.

1.3.8 Need For BDM to Protect Livestock

Blackbirds, starlings, English sparrows, and, to a lesser extent, feral domestic pigeons and crows often cause damage at cattle feeding facilities and dairies by congregating in large numbers to feed on the grain component of cattle feed. The birds also cause damage by defecating on fences, shade canopy structures, and other structures, which can accelerate corrosion of metal components and which generally is considered an unsightly nuisance and potential health hazard for the feedlot/dairy operators and their personnel.

Birds of prey often cause considerable amounts of damage by attacking and preying upon ungulates, poultry and fowl. In CY 97-01 MO WS received 83 complaints about damage caused by birds to livestock totaling more than \$20,000.

Contribution of Livestock and Dairies to the Economy. Livestock and dairy production in Missouri contributes substantially to local economies. Total cash receipts for 2000 Missouri livestock and products were 2.68 billion dollars, up 8 percent from the 2.48 billion dollars received in 1999. Meat animals accounted for 61.3 percent of total receipts in 2000, poultry/eggs 27.2 percent, and dairy products 10.1 percent. Specialty livestock farms accounted for the remaining 1.4 percent. (MO NASS 2000)

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 as barley, which may be incorporated as whole grains, crushed or ground cereal. While cattle cannot select individual ingredients from that ration, starlings can and do select the barley, thereby altering the energetic value of the complete diet. The removal of this 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 also associated with proximity to roosts, snow, and freezing temperatures and the number of livestock on feed.

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.

BDM at feedlots and dairies has been a small component of the MO WS program. In 2001 Missouri accounted for five percent of the nations farms and was the second leading state in the number of farms. With this, Missouri was the nations second leading producer in beef cows, and seventeenth in milk production. Furthermore, the state produces nine percent of the U.S turkeys, and four percent of U.S. hogs. Missouri ranks tenth in broiler production (MASS 2002). Despite the size of the cattle, cattle feedlot and dairy industries in Missouri, WS provided operational BDM assistance in response to only 22 requests for assistance at such facilities during the 5-year period of CY 97 through CY 01. The reasons for the low numbers of requests in Missouri are not entirely clear but several possible reasons are (1) relatively lower numbers of wintering blackbirds and starlings in the major areas where feedlots/dairies occur in the State compared to other areas of the country, (2) more availability of natural foods because of lack of snow cover compared to more northern areas where bird damage is more severe (Besser et al. 1968), and (3) the number of dairies and feedlots in the State is perhaps high enough that bird damage is spread over many facilities so that few individual facilities experience intolerable bird levels. Despite the minor nature of this type of BDM in MO, the agricultural/dairy industry is substantial in the state, and requests for BDM could increase in the future.

A large cattle-feeding operation in the panhandle of Texas had upwards of 1,000,000 blackbirds and starlings using the facility per day. Trained WS field personnel made this estimate. The operators had a similar facility that did not have bird damage problems. They reported that, based on a comparison of feed losses, livestock health problems (primarily coccidiosis), and water trough maintenance costs (continuous labor costs for cleaning bird droppings out of water troughs), bird damage was costing them about \$5,000/day (██████████, WS, Canyon District, TX, pers. comm.).

An 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 (USDA 1996).

Scope of Livestock Health Problems. A number of diseases that affect livestock have been associated with feral domestic pigeons, starlings, blackbirds, and English sparrows (Weber 1979). Transmission of diseases such as Transmissible Gastroenteritis Virus (TGE), Tuberculosis (TB), and Coccidiosis to livestock has been linked to migratory flocks of starlings and blackbirds. Estimates

of the dollar value of this type of damage are not available. A consulting veterinarian for a large cattle feeding facility in Texas indicated problems associated with coccidiosis declined following reduction of starling and blackbird numbers using the facility (██████, WS, Canyon District, TX, pers. comm.). Table 1-2 summarizes some of these diseases and the problems they can cause.

Table 1-2. Some diseases of livestock that have been linked to feral domestic pigeons, starlings, blackbirds, and/or English sparrows. Information from Weber (1979).

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,	Inflammation of the	Associated with

	poultry	brain, newborn calve unable to suckle	listeriosis, salmonellosis, cryptococcosis
Encephalitis (7 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 pouts
		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

1.4 CURRENT AND PROJECTED WORK

- Blackbird management around agricultural crops in the Missouri boot heal.
- Assisting with BDM at aquaculture facilities.
- The removal of problem pigeons within Missouri communities and power plants.

- Monitoring for the state of Missouri Department of Health for St Louis encephalitis and West Niles Virus.
- Blackbird damage management conducted at feed mills and power plants.
- Protecting Missouri airports from bird hazards (USDA 2001).
- Urban waterfowl management
- Raptor management to stop livestock losses.
- Damage management to fruit, nut and berry crops caused by songs birds.

1.5 RELATIONSHIP OF THIS ENVIRONMENTAL ASSESSMENT TO OTHER ENVIRONMENTAL DOCUMENTS

ADC Programmatic FEIS. WS has issued a Final Environmental Impact Statement on the national APHIS/WS program (USDA 1997). This EA is tiered to the Final EIS. Pertinent information available in the FEIS has been incorporated by reference into this EA.

Environmental Assessment (EA) -- Statewide wildlife damage management at airports in Missouri. WS has issued an EA and Finding of No significant Impact (FONSI) for MO APHIS/WS WDM activities conducted within the state of Missouri (USDA 2001). Pertinent information is incorporated by reference into this EA.

1.6 DECISION TO BE MADE

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

- Should BDM as currently implemented by the WS program be continued in Missouri?
- If not, should WS attempt to implement one of the alternatives to an IWDM strategy as described in the EA?
- Might the continuing of WS's current program of BDM have significant impacts requiring preparation of an EIS?

1.7 Scope Of This Environmental Assessment Analysis

1.7.1 Actions Analyzed This EA evaluates bird damage management by WS to protect property, agriculture, aquaculture, livestock, natural resources, and human health and safety throughout Missouri wherever such management is requested from the WS program.

1.7.2 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 to the scope of BDM activities within Missouri.

1.7.3 Site Specificity. This EA analyzes potential impacts of WS's BDM activities that will occur or could occur throughout the State of Missouri on public and private lands. This EA analyzes the potential impacts of such efforts wherever and whenever they might occur as part of the current program. The EA emphasizes significant issues as they relate to specific areas whenever possible. However, the issues that pertain to the various types of wildlife damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 is the routine thought process that is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS throughout Missouri. (See USDA 1997, Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application). Decisions made using this thought process will be in accordance with any mitigation measures and standard operating procedures described herein and adopted or established as part of the decision.

1.7.4 Public Involvement/Notification. As part of this process, and as required by the Council on Environmental Quality (CEQ) and APHIS-NEPA implementing regulations, this document and its Decision are being made available to the public through “Notices of Availability” (NOA) published in local media and through direct mailings of NOA to parties that have specifically requested to be notified. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA and its Decision should be revisited and, if appropriate, revised.

1.8 AUTHORITY AND COMPLIANCE

1.8.1 Authority of Federal and State Agencies in Wildlife Damage Management Within The State of Missouri

1.8.1.1 WS Legislative Authority

The primary statutory authority for the Wildlife Services program is the Act of 1931, as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, which 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.”

Since 1931, with the changes in societal values, WS policies and programs place greater emphasis on the part of the Act discussing "bringing (damage) under control," rather than "eradication" and "suppression" of wildlife populations. In 1988, Congress strengthened the legislative mandate of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

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

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

The USFWS is responsible for managing and regulating take of bird species that are listed as migratory under the Migratory Bird Treaty Act and those that are listed as threatened or endangered under the Endangered Species Act. Sections 1.7.2.2 and 1.7.2.3 below describe WS's interactions with the USFWS under these two laws.

1.8.1.3 Missouri Department of Conservation Legislative Authority

The Missouri Department of Conservation (MDC), under the direction of the Conservation Commission, is specifically charged by the General Assembly with the management of the state's wildlife resources. Although many legal mandates of the Conservation Commission and the Department are expressed throughout the Wildlife Code of Missouri, the primary statutory authorities include wildlife management responsibilities, public education charges, law enforcement authorities, and regulatory powers. Also, MDC has the statutory authority to manage damage to agriculture and property, and to protect human health and safety from damage involving mammals.

1.8.1.4 Missouri Department of Agriculture (MDA)

The MDA is authorized by RSMo 261.090 to cooperate with "other agencies of the state government dealing with the production, handling and marketing of farm products in the interest of economy, harmony and efficient service and may also cooperate with the USDA and its sub-departments and with other state or organizations have common agricultural problem with those of the State of Missouri.

[REDACTED]

[REDACTED]

1.8.2 COMPLIANCE WITH OTHER FEDERAL LAWS

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

1.8.2.1 National Environmental Policy Act (NEPA)

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 at Missouri Airports. When WS operational assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency. However, WS may agree to complete NEPA documentation at the request of the other federal agency.

1.8.2.2 Endangered Species Act (ESA)

It is federal policy, under the ESA, that all federal agencies shall seek to conserve threatened and endangered (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 the U.S. Fish & Wildlife Service (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 (B.O.) from USFWS in 1992 describing potential effects on T & E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F).

1.8.2.3 Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711; 40 Stat. 755), as amended.

The Migratory Bird Treaty Act (MBTA) provides the USFWS regulatory authority to protect families of birds that contain species which migrate outside the United States. The law prohibits any "take" of these species, except as permitted by the USFWS; therefore the USFWS issues permits for reducing bird damage. WS will obtain MBTA permits covering BDM activities that involve the taking of species for which such permits are required in accordance with the MBTA and USFWS regulations, or will operate as a named agent on MBTA permits obtained by cooperators. WS is also authorized by the MDC covering the intentional take of migratory birds for damage management purposes from the MDC Wildlife Code, which regulates take of migratory birds protected by state law.

1.8.2.4 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 the WS program at Missouri airports are registered with and regulated by the EPA and MO and are used by WS in compliance with labeling procedures and requirements.

1.8.2.5 National Historic Preservation Act (NHPA) of 1966 as amended

The National Historic Preservation Act (NHPA) of 1966, 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. 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 the NHPA. 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.

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

Executive Order 12898, entitled, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" promotes 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 is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. It is a priority within 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 implements Executive Order 12898 principally through its compliance with NEPA. All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. WS personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. 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.

1.8.2.7 Protection of Children from Environmental Health and Safety Risks (Executive Order 13045).

Children may suffer disproportionately from environmental health and safety risks for many reasons. Wildlife damage management as proposed in this EA would only involve legally available and approved damage management methods in situations or under circumstances where it is highly unlikely that children would be adversely affected. Therefore, implementation of the proposed action would not increase environmental health or safety risks to children.

1.8.2.8 Executive Order 13112 - Invasive Species

Invasive Species directs Federal agencies to use their programs and authorities to prevent the spread of or to control populations of invasive species that cause economic or environmental harm, or harm to human health. In Missouri, WS responds to a number of requests for assistance with human health and safety threats associated with large populations of feral domestic pigeons, European starlings and English sparrows, all invasive non-native species in the United States. To comply with Executive Order 13112, WS

may cooperate with other Federal, State or local government agencies, or with industry or private individuals to reduce damage to the environment or threats to human health and safety.

1.8.2.9 Occupational Safety and Health Act of 1970

The Occupational Safety and Health Act of 1970 and its supplementing regulations (29CFR1910) on sanitation standards states that "Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practical, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected." This standard includes birds that may cause safety and health concerns at workplaces.

1.8.2.10 The Clean Water Act (33 U.S.C. 1344)

The Clean Water Act provides regulatory authority and guidelines for the EPA and the U.S. Army Corps Of Engineers related to wetlands. Several Sections of the Clean Water Act pertain to regulating effects to wetlands. Section 101 specifies the objectives of this Act, which are implemented largely through Subchapter III (Standards and Enforcement), Section 301 (Prohibitions). The discharge of dredged or fill material into water of the United States is subject to permitting specified under Subchapter IV (Permits and Licenses of this Act. Section 401 (Certification) specifies additional regulatory authorities when wetlands exist in proximity to proposed activities or when such activities might impact wetland areas. Such consultations are designed to determine if any wetland will be affected by proposed actions.

1.8.3 COMPLIANCE WITH OTHER STATE LAWS.

1.8.3.1 Owner May Protect Property 3CSR10-4.130

This regulation authorizes landowners or agents of the landowner to protect property, subject to federal regulations from migratory birds, any wildlife except deer, turkey, bear and any endangered species which beyond reasonable doubt is damaging property may be capture or killed at any time with out a permit. Deer, turkey, black bears and endangered species that are causing damage maybe killed only with the permission of an agent of the department, and by methods authorized by the agent.

2.0 CHAPTER 2 - 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 mitigation measures and/or standard operating procedures, and issues that will not be considered in detail, with rationale. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Additional description of affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4.

2.1 Affected Environment

Missouri is located in Midwest with two major cities on the eastern and western borders. The state is made up of several ecological regions that include, but not limited to, the Mississippi River Valley, the Ozarks, rolling hills and prairies. These ecosystems are home to a wide variety of wildlife and habitat. Within the state there are large cities, small towns, rural areas, feedlots, feed production plants, power plants and several airports

2.2 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

Issues. The following issues have been identified as areas of concern requiring consideration in this EA. These will be analyzed in detail in Chapter 4:

- Effects on Target Wildlife Species Populations
- Effects on Non-target Species Populations, including T&E Species
- Economic Losses to Property as a Result of Bird Damage
- Effects on Human Health and Safety
- Effects on Aesthetics
- Humanness and Animal Welfare Concerns of Lethal Methods Used by WS

2.2.1 Effects on Target Wildlife Species Populations

A common concern among members of the public is whether wildlife damage management actions adversely affect the viability of target species populations. The target species selected for analysis in this EA are the bird species listed in section 1.2. A minimal number of individuals are likely be killed by WS's use of lethal control methods under the proposed action in any one year. Individual numbers of bird species take by WS in FY 97-00 are list in tables 4-1 and 4-2, respectively.

2.2.2 Effects on Non-target Species populations, including T&E Species

A common concern among members of the public and wildlife professionals, including WS personnel, is the impact of damage control methods and activities on non-target species, particularly Threatened and Endangered Species. WS's standard operating procedures include measures intended to mitigate or reduce the effects on non-target species populations and are presented in Chapter 3.

Special efforts are made to avoid jeopardizing Threatened and Endangered Species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the Endangered Species Act (ESA) concerning potential impacts of BDM methods on T&E species and has obtained a Biological Opinion (B.O.). For the full context of the B.O., see Appendix F of the ADC FEIS (USDA 1997, Appendix F). WS has reinitiated Section 7 consultation at the program level to assure that potential effects on T&E species have been adequately addressed. The USFWS concurs with USDA-Wildlife Services that the proposed action is not likely to adversely affect federally listed species in Missouri.

At the State level, USDA-Wildlife Services has contacted and consulted with MDC for their B.O. of the proposed action and it affects on State listed T&E species. MDC concurs that USDA-Wildlife Services proposed action is not likely to affect listed species.

2.2.3 Economic Losses to Property as a Result of Bird Damage

A major concern by those requesting assistance is the economic impact of bird damage to aircraft, electrical stations, golf courses, livestock, crops and other public and private property. These people are concerned as to whether the proposed action or any of the alternatives would reduce such damage to more acceptable levels. Wildlife has and could cause damage to items listed above and property as describe in the need for action (Section 1.3).

2.2.4 Effects on Human Health and Safety

2.2.4.1 Safety and efficacy of chemical control methods

Some individuals may have concerns that chemical used for bird control should not be used because of potential adverse effects on people from being exposed to the chemicals directly or to birds that have died as a result of the chemical use. Under the alternatives proposed in this EA, the primary toxicant proposed for use by WS is DRC-1339 (Starlicide), which would be primarily used to remove feral domestic pigeons and starlings or blackbirds in damage situations. The EPA through FIFRA regulates DRC-1339 use, by Missouri Pesticide Control Laws, and by WS Directives. The chemical bird repellent Flight Control® could be used to reduce feeding activity on airfields and turf. Flight Control® is a bio-pesticide that is non-lethal and works by causing a negative response to feeding in the treated area. Another chemical method that could be used is Avitrol, which is classified as an avian distressing agent and is normally used to avert certain bird species from using certain problem areas. Other chemicals available for use include the tranquilizer Alpha-Chloralose (for live-capturing nuisance waterfowl and pigeons) and methyl anthranilate (artificial grape flavoring, which also has bird repellent capabilities).

2.2.4.2 Impacts on human safety of non-chemical BDM methods

Some people may be concerned that WS's use of firearms, traps, and pyrotechnic scaring devices could cause injuries to people. WS personnel occasionally use traps, pellet rifles and shotguns to scare or remove birds that are causing damage. WS frequently uses pyrotechnics in noise harassment programs to disperse or move birds. There is some potential fire hazard to property from pyrotechnic use.

Firearm use is very sensitive and a public concern because of safety issues relating to the public and misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every biennially afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

2.2.4.3 Effects on Human Health and Safety From Not Conducting BDM to Reduce Human/Aggressive Bird Confrontations, Disease Threats or Outbreaks.

The concern stated here is the absence of adequate BDM would result in adverse effects on human health and safety, because attacks on humans by some birds, especially nesting Canada geese, and the transmission of bird-borne diseases would not be reduced to acceptable levels. In Missouri, WS conducts at least two projects annually to address human health and safety concerns at

business facilities, private property, or for State and local governments. At some sites, nesting Canada geese have been observed to attack employees or patrons. Such attacks can lead to human injury, expensive medical bills, and lawsuits. At other sites, property managers are concerned about sanitation where birds have deposited droppings and litter.

Sites, where roosting birds, such as European starlings and blackbirds have deposited considerable quantities of droppings are viewed as unacceptable and filthy. In addition, such locations are likely to harbor infective levels of *Histoplasma capsulatum*, posing a threat of disease to humans (Stickley and Weeks 1985) or *Cryptococcus neoformans* (U.S. Environmental Hygiene Agency 1992), as discussed in Subsection 1.3.4. Many cases of sub-clinical histoplasmosis are associated with sites know to have infective levels of the organism (Kentucky Epidemiological Notes & Reports, 1992). Part of programs to sanitize such sites includes reducing the use of the area by birds.

Property managers fear that the absence of the WS BDM mean that birds would continue to use these areas and humans would still be at risk for bird –caused injuries or disease.

2.2.5 Effects on Aesthetics

2.2.5.1 Effects on Human Affectionate-Bonds with Individual Animals and on Aesthetic Values of Bird Species

Some individual members or groups of wildlife species habituate and learn to live in close proximity to humans. Some people in these situations feed such bird and/or otherwise develop emotional attitudes toward such animals that result in aesthetic enjoyment. In addition, some people consider individual wild animals 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 birdhouses. Many people do not develop emotional bonds with individual wild animals, but experience aesthetic enjoyment from observing them.

There is some concern that the proposed action or the alternatives would result in the loss of aesthetic benefits to the public, resource owners, or neighboring residents. Wildlife generally is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics are truly subjective in nature, dependent on what an observer regards as beautiful.

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 (e.g., wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using up the animal or intending to) or non-consumptive use (viewing the animal in nature or in a zoo, photography) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

Public reaction to damage management 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 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.

The public's ability to view wildlife in a particular area would be more limited if the birds are removed or relocated. However, immigration of wildlife from other areas could possibly replace the animals removed or relocated during a damage management action. In addition, the opportunity to view or feed other wildlife would be available if an individual makes the effort to visit local wildlife management areas and other sites with adequate habitat and local populations of the species of interest.

Some people do not believe that individual animals or nuisance bird roosts should even be harassed to stop or reduce damage problems. Some of them are concerned that their ability to view birds and other wildlife species are lessened by WS non-lethal harassment efforts.

2.2.5.2 Effects on Aesthetic Values of Property Damaged by Birds

Some persons requesting assistance to reduce the negative aesthetic values that birds may cause to property are concerned as to whether the proposed action or any of the alternatives would reduce such damage to more acceptable levels. Such property owners include those that have pigeons roosting or nesting on their buildings or waterfowl grazing on turf areas. These persons are generally concerned about the negative aesthetic appearance of bird droppings and the damage to turf. 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 non-lethal wildlife management methods, loss of property use, loss of aesthetic value of flowers, gardens, and lawns consumed by geese, loss of customers or visitors irritated by the odor of or of 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.

2.2.6 Humanness and Animal Welfare Concerns of Lethal Methods Used by WS.

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest 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 . . ." (AVMA 1987). Because suffering carries with it the implication of a time frame, a case could be made for ". . . little or no suffering where death comes immediately . . ." (CDFG 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would ". . . probably be causes for pain in other animals . . ." (AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 1991).

Pain and suffering, as it relates to WS 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 or veterinary curricula explicitly address suffering or its relief" (CDFG 1991).

Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The 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 and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some BDM methods are used in situations where non-lethal damage management methods are not practical or effective.

MO WS personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology, workforce and funding. Mitigation measures/Standard Operating Procedures (SOP) used to maximize humaneness are listed in Chapter 3.

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

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 Missouri would meet the NEPA requirements for site specificity. Wildlife damage management falls within the category of federal or other agency actions in which the exact timing or location of individual activities cannot usually be predicted well enough ahead of time to accurately describe such locations or times in an EA or EIS. The WS program is analogous to other agencies or entities with damage management missions such as fire and police departments, emergency clean-up organizations, insurance companies, etc. Although WS can predict some of the possible locations or *types* of situations and sites where some kinds of wildlife damage will occur, the program cannot predict the specific locations or times at which affected resource owners will determine a bird damage problem has become intolerable to the point that they request assistance from WS. Nor would WS be able to prevent such damage in all areas where it might occur without resorting to destruction of wild animal populations over broad areas at a much more intensive level than would be desired by most people, including WS and state agencies. Such broad scale population control would also be impractical, if not impossible, to achieve.

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.

2.3.2 WS Impact on Biodiversity

The WS program does not attempt to eradicate any species of wildlife in Missouri. WS operates in accordance with international, federal and state laws, and regulations enacted to ensure species viability. Impacts on target and non-target species populations because of WS lethal BDM activities are minor as shown in section 4.1. The impacts of the current WS program on biodiversity are not significant nationwide or statewide (USDA 1997). In the case of local populations of nonnative species such as feral domestic pigeons, the goal may be to eliminate a local population but because such species are not part of the mix of native wildlife species, they are not an essential component of the native biodiversity. Rarely, if ever, would BDM result in the long-term local elimination of even these nonnative species, however.

2.3.3 Wildlife Damage is a Cost of Doing Business -- a "Threshold of Loss" should be established before allowing any lethal bird damage management.

WS is aware that some people feel federal wildlife damage management should not be allowed until economic losses reach some arbitrary pre-determined threshold level. This type of policy, however, would be

very difficult or inappropriate to apply to human health and safety situations. Although some damage can be tolerated by most resource owners, WS has the legal direction to respond to requests for wildlife damage management, and it is program policy to aid each requester with the goal of minimizing losses. WS uses the Decision Model thought process discussed in Chapter 3 to determine appropriate strategies.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie NF, et al., the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part the court found that a forest supervisor need only show that damage from wildlife is threatened, to establish a need for wildlife damage management (Civil No. 92-C-0052A January 20, 1993). Thus, there is judicial precedence indicating that it is not necessary to establish a criterion such as percentage of loss of a particular resource to justify the need for wildlife damage management actions.

2.3.4 Wildlife Damage Management Should Not Occur at Taxpayer Expense, But Should be Fee Based.

WS is aware of concerns that wildlife damage management should not be provided at the expense of the taxpayer or that it should be fee based. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Funding for WS comes from a variety of sources in addition to federal appropriations. Such nonfederal sources include State general appropriations, local government funds (county or city), livestock associations, and private funds which are all applied toward program operations. Federal, state, and local officials have decided that WS should be conducted by appropriating funds. Additionally, wildlife damage management is an appropriate sphere of activity for government programs, since wildlife management is a government responsibility. A commonly voiced argument for publicly funded wildlife damage management is that the public should bear responsibility for damage to private property caused by public wildlife.

A minimal Federal appropriation is allotted for the maintenance of the WS state office and a field office in the Southeastern portion of the state. The remainder of the WS program in MO is entirely fee-based. Technical assistance is provided to the requester as part of the Federally-funded activities, but all direct assistance in which WS employees perform damage management activities is funded through cooperative agreements between the requester and WS. Thus, BDM by WS in Missouri is fee-based to a high degree.

2.3.5 Lethal BDM for Blackbirds and Starlings is Futile Because 50-60% of them Die Each Year Anyway.

Because natural mortality in blackbird populations is 50 - 65% per year (see section 4.1.1.1), some persons argue that this shows lethal BDM actions are futile. However, the rate of natural mortality has little or no relationship to the effectiveness of lethal BDM because natural mortality generally occurs randomly throughout a population and throughout the course of a year. Natural mortality is too gradual in individual concentrations of depredating birds to adequately reduce the damage that such concentrations are causing. It is probable that mortality caused by BDM actions are not additive to natural mortality but merely displaces it (known as "compensatory" mortality). In any event, it is apparent that the rate of mortality from BDM is well below the extent of any natural fluctuations in overall annual mortality and is, therefore, insignificant to national or eastern populations. Population estimates and trends for starlings and blackbird in the U.S. and for the eastern U.S. are discussed in subsection 4.1.1. The objective of lethal BDM in Missouri is not to necessarily add to overall blackbird or starling mortality, which would be futile under current funding limitations, but to redirect mortality to a segment of the population that is causing damage in order to realize benefits during the current production season. The resiliency of these bird populations does not mean individual BDM actions are not successful in reducing damage, but that periodic and recurring BDM actions are necessary in many situations.

2.3.6 Cost Effectiveness of BDM.

Perhaps a better way to state this issue is by the question “Does the value of damage avoided equal or exceed the cost of providing BDM?” The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.23) do not require a formal, monetized cost-benefit analysis to comply with NEPA. Consideration of this issue is not essential to making a reasoned choice among the alternatives being considered. The ADC EIS, Appendix L, p. 32 (USDA 1994) stated:

Cost effectiveness is not, nor should it be, the primary goal of the APHIS WS program. Additional constraints, such as environmental protection, land management goals, and others, are considered whenever a request for assistance is received. These constraints increase the cost of the program while not necessarily increasing its effectiveness, yet they are a vital part of the APHIS WS program.

An analysis of cost-effectiveness in many BDM situations is exceedingly difficult if not impossible to perform because the value of benefits is not readily determined. For example, the potential benefit of eliminating feral domestic pigeons from roosting and nesting around heating and cooling structures on a school or hospital could be reduced incidence of illness among an unknown number of building users. Since some of the bird-borne diseases described in Chapter 1 are potentially fatal or severely debilitating, the value of the benefit may be high. However, no studies of disease problems with and without BDM have been conducted, and, therefore, the number of cases *prevented* by effective BDM is not possible to estimate. Also, it is rarely possible to conclusively prove that birds are responsible for individual disease cases or outbreaks.

The WS program in Arizona prepared an analysis of cost vs. avoided loss for feedlot and dairy operations that received BDM service. The analysis indicated that the value of feed saved from blackbird and starling damage by BDM with DRC-1339 exceeds the cost of the service by a factor of three to one, without considering other benefits such as prevention of disease transmission, restored weight gain performance, and milk yields (USDA 1996). A similar analysis in Idaho yielded a ratio of avoided losses to cost of about 4 to 1 (USDA 1998a). Although not available for Missouri feedlots and dairies because this type of BDM has been extremely limited, the Arizona and Idaho analyses indicate blackbird and starling control at dairies and feedlots is cost-effective.

3.0 CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternatives analyzed in detail are:

- 1) Alternative 1 - Continue the Current Federal BDM Program/Integrated Wildlife Damage Management (No Action/Proposed Action).
- 2) Alternative 2 - Non-lethal BDM only by WS
- 3) Alternative 3 - Lethal BDM only by WS
- 4) Alternative 4 - No Federal WS BDM. This alternative consists of no federal BDM program by WS.

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1 - Continue the Current Federal BDM Program /Integrated Wildlife Damage Management (No Action/Proposed Action).

The No Action alternative is a procedural NEPA requirement (40 CFR 1502), is a viable and reasonable alternative that could be selected, and serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with the Council on Environmental Quality's (CEQ's) definition (CEQ 1981).

The proposed action is to continue the current portion of the WS program that responds to requests for BDM to protect property, agriculture crops, livestock, turf, livestock feed, livestock health, aquaculture, other natural resources, and human health and safety in the state of Missouri. A major component of the current program consists of an Integrated Wildlife Damage Management (IWDM) approach. The IWDM approach would be implemented to address human health and safety threats and property damages associated with large concentrations of birds at roosts and other sites at both public and private facilities in the States. The program would also operate to reduce or minimize the loss of livestock feed and the risk of bird-related livestock problems presented by European starlings and blackbirds at requesting dairies, feedlots and livestock operations, and to meet requests to minimize damage or the risk of damage to agriculture, or other resources caused by birds. To meet these goals WS would have the objective of responding to all requests for assistance with a minimum, technical assistance or self-help, or where appropriate and when cooperative or congressional funding is available, direct damage management assistance in which professional WS Wildlife Specialists or Wildlife Biologists conduct damage management actions. An IWDM would allow use of any legal technique or method, used singly or in combination, to meet request or needs for resolving conflicts associated with birds on public and private property (Appendix B). Landowners requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Lethal methods used by WS would include shooting, trapping, toxicants, DRC-1339 (Starlicide, Avitrol), nest and/or egg destruction or euthanasia following live captures by trapping or use of the tranquilizer alpha-chloralose (A-C). Non-lethal methods used and/or recommended by WS may include habitat alteration, chemical repellents (e.g., methyl anthranilate), wire barriers and deterrents, netting, capture and relocation, and harassment and scaring devices. The implementation of non-lethal methods such as habitat alteration and exclusion-type barriers would be the responsibility of the landowner to implement. BDM by WS would be allowed when requested, where a need has been documented and upon completion of an Agreement for Control. All management actions would comply with appropriate Federal, State, and local laws. Appendix B provides a more detailed description of the methods that could be used under the proposed action.

3.1.2 Alternative 2 - Non-lethal BDM Only By WS.

This alternative would require WS to use and recommend non-lethal methods only to resolve wildlife damage problems. Requests for information regarding lethal management approaches would be referred to MDC, FWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, or take no action. Persons receiving technical assistance could still resort to lethal methods that were available to them. WS would not make recommendations to the FWS and MDC regarding the issuance of permits to resource owners to allow them to take wildlife by lethal methods. Currently, DRC-1339 and Alpha-Chloralose are only available for use by WS employees. Therefore, use of these chemicals by private individuals would be illegal. Under this alternative, Alpha-Chloralose would be used by WS personnel to capture and relocate wildlife. Appendix B describes a number of non-lethal methods available for use by WS under this alternative.

3.1.3 Alternative 3 - Lethal BDM Only By WS.

Under this alternative, WS would provide only lethal direct control services and technical assistance. Technical assistance would include making recommendations to the FWS and MDC regarding the issuance of permits to resource owners to allow them to take wildlife by lethal methods. Requests for information regarding non-lethal management approaches would be referred to MDC, FWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS lethal recommendations, implement non-lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, or take no action. In some cases, control methods employed by others could be contrary to the intended use or in excess of what is necessary. Not all of the methods listed in Appendix B are available to other agencies or private individuals.

3.1.4 Alternative 4 - No Federal WS BDM.

This alternative would eliminate Federal involvement in BDM within Missouri. WS would not provide direct operational or technical assistance and requesters of WS services would have to conduct their own BDM without WS input. DRC-1339 and Alpha-Chloralose are only available for use by WS employees. Therefore, use of these chemicals by private individuals would be illegal. Avitrol could be used by State certified restricted-use pesticide applicators.

3.2 BDM STRATEGIES AND METHODOLOGIES AVAILABLE TO WS

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. Appendix B is a more thorough description of the methods that could be used or recommended by WS.

3.2.1 Integrated Wildlife Damage Management (IWDM).

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in a cost-effective¹ manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (i.e., change feeding schedules), habitat modification (i.e., exclusion), animal behavior modification (i.e., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

¹ The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns

3.2.2 Technical Assistance Recommendations.

"Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods. The implementation of damage management actions is the responsibility of the requester. In some cases, WS provides or supplies 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 requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and the practicality of their application and may include lethal and non-lethal recommendations.

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 wildlife damage problems.

3.2.3 Direct Damage Management Assistance.

This is the implementation or supervision of damage management activities by WS personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone, and when 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.

3.2.4 WS Decision-Making

WS personnel use a thought process for evaluating and responding to damage complaints that is depicted by the WS Decision Model described by Slate et al. (1992) (Figure 3-1). WS personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for reducing damage to an acceptable level. WS personnel assess the problem, evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are developed into a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), 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.

3.2.5 Bird Damage Management Methods Available for Use. (See Appendix B for detailed descriptions of BDM Methodologies)

3.2.5.1 Non-chemical, Non-lethal Methods

Property owner practices consist primarily of non-lethal preventive methods such as cultural methods² and habitat modification.

Animal behavior modification refers to tactics that alter the behavior of wildlife to reduce damages. Some but not all of these tactics include:

- Exclusions such as netting
- Lasers (to scare birds)
- Propane cannons (to scare birds)
- Pyrotechnics (to scare birds)
- Distress calls and sound producing devices (to scare birds)
- Visual repellents and scaring tactics

Relocation of damaging birds as directed by MDC to other areas.

Nest destruction of the target species before eggs or young is in the nest.

Egg addling/destruction is the practice of destroying the embryo in the egg prior to hatching; physically breaking eggs; or directly removing eggs from a nest and destroying them.

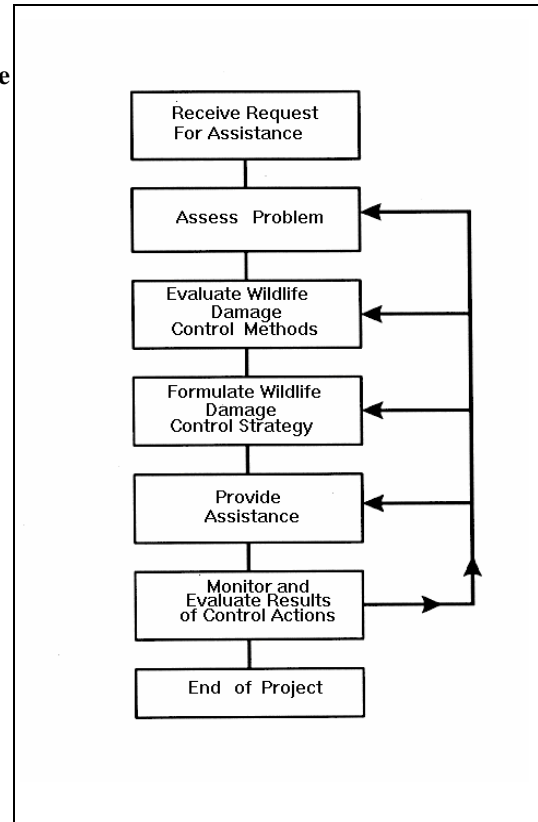
Habitat/environmental modification to attract or repel certain bird species.

Live traps are various types of traps designed to capture birds alive for relocation or euthanasia. Some examples are, cage traps, decoy traps, nest box traps, mist nets, etc.

Lure crops/alternate foods are crops planted or other food resources provided to mitigate the potential loss of higher value crops.

3.2.5.2 Chemical, Non-lethal Methods

Avitrol is a chemical frightening agent registered for use on pigeons, crows, gulls, blackbirds, starlings, and English sparrows in various situations. This chemical works by causing distress behavior in the birds that consume treated kernels from a mixture of treated and untreated bait, which generally frightens the other birds from the site. Generally birds that eat the treated bait will die (Johnson and Glahn 1994).



² Generally involves modifications to the management of protected resources to reduce their vulnerability to wildlife damage

Alpha-chloralose is used as an immobilizing agent, which is a central nervous system depressant, and used to capture waterfowl or other birds. It is generally used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts. Alpha-chloralose is typically delivered as a well-contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds.

Methyl Anthranilate (MA) (artificial grape flavoring food additive) has been shown to be an effective repellent for many bird species, including starlings. It can be applied to turf or surface water, or as a fog to repel birds from small areas. It may also become available for use as a livestock feed additive that has bird repellent value.

Anthraquinone products, such as Flight Control® (Avery et al. 1997) The chemical bird repellent Flight Control® could be used to reduce feeding activity in specific areas. Flight Control® is a bio-pesticide that is non-lethal and works by causing a negative response to feeding in the treated area.

Other repellants: Other bird repellants that might become available include charcoal particles (e.g., adhered to livestock feed) and measure all.

3.2.4.3 Mechanical, Lethal Methods

Shooting is the practice of selectively removing target species by shooting with an air rifle, shotgun, or rifle. Shooting a few individuals from a larger flock can reinforce birds' fear of harassment techniques.

Snap traps are modified rat-traps that are used to remove individual birds such as starlings and woodpeckers causing damage to buildings.

Cervical dislocation is sometimes used to euthanize birds that are captured in live traps. AVMA approves this technique as humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of poultry and of small birds (Beaver et al. 2001).

Sport Hunting can be part of a BDM strategy to enhance the effectiveness of harassment techniques. For example, golf courses allow sport hunters licensed by the MDC to hunt problem waterfowl during prescribed seasons and when normal golf activities are suspended due to weather conditions (i.e. golf courses close during the winter due to cold weather or lack of interest).

Cage, decoy and nest box traps are sometimes used by WS to capture pigeons, blackbirds and European starlings. Decoy traps are set in limited numbers in selected locations where a resident population is causing localized damage or where other techniques cannot be used. Decoy traps are similar in design to the Australian crow trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds are placed in the trap with sufficient food and water to assure their survival. Feeding behavior and call of the decoys attract other birds into the trap. Blackbirds, pigeons and starlings taken in these traps are euthanized.

3.2.4.4 Chemical, Lethal Methods

DRC-1339 is a slow acting pesticide for reducing damage from several species of birds, including blackbirds, starlings, and pigeons. DRC-1339 is highly toxic to sensitive species but only slightly toxic to non-sensitive birds, predatory birds and mammals.

Carbon dioxide (CO₂) gas is an American Veterinary Medical Association (AVMA) approved euthanasia method (Beaver et. al 2001) which is sometimes used to euthanize birds which are

captured in live traps or by chemical immobilization and when relocation is not a feasible option. Live animals are placed in a container or chamber into which CO₂ gas is released. The animals quickly expire after inhaling the gas.

Starlicide Complete is slow acting avicide whose active ingredient is within a complete feed bait that is available to the public. It is used to kill starlings and blackbirds around livestock and poultry operations. Starlicide Complete is palatable to starlings and blackbirds, however, other wild species of birds do not prefer this particular base.

3.2.5 Examples of WS Direct Operational and Technical Assistance in BDM in Missouri.

Missouri WS has implemented and conducted many projects that provide both direct damage management and technical assistance (TA) throughout the state. Projects covered a wide range of species and damage types and included but are not limited to the problems of red-winged blackbirds (*Agelaius phoeniceus*) roosting on airport property causing the closure of the airfield; European starlings (*Sturnus vulgaris*) roosting at power stations causing power outages and fire threats; Canada geese (*Branta Canadensis*) causing damage to property and turf at golf courses, public beaches, businesses and private dwellings; and monitoring of the wildlife borne diseases in European house Sparrows (*Passer domesticus*) for St. Louis Encephalitis and American crow (*Corvus brachyrhynchos*) West Niles Virus for the [REDACTED].

Blackbirds and European starling Damage

Blackbirds and European starlings are responsible for a variety of damage complaints and request for assistance in Missouri. A common complaint with this species involves concerns with damage related to roosting and nesting locations. Areas of concern range from several types of human health and safety issues to the damage of agriculture crops. Human health and safety is at risk from the bird droppings, which causes concern for diseases associated with bird droppings in Missouri, and an unsightly mess, that result in clean up cost. At airports these species are a major concern as extremely large number of birds common to a single flock or roost can be in the hundreds of thousands, thus can possibly cause substantial damage to aircraft, possibly resulting in a crash.

During migration periods, WS often receives complaints from farms of excessive damage to crops. With flocks congregating and staging in agricultural areas of Missouri, farmers are at risk of loosing there crops and livelihood as a result of birds consuming excessive amounts of grain, plant damage or destruction, seeds knocked from the plant and fecal contamination. These problems are frequently addressed by recommending habitat modification, behavior management through harassment and/or local population reduction. Harassment often includes the use of propane cannon, pyrotechnics, distress calls, radio-controlled airplanes and lasers. Lethal methods, often used to reinforce harassment techniques include shooting with, shotguns (in rural or semi-rural situations). Live capture with cage traps followed by euthanasia, and DRC-1339, may also be used for population control.

WS has been requested in the past to manage damage caused by blackbirds and European starlings through direct control projects. These projects have included activities to move roost and to reduce local numbers on or at several airports, power plants and agricultural sites around the state. WS expects to receive future requests from entities presently or previously assisted, as well as other entities across the state and could respond with technical assistance, direct operational assistance, or a combination of both in any situation in the state.

Feral Domestic Pigeon Problems

Feral domestic pigeons are responsible for a portion of nuisance bird damage and human health and safety request for assistance in Missouri. The most common situation with this species involves pigeons roosting and nesting on buildings and structures in urban areas. The main problem is from the birds droppings which cause concerns for diseases associated with bird droppings in Missouri, and an unsightly mess, and result in clean-up costs. These problems are frequently addressed by recommending exclusion devices/barriers (such as netting, hardware cloth, screen, porcupine wire) or habitat modification and local population reduction. Methods that could be used for population reduction include shooting with pellet rifles, low-velocity .22 caliber rifle rounds (that shoot bullets at about the same velocity as a pellet rifle), shotguns (mostly in rural or semi-rural situations), live capture with cage traps followed by euthanasia, DRC-1339 baiting, or Avitrol.

WS has been requested in the past to manage damage caused by feral domestic pigeons through direct control operational projects. These projects have included activities to reduce local pigeon numbers in several cities and power facilities around the state. WS expects to receive future request from entities presently or previously assisted, as well as other entities across the state and could respond with technical assistance, direct operational assistance, or a combination or both in any situation in the state.

Management of Damage Caused by Urban Waterfowl

Canada goose (*Branta canadensis*), and mallard ducks (*Anas platyrhynchos*) are populous in most major cities in Missouri. These species concentrate in areas where water is available such as swimming pools, various sized ponds and small lakes at business parks, golf courses, zoos, city, county and state parks, lakes owned and operated by homeowner associations in large subdivisions, and city water source reservoirs. Mating birds usually are implicated in the greatest damage losses, because they spend longer periods at a damage site than itinerant and migratory birds, and parents and their young may use the same site late in the season and in recurrent years. WS responded to 658 calls for assistance with damage caused by waterfowl during CY 97-01.

Assistance was provided for threats to human health and safety, property damage, and nuisance problems associated with waterfowl. Many of these calls are handled through technical assistance and provided with advisory leaflets, or more specific recommendations resulting from visits by WS to damage sites. Normally, complainants are advised to use strategies which combine harassment with habitat manipulation such as netting, grid wire exclusion systems, dogs and changing the vegetation to deter nesting. In some situations, elimination of water bodies is recommended. If non-lethal strategies are unsuccessful, WS sometimes recommend a USFWS depredation permit be granted to the requester for nest and egg destruction or egg addling/oiling.

Capture and relocation is a component of waterfowl damage management in Missouri which may involve the use of net guns, hand nets, rocket nets, cage traps, drop nets or alpha-chloralose to live capture birds. The birds are then under the direction of MDC relocated to wild sites and released.

In instances where human health and safety threats and property damage cannot be resolved through non-lethal methods, selective lethal removal could be preformed. This method may also be used to reinforce harassment programs where human health and safety or agricultural losses are a factor and would usually result in the selective removal of a few birds.

WS may receive requests for assistance in managing damage caused by urban waterfowl from Federal, State and Local government agencies, businesses, or private individuals in Missouri in the future. WS may provide technical or direct operational assistance to requesters in an effort to resolve damage problems caused by waterfowl. IWDM strategies will be recommended by WS, and direct operational assistance could include any of the methods previously discussed.

3.3 Alternatives Considered But Not Analyzed in Detail with Rationale

3.3.1 Technical Assistance Only

This alternative would not allow WS operational BDM with in Missouri. WS would only provide technical assistance and make recommendations when requested. This alternative has been determined ineffective based upon the unsuccessful attempts by landowners to conduct BDM prior to WS direct control involvement.

3.3.2 Compensation for Bird Damage Loss

The Compensation alternative would require the establishment of a system to reimburse persons impacted by bird damage. This alternative was eliminated from further analysis because no Federal or State laws currently exist to authorize such action. Under such an alternative, WS would not provide any direct control or technical assistance. Aside from lack of legal authority, analysis of this alternative in the FEIS indicated that the concept has many drawbacks (USDA 1997):

- It would require larger expenditures of money and labor to investigate and validate all damage claims, and to determine and administer appropriate compensation. A compensation program would likely cost several times as much as the current program. In the Missouri WS program, goose damage would likely exceed \$100,000 per year, yet the current non-lethal yet effective WS program of abating such damage only costs less than \$60,000 per year.
- Compensation would most likely be below full market value. It is difficult to make timely responses to all requests to assess and confirm damage, and certain types of damage could not be conclusively verified. For example, it would be impossible to prove conclusively in individual situations that birds were responsible for disease outbreaks even though they may actually have been responsible. Thus, a compensation program that requires verification would not meet its objective for mitigating such losses.
- Compensation would give little incentive to resource owners to limit damage through improved cultural, husbandry, or other practices and management strategies.
- Not all resource owners would rely completely on a compensation program and unregulated lethal control would most likely continue as permitted by state law.
- Compensation would not be practical for reducing threats to human health and safety.

3.3.3 Short Term Eradication and Long Term Population Suppression

An eradication alternative would direct all WS program efforts toward total long term elimination of bird populations on private, Federal, State, and local government lands within entire cooperating counties or larger defined areas in the state.

In Missouri, eradication of native bird species (the starling, English sparrow, and feral domestic pigeon are not native to North America) is not a desired population management goal of State or Federal agencies. Although generally difficult to achieve, eradication of a local population of feral domestic pigeons or starlings may be the goal of individual BDM projects. This is because feral domestic pigeons and starlings are not native to North America and are only present because of human introduction. However, eradication as a general strategy for managing bird damage will not be considered in detail because:

- All State and Federal agencies with interest in or jurisdiction over wildlife oppose eradication of any native wildlife species.
- Eradication is not acceptable to most members of the public.
- Because blackbirds and starlings are migratory and most winter populations are comprised of winter migrants from northern latitudes, eradication would have to be targeted at entire North American populations of these species to be successful. That would not be feasible or desirable.

Suppression would direct WS program efforts toward managed reduction of certain problem populations or groups. In areas where damage can be attributed to localized populations of birds, WS can decide to implement local population suppression as a result of using the WS Decision Model. Problems with the concept of suppression are similar to those described above for eradication.

It is not realistic or practical to consider large-scale population suppression as the basis of the WS program. Typically, WS activities in the State would be conducted on a very small portion of the sites or areas inhabited or frequented by problem species.

3.4 Mitigation and Standard Operating Procedures for Wildlife Damage Management Techniques

3.4.1 Mitigation in Standard Operating Procedures (SOP)

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current WS program, nationwide and in Missouri uses many such mitigation measures and these are discussed in detail in Chapter 5 of the FEIS (USDA 1997). Some key mitigating measures pertinent to the proposed action and alternatives that are incorporated into WS's Standard Operating Procedures include:

Mitigation Measures	Alternatives			
	1	2	3	4
<i>Animal Welfare and Humanness of Methods Used by WS</i>				
Research on selectivity and humaneness of management practices would be monitored and adopted as appropriate.	X	X	X	
The Decision Model (Slate et al. 1992) is used to identify effective biological and ecologically sound BDM strategies and their impacts.	X	X	X	
Captured non-target animals are relocated unless it is determined by the Missouri WS personnel that the animal would not survive	X	X	X	
The use of traps conform to current laws and regulations administered by MDC and Missouri WS policy	X	X	X	
Euthanasia procedure approved by the AVMA that cause minimal pain are used for live animals	X		X	
Drugs are used according to the Drug Enforcement Agency, FDA and WS program policies and directives and procedures are followed that do not cause pain.	X	X	X	
The use of newly developed, proven non-lethal methods would be encouraged when appropriate.	X	X		
<i>Safety Concerns Regarding WS BDM Methods</i>				
All pesticides are registered with the EPA and MDNR	X	X	X	
EPA-approved label directions would be followed by WS employees	X	X	X	
The Decision Model (Slate et al. 1992), designed to identify the most appropriate damage management strategies and their impacts, is used to determine BDM strategies	X	X	X	

WS employees that use pesticides are trained to use each material and are certified to use pesticides under EPA approved certification programs.	X	X	X	
WS employees, who use pesticides, participate in MDNR approved continuing education to keep abreast of developments and maintain their certifications.	X	X	X	
Pesticide use, storage, and disposal conform to label instructions and other applicable laws and regulations, and Executive Order 12898.	X	X	X	
Material Safety Data Sheets for pesticides are provided to all WS personnel involved with specific BDM activities.	X	X	X	
<i>Concerns about Impacts of BDM on Target Species, T&E Species, Species of Special Concern, and Non-target Species</i>				
WS consulted with the USFWS regarding the nation-wide program and would continue to implement all applicable measure identified by the USFWS to ensure protection of T&E species.	X	X	X	
Management actions would be directed toward localized populations or groups and/or individual offending animals.	X	X	X	
WS personnel are trained and experienced to select the most appropriate methods for taking targeted animals and excluding non-target species.	X	X	X	
WS would initiate informal consultation with the USFWS following any incidental take of T&E species.	X		X	
The presence of non-target species is monitored before using DRC-1339 to control starlings, blackbirds and pigeons to reduce the risk of significant mortality of non-target species populations.	X		X	
WS take is monitored by number of animals by species or species groups (i.e. blackbirds, pigeons) with overall populations or trends in population to assure the magnitude of take is maintained below the level that would cause significant adverse impacts to the viability of native species populations (See Chapter 4)	X		X	
WS uses chemical methods for BDM that have undergone rigorous research to prove their safety and lack of serious effects on non-target animals and the environment.	X	X	X	

4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

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

The following resource values within the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

Cumulative Impacts: Discussed in relationship to each of the potentially affected species analyzed in this chapter.

Irreversible and Irrecoverable Commitments of Resources: Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources.

Impacts on sites or resources protected under the National Historic Preservation Act: WS BDM actions are not undertakings that could adversely affect historic resources (See Section 1.7.2.5).

4.1 Environmental Consequences for Issues Analyzed in Detail

4.1.1 Effects on Target Species Wildlife Populations

4.1.1.1 Alternative 1 - Continue the Current Federal BDM Program/ Integrated Wildlife Damage Management (The Proposed Action/No Action)

Analysis of this issue is limited primarily to those species most often killed during WS BDM. The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997). 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. Generally, WS only conducts damage management on species whose population densities are high and usually only after they have caused damage.

Table 4-1 shows the numbers of birds killed by species and methods as a result of WS BDM activities within MO from CY 97 through July 2000. WS activities in resolving wildlife damage have been more than 99% non-lethal -- for example; for the 4-year period from FY 97 through 00, the number of mixed blackbirds species including starlings, red-winged blackbirds, and brown-headed cowbirds, killed by WS personnel was 7,907 while the number moved by used of harassment with pyrotechnics totaled an estimated 1,200,228. (Table 4-2).

Under this alternative the number of birds killed by WS would likely remain the same or not change substantially. If the numbers do change, WS will address the issue in the annual monitoring reports and provide additional NEPA analysis as appropriate.

Based upon the information provide below, WS has determined that WS BDM activities will not adversely affect any target bird species that are killed by WS while conducting damage management activities.

Table 4-1. Wildlife Lethally Removed by WS for Bird Damage Management in FY 97, 98, 99 and 00 in MO.

Species	Damage Management Methods							
	Hand Caught	DRC-1339.	Spotlight/shoot	Other Trap	Cage Trap	Shooting	Mist Net	Egg Destruction/Nest Removal
Mixed Blackbird Species					8	181		
Red-winged Blackbird				16	7	186		
Yellow-headed Blackbird					1			
Brown-headed Cowbird				99	20	456	6	
Common Grackles				42	8	9		
Great-tail Grackles						1		
Other Grackles				7		3		
English House Sparrow						145	460	
American Crow				2		32		
Pigeon	90	240	1,181		21	5,082		11
European Starling	10	6,075	40	39	33	649	10	1
Canada Goose	8		10	14		17		6,113
Snow Geese						2		
Ducks other						9		
Mallards						61		8
Great Egret						1		
Great Blue Heron						43		
Red-tailed hawk				8		22		
Great-horned Owl			1			8		
Ring-billed Gull						5		
Morning Dove						152		
Horned Lark						206		
Barn Swallow	10					107	20	30
Eastern Meadow Lark				10		100		
Other Swallows						68		211
Purple Martin						6		

¹Estimated Number of Pigeons and Starlings taken by pre-baiting population counts.

Table 4-2 Wildlife Harassed and Lethally Removed by WS for Wildlife Damage Management in FY 97-00 with in MO.

Species	Killed 97	Dispersed /Freed 97	Killed 98	Dispersed /Freed 98	Killed 99	Dispersed /Freed 99	Killed 00	Dispersed /Freed 00
Black Birds Mixed Species	0	22,000	0	181,676	98	867,400	91	44,442
Common Grackles	0	20	4	150	45	0	10	0
Great-tail Grackles	0	0	1	0	0	0	0	0
Other Grackles	0	0	0	0	10	0	0	0
Red-winged Blackbird	0	10,015	10	6,565	193	35,050	6	170
Yellow-headed Blackbird	0	0	0	0	1	0	0	0
Brown-headed Cowbird	6	0	232	1,588	343	2,750	0	0
European Starling	2,565	6,275	46	1,755	217	9,272	4,029	11,100
American Crow	0	27	3	134	10	62	21	181
English House Sparrow	44	0	0	0	413	0	148	5
Pigeons	2,075	15	1,176	20	1,488	0	1,886	42
Canada Geese	10	193	14	316	17	185	8	838
Snow Geese	0	0	0	0	2	190	0	7500
Ducks Other	0	185	0	0	6	67	3	2,504
Mallards	0	8	0	15	28	0	41	171
Double-crested Cormorant	0	30	0	0	0	0	0	400
Great Blue Heron	0	5	0	10	1	10	42	10
Great Egret	0	0	0	0	0	0	1	0
American Robins	0	0	3	150	0	0	0	50
Turkey Vulture	0	37	0	155	0	82	0	295
Red-tailed hawk	2	47	20	117	5	113	3	241
Great-horned Owl	2	0	5	6	2	2	0	15
Herring Gull	0	0	0	0	0	2	0	0
Horned Lark	6	917	81	2288	56	1449	63	1145
Barn Swallow	31	182	7	240	101	158	28	615
Eastern Meadow Lark	0	100	29	369	3	0	78	1094
Other Swallows	163	210	53	60	16	980	47	1268
Purple Martin	5	75	0	0	1	0	0	0

American Crow Population Impacts

American crows (*Corvus brachyrhynchos*) have a wide range and are abundant, being found in most of the United States (National Audubon Society, 1990). They are found in both urban and rural environments and in Missouri sometimes form large communal roosts in cities. WS in at least one Missouri County has documented roosts of more than 7,000 birds. In the U.S., some crow roosts may reach a half-million (National Audubon Society, 1990). This species is exempt from protection by the MBTA under conditions in which certain birds, including crows, are identified as “committing or about to commit depredations upon ornamental or shade trees, agriculture crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance (50 CFR Ch. 1[10-1-98 Edition] 21.43), and by hunting regulation in

Missouri, which establishes regulations for a hunting season to take crows and allows take of this species under the same conditions of depredations as outlined in 50 CFR.

BBS indicate that American crow populations increased in the U.S., the eastern BBS region, and Missouri from 1966-99 (Sauer et al. 1999). WS killed an average of 8.5 crows per year in Missouri during FY 1997-00. During this period, data indicates that crow population trends continued to rise in the State.

During CY 97-01, MO WS received 20 requests for technical assistance with crow problems from Missouri residents. In addition to the technical assistance, MO WS responded to 4 requests for operational direct control of problem crows. In the 4 requests for operational direct control, MO WS harassed some 404 crows, and destroyed 34 birds (MO WS MIS). Most of the birds destroyed were killed in association with harassment shooting to reinforce noise harassment as part of crow dispersal activities.

Based upon an anticipated increase in future requests for WS crow damage management assistance in MO, WS predicts that no more than 100 crows would be killed by WS annually. Based on population trends WS limited take should have minimal effects on American crow populations.

Starling and Blackbird Population Impacts

Colonization of North America by the European Starling began on March 6, 1890 when a Mr. Eugene Scheiffelin, a member of the Acclimatization Society, released 80 starlings into New York's Central Park. The birds thrived and exploited their new habitat. By 1918, the advance line of migrant juveniles extended from Ohio to Alabama; by 1926 from Illinois to Texas; by 1941 from Idaho to New Mexico; and by 1946 to California and Canadian coasts (Miller 1975). In just 50 short years the starling had colonized the United States and expanded into Canada and Mexico and 80 years after the initial introduction had become one of the most common birds in North America (Feare 1984).

Precise counts of blackbird and starling populations do not exist but one estimate placed the United States summer population of the blackbird group at over 1 billion (USDA 1997) and the winter population at 500 million (Royall 1977). The majority of these birds occur in the eastern U.S.; for example surveys in the southeastern part of the country estimated 350 million blackbirds and starlings in winter roosts (Bookhout and White 1981). Meanley and Royal (1976) estimated 538 million blackbirds and starlings in winter roosts across the country during the winter of 1974-75.

An extensive population survey by Dolbeer and Stehn published in 1979 showed that, in the southwestern U.S., the number of breeding starlings doubled between 1968 and 1976. In California, where starlings were first observed in 1942, the number of breeding birds increased by 19% during the same period. Breeding Bird Survey data from Hines et al. (1998) indicate a slight increase (0.8% per year) in the starling breeding population in the central U.S. from 1966 -1998, and a slight decrease (2.7% per year) from 1980 - 1994. Breeding Bird Survey data for Missouri indicates starling populations stable or slightly increasing from 1980 to 1998. Red-winged blackbirds showed a stable population in the Missouri and slightly down (0.4% per year) in the central region of the United States. Brown-headed cowbirds showed a steady increase of 2.3% from 1968 to 1979 and a slight decline from 1980 to 1998 with a decline of 0.6% (Sauer et al. 2000).

The nationwide starling population has been estimated at 140 million (Johnson and Glahn 1994). The winter starling population in the northwest and southwest regions has been estimated at 27.8 million (Meanley and Royall 1976). The northwest and southwest regional population of the blackbird group is 139 million of which 27.8 million are starlings (Meanley and Royall 1976).

All of the above information indicates that populations of starlings and blackbirds have been relatively stable in recent years. For most species that show upward or downward trends, such trends have been relatively gradual. Additionally, blackbird populations are healthy enough, and the problems they cause great enough, that the USFWS has established a standing depredation order for use by the public. 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.

During FY 97- 00, MO WS personnel lethally removed 1,050 blackbirds and 6,857 European starlings from and airfields, feedlots, agriculture fields, power plants and domestic dwellings. States in the WS Eastern Region reported a total kill of between 67,416 and 243,110 blackbirds and starlings per year. The average annual reported kill was 131,068 blackbirds and starlings (data from WS MIS system). No other sources of major human-caused blackbird and starling mortality are known.

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997). The northwest and southwest regional population of the blackbird group has been estimated to be about 140 million of which about 28 million are starlings (Meanley and Royall 1976). Estimated natural mortality of the blackbird group should therefore be between 60 and 75 million birds annually. WS kill of blackbirds and starlings within Missouri has been less than .0001167% of the estimated natural mortality of these populations, and would be expected to be no more than .004% of total mortality in any one year under the current program. The number of birds killed by the MO WS program amounts to only 0.0000567% of the regional wintering population. Regionally, WS's *confirmed kill*, which may be underestimated, averages less than a 131,068 blackbirds and starlings annually, which accounts for only 0.218% of the natural mortality. Even if WS's actual regional kill is much higher than the "confirmed" kill, it should continue to be well below normal mortality levels for these populations.

Dolbeer et al. (1995) showed that WS kills of 3.6% of the wintering population had no effect on breeding populations the following spring. Dolbeer et al. (1976) constructed a population model which indicated that a reduction of 14.8% of the wintering blackbird population would reduce the spring breeding population by 20% and that a 56.2% reduction in the wintering blackbird population would reduce spring breeding populations by only 33%. Given the density-dependent relationships in a blackbird population (i.e. decreased mortality and increased fecundity of surviving birds) a much higher number would likely have to be killed in order to impact the regional breeding population.

Cumulative impacts would be mortality caused by the MO WS program added to the other known human causes of mortality. Given that the maximum annual mortality caused by the MO WS program has not accounted for more than 0.00000003% of the regional blackbird population, and should not exceed 0.5% of the population in any future year, the proposed control projects implemented under this alternative would have no significant impact on overall breeding populations.

Starlings, being non-indigenous and because of their negative impacts and competition with native birds, are considered by many wildlife biologists and ornithologists to be an undesirable component of North American wild and native ecosystems. Any reduction in starling populations in North America, even to the extent of complete eradication, could be considered a beneficial impact to native bird species.

During CY 97-01, MO WS received requests for technical assistance with blackbird problems from nearly 138 Missouri residents. In addition to the technical assistance, MO WS responded to 9

requests for operational direct control of problem blackbirds. Damage reported to WS was in excess of \$305,000 to a wide variety of resources. In the 9 requests for operational direct control, MO WS harassed some 1.2+ million blackbirds, and destroyed 7900+ birds (MO WS MIS). Most of the birds destroyed were killed in association with harassment shooting to reinforce noise harassment as part of blackbird dispersal activities.

Canada Geese

Canada geese (*Branta canadensis*) have been a popular and common waterfowl species throughout North America since pre-settlement times. Canada geese exhibit very strong family and pair bonds. They tend to return to their natal homes to nest. There are 11 recognized subspecies of Canada geese (giant, western, dusky, Vancouver, interior, Atlantic, Tavernier's, Richardson's, lesser, Aleutian, and cackling) that nest across North America in habitats ranging from semi-desert, to temperate rainforest, to arctic tundra. Female Canada geese lay an average of 4 to 6 eggs.

Wintering habitat for Canada geese is slightly less diverse than breeding habitat. In eastern North America, grain producing agricultural lands adjacent to estuarine or salt-water marshes with bulrush and cord grass provide ideal winter habitat in the form of food and protection. In the mid-western United States, refuges with fresh-water marshes and abundant food crops attract increasing numbers of Canada geese that previously had migrated to the Gulf Coast.

In general, populations of Canada geese are currently more stable than in previous decades. However, populations of certain subspecies are at record low numbers while others have increased dramatically. Presently, Aleutian Canada geese are listed as threatened and giant Canada goose populations have become problematic in some areas due to their elevated numbers. An indirect population estimate based on observations of neck-banded Aleutian Canada geese was 33,496 in 2000, 17% greater than the previous year's estimate. The Mississippi Flyway giant Canada goose population was estimated at 1.5 million birds, a 21% increase from last year's estimate (Ducks Unlimited 2002).

Both sexes of Canada geese have a black head and neck except for broad white cheek patches extending from the throat to the rear of the eye. The female of a breeding pair is often smaller. The breast, abdomen, and flanks range in coloring from a light gray to a dark chocolate brown, either blending into the black neck or being separated from it by a wide white collar. The back and scapulars are darker brown, the rump is blackish, and the tail is blackish brown with U-shaped white band on rump. The bill, legs, and feet are black. Most subspecies have the characteristic "honking" call.

The State of Missouri is home to the Giant Canada goose (*Branta canadensis maxima*) sub-species, and is part of the Eastern Prairie Population (EPP). Missouri also hosts wintering migrants of the Mississippi Valley Population (MVP) The Giant Canada geese are native to the prairie portions of the upper Midwest and they were common in portions of Missouri during pre-settlement times. Giant Canada geese were thought to have become extinct by the late 1800s but have now been restored to most of the eastern U.S. A cooperative breeding population surveys was developed and has been implemented in at least 6 Mississippi Flyway states since 1993. This survey involves the use of helicopters to conduct low level counts on randomly selected 2 mi sq plots. Additional states cooperate in the survey using fixed wing aircraft, ground counts or they extrapolate from known density areas to habitats in non-surveyed areas. These surveys resulted in an initial flyway estimate of 832,900 giant Canada geese during 1993, which was 2 to 3 times the number that were thought to have been present at the time. The estimates increased by an average of 6% per year since 1993 to a high of 1.5 million during spring 2000. The 2001 estimate of 1.37 million is 8% lower than the 2000 estimate. These estimates are considered conservative due to the inability to survey some urban locations. In Missouri, the 2001 survey was conducted during 6 days from April 9-18, resulting in a giant Canada goose population estimate of 50,517 (+14,934) (MDC 2002).

The state of Missouri monitors populations and sets harvest dates and limits governed by USFWS guidelines. The MDC Mid-Winter 2000 Canada goose count of 128,610 was lower than in January 1999 (259,800) This was due primarily to the lack of cold weather and poor dry habitat conditions. The first significant cold weather occurred on 20-21 December, lasted 2 days, and then mild weather again prevailed during the remainder of December and early January 2000. Giant Canada geese nesting in Missouri continued to increase in number and good production in spring 2000 ensured a larger fall flight than 1999. The 2001 season in Missouri allowed the following harvest: in the North Zone (except Swan Lake Zone), the Middle Zone, the Southeast Zone, and the South Zone, bag limit is 3 Canada geese daily (6 in possession) during 9/30- 10/8 and 2 Canada geese daily (4 in possession) thereafter. In the Swan Lake Zone the bag limit is 2 Canada geese daily (4 in possession). Statewide, the Canada goose harvest in 1999-2000 numbered 32,500 geese.

Canada geese are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. During CY 97-01, MO WS received requests for technical assistance with Canada goose problems from nearly 500 Missouri residents. In addition to the technical assistance, MO WS responded to 51 requests for operational direct control of problem Canada geese. Damage reported to WS was in excess of \$800,000 to a wide variety of resources. In the 51 requests for operational direct control, MO WS harassed some 6258 Canada geese, relocated an additional 44 and destroyed 106 birds (MO WS MIS). Most of the birds destroyed were killed in association with harassment shooting to reinforce noise harassment as part of goose dispersal activities.

Based upon an anticipated increase in future requests for WS Canada goose damage management assistance in MO, WS predicts that WS anticipated lethal take of Canada geese will not to exceed 1,000 individuals annually. Based on population trends and hunter harvest data for this species in Missouri and the Central Flyway, WS BDM activities will not have a significant impact on the species.

English House Sparrow

The house sparrow (*Passer domesticus*), also know as the English sparrow, is an introduced nonnative species in North America. They are abundant and aggressive. The entire North American population is descended from a few birds released in Central Park, New York City, in 1850. These birds found and unoccupied niche—the many towns and farms of the settled parts of the country--- and quickly multiplied. House sparrows often have 2 to 3 broods per season, which average 5 to 6 eggs per clutch.

BBS population trends from 1966-99 indicate that English sparrows are decreasing throughout the U.S. as a whole by about 2.4% per year (Sauer et al. 1999). Robbins (1973) suggested that declines in the population of this species must be largely attributed to changes in farming practices which provide less feeding opportunities for the birds. One aspect of changing farming practices which might have been a factor would be the considerable decline in small farms and associated disappearance of a multitude of small feed lots, stables and barns, a primary source of food for these birds in the early part of the 20th century. Ehrlich et al. (1988) suggested that English sparrow population declines might be linked to the dramatic decrease during the 20th century in the presence of horses as transport animals. Grain rich horse droppings were apparently a major food source for this species.

Although precise population numbers for English sparrows were not available for Missouri and the region, BBS and the Audubon Society's, Christmas bird count (Sauer et. al. 1996) revealed that this species was relatively, very abundant. Based on relative abundance of English sparrows for this region, application of all non-lethal methods proposed for BDM in Missouri would not be likely to have any significant impact on regional populations of this species. English sparrows are considered extremely abundant and are not afforded protection by Federal or State law; depredation permits are not required before they can be killed by the public.

Any BDM activity involving lethal control of English sparrows by WS would be restricted to individual sites. As stated previously, because English sparrows are not native to North America, any reduction in English sparrow populations, even to the extent of complete local eradication, could be considered a beneficial impact on populations of native bird species. Therefore, any reduction in this species' populations in North America should not be considered as having any significant adverse impact on the quality of the human environment.

During CY 97-01, MO WS received requests for technical assistance with English sparrow problems from 143 Missouri residents. In addition to the technical assistance, MO WS responded to 3 requests for operational direct control of problem English sparrows. During this time MO WS took 651 house sparrows primarily to test for the viruses St. Louis encephalitis, and West Niles. Both viruses are carried by the bird and are contagious to humans. This number of sparrows taken at multiple sites undoubtedly had little effect on overall sparrow populations in Missouri. Based upon an anticipated increase in future requests for WS English sparrow damage management assistance in MO, WS predicts that WS would kill no more than 1,000 English sparrows annually. Based upon the reproductive capabilities and population trends WS BDM activities will not have a significant impact on the species.

Feral Domestic Pigeon Population Impacts

The feral domestic pigeon, also known as the rock dove, is an introduced nonnative species in North America. Breeding Bird Survey data indicate the species has been stable across the western United States from 1967 through 1995 (Sauer et al. 1997). Federal or state law does not protect the species. 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 domestic pigeons are causing damage or are a nuisance, complete removal of the local population could be achieved. This would be considered to be a beneficial impact on the human environment since the affected property owner or administrator would request it. Although regional population impacts would be minor, 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 of pigeons may consider major population reduction in some localities a negative impact.

During CY 97-01, MO WS received requests for technical assistance with pigeon problems from nearly 51 Missouri residents. In addition to the technical assistance, MO WS responded to 20 requests for operational direct control of problem pigeons. Damage reported to WS was in excess of \$45,000 to a wide variety of resources.

Between FY 97 and FY 00, MO WS took 6,625 pigeons, primarily to reduce health hazards associated with dropping and damage in and around buildings. This number of pigeons taken at multiple sites had little effect on overall pigeon populations in Missouri. Based upon an anticipated increase in future requests for WS pigeon damage management assistance in MO, WS predict that WS would kill no more than 5,000 pigeons annually. Based upon the reproductive capabilities and population trends, WS BDM activities will not have a significant impact on the species.

Fish-eating Bird Population Effects

Fish-eating birds and damage associated with them was discussed in Subsection 1.3.7. Birds listed in that discussion may be addressed in BDM projects related to abatement of damage to aquaculture or other fish producing operations. WS may also address damage by birds on a very small scale in technical or direct assistance programs dealing with recreational recreation fish production.

Great-blue herons, double-crested cormorants, ospreys, ringed billed gulls, green-backed herons, American white pelicans, diving ducks and egrets have all been reported to WS in Missouri as causing damage to fish production facilities. They have also been implicated in damages to recreational fish collections in urban environments. Requests for assistance for damage management from fish eating species are increasing. In CY 97-01 MO WS has responded to 84 requests with technical assistance and 7 using direct control.

BBS data revealed a positive population trend (+6.6) for great-blue heron populations from 1966 to 1999 in Missouri (Sauer et al., 2002). MO WS in CY 97-01 removed an average of 10 problem birds per year. Based upon an anticipated increase in future requests for WS great-blue heron damage management assistance in MO, WS predicts that no more than 100 herons would be killed by WS annually. Based on population trends for this species in Missouri, WS BDM activities will not have a significant impact on the species.

Double-crested cormorant populations are at an all time high of more than an estimated 1-2 million birds. These birds have been identified throughout much of the U.S. as causing excessive damage to aquaculture facilities by feeding on fish being produced (USDI 1998). Severe damage has been documented in Missouri and is discussed in subsection 1.3.7

Ospreys are a large fish eating bird that has been documented by WS to have caused damage at one Missouri aquaculture facility. Globally, osprey populations are stable, demonstrably widespread, abundant and secure globally, though it may be quite rare in parts of its range, especially at the periphery. MDC website states that the department lists the osprey at a ranking of SX, or that it has been extirpated from the state (MDC Endanger Species Checklist 2002). Also, the breeding bird survey does not indicate any breeding populations within the state. However, in 2002 two active nesting pairs were observed by MDC, which should result in a revision of that species rank in the near future.

Fish eating birds are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. Current MO WS direct control projects have not resulted in any take of double-crested cormorants as well as ospreys, greenback herons, American white pelicans, herring gull however future BDM activities could result in the removal of individuals to reinforce non-lethal methods. WS has taken a minimal number of great egrets and ring-billed gulls annually (Table 4-2). Based upon an anticipated increase in requests for fish-eating bird damage management assistance in MO, WS anticipates that no more than 20 individuals of each of these fish eating bird species would be killed by WS annually. This small number of birds lethally taken by WS would not have a significant impact on the populations of the species in Missouri or the region.

Great Horned Owl Population Effects

Great horned owls are a common owl found through most of the United States and Canada. The largest of American "eared" owls, only the rare Great Gray Owl exceeds it in size. The Great Horned owl preys on a wide variety of creatures including grouse and rabbits as well as beetles, lizards and frogs. It is one of the first birds to nest, laying its eggs as early as late January when there is still snow on the ground. Its habitat is ubiquitous, frequenting forest, desert, open country, swamps and even city parks (Audubon Society, 1990).

BBS data indicates that great horned owl population trends were increase slightly (0.6%) in the U.S., (1.6%) in the Eastern BBS region, while decreasing in Missouri (-3.3%) from 1967-99(Saur et al. 2001).

During CY 97-01, MO WS received requests for technical assistance with great horned owl problems from 21 Missouri residents. In addition to the technical assistance, MO WS responded to 3 requests for operational direct control of problem owls.

Great horned owls are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. In Missouri WS killed an average of 2 great horned owls per year in FY 1997-00. Based upon an anticipated increase in future requests for WS great-horned owl damage management assistance in MO, WS predict that no more than 20 owls would be killed by WS annually. Based on population trends for this species in Missouri, WS BDM activities will not have a significant impact on the species.

Mallard Duck Population Effects

Mallard ducks are migratory game birds with substantial populations throughout much of North America. Many states in the U.S. have regulated annual hunting seasons for the species and take is liberal. Missouri allows a hunting season each year with daily bag limits of this species.

BBS data indicates that the mallard population trends have increased across the U.S (3.7%), and (15.2%) in Missouri. In 2000 mallard population reached a record of an estimated 9.5 million birds. Mallards have become common inhabitants of urban Missouri, nesting and living on urban ponds. In 2000-01, Missouri hunters recorded the second highest harvest of ducks, with 412,800 birds over a 60-day season. MDC statistics show that this harvest was comprised of greater than 75 % mallards.

Mallard ducks are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. Missouri WS killed an average of 10 mallards per year in FY 97-01. Based upon an anticipated increase in future requests for WS mallard duck damage management assistance in MO, WS predicts that no more than 100 mallard ducks would be killed by WS annually. Based on population trends and hunter harvest data for this species in Missouri, WS BDM activities will not have a significant impact on the species.

During CY 97-01, MO WS received requests for technical assistance with mallard problems from 15 Missouri residents. In addition to the technical assistance, MO WS responded to 1 request for operational direct control of problem mallards. Damage reported to WS was in excess of \$7,500 to a wide variety of resources. In the 1 request for operational direct control, MO WS harassed 194 mallards, and destroyed 69 birds (MO WS MIS). Most of the birds destroyed were killed in association with harassment shooting to reinforce noise harassment as part of bird dispersal activities.

Mourning Dove Population Effects

Mourning doves are migratory game birds with substantial populations through much of North America. Many states in the U.S. have regulated annual hunting seasons for the species and take is liberal. Missouri allows a hunting season each year with generous bag limits of this species. MDC 2001 Annual Harvest report showed Missouri hunters taking 687,264 doves in the Fall of 2000 (MDC Schulz 2001).

BBS data indicates that mourning dove population trends were decreasing slightly (-.4%) in the U.S., but rising (.4%) in the Eastern BBS region, and decreasing in Missouri (-2.6%) from 1967-99(Saur et al. 2001). Mourning doves have become common inhabitants of urban Missouri, even nesting frequently in man-made structures. This species is the most abundant dove in North America, is the champion of multiple brooding in its range, and is expanding northward (Ehrlich et. al, 1988).

During CY 97-01, MO WS received requests for technical assistance with mourning dove problem from nearly 9 Missouri residents. In addition to the technical assistance, MO WS responded to 4 requests for operational direct control. Mourning doves are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit.

In Missouri WS killed an average of 38 mourning doves per year in FY 1997-00. Based upon an anticipated increase in future requests for WS Mourning Dove damage management assistance in MO, WS predicts that WS would lethally kill no more than 100 doves annually. Based on population trends and hunter harvest data for this species in Missouri, WS BDM activities will not have a significant impact on the species.

Red-tailed Hawk Population Effects

Red-tailed hawks are North America's most common and widespread Buteo. They are occasionally abundant and occur in every North American habitat except the high Arctic and extensive tracts of dense forest. Northern birds are migratory. They are bird of both open and wooded areas, particularly wood edges, and are often seen perching conspicuously on a treetop, a telephone poles or other lookout while hunting (Clark and Wheeler, 1987).

BBS trend data for red-tailed hawks reveals that populations increased across the U.S. (3.1%), the eastern region (4.3%), and down slightly in Missouri (-0.1%) from 1966-98 (Sauer et al., 1999).

During CY 97-01, MO WS received requests for technical assistance with red-tailed hawk problems from 30 Missouri residents. In addition to the technical assistance, MO WS responded to 5 requests for operational direct control of problem hawks.

Red-tailed hawks are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. In Missouri WS killed an average of 7.5 red-tailed hawks per year in FY 1997-00. Based upon an anticipated increase in future requests for WS red-tailed hawk damage management assistance in MO, WS predicts that no more than 50 red-tailed hawks would be killed by WS annually. Based on population trends for this species in Missouri, WS BDM activities will not have a significant impact on the species.

Turkey Vulture Population Effects

The turkey vulture is one of three species of vultures found in North America and is the most common and widespread of the New World vultures. This species nests throughout all of the United States except for northern New England. They are conspicuous for their soaring behavior as they search for carcasses, locating them primarily by aid of the sense of smell. They possess weak feet and blunt claws instead of sharp talons like hawks and owls. Their heads are bare which assists them in preventing their feathers from becoming fouled by carrion. They nest in tree cavities or on the ground. Turkey vultures are valuable for their removal of garbage and disease-causing carrion. At night they often gather in large roosts (National Audubon Society, 1990).

BBS population trend data indicates that the turkey vulture has experienced an increasing population trend in the U.S. as a whole (3.1%), in the eastern BBS region (1.1%) and in Missouri (5.4%) from 1966-99 (Sauer et al. 1999).

Turkey vultures are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. WS receives requests to address damage caused by turkey vultures in Missouri. During FY 1997-00 WS received 17 requests for technical assistance and 3 operational control. WS killed no vultures during BDM activities, but harassed more than 500 birds from problem sites. In the future, WS might need use lethal techniques to reinforce hazing effort. Based upon an anticipated increase in future requests for WS turkey vulture damage management assistance in MO, WS predicts that no more than 50 vultures would be killed by WS annually. Based on population trends for this species in Missouri, WS BDM activities will not have a significant impact on the species.

Horned Lark Population Impacts

Horned Larks (*Eremophila alpestris*) are a small passerine that is found throughout North America. Breeding Bird Survey data indicates the species has been stable or slightly decreasing across the United States from 1967 to 1995 (Sauer et al. 1999). Horned larks are a widespread occupant of open habitats and prefer areas with sparse vegetation and exposed soil. In eastern North America, most pairs occupy tilled fields, the grassy fields bordering airports and similar habitats and are occasionally found in vacant lots within cities (Sauer et. al. 1999).

Horned Larks are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. In CY 97-99 WS @ MO Airports has taken an average of 44 birds per year, while harassing more than 4,350 birds from it's airfields (USDA 2001). Based upon an anticipated increase in future requests for WS horned lark damage management assistance in MO, WS predict that WS would kill no more than 100 larks annually. Based on population trends, WS BDM activities will not have a significant impact on the species.

Swallows

Swallows are a small insectivorous bird from the family *Hirundinidae*. Swallows that are found throughout North America. Within the state of Missouri five species of swallows are common, as well as, the Purple Martin.

Breeding Bird Survey data indicates the family have been stable or increasing across the United States from 1980 to 1999. The family as a whole increased by an average of 7.48 %. The greatest population increase was Cliff Swallows at 18%, while the largest decrease was 2.9% (Sauer et al. 2001). Swallows are a widespread occupant of open to semi open land, preferring fields, farmland, marshes and areas near water.

Swallows are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. In CY 97-99 WS @ MO Airports has taken an average of 38.6 birds per year, while harassing more than 2,000 birds from it's airfield (USDA 2001). During CY 97-01, MO WS received 7 requests for technical assistance with swallows. In addition to the technical assistance, MO WS responded to 4 requests for operational direct control. Based upon an anticipated increase in requests for WS swallow damage management assistance in MO, WS predicts that no more than 100 swallows would be killed by WS annually. Based on population trends for this species in Missouri, WS BDM activities will not have a significant impact on the species.

Other Target Species

Target species, in addition to those analyzed above, have been killed in small numbers during the past several years and have included no more than 20 individuals of a given species annually (Table 4-2) Other species that could be killed during BDM include any of the species listed in Section 1.2. These other bird species are protected by the USFWS under the Migratory Bird Treaty Act and take is limited by permit. Based upon an anticipated increase in future requests for assistance, WS predicts that no more than 20 individuals of each of these bird species will be killed by WS annually. None of these species are expected to be taken by WS BDM at any level that would adversely affect populations.

4.1.1.2 Alternative 2 - Non-lethal BDM Only by WS

Under this alternative, WS would not lethally take any target species and only non-lethal BDM activities and technical assistance recommendations would be made or implemented. Although WS take of target wildlife species would not occur, it is likely that, without WS conducting some level of lethal BDM activities, landowners or contractors BDM efforts would increase, leading to similar or greater impacts on target species populations as those of the current program alternative. For the same reasons shown in the population impacts analysis in section 4.1.1.1, however, it is unlikely that target wildlife populations would be impacted adversely affected by implementation of this alternative.

4.1.1.3 Alternative 3 - Lethal BDM Only by WS

Under this alternative, WS would likely have a greater impact on the target species population within Missouri than Alternative 1 (No Action/Proposed Action). Only lethal BDM activities would be implemented to resolve wildlife damage in all situations. WS would not recommended or use any non-lethal BDM activities to reduce wildlife damage at Missouri airports. It is likely that a greater number of birds would likely have to be removed lethally to attempt to achieve the same results as the proposed action. For the same reasons shown in the population impacts analysis in section 4.1.1.1, however, it is unlikely that target wildlife populations would be impacted adversely affected by implementation of this alternative

4.1.1.4 Alternative 4 -No Federal WS BDM

Under this alternative, WS would have no impact on target species populations within Missouri. Landowner efforts to reduce or prevent wildlife conflict could increase which could result in impacts on target species populations to an unknown degree. 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 airport personnel and/or contractors. For the same reasons shown in the population impacts analysis in section 4.1.1.1 it is unlikely that target bird populations would be impacted adversely affected by implementation of this alternative.

4.1.2 Effects on Non-target Species Populations, including Threatened and Endangered Species.

4.1.2.1 Alternative 1 - Continue the Current Federal Bird Damage Management Program/ Integrated Wildlife Damage Management (The No Action/Proposed Action)

Adverse Impacts on Non-target (non-T&E) Species. There has been minimal take of non-target species by WS during BDM activities during FY 97 - 00. This take was limited to two northern cardinals and one mourning dove by the pesticide DRC-1339. While every precaution is taken to safeguard against taking non-target species, at times changes in local animal movement patterns and other unanticipated events can result in the incidental take of unintended species. These occurrences are rare and should not affect the overall populations of any species under the current program.

T&E Species Impacts.

Federal Listed T&E Birds and Mammals In Missouri

- E -- Bat, gray (*Myotis grisescens*)
- E -- Bat, Indiana (*Myotis sodalis*)
- E -- Bat, Ozark big-eared (*Corynorhinus townsendii ingens*)
- T -- Eagle, bald (*Haliaeetus leucocephalus*)
- T -- Plover, piping (*Charadrius melodus*)
- E -- Puma, eastern (*Puma concolor cougar*)
- E -- Tern, least (*Sterna antillarum*)

(Species listed under the Federal List are current as posted on USFWS web site.)

State Listed T&E Birds and Mammals

Northern Harrier (*Circus cyaneus*), Interior Least Tern (*Sterna albifrons*), Barn-Owl (*Tyto alba*), Swainson's Warbler (*Limnothlypis swainsonii*), Snowy Egret (*Egretta thula*), King Rail (*Rallus elegans*), Bachman's Sparrow (*Aimophila aestivalis*), Bald Eagle (*Haliaeetus leucocephalus*), Peregrine Falcon (*Falco mexicanus*), American Bittern (*botaurus lentiginosus*), Greater Prairie-chicken (*Tympanuchus cupido*).

Gray Bat (*Myotis grisescens*), Ozark Big-eared Bat (*Corynorhinus townsendii ingens*), Indiana Bat (*Myotis sodalis*), Mountain Lion (*Puma concolor cougar*), Black-tailed Jackrabbit (*Lepus californicus*), Spotted Skunk (*Spilogale putorius*). (Wildlife code of Missouri 3CRS10-4.111)

WS has obtained a list of the T&E species and has concluded that BDM activities within Missouri would not adversely affect any Federal or State listed T&E species, including those listed above. WS has conducted an informal section 7 with the USFWS and MDC. Both agencies concur with WS findings. WS will notify landowners of their responsibilities relating to T&E species when WS recommends habitat alteration.

The 1992 Biological Opinion (B.O.) from the USFWS concluded that the interior least tern and piping plover would not be adversely affected by any aspect of the WS program which included all methods of BDM described herein (USDA 1997, Appendix F).

DRC-1339 poses no primary hazard to eagles because eagles do not eat grain or other bait materials on which this chemical might be applied during BDM, and, further, because eagles are highly resistant to DRC-1339. Up to 100 mg doses were force fed to captive golden eagles with no mortality or adverse effects noted other than regurgitation and head-shaking (Larsen and Dietrich 1970). Secondary hazards to raptors from DRC-1339 and Avitrol are low to nonexistent (see Appendix B). Therefore, WS BDM will have no adverse effects on bald eagles.

Mitigation measures to avoid non-target and T&E species impacts are described in Chapter 3 (section 3.4.2.2). The inherent safety features of DRC-1339 use that preclude or minimize hazards to mammals and plants are described in Appendix B and in a formal risk assessment in the ADC FEIS (USDA 1997, Appendix P). 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.

Starlicide Complete is a slow acting avicide that is registered with the EPA for reducing damage from starlings and blackbirds around livestock and poultry operations. It is toxic to other types of birds in differing amounts, but will not kill (English) sparrows at the registered levels. Mammals are generally resistant to the toxic effects. Poisoned birds experience a slow, non-violent death. They usually die 24-36 hours after feeding, often at their roost. Poisoned starlings are not dangerous to scavengers or predators. (Johnson 1998).

When using pesticides, WS takes several actions to ensure that non-target animals, particularly threatened and endanger species are not effected. These actions include the monitoring of non-target species during pre-baiting activities. Based on observations, decisions are made about application procedures. With the use of many pesticides, all treated material is removed from the site prior to WS personnel leaving the area. Furthermore, WS conducts post application surveys to document results of the treatment. Treated carcasses are collected and destroyed as recommended by the manufacture to reduce any possible exposure to secondary poisoning.

Based upon the information provide above, WS has determined that WS BDM activities will not adversely affect any non-target wildlife species in Missouri while conducting bird damage management activities.

4.1.2.2 Alternative 2 – Non-lethal BDM Only by WS

Under this alternative, WS take of non-target animals would probably be less than that of the proposed action because WS would take no lethal control actions. However, non-target take would not differ substantially from the current program because the current program has taken few non-target animals during FY 97-00. On the other hand, MO landowners whose wildlife damage problems were not effectively resolved by non-lethal control methods and recommendations would likely resort to other means of lethal control such as use of shooting by landowners or their agents. This could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of non-target birds.

4.1.2.3 Alternative 3 Lethal BDM Only by WS

Under this alternative, only lethal BDM activities would be recommended and implemented to resolve wildlife conflicts in all situations. WS would not recommended or use any non-lethal BDM activities to reduce wildlife damage in MO. WS take of non-targets would not differ substantially from the current program described in section 4.1.2.1. Since all BDM control methods would not be available for use by WS, wildlife conflicts may not be reduced to an acceptable level leading to non-WS personnel implementing their own BDM activities. Although technical support, might lead to more selective use of lethal control methods by non-WS personnel than that which might occur under Alternative 2, landowner efforts to reduce or prevent damage could still result in less experienced persons implementing control methods leading to greater take of non-target wildlife than under the proposed action

4.1.2.4 Alternative 4 - No Federal WS BDM

Alternative 4 would not allow any WS BDM with in the State of MO. There would be no impact on non-target or T&E species by WS BDM activities from this alternative. However, landowner efforts to reduce or prevent conflicts could increase, which could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than under the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of non-target birds.

4.1.3 Economic Losses to Property as a Result of Bird Damage

4.1.3.1 Alternative 1- Continue the Current Federal Wildlife Damage Management Program/ Integrated Wildlife Damage Management (The No Action/Proposed Action)

MO landowners are concerned with the economic cost associated with damage caused by birds to personal property. Birds can cause structural damage to buildings, cause fires by shorting out electrical transformers, contaminate food sources and obstruction and damage of water control structures, and damage to the perimeter security fencing. Integrated BDM, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing the risk of bird damage. All BDM methods could possibly be implemented and recommended by WS.

4.1.3.2 Alternative 2 – Non-lethal BDM Only by WS

Under this alternative, WS would be restricted to implementing and recommending only non-lethal methods in providing assistance with bird damage. Bird damage could increase under this alternative if non-lethal techniques were ineffective. Landowners requesting BDM assistance to reduce wildlife damage would not be provided information or services in lethal control. If non-lethal methods did not reduce or eliminate the wildlife damage no other WS options would be available. Landowners would then be required to implement their own lethal program with potential for limited success, depending upon the expertise of the personnel involved. Therefore bird damage to property could remain the same or greater than the proposed action.

4.1.3.3 Alternative 3 - Lethal BDM Only by WS

Under this alternative, only lethal BDM activities would be implemented or recommended to resolve bird damage to property in all situations. DRC-1339 would be available for use, however, due to safety considerations and regulations at airports, within some city limits, and power plants, all lethal BDM methods would not be available for use in all situations. In areas where lethal BDM could not be conducted, such as areas around power plants where discharge of firearms is not safe or allowed, bird damage would not be reduced. In these situations WS would not be able to recommend or use non-lethal methods that otherwise would be available under the proposed action. If landowners did not implement their own non-lethal program in this particular situation, the likely results would be bird damage to property remaining the same or increasing. Overall impacts on bird damage to property would likely be greater under of this alternative than the proposed action.

4.1.3.4 Alternative 4 - No Federal WS BDM

With no WS assistance, landowners would be responsible for developing and implementing their own BDM program. Negative impacts on bird damage to property would likely be greater under this alternative than the proposed action. Landowner efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods, therefore leading to a greater potential of not reducing bird property damage, than under the proposed action.

4.1.4 Effects on Human Health and Safety

4.1.4.1 Safety and efficacy of chemical control methods.

4.1.4.1.1 Alternative 1 - Continue the Current Federal Wildlife Damage Management Program/ Integrated Wildlife Damage Management (The No Action/Proposed Action)

DRC-1339 (3-chloro-p-toluidine hydrochloride). DRC-1339 is the primary lethal chemical method that would be used under the current program alternative for lethal bird control. 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.

This chemical is one of the most extensively researched and evaluated pesticides ever developed. Over 30 years of studies have demonstrated the safety and efficacy of this compound. Appendix B provides more 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:

- Its use is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops (contrary to some misconceptions expressed by a few members of the public, DRC-1339 is not applied to feed materials that livestock can feed upon).
- 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 treated bait material generally is nearly 100% broken down within a week.
- It is more than 90% metabolized in target birds within the first few hours after they consume the bait. Therefore, little material is left in bird carcasses that may be found or retrieved by people.

- Application rates are extremely low (less than 0.1 lb. of active ingredient per acre) (EPA 1995).
- A human 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 his/her system. This is highly unlikely to occur.
- The EPA has concluded that, based on mutagenicity (the tendency to cause gene mutations in cells) studies, 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.

Starlicide Complete is a premixed form of DRC-1339 that is available to the general public. The active ingredient is 3-chloro-p-toluidine hydrochloride, which is the same as DRC-1339. The above affects are the same for this chemical.

Avitrol (4-Aminopyridine). Avitrol is another chemical method that might be used by WS for bird control. 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. Appendix B 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 1:9 treated to untreated mixture. In addition to this factor, other factors that virtually eliminate health risks to members of the public from use of this product as an avicide are:

- It is readily broken down or metabolized into removable compounds that are excreted in urine in the target species (ETOXNET 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, 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 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 non-lethal BDM chemicals that might be used or recommended by WS include repellents such as methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption) and Flight Control®, which are used as an area repellent, and the tranquilizer drug Alpha-chloralose. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before EPA or FDA would register them. Any operational uses of chemical repellents would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations that 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).

4.1.4.1.2 Alternative 2 – Non-lethal BDM Only by WS

Alternative 2 would not allow for any lethal methods use by WS within the state of MO. WS could only implement non-lethal methods such as harassment and exclusion devices and materials. Non-lethal methods could, however, include the tranquilizer drug Alpha-chloralose and chemical repellents such as methyl anthranilate which, although already considered safe for human consumption because it is artificial grape flavoring, and Flight Control® which might nonetheless raise concerns about human health risks. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before EPA or FDA registers them. 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 are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health.

4.1.4.1.3 Alternative 3 - Lethal BDM Only by WS

Under this alternative, only lethal BDM activities would be implemented to resolve wildlife damage in all situations. WS would not recommended or use any non-lethal BDM activities to reduce bird damage. WS's use of chemical BDM methods would not differ substantially from the current program described in section 4.1.4.1.

4.1.4.1.4 Alternative 4 - No Federal WS Wildlife Damage Management

Alternative 4 would not allow any WS BDM within the state of MO. Concerns about human health risks from WS's use of chemical BDM methods would be alleviated because no such use would occur. DRC-1339 and Alpha-Chloralose are only registered for use by WS personnel and would not be available for use by landowners or their agents. 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. However, use of Avitrol in accordance with label requirements should avoid any hazard to members of the public.

4.1.4.2 Impacts on human safety of non-chemical BDM methods

4.1.4.2.1 Alternative 1 - Continue the Current Federal Wildlife Damage Management Program/ Integrated Wildlife Damage Management (The No Action/Proposed Action)

Non-chemical BDM methods that might raise safety concerns include shooting with firearms, use of traps, and harassment with pyrotechnics. Firearms are only used by WS personnel who are experienced in handling and using them. WS traps are strategically placed to minimize exposure to the landowner, the public and pets. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. The MO WS program has had no accidents involving the use of firearms, traps, or pyrotechnics in which a member of the public was harmed. A formal risk assessment of WS's operational management methods found that risks to human safety were low

(USDA 1997, Appendix P). Therefore, no adverse impacts on human safety from WS's use of these methods are expected.

4.1.4.2.2 Alternative 2 - Non-lethal by BDM Only by WS

Under this alternative, WS would not use firearms for lethal control during BDM but would still be able to use them as a harassment method. WS would also use pyrotechnics. Risks to human safety from WS's use of firearms, lethal control and pyrotechnics hypothetically would be similar to the current program alternative. MO WS's current BDM program has an excellent safety record of no accidents involving these devices have occurred resulting in a member of the public being harmed. Increased use of these devices by less experienced and trained individuals would probably occur under this alternative. Impacts from this alternative could be greater or about the same as the proposed action.

4.1.4.2.3 Alternative 3 – Lethal BDM Only by WS

Under this alternative, only lethal BDM activities would be implemented to resolve wildlife damage in all situations. WS would not recommend or use any non-lethal BDM activities to reduce wildlife damage. WS's use of non-chemical lethal BDM methods, the use of firearms, would not differ substantially from the current program described in Alternative 1. Although technical support, might lead to more selective use of lethal control methods by landowners or their agents than that which might occur under Alternative 2, efforts to reduce or prevent conflicts could still result in less experienced persons implementing control methods. Resulting in risks to human safety similar to Alternative 2, but to a lesser extent than Alternative 4 because some of these personnel would be receiving advice and instruction from WS.

4.1.4.2.4 Alternative 4 - No Federal WS Wildlife Damage Management

Under this alternative, WS would not engage in or recommend use of any non-chemical BDM methods. Risks to human safety from WS's use of firearms, traps, and pyrotechnics would hypothetically be lower than the current program alternative. However, increased use of firearms, traps, and pyrotechnics by less experienced and trained private individuals would probably occur without WS assistance. Risks to human safety under this alternative could increase or remain about the same as the proposed action.

4.1.4.3. Effects on Human Health and Safety From Not Conducting DDM to Reduce Human/Aggressive Bird Confrontations, Disease Threats or Outbreaks.

4.1.4.3.1 Alternative 1 - Continue the Current Federal Wildlife Damage Management Program/ Integrated Wildlife Damage Management (The No Action/Proposed Action)

As discussed in Chapter 1, feral domestic pigeons, European starlings, blackbirds, and English sparrows can all carry or be involved in the cycle of diseases that are transmittable to humans and that can adversely affect human health. In most cases, it is difficult to conclusively prove that birds were responsible for transmission of individual human cases or outbreaks of bird-borne diseases. Nonetheless, certain requesters of BDM service may consider this risk to be unacceptable and may request such service primarily for that reason. In such cases, BDM, either by lethal or non-lethal means, would, if successful, reduce the risk of bird-borne disease transmission at the site for which BDM is requested.

In some situations, such as those involving urban feral domestic pigeons and European starlings, the implementation of non-lethal controls (e.g., electric or porcupine wires, netting barriers and harassment) could actually increase the risk of human health problems at other sites by causing the birds to move to other urban roosting sites not previously affected. In such cases, lethal removal of

the birds may actually be the best action from the standpoint of overall human health concerns in the local area.

The current program Alternative allows for the effective, efficient, and timely resolution of aggressive bird confrontations. Through the implementation of an integrated wildlife damage management program, aggressive birds that may inflict harm to humans can be effectively resolved since all available BDM methods would be available.

4.1.4.3.2 Alternative 2 - Non-lethal by BDM Only by WS

Under this Alternative, WS would be restricted to implementing only non-lethal methods in providing assistance with bird damage problems. Entities requesting BDM assistance for human health and safety concerns would only be provided information on non-lethal barriers or exclusion devices, habitat alteration, or other non-lethal methods such as harassment. Because some of these non-lethal methods would likely be effective at the individual sites where they are used, this Alternative would likely create or increase human health and safety risks at other locations to where the birds would then move. Limitations to the types of available control options would increase the health and safety threats caused by birds. DRC-1339 would not be available for use by non-WS personnel. Therefore, it may be difficult to achieve management goals in certain circumstances. In such cases, human health risks may remain the same or become worse. Also, under this Alternative, human health and safety problems would probably increase if private individuals were unwilling to implement non-lethal control methods because of high cost, lack of faith in their effectiveness, or if they were unable to hire other entities to conduct effective BDM for human health and safety concerns.

4.1.4.3.3 Alternative 3 – Lethal BDM Only by WS

Under this Alternative, WS would be restricted to implementing only lethal methods in providing assistance with bird damage problems. In certain situations, such as those associated with fall and winter blackbird roosts, large concentrations of birds may not be effectively controlled by using only lethal control devices. Often times the use of lethal and non-lethal harassment techniques is necessary to effectively disperse large concentrations of birds. Furthermore, at some locations the use of lethal methods may not be allowed due to safety concerns or laws and regulations prohibiting use of certain lethal control methods. These limitations to the types of available control options would increase the health and safety threats caused by birds. Under this Alternative, human health and safety problems would probably increase if lethal control methods were ineffective or unavailable for use and private individuals were unwilling to implement non-lethal control methods because of high cost, lack of faith in their effectiveness, or if they were unable to hire other entities to conduct effective non-lethal BDM for human health and safety concerns.

4.1.4.3.4 Alternative 4 - No Federal WS Wildlife Damage Management

With no WS assistance, landowners would be responsible for developing and implementing their own BDM program. Negative impacts on human health and safety would likely be greater under this alternative than the proposed action. Landowner efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods, therefore leading to a greater potential of not reducing human health and safety conflicts, than under the proposed action.

4.1.5 Effects on Aesthetics

4.1.5.1 Effects on Human Affectionate-Bonds with Individual Animals and on Aesthetic Values of Wildlife Species

4.1.5.1.1 Alternative 1 - - Continue the Current Federal Wildlife Damage Management Program/ Integrated Wildlife Damage Management (The No Action/Proposed Action)

Some people who routinely view or feed individual birds such as pigeons and waterfowl would likely be disturbed by removal of such animals under the current program. Some people have expressed opposition to the killing of any animal during BDM activities. Under the current program, some lethal control of birds would continue and these persons would continue to be opposed. However, many persons who voice opposition has no direct connection or opportunity to view or enjoy the particular animals that would be killed by WS's lethal control activities. Lethal control actions would generally be restricted to local sites and to small, insubstantial 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 bird roosts should even be harassed to stop or reduce damage problems. Some people who enjoy viewing wildlife would feel their interests are harmed by WS's non-lethal harassment program. Mitigating that impact, however, is the fact that a harassment program does not diminish overall numbers of wild animals in the area. People who like to view these species can still do so on State wildlife management areas, as well as numerous private and public property sites where the owners are not experiencing damage from wild birds and are tolerant of their presence.

4.1.5.1.2 Alternative 2 – Non-lethal BDM Only by WS

Under this alternative, WS would not conduct any lethal BDM but would still conduct harassment of birds that were causing damage. Some people who oppose lethal control of wildlife by government but are tolerant of government involvement in non-lethal wildlife damage management would favor this alternative.

Some people do not believe that bird roosts should even be harassed to stop or reduce damage problems. Some people who enjoy viewing wildlife would feel their interests are harmed by WS's non-lethal harassment program. Mitigating that impact, however, is the fact that a harassment program does not diminish overall numbers of wild animals in the area. People who like to view these species can still do so on State wildlife management areas, as well as numerous private and public property sites where the owners are not experiencing damage from wild birds and are tolerant of their presence.

Persons who have developed affectionate bonds with individual wild birds would not be affected by WS lethal BDM activities under this alternative because WS would not kill the individual animal(s). However, landowners or their agents would likely conduct lethal BDM activities that would no longer be conducted by WS. Therefore the impacts of this alternative would be similar to the proposed action.

4.1.5.1.3 Alternative 3 - Lethal BDM Only by WS

Under this alternative, only lethal BDM activities would be implemented or recommended. People that have expressed opposition to the killing of any bird during BDM activities would likely be opposed to this alternative. Non-lethal methods would not be used or recommended by WS, therefore impacts of this alternative would be greater than the propose action.

4.1.5.1.4 Alternative 4 - No Federal WS BDM

Under this alternative, WS would not conduct any lethal or non-lethal BDM activities. Some people who oppose any government involvement in wildlife damage management 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. However, landowners or their agents would likely conduct similar BDM activities as those that would no longer be conducted by WS, resulting in impacts similar to the current program alternative.

4.1.5.2 Effects on Aesthetic Values of Property Damaged by Birds

4.1.5.2.1 Alternative 1 - - Continue the Current Federal Wildlife Damage Management Program/ Integrated Wildlife Damage Management (The No Action/Proposed Action)

Under this alternative, WS would provide operational and technical assistance in reducing bird problems in which droppings are causing a unsightly mess and would, if successful improve aesthetic values of affected properties in the view of the landowner. All BDM methods would be available for use, including the use of DRC-1339 and Alpha-chloralose. Relocation of nuisance roosting birds by 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 in other undesirable locations.

4.1.5.2.2 Alternative 2 – Non-lethal BDM Only by WS

Under this alternative, WS would only provide non-lethal operational and technical assistance in reducing problems in which droppings from birds are causing a unsightly mess and would, if successful improve aesthetic values of affected properties in the view of the land owner. Relocation of nuisance roosting birds by 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 are generally conducted to assure they do not reestablish in other undesirable locations. If non-lethal BDM methods are not effective in reducing bird problems WS would not be able to recommend or implement any potential successful lethal BDM method. Landowners would then have the option of doing nothing, which would not reduce the problem, or implement their own control methods, which can have varying success. Overall, impacts of improving aesthetics would be slightly less than the proposed action.

4.1.5.2.3 Alternative 3 - . Lethal BDM Only by WS

Under this alternative, only lethal BDM activities would be implemented or recommended. This alternative would result in nuisance birds being removed by lethal means only. Where lethal BDM could be conducted bird damage would likely be reduced to acceptable levels. In areas where lethal BDM could not be conducted, such as areas where discharge of firearms is not safe or allowed, bird damage would not be reduced. Landowners would be required to develop and implement their own non-lethal BDM programs. Relocation of nuisance birds or bird roosts through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. If WS does not provided non-lethal assistance to landowners, coordination with local authorities to monitor the birds' movements to assure the birds do not reestablish in other undesirable locations might not be conducted. Thus, this alternative could likely result in more property owners experiencing adverse effects on the aesthetic values of their properties than the current program alternative.

4.1.5.2.4 Alternative 4 - No Federal WS BDM

Under this alternative, WS would not provide any operational or technical assistance in reducing bird problems. Aesthetic values of the landowner would continue to be adversely affected, if landowners or their agents were not able to implement there own BDM, or reduce damage in some

other way. In many cases, this type of aesthetic “damage” would increase as a result of affected individuals not being able to resolve their problems. Bird conflicts would continue to increase, resulting in a greater chance of adverse impacts than with the proposed action.

4.1.6 Humanness and Animal Welfare Concerns of Lethal Methods Used by WS

4.1.6.1 Alternative 1 -- Continue the Current Federal Wildlife Damage Management Program/ Integrated Wildlife Damage Management (The No Action/Proposed Action)

Under this alternative, methods viewed by some persons as inhumane would continue to be used or recommended in BDM by WS. These methods would include shooting, lethal trapping and toxicants/chemicals such as DRC-1339, Starlicide Complete and Avitrol.

Shooting, when performed by experienced professionals, usually results in a quick death for target animals. Occasionally, however, some birds are initially wounded and must be shot a second time or must be caught by hand and then dispatched or euthanized. Some persons would view shooting as inhumane. Despite SOP's designed to maximize humaneness, as described in sections 3.4.1, the perceived stress and trauma associated with being held in traps until the WS specialist arrives to dispatch the animal, is unacceptable to some persons.

The primary lethal chemical BDM method that would be used by WS under this alternative would be DRC-1339. This chemical causes a quiet and apparently painless death that results from uremic poisoning and congestion of major organs (Decino et al. 1966). The birds become listless and lethargic, and a quiet death normally occurs in 24 to 72 hours following ingestion. This method appears to result in a less stressful death than which probably occurs by most natural causes; which are primarily disease, starvation, and predation. For these reasons, WS considers DRC-1339 use under the current program to be a relatively humane method of lethal BDM. However, despite the apparent painlessness of the effects of this chemical, some persons will view any method that takes a number of hours to cause death as inhumane and unacceptable.

The chemical Avitrol repels birds by poisoning a few members of a flock, causing them to become hyperactive (see discussion in Appendix B). Their distress calls generally alarm the other birds and cause them to leave the site. Only a small number of birds need to be affected to cause alarm in the rest of the flock. The affected birds generally die. Some persons would view Avitrol as inhumane treatment of the affected birds, based on the birds' distress behaviors.

Starlicide Complete is a slow acting avicide that is registered with the EPA for reducing damage from starlings and blackbirds around livestock and poultry operations. Poisoned birds experience a slow, non-violent death. They usually die 24-36 hours after feeding, often at their roost. Poisoned starlings are not dangerous to scavengers or predators. (Johnson 1998).

Occasionally, birds captured alive by traps, by hand or with nets would be euthanized. The most common method of euthanization would be cervical dislocation and by CO₂ gas which are AVMA-approved euthanasia methods (Beaver et. al 2001). Most people would view AVMA-approved euthanization methods as humane.

4.1.6.2 Alternative 2 – Non-lethal BDM Only by WS

Under this alternative, WS would not use lethal methods viewed as inhumane by some persons. However, landowners or their agents may reject non-lethal BDM recommended and provided by WS and would seek alternative lethal means resulting in impacts to humaneness similar to or greater than the proposed action. Impacts of lethal methods implemented by non-WS employees could be similar or greater than the proposed action depending upon their BDM training and experience. Since DRC-1339 would not be available to non-WS entities, the only chemical BDM

methods that could be legally used by these entities would be Starlicide and Avitrol. Avitrol would most likely be viewed as less humane than DRC-1339 because of the distress behaviors that it causes. Overall, people who perceive the use of lethal control methods by WS as inhumane would prefer this alternative to the proposed action.

4.1.6.3 Alternative 3 - Lethal BDM Only by WS

Under this alternative, only lethal BDM activities would be implemented or recommended. These methods would include shooting, trapping, and the use of toxicants/chemicals such as DRC-1339, Starlicide Complete and Avitrol. These lethal methods are viewed by some persons as inhumane. Impacts for this alternative would be similar to the proposed action.

4.1.6.4 Alternative 4 - No Federal WS BDM

Under this alternative, lethal methods viewed as inhumane by some persons would not be used or recommended by WS. Similar to Alternative 2, DRC-1339 would no longer be available for use since it is only registered for use by WS personnel. Thus, the only chemical BDM methods legally available would be Starlicide Complete and Avitrol—Avitrol would be viewed by many persons as less humane than DRC-1339. Shooting, and BDM trapping and capture methods could be used by non-WS entities and, similar to the current program alternative, would be viewed by some persons as inhumane. Overall, it is likely that BDM would be similar or somewhat less humane with this alternative than under the proposed action, dependent upon the training and expertise of the person implementing control methods.

4.2 Cumulative Impacts

No significant cumulative environmental impacts are expected from any of the 4 alternatives. Under the Proposed Action and Alternative 3, the lethal removal of wildlife would not have a significant impact on overall wild bird populations in Missouri, but some local reductions may occur. This is supported by the MDC, which is the agency with responsibility for managing wildlife in the State. No risk to public safety is expected when WS' services are provided and accepted by requesting individuals in Alternatives 1,2, and 3, since only trained and experienced wildlife specialists would conduct and recommend BDM activities. There is a slight increased risk to public safety when persons that reject WS assistance and recommendations in Alternatives 1, 2, and 3 conduct BDM activities, and when no WS assistance is provided in Alternative 4. In all 4 Alternatives, however, it would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS' participation in BDM activities, the analysis in this EA indicates that WS Integrated BDM program will not result in significant cumulative adverse impacts on the quality of the human environment. Table 4-3 summarizes the expected impacts of each of the alternatives on each of the issues.

Table 4-3 Summary of the expected impact of each of the alternatives on each of the issues.

Issues/Methods	Alternative 1 -- Continue the Current Federal BDM Program/ Integrated Wildlife Damage Management (The No Action / Proposed Action)	Alternative 2 – Non-lethal BDM Only by WS	Alternative 3- Lethal BDM Only by WS	Alternative 4 - No Federal WS BDM
Effects on Target Wildlife Species Populations	Local populations in areas with damage or threats of damage would be reduce and sustained at a lower level. No adverse affects on state or regional populations.	Results may equal or be less than the proposed action.	Local populations in areas with damage or threats of damage would be reduce and sustained at a lower level. No adverse affects on state or regional populations.	WS would have no impact on target bird populations. If landowners conduct their own management without WS, results could be similar or greater than the proposed action.
Effects on Non-target Species Populations, including T&E Species	No adverse affects by WS.	No adverse affects by WS. If landowners implement lethal removal activities without WS, non-targets species take may increase.	No adverse affects by WS.	No impact by WS. If landowners conduct lethal BDM, non-target species take may increase.
Effects on Human Health and Safety	WS BDM methods would not adversely impact human health and safety. The proposed action has the greatest potential of successfully reducing bird impacts.	WS BDM methods would not adversely impact human health and safety. Impacts from birds could be similar or could be greater under this alternative than the proposed action.	WS BDM methods would not adversely impact human health and safety. Impacts from birds could be similar or greater under this alternative than the proposed action.	WS would have no impact. Depending on actions taken by the land manager, impacts from birds could increase, decrease or remain the same.
Effects on Aesthetics	Variable. Land managers who are receiving damage would favor this alternative. Some people would oppose this alternative.	Variable. Some people would favor this alternative; however, landowners would probably impose their own lethal control, resulting in impacts similar to the proposed action.	Variable. Since WS could not use non-lethal methods the impacts of this alternative would likely be greater than the proposed action. Some people would oppose this alternative.	WS would have no impact. Landowners or their agents would likely conduct similar BDM activities no longer conducted by WS, resulting in impacts similar to or greater than the proposed action.
Humanness and Animal Welfare Concerns of Lethal Methods Used by WS	Variable. Some people will view as inhumane. Other will view as more humane than alternative 3. methods as humane.	Variable. People who perceive the use of lethal control methods by WS as inhumane would prefer this alternative to the proposed action.	Variable. Impacts for this alternative would be similar to the proposed action.	WS would have no impact.

Appendix A

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Appendix B

BIRD DAMAGE MANAGEMENT (BDM) METHODS AVAILABLE FOR USE OR RECOMMENDATIONS BY THE MISSOURI WILDLIFE SERVICES PROGRAM

NONLETHAL METHODS-NONCHEMICAL

Property owner practices. These consist primarily of non-lethal preventive methods such as cultural methods and habitat modification. Property owner implements cultural methods and other management techniques. Resource owners/managers may be encouraged to use these methods, based on the level of risk, need, and professional judgment on their effectiveness and practically. These methods include:

Cultural methods. These may include altering the reducing availability of food and water at livestock facilities: remove spilled grain and standing water; use bird-proof feeders and storage facilities; increasing planting depth, and avoiding early planting of rice.

Environmental/Habitat modification can be an integral part of BDM. Wildlife production and/or presence are directly related to the type, quality and quantity of suitable habitat. Therefore, habitat can be managed to reduce or eliminate the production or attraction of certain wildlife species. Property owners are responsible for implementing habitat modifications, and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect. Habitat management is most often a primary component of BDM strategies to reduce problems by eliminating nesting, denning, roosting, loafing and feeding sites. Generally, many problems can be minimized through management of vegetation and water on areas adjacent to problem areas.

Lure crops/alternate foods. When depredations cannot be avoided by careful crop selection or modified planting schedules, lure crops can sometimes be used to mitigate the loss potential. Lure crops are planted or left for consumption by wildlife as an alternative food source. 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.

Animal Behavior Modification. This refers to tactics that alter the behavior of wildlife to reduce damage. Animal behavior modification may involve use of scare tactics or fencing to deter or repel animals that cause loss or damage (Twedt and Glahn 1982). Some but not all methods are included in this category are:

- Bird proof barriers
- Propane cannons
- Pyrotechnics
- Distress Calls and sound producing devices
- Chemical frightening agents
- Repellents
- Harassment with a radio controlled plane
- Mylar tape

These methods are generally only practical for small area. Scaring devices such as distress calls, propane cannons, 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).

Bird-proof barriers can be effective but often are cost-prohibitive, particularly because of the aerial mobility of, which requires overhead barriers as well as peripheral fencing or netting. Buildings, hangers, display planes, and other structures could be “bird proofed” using hardware cloth or netting, where feasible, to eliminate roosting and nesting areas. Porcupine wire (e.g., Nixalite™, Catclaw™) is a mechanical repellent method that can be used to exclude pigeons and other birds from ledges and other roosting surfaces (Williams and Coorigan 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 birds have been known to build nests on top of porcupine wires and the method can be expensive to implement if 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).

Auditory scaring devices such as propane cannons, pyrotechnics, electronic guards, sirens, scarecrows, and audio distress/predator vocalizations are effective in many situations for dispersing damage-causing bird species. These devices are sometimes effective but usually only for a short period of time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Mott 1985, Shirota et.al. 1983, and Arhart 1972). These methods should be reinforced with other scaring devices such as shooting and other types of physical harassment.

Visual techniques such as use of mylar tape (highly reflective surface produces flashes of light that startles birds), eye-spot balloons (the large eyes supposedly gives 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. 1998). 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.

Relocation of damaging birds to other areas following live capture generally would not be effective nor cost-effective. Relocation to other areas following live capture would not generally be 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. Translocation 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 are exceptions to the rule for relocating certain bird species. Relocation of damaging birds might be a viable solution and acceptable to the public when the birds are considered to have “high value” such as migratory waterfowl, raptors, or T&E species. In these cases, WS would consult with the USFWS and/or MDC to coordinate capture, transportation, and selection of suitable relocation sites.

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle. Nest destruction is generally only applied when dealing with a single bird or very few birds. This method is used to discourage birds from constructing nests in areas which may create nuisances for home and business owners. Heusmann and Bellville (1978) reported that nest removal was an effective but time-consuming method because problem bird species are highly mobile and can easily return to damage sites from long distances, or because of high populations.

Egg addling/destruction is a method of suppressing reproduction in local nuisance bird populations by destroying egg embryos 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 destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the egg from obtaining oxygen (see *Egg oiling* below). Although WS does not commonly use egg addling or destruction, it is a valuable damage management tool and has shown to be effective.

Live traps include:

Clover, funnel, and common 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 food material which attract the target birds. WS' standard procedure when conducting pigeon 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.

Decoy traps are used by WS for preventive and corrective damage management. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds of the same species that are being targeted are usually placed in the trap with sufficient food and water to assure their survival. Perches are configured in the trap to allow birds to roost above the ground and in a more natural position. Feeding behavior and calls of the decoy birds attract other birds which enter and become trapped themselves. Active decoy traps are monitored daily, every other day, or as appropriate, to remove and euthanize excess birds and to replenish bait and water. Decoy traps and other cage/live traps, as applied and used by WS, pose no danger to pets or the public and if a pet is accidentally captured in such traps, it can be released unharmed.

Mist nets are more commonly used for capturing small-sized birds such as house sparrows, finches, etc. but can be used to capture larger birds such as ducks and ring-neck pheasants or even smaller nuisance hawks and owls. It was introduced in to the United States in the 1950's from Asia and the Mediterranean where it was used to capture birds for the market (Day et al. 1980). The mist net is a fine black silk or nylon net usually 3 to 10 feet wide and 25 to 35 feet long. Net mesh size determines which birds can be caught and overlapping "pockets" in the net cause birds to entangle themselves when they fly into the net.

Cannon nets are normally used for larger birds such as pigeons, feral ducks, and waterfowl and use mortar projectiles to propel a net up and over birds, which have been baited, to a particular site. This type of net is especially effective for waterfowl that are flightless due to molting and other birds, which are typically, shy to other types of capture.

Panel nets as described by Costanzo et al. (1995) are lightweight, portable panels (approximate size 4' x 10') that are used to herd and surround geese into a moveable catch pen. This method is equally efficient on hard (pavement) and soft (field) surfaces, and can be employed in such a way as to reduce stress on captured birds (place the catch pen in a shaded area) and control other impacts (place far from roadways).

Bow nets are small circular net traps used for capturing birds. 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 it triggered by an observer using a pull cord.

Hand nets are used to catch birds 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.

Net guns are devices used to trap birds. The devices project a net over a target using a specialized gun.

Lasers are small electronic devices that project a beam of light at or onto a target. The beam is used to harass problem birds by both visual cues and as an irritant to the eye. Built in safety devices and the lack of sound make this an effective tool in heavily populated areas as well as sites where auditory harassment might disturb normal operations.

NONLETHAL METHODS - CHEMICAL

Methyl anthranilate (artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. Methyl anthranilate (MA) (artificial grape flavoring food additive) has

been shown to be an effective repellent for many bird species, including waterfowl (Dolbeer et al. 1993). Methyl anthranilate (MA) is also under investigation as a potential bird taste repellent. MA may become available for use as a livestock feed additive (Mason et. al. 1984; 1989). It is registered for 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/bee³), nontoxic to rats in an inhalation study ($LC_{50} > 2.8$ mg/L⁴), and of relatively low toxicity to fish and other invertebrates. Methyl anthranilate is naturally occurring in concord grapes and in the blossoms of several species of flowers and is used as a food additive and perfume ingredient (Dolbeer et al. 1992; RJ Advantage, Inc. 1997). It has been listed as “Generally Recognized as Safe” (GRAS) by the U.S. Food and Drug Administration (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 (RJ Advantage, Inc. 1997). An example of the level of expense involved is a golf course in ██████████, NM where it was estimated that treating four watercourse areas would cost in excess of \$25,000 per treatment for material alone. Cost of treating turf areas would be similar on a per acre basis. Also, MA completely degrades in about 3 days when applied to water (RJ Advantage, Inc. 1997) which indicates the repellent effect is short-lived.

Another potentially more cost effective method of MA application is by 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 non-irritating to any humans that might be exposed. Fogging applications must generally be repeated 3-5 times after the initial treatment before the birds abandon a treatment site (Dr. P. Vogt, RJ Advantage, Inc., pers. comm. 1997). 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 fogging method is currently not registered for use in Missouri and therefore cannot legally be used to meet the goals of the proposed action.

MA is also being investigated as a livestock feed additive to reduce or prevent feed consumption by birds. Such chemicals undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by U.S. Environmental Protection Agency (EPA) or the Food and Drug Administration (FDA).

Particulate feed additives have been investigated for their bird-repellent characteristics. In pen trials, starlings rejected grain to which charcoal particles were adhered (L. Clark, National Wildlife Research Center, pers. comm. 1999). If further research finds this method to be effective and economical in field application, it might become available as a bird repellent on livestock feed. Charcoal feed additives have been explored for use in reducing methane production in livestock and should have no adverse effects on livestock, on meat or milk production, or on human consumers of meat or dairy products (L. Clark, NWRC, pers. comm. 1999).

Other chemical repellents. A number of other chemicals have shown bird repellent capabilities. Anthraquinone, a naturally occurring chemical found in many plant species and in some invertebrates as a natural predator defense mechanism, has shown effectiveness in protecting rice seed from red-winged blackbirds and boat-tailed grackles (Avery et al. 1997). It has also shown effectiveness as a foraging repellent against Canada goose grazing on turf and as a seed repellent against brown-headed cowbirds (Dolbeer et al. 1998). This chemical is not yet registered in the U.S. but may become available at some future date. Compounds extracted from common spices used in cooking and applied to perches in cage tests have been shown repellent characteristics against roosting starlings (Clark 1997). Naphthalene (moth balls) was found to be ineffective in repelling starlings (Dolbeer et al. 1988).

³An 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.

⁴An 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.

Tactile repellents. A number of tactile repellent products are on the market which reportedly deter birds from roosting on certain structural surfaces by presenting a tacky or sticky surface that the birds avoid. However, experimental data in support of this claim are sparse (Mason and Clark 1992). The repellency of tactile products is generally short-lived because of dust, and they sometimes cause aesthetic problems and expensive clean-up costs by running down the sides of buildings in hot weather.

Avitrol is a chemical frightening agent (repellent) that is effective in a single dose when mixed with untreated baits, normally in a 1:9 ratio. Avitrol, however, is not completely non-lethal in that a small portion of the birds are generally killed (Johnson and Glahn 1994). Pre-baiting is usually necessary to achieve effective bait acceptance by the target species. This chemical is registered for use on pigeons, crows, gulls, blackbirds, starlings, and English sparrows in various situations. Avitrol treated bait is placed in an area where the targeted birds are feeding and usually a few birds will consume a treated bait and become affected by the chemical. The affected birds then broadcast distress vocalizations and display abnormal flying behavior, thereby frightening the remaining flock away.

Avitrol is a restricted use pesticide that can only be sold to certified applicators and is available in several bait formulations where only a small portion of the individual grains carry the chemical. It can be used during anytime of the year, but is used most often during winter and spring. 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. Bio-degradation 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 availability for intake by organisms from water, is non-accumulative in tissues and rapidly metabolized by many species (Schafer 1991).

Avitrol is acutely toxic to avian and mammalian species, however, blackbirds are more sensitive to the chemical and there is little evidence of chronic toxicity. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning, and during field use only magpies and crows appear 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 Lethal Dose (LD₅₀) in contaminated prey for 20 days were not adversely affected and three American kestrels that were fed contaminated blackbirds for seven to 45 days were not adversely affected. A formal Risk Assessment found no probable risk is expected for pets and the public, based on low concentrations and low hazards quotient value for non-target indicator species tested on this compound (USDA 1997, Appendix P).

Alpha-chloralose is a central nervous system depressant used as an immobilizing agent to capture and remove nuisance waterfowl, pigeons and other birds. It is labor intensive and in some cases, may not be cost effective (Wright 1973, Feare et al. 1981), but is typically used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts. Alpha-chloralose is typically delivered as a well contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds. WS personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Alpha-chloralose was eliminated from more detailed analysis in USDA (1994) 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. Bio-accumulation in plants and animal tissue is believed to be low. Alpha-chloralose 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 two to 30 times lower than the LD₅₀. Mammalian data indicate higher LD₅₀ values than birds. Toxicity to aquatic organisms is unknown (Woronecki et al. 1990) but the compound is not generally soluble in water and therefore should remain unavailable to aquatic organisms. Factors supporting the determination of this low potential included the lack of exposure to pets, non-target species and the public, and the low toxicity of the active ingredient. Other supporting rationale for this determination included relatively low total annual use and a limited number of potential exposure pathways. The agent is currently approved for use by WS as an Investigative New Animal Drug by the FDA rather than a pesticide.

LETHAL METHODS - MECHANICAL

Shooting is more effective as a dispersal technique than as a way to reduce bird densities when large numbers of birds are present. Normally shooting is conducted with shotguns or air rifles. Shooting is a very individual specific method and is normally used to remove a single offending bird. However, at times, a few birds could be shot from a flock to make the remainder of the birds more wary and to help reinforce non-lethal methods. Shooting can be relatively expensive because of the staff hours sometimes required (USDA 1997). It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Shooting with shotguns, air rifles, or rim and center fire firearms is sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. WS follows all firearm safety precautions when conducting BDM activities and all laws and regulations governing the lawful use of firearms are strictly complied with.

Firearm use is very sensitive and a public concern because of safety issues relating to the public and misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use, training program within 3 months of their appointment and a refresher course biennially (WS Directive 2.615 5/03/02). WS employees, who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

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 caused by the woodpecker. These traps pose no imminent danger to pets or the public.

Cervical Dislocation - is sometimes used to euthanize birds which are captured in live traps and when relocation is not a feasible option. The bird is stretched and the neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. The AVMA approves this technique as humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of poultry and other small birds (Beaver et al. 2001). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Beaver et al. 2001).

Sport Hunting is sometimes recommended by WS as a viable damage management method when the target species can be legally hunted. A valid hunting license and other licenses or permits may be required by the MDC 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 crows, mourning doves, Canada geese, and other damage causing waterfowl and game birds.

LETHAL METHODS - CHEMICAL

All chemicals used by WS are registered as required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (administered by the EPA and the Missouri Department of Natural Resources (MO DNR) or by the FDA. WS personnel that use restricted-use chemical methods are certified as pesticide applicators by MO DNR and are required to adhere to all certification requirements set forth in FIFRA and Missouri pesticide control laws and regulations. Chemicals are only used on private, public, or tribal property sites with authorization from the property owner/manager.

CO₂ is sometimes used to euthanize birds which are captured in live traps and when relocation is not a feasible option. Live birds are placed in a container such as a plastic 5-gallon bucket or chamber and sealed shut. CO₂ gas is released into the bucket or chamber and birds quickly die after inhaling the gas. The American Veterinary Medical Association approves this method as a euthanizing agent (Beaver et al. 2001). CO₂ gas is a byproduct of animal respiration, is common in the atmosphere, and is required by plants for photosynthesis. It is used to carbonate beverages for human consumption and is also the gas released by dry ice. The use of CO₂ by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society.

Egg oiling is method of suppressing reproduction of nuisance birds by spraying a small quantity of food grade corn oil on eggs in nests. The oil prevents exchange of gases and causes asphyxiation of developing embryos and has

been found to be 96-100% effective in reducing hatchability. (Pochop 1998; Pochop et al. 1998). The method has an advantage over nest or egg destruction in that the incubating birds generally continue incubation and do not re-nest. The EPA has ruled that use of corn oil for this purpose is exempt from registration requirements under FIFRA. To be most effective, the oil should be applied anytime between the fifth day after the laying of the last egg in a nest and at least five days before anticipated hatching. This method is extremely target specific and is less labor intensive than egg addling.

DRC-1339 is the principal chemical method that would be used for starling/blackbird and pigeon damage management in the proposed action. For more than 30 years, DRC-1339 has proven to be an effective method of starling, blackbird, gull, and pigeon control at feedlots, dairies, airports, and in urban areas (West et al. 1967, Besser et al. 1967, Decino et al. 1966). Studies continue to document the effectiveness of DRC-1339 in resolving blackbird starling problems at feedlots (West and Besser 1976, Glahn 1982, Glahn et al. 1987), and Blanton et al. (1992) reports that DRC-1339 appears to be a very effective, selective, and safe means of urban pigeon population reduction. Glahn and Wilson (1992) noted that baiting with DRC-1339 is a cost-effective method of reducing damage by blackbirds to sprouting rice.

DRC-1339 is a slow acting avicide that is registered with the EPA for reducing damage from several species of birds, including blackbirds, starlings, pigeons, crows, ravens, magpies, and gulls. DRC-1339 was developed as an avicide because of its differential toxicity to mammals. DRC-1339 is highly toxic to sensitive species but only slightly toxic to non-sensitive birds, predatory birds, and mammals. For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/bird to cause death (Royall et al. 1967). Most bird species that are responsible for damage, including starlings, blackbirds, pigeons, crows, magpies, and ravens are highly sensitive to DRC-1339. Many other bird species such as raptors, sparrows, and eagles are classified as non-sensitive. Numerous studies show 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 that 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. 1981). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds and starlings killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers. Secondary hazards of DRC-1339 are almost nonexistent. DRC-1339 acts in a manner producing a quiet and non-convulsive death.

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). Appendix P of USDA (1997) contains a thorough risk assessment of DRC-1339 and the reader is referred to that source for a more complete discussion. That assessment concluded that no adverse effects are expected from use of DRC-1339.

DRC 1339 has several EPA Registration Labels (56228-10, 56228-17, 56228-28, 56228-29, and 56228-30) depending on the application or species involved in the BDM project.

Starlicide Complete is a chemical method that would be used for starling /blackbird damage management is the proposed action around livestock and poultry operations. The chemical differs from DRC-1339 in that it is premixed in a pellet bait formula and is available to the public.

Starlicide Complete is a slow acting avicide that is registered with the EPA for reducing damage from starlings and blackbirds around livestock and poultry operations. It is toxic to other types of birds in differing amounts, but will not kill (English) sparrows at the registered levels. Mammals are generally resistant to the toxic effects. Poisoned birds experience a slow, non-violent death. They usually die 24-36 hours after feeding, often at their roost. Poisoned starlings are not dangerous to scavengers or predators. (Johnson 1998). Starlicide Complete is labeled and registered by the EPA for BDM under pesticide number 67517-8-59613.

Appendix C

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