ENVIRONMENTAL ASSESSMENT

BIRD DAMAGE MANAGEMENT
BY THE
ILLINOIS WILDLIFE SERVICES PROGRAM

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

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ACRONYMS USED

A-C	Alpha chloralose
ADC	Animal Damage Control (see Note below)
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BBS	Breeding Bird Survey
BDM	Bird Damage Management
B.O.	Biological Opinion
CDFG	California Department Of Fish And Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	Carbon dioxide
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ETOXNET	Extension Toxicology Network
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FWS	Fish and Wildlife Service (also USFWS)
FY	Fiscal Year
GRAS	Generally recognized as safe
IDA	Illinois Department of Agriculture
IDNR	Illinois Department of Natural Resources
IDPH	Illinois Department of Public Health
ILCS	Illinois Conservation Law
IWDM	Integrated Wildlife Damage Management
KDFWR	Kentucky Department of Fish and Wildlife Resources
LD_{50}	Lethal dose-50 (i.e., needed to kill 50% of sample population)
MA	Methyl anthranilate
MBTA	Migratory Bird Treaty Act
MIS	Management Information System
MOU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NTSB	National Transportation Safety Board
NWRC	National Wildlife Research Center
RPA	Reasonable and prudent alternative
RPM	Reasonable and prudent measure
SOP	Standard operating procedure
T&E	Threatened and Endangered
TB	Tuberculosis
TGE	Transmissible gastroenteritis

USC	United States Code
USDA	U.S. Department of Agriculture
USDC	U.S. Department of Commerce
USDI	U.S. Department of Interior
USDOT	U.S. Department of Transportation
USGS	U. S. Geological Survey
USFWS	U.S. Fish and Wildlife Services
WS	Wildlife Services (see Note below)

NOTE: On August 1, 1997, the Animal Damage Control program was officially renamed to Wildlife Services. The terms Animal Damage Control, ADC, Wildlife Services, and WS are used synonymously throughout this Environmental Assessment.

NOTE: Upon examining this document, you will note that some information has been removed. This is in compliance with an injunction granted to the American Farm Bureau and Texas Farm Bureau (February 9, 2000), which states that Wildlife Services (WS) is restrained and prohibited from releasing to third parties any private information. The injunction identifies private information as "any information that allows the recipient of it to obtain or deduce the specific identity or personal identifying information of the entities who have requested, executed cooperative agreements with or otherwise allowed WS to enter their property for any purpose." Third parties are "individuals, groups, agencies, including but not limited to animal rights groups." Therefore, cooperators' private information has been removed from the Environmental Assessment.

1.0 CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

USDA/APHIS/ Wildlife Services (WS) is authorized by Congress to manage a program to reduce human/wildlife conflicts. WS' mission is to "provide leadership in wildlife damage control to protect America's agricultural, industrial and natural resources, and to safeguard public health and safety (USDA 1989)." This is accomplished through:

- training of wildlife damage management professionals;
- development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
- collection, evaluation, and dissemination of management information;
- cooperative wildlife damage management programs;
- informing and educating the public on how to reduce wildlife damage and;
- providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989).

This Environmental Assessment (EA) evaluates ways by which this responsibility can be carried out to resolve conflicts with bird species in Illinois.

WS is a cooperator-based service-oriented program. Before any operational wildlife damage management is conducted, *Agreements for Control* or *Cooperative Service Agreements* are completed by WS and the land owner/administrator. WS cooperates with other Federal, State and local government entities, 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)). Bird damage management (BDM) is a large component of the Illinois WS program. Therefore, WS has decided to prepare this EA to assist in planning BDM activities and to clearly communicate with the public the analysis of cumulative effects for a number of issues of concern in relation to alternative means of meeting needs for such management in the State. This analysis covers WS' plans for current and future BDM actions wherever they may be requested within the State of Illinois.

1.2 PURPOSE

The purpose of this EA is to analyze the effects of WS activities in Illinois to manage damage caused by bird species or species groups that include, but are not necessarily limited to, the following: European starlings (*Sturnus vulgaris*), blackbirds and meadowlarks (family Emberizidae), feral pigeons or rock doves (*Columba livia*), American crows (*Corvus brachyrhynchos*), English or house sparrows (*Passer domesticus*), American robins (*Turdus migratorius*), killdeer (*Charadrius vociferus*), mourning doves (*Zenaida macroura*), swallows (family Hirundinidae), woodpeckers (family Picidae), geese and swans (family Anatidae), ducks (family Anatidae, subfamily Anatinae), larks (family Alaudidae), coots (*Fulica americana*), gulls (*Larus spp.*), herons (family Ardeidae), and raptors (hawks, owls, and vultures; families Falconidea, Accipitridea, Titonidea, Strigidea, and Cathartidea). Resources protected by such activities include agricultural crops, turf, livestock feed, livestock, livestock health, property, threatened and endangered species, other wildlife, aquaculture, aviation safety, and human health and safety. Hereinafter, blackbirds refers to the blackbird group as described in the Final Environmental Impact Statement (FEIS), as revised, prepared by the WS program (USDA 1997). These include red-winged (*Agelaius phoeniceus*), tricolored (*A. tricolor*) and rusty blackbirds (*Euphagus carolinus*), brown-headed cowbirds (*Molothrus ater*), bronzed cowbirds (*Tangavius aeneus*), great-tailed grackles (*Cassidix mexicanus*), and common grackles (*Quiscalus quiscula*).

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 Illinois that responds to requests for BDM to protect human health and safety, aviation, agricultural crops, turf, livestock feed, livestock, livestock health, property, threatened and endangered species, and other wildlife, and aquaculture in the State of Illinois. A major component of BDM in the Illinois WS program has the goal of minimizing human health and safety threats and property damage in urban environments. Primary species of concern related to damage in urban environments are feral domestic pigeons, European starlings / blackbirds, English sparrows and waterfowl. The program would also operate to reduce loss or the risk of loss of agricultural crops and to reduce or minimize the loss of livestock feed and the risk of bird-related livestock health problems presented by European starling / blackbirds, and Canada geese (*Branta canadensis*), at requesting dairies, feedlots, and poultry operations, and to meet requests to minimize damage or the risk of damage to other agriculture, 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 employees conduct damage management actions. An Integrated Wildlife Damage Management (IWDM) approach would be implemented which would allow use of any legal technique or method, used singly or in combination, to meet requester needs for resolving conflicts with birds. Agricultural producers and others who request assistance would be provided with information regarding the use of effective nonlethal and lethal techniques. Lethal methods used by WS could include shooting, trapping, egg addling/destruction, toxicants such as DRC-1339 (also called Starlicide (3-chloro-p-toluidine hydrochloride)) and Avitrol® (4-aminopyridine), or euthanasia following live capture by trapping or use of the tranquilizer alpha-chloralose (A-C). Nonlethal methods used by WS could include porcupine wire deterrents, wire barriers and deterrents, netting, live capture and translocation using the tranquilizer A-C, chemical repellents (e.g., methyl anthranilate, di-methyl anthranilate, or anthraquinone), and harassment. In many situations, the implementation of nonlethal methods, such as exclusion-type barriers, would be the responsibility of the requester to implement. BDM by WS would be conducted in the State, when requested, on private property sites or public facilities where a need has been documented, upon completion of an *Agreement for Control* or *Cooperative Service Agreement*. All management actions would comply with appropriate Federal, State, and local laws. In addition, all individual actions would be analyzed to make sure that they are covered by this document.

1.3.2 Need For Bird Damage Management to Protect Human Health and Safety

Feral domestic pigeons and European starlings have been suspected in the transmission of 29 different diseases to humans (Davis et.al. 1971and Weber 1979). These include: viral diseases such as meningitis and seven different forms of encephalitis; bacterial diseases such as erysipeloid, salmonellosis, paratyphoid, Pasteurellosis, and Listeriosis; mycotic (fungal) diseases such as aspergillosis, blastomycosis, candidiasis, cryptococcosis, histoplasmosis, and sarcosporidiosis; protozoal diseases such as American trypansomiasis and toxoplasmosis; and rickettsial/chlamydial diseases such as chlamydiosis and Q fever. As many as 65 different diseases transmittable to humans or domestic animals have been associated with pigeons, European starlings, and English sparrows (Weber 1979). Table 1-1 shows the more typical diseases affecting humans that can be transmitted by pigeons and European 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 Illinois where the threat of disease associated with European starling, feral domestic pigeon, or English sparrow populations might occur could be:

- exposure by residents to a European starling roost which has been in a residential area for more than three years;
- disturbance of a large deposit of droppings in a structure (e.g., barn or attic) where a flock of feral domestic pigeons routinely roosts or nests;
- accumulated droppings from roosting European starlings, feral domestic pigeons, or English sparrows on structures at an industrial site where employees must work in areas of accumulation; or
- 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.

Canada geese have caused a wide range of concern in Illinois where they have threatened public safety and health. During their nesting season and in defense of the territory around their nest, geese have attacked pedestrians. The effects of these attacks have ranged from terrifying the individuals to causing lacerations and bruises from direct contact to broken bones and strokes while fleeing from the birds (T. Grimm, K. Gustad, WS, Pers. Comm. 2001). Nests have been found in a wide variety of locations that pose direct contacts with pedestrians, including; parking lot islands, planters, near hospital emergency room entrances, near business and courthouse entrances, shopping centers, etc.

High concentrations of Canada geese have also caused concerns to public health from the accumulation of droppings in water resources. Public swimming beaches have been closed by the Illinois Department of Public Health due to high levels of fecal coliform and *e. coli* levels in the water attributed to the geese (L. Haramis, IDPH, Pers. Comm., 2000). Public water treatment facilities have also been cited by the EPA for elevated levels of fecal coliform attributed to geese in their effluent discharge (L. Hughes, GPSD, Pers. Comm., 1998). Regardless of whether the serological types of *E. coli* disseminated into watersheds by geese are proven to be harmful to humans, it has been demonstrated that Canada geese can disseminate *E. coli* into the environment and result in elevated fecal coliform densities in the water column (Hussong et al. 1979).

In Illinois, European starlings and American crows form large communal roosts of the kind associated with disease organisms which grow in soils enriched by bird excrement, such as *Histoplasma capsulatum* (Weeks and Stickley 1984). Sometimes, such roosts occur in urban environments. Public health officials and residents at such sites express concerns for human health related to the potential for disease transmission where dropping deposits accumulate. WS receives requests for assistance in resolving problems related to large urban starling and crow roosts in Illinois.

Many times, individuals or property owners that request assistance with feral domestic pigeon, American crow, or nuisance blackbird or European 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 repeated clean-up costs. Under the proposed action, WS could agree to assist in resolving these types of problems.

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

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

Disease	Human Symptoms	Potential for Human Fatality	Effects on Domestic Animals
Bacterial:			
erysipeloid	skin eruption with pain, itching, headaches, chills, joint pain, prostration, fever, vomiting	sometimes - particularly to young children, old or infirm people	serious hazard for the swine industry
salmonellosis	gastroenteritis, septicaemia, persistent infection	possible, especially in individuals weakened by other disease or old age	causes abortions in mature cattle, possible mortality in calves, decrease in milk production in dairy cattle
Pasteurellosis	respiratory infection, nasal discharge, conjunctivitis, bronchitis, pneumonia, appendicitis, urinary bladder inflammation, abscessed wound infections	rarely	may fatally affect chickens, turkeys and other fowl
Listeriosis	conjunctivitis, skin infections, meningitis in newborns, abortions, premature delivery, stillbirth	sometimes - particularly with newborns	in cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles
Viral:			
meningitis	inflammation of membranes covering the brain , dizziness, and nervous movements	possible — can also result as a secondary infection with listeriosis, salmonellosis, cryptococcosis	causes middle ear infection in swine, dogs, and cats
encephalitis (7 forms)	headache, fever, stiff neck, vomiting, nausea, drowsiness, disorientation	mortality rate for eastern equine encephalomyelitis may be around 60%	may cause mental retardation, convulsions and paralysis
Mycotic (fungal):			
aspergillosis	affects lungs and broken skin, toxins poison blood, nerves, and body cells	not usually	causes abortions in cattle
blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	rarely	affects horses, dogs and cats
candidiasis	infection of skin, fingernails, mouth, respiratory system, intestines, and urogenital tract	rarely	causes mastitis, diarrhea, vaginal discharge and aborted fetuses in cattle
cryptococcosis	lung infection, cough, chest pain, weight loss, fever or dizziness, also causes meningitis	possible especially with meningitis	chronic mastitis in cattle, decreased milk flow and appetite loss
histoplasmosis	pulmonary or respiratory disease - may affect vision	possible, especially in infants and young children or if disease disseminates to the blood and bone marrow	actively grows and multiplies in soil and remains active long after birds have departed
Protozoal:			
American 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	inflammation of the retina, headaches, fever, drowsiness, pneumonia, strabismus, blindness, hydrocephalus, epilepsy, and deafness	possible	may cause abortion or still birth in humans, mental retardation

Rickettsial /Chlamydial:			
chlamydiosis	pneumonia, flu-like respiratory infection, high fever, chills, loss of appetite, cough, severe headaches, generalized aches and pains, vomiting, diarrhea, hepatitis, insomnia, restlessness, low pulse rate	occasionally, restricted to old, weak or those with concurrent diseases	in cattle, may result in abortion, arthritis, conjunctivitis, and enteritis
Q fever	sudden pneumonitis, chills, fever, weakness, severe sweating, chest pain, severe headaches and sore eyes	possible	may cause abortions in sheep and goats

1.3.3 Need For Bird Damage Management at Airports

Throughout the nation, bird strikes with aircraft pose a threat to aviation safety. Wildlife strikes with aircraft cost the civil aviation industry over $300 million in direct and associated damage annually. Since 1960, over 100 lives have been lost, attributed to bird strikes with aircraft (Cleary and Dolbeer 1999).

The risk that birds pose to aircraft is well documented, with the worst case reported in Boston in 1960 when 62 people were killed in the crash of an airliner which collided with a flock of European starlings (Terres 1980). In 1993 at [redacted], a 767 ingested a gull, destroying one engine and causing the pilot to make an emergency landing. During this landing, all of the brakes were damaged as the pilot could not reverse the engines to slow the aircraft. Damage from this single incident was more than $4 million. In fiscal year (FY) 1996, Canada geese were struck by an Air Force AWACS plane in Elmendorf Air Force Base, Alaska, causing the death of 24 airmen when the plane crashed. In addition a $190 million plane was lost (Dolbeer 1997). Again, in 1999, a Boeing 757 struck a flock of European starlings at the [redacted] and was forced to abort the flight (NTSB 1999). Damages were assessed at more than $500,000 by airport officials (D.T. Little, WS Pers. Comm. 1999).

Over the past seven years (1994-2000) 22 airports within Illinois reported 1,323 bird strikes to civil aircraft (FAA 2001). Although most of these strikes did not result in any damage to the aircraft, each strike does pose a threat of causing significant damage to the aircraft and passenger safety. For this reason, WS could provide operational BDM involving virtually any bird species that poses a strike hazard at the request of any aviation facility in the State.

1.3.4 Need for Bird Damage Management at Cattle Feeding Facilities

Blackbirds, European starlings, English sparrows, and, to a lesser extent, feral domestic pigeons and American crows often cause damage at cattle feeding facilities and dairies by congregating in large numbers to feed on the grain component of cattle feed. Such feeding habits present disease threats to livestock (Table 1-2) and causes contamination of the feed with the birds feces. The birds also cause damage by defecating on fences, shade canopies, 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.

Contribution of Livestock and Dairies to the Economy. Livestock and dairy production in Illinois contribute substantially to local economies. In 1998, 26,000 Illinois feedlot operations maintained 1,510,000 cattle and calves valued at approximately $770 million (NASS 1999). There were 139,000 milk cows valued at $63.7 million in the State, and Illinois' dairy operators produced 183 million pounds of milk generating $26 million in producer gross income (NASS 1998).

The effects of feed consumption and contamination (i.e., feed contaminated with bird feces that will not be consumed by the livestock) by European starlings was provided by two dairy producers in southern Illinois. Each reported daily production losses to be approximately 0.6% due to feeding of and contamination by approximately 3,000 birds. One operator characterized this, assuming that ten pounds of feed consumed by cattle yielded one pound of milk produced, as 500 to 700 pounds of feed daily that was consumed or contaminated by the starlings (A. Spencer, WS, Pers. Comm. 2001). WS has received complaints from dairy producers that have had as many as 25,000 starlings. Losses with these higher concentrations is assumed to be comparatively higher.

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 European 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 single 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 grain, crushed, or ground cereal. While cattle cannot select individual ingredients from that ration, European starlings can and do select the barley, thereby altering the energetic value of the complete diet. The removal of this high energy fraction by European starlings is believed to reduce milk yields, weight gains, and is economically critical (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 European 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 European 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 European starling depredation problems of which 6.3% experienced considerable economic loss. Williams (1983) estimated nearly 140 tons of feed losses seasonally to five species of blackbirds at one feedlot in Texas at valued at $18,000.

An example of damage through effects on livestock operations caused by birds occurred in a large cattle feeding operation in the panhandle of Texas. Trained WS field personnel determined that this operation had an estimated 1,000,000 blackbirds and European starlings using the facility per day. 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 [redacted].

Scope of Livestock Health Problems. A number of diseases that affect livestock have been associated with feral domestic pigeons, European 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 European 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 [redacted].

Table 1-2 summarizes some diseases associated with European starlings, blackbirds, feral domestic pigeons, and English sparrows. The table also summarizes types of livestock affected, typical symptoms and comments regarding implications for the listed diseases.

Table 1-2. Some diseases of livestock that have been linked to feral domestic pigeons, European 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	Swine - arthritis, skin lesions, necrosis, septicemia Sheep - lameness	serious hazard for the swine industry, rejection of swine meat at slaughter due to speticemia, also affects dogs
salmonellosis	all domestic animals	Cattle - abortions in mature cattle, mortality in calves, decrease in milk production in dairy cattle Swine - colitis	over 1700 serotypes
Pasteurellosis	cattle, swine, horses, rabbits, chickens, turkeys	Poultry - die suddenly without illness pneumonia, bovine mastitis Swine - abortions, septicemia, abscesses	also affects cats and dogs
avian tuberculosis	chickens, turkeys, swine, cattle, horses, sheep	Poultry - emaciation, decrease in egg production, and death in poultry Cattle - mastitis	also affects dogs and cats
Streptococcosis	cattle, swine, sheep, horses, chickens, turkeys, geese, ducks, rabbits	Poultry - emaciation and death Cattle - mastitis Swine - abscesses and inflamation of the heart and death	feral pigeons are susceptible and aid in transmission
yersinosis	cattle, sheep, goats, horses, turkeys, chickens, ducks	Cattle and sheep - abortion	also affects dogs and cats
vibriosis	cattle and sheep	Cattle - often a cause of infertility or early embryonic death Sheep - the only known cause of infectious abortion in late pregnancy	of great economic importance
Listeriosis	chickens, ducks, geese, cattle, horses, swine, sheep, goats	Livestock - difficulty swallowing, nasal discharge, paralysis of throat and facial muscles	also affects cats and dogs
Viral:			
meningitis	cattle, sheep, swine, poultry	Cattle - inflamation of the brain, newborn calves unable to suckle	associated with listeriosis, salmonellosis, cryptococcosis
encephalitis (7 forms)	horses, turkeys, ducks	Livestock - drowsiness, inflamation of the brain	mosquitos serve as vectors
Mycotic (fungal):			
aspergillosis	cattle, chickens, turkeys, and ducks	Cattle - abortions	common in turkey poults
blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	Symptoms rare in livestock	affects horses, dogs and cats
candidiasis	cattle, swine, sheep, horses, chickens, turkeys	Cattle - mastitis, diarrhea, vaginal discharge, and aborted fetuses	causes unsatisfactory growth in chickens
cryptococcosis	cattle, swine, horses	Cattle - chronic mastitis, decreased milk flow and appetite loss	also affects dogs and cats

histoplasmosis	horses cattle and swine	Cattle and swine - chronic cough, loss of appetite, weakness, depression, diarrhea, extreme weight loss	actively grows and multiplies in soil and remains active long after birds have departed
Coccidiosis	poultry, cattle, and sheep	Poultry - bloody diarrhea, dehydration, retardation of growth	almost always present in English sparrows; also found in pigeons and European starlings
Protozoal:			
American trypanosomiasis	cattle, swine, horses, sheep, chickens, turkeys	Livestock - 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	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	Cattle - abortion, arthritis, conjunctivitis, enteritis	also affects dags and cats and many wild birds and mammals
Q fever	affects cattle, sheep, goats, and poultry	Sheep and goats - may cause abortions	can be transmitted by infected ticks

1.3.5 Need For Canada Goose Damage Management to Protect Agriculture

Canada goose populations are at very high levels in Illinois with estimated resident populations of approximately 103,000 birds in 2000 (R. Marshalla, IDNR Pers. Comm. 2001). Geese rely on a variety of agricultural crops such as wheat, corn, and cereal crops. These birds feed on waste grain in harvested fields during late fall and winter and little damage results from these activities. However, in addition to feeding on grain, young shoots of agricultural crops and grasses are favored by them. As a result, winter wheat is sometimes heavily damaged by feeding birds, as is 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 (Pfeifer, 1983).

1.3.6 Need for Other Bird Damage Management Related to Agricultural Crops

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. 1979, and Feare 1984). Fruit or nut crops can be severely damaged by blackbirds, American robins, American crows, and ravens. Bird damage to crops has occasionally been identified as a major problem in the State. In one instance, over $100,000 loss to a producers blackberry production in a single year was caused by a large flock of American robins. The damage was sufficient over a three-year period that the blueberry production was halted by this producer.

1.3.7 Need for Bird Damage Management to Protect Property

Birds frequently 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).

Canada goose damage to property accounts for one of the most frequent requests for assistance received. During FY 1996 - 99, WS received 631 requests for assistance regarding damage and threats caused by Canada geese. Of these requests, 90% were in response to property damage that was being experienced. Many of these complaints were from golf course operators where damage was occurring to the putting greens and tee boxes with a reported damage of $302,904. An additional $2.6 million in damage was reported due to consumption or other damage to turf and flowers and $24,800 in damage to crops (USDA-WS MIS Database).

Woodpeckers sometimes cause structural damage to wood siding and stucco on homes. Corrosion damage to metal structures and painted finishes, including those on automobiles, can occur because of uric acid from bird droppings. Electrical utility companies frequently have problems with birds causing power outages by shorting out transformers and substations. 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 Illinois for the period of FY 1996 - 99 was $78,525. This included property damage reported for aircraft, residential and non-residential buildings, general property, and other human property (USDA-WS MIS Database).

1.3.8 Need For Bird Damage Management to Protect Aquaculture

Aquaculture in Illinois consists of both commercial fish production for the consumer market by private industry and sport fish production in hatcheries operated by private entities and the IDNR. The commercial aquaculture industry has recently begun to develop in Illinois, producing $952,000 in cash receipts from farm marketings in 1999 (National Agricultural Statistics Service, Pers. Comm., 2001).

Sometimes fish-eating birds such as various species of herons and egrets (order *Ciconiiformes*, family *Ardeidae*), double-crested cormorants (*Phalacrocorax auritus*), herring gulls (*Larus argentatus*), ring-billed gulls (*Larus delawarensis*), ospreys (*Pandion haliaetus*), 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). 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, primarily through nonlethal means 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 nonlethal and lethal means of resolving bird damage problems at these or similar facilities. Lethal methods would generally be restricted to taking only a few birds to reinforce harassment.

1.3.9 Need For Bird Damage Management to Protect Wildlife Including T&E Species

Some of the species listed as threatened or endangered under the Endangered Species Act of 1973 are preyed upon or otherwise adversely affected by certain bird species. For example, an incident occurred in Kentucky where juvenile peregrine falcons (*Falco peregrinus*) being reintroduced from an electrical power plant in [redacted] were preyed upon by great-horned owls (*Bubo virginianus*). The [redacted], who was conducting the reintroduction program reported the loss of three falcons to owls. Damage costs exceeded $4,000. WS provided technical assistance to [redacted] for developing a damage management project to protect these birds from depredations. Although peregrine falcons are now removed from the endangered species list, they are still considered a valued natural resource.

Other endangered species could be jeopardized by birds in Illinois. WS may be asked to assist in managing such damage. For instance, brood parasitism by brown-headed cowbirds has become a concern for most wildlife professionals where these birds are plentiful. With endangered bird species, such parasitism can cause

enough nest failures to jeopardize the host species. Other instances where WS was requested to assist in developing programs to safeguard the survival of endangered species include protection of piping plover nests from depredating gulls in New York (J. Sillings WS, Pers. Comm. 1994), protection of adult and young least terns in California from depredations by bird and mammalian predators, and protection of desert tortoises from raven depredations in California and Utah, (G. Simmons WS, Pers. Comm. 1999). Although WS has not conducted damage management activities related to endangered species, such activities might be requested.

The above are just a few examples of BDM activities that WS could conduct under the proposed action to protect other wildlife species. In most cases, if such work is requested by another Federal agency, NEPA responsibility rests with that agency. WS could, however, agree to prepare NEPA documentation for such activities if requested by the other Federal agency.

1.3.10 Number of Requests for Assistance WS Has Received in Previous Years

The WS program in Illinois has received numerous requests for assistance from people throughout the State for assistance with a wide variety of problems associated with birds. During FY 1996-99, WS has received 1,043 requests that dealt directly with damage-related concerns involving birds. Table 1-3 provides a breakdown of these calls and the general resource categories (i.e., human health and safety, property, agriculture and natural resources) affected by the bird species.

1.4 RELATIONSHIP OF THIS ENVIRONMENTAL ASSESSMENT TO OTHER ENVIRONMENTAL DOCUMENTS

WS has issued a FEIS on the national APHIS/WS program (USDA 1997). This EA is tiered to the FEIS, and pertinent information available in the FEIS has been incorporated by reference into this EA.

1.5 DECISION TO BE MADE

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

- Should BDM activities, as currently implemented by the WS program, be continued in the State?
- If not, how should bird damage in the State be managed and what role should WS play in this?
- Might the continuing of WS' current program of BDM have significant effects requiring preparation of an EIS?

1.6 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

1.6.1 Actions Analyzed

This EA evaluates bird damage management by WS to protect human health and safety, aviation, agricultural crops, turf, livestock feed, livestock, livestock health, property, threatened and endangered species, other wildlife, other natural resources, and aquaculture on private land or public facilities within the State wherever such management is requested from the WS program.

1.6.2 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. WS monitoring procedures direct that State or Station Directors within the agency assure that each EA for which they are responsible, the Decision associated with the EA, and the activities specified in the Decision will be reviewed annually for applicability and accuracy of the

documents, monitoring compliance, and the need for further analysis and documentation due to new information or changes in activities. A report of this review is prepared and filed in the respective State or Station WS office and with the appropriate WS Regional Director. Results of the review and monitoring report will be noticed to the public, including the affected interests within five years of the Decision date for any EA's analyzing ongoing projects. This process ensures that each EA is complete and still appropriate to the scope of the State BDM activities.

Table 1-3. Number of requests for assistance WS has received during fiscal years 1996-99 by general resource categories.

Fiscal Year	General species category	General Resource Category			
		Human health and safety	Property	Agriculture	Natural Resources
1996	Feral Pigeons	9	8		
	Waterfowl	125	56	7	
	Blackbirds	28	17	8	
	All others	47	55	1	1
1997	*Feral Pigeons*	*8*	*2*		
	Waterfowl	*44*	*98*	*10*	
	Blackbirds	*19*	*9*	*4*	
	All others	*47*	*52*	*5*	
1998	Feral Pigeons	3			
	Waterfowl	43	76	7	
	Blackbirds	10	1	1	
	All others	10	6	2	
1999	*Feral Pigeons*	*2*	*1*		
	Waterfowl	*37*	*135*	*11*	
	Blackbirds	*12*	*1*	*1*	
	All others	*5*	*19*		

1.6.3 Site Specificity

This EA analyzes potential effects of WS' BDM activities that will occur or could occur at private property sites or at public facilities within any of the 102 Illinois counties. Because the proposed action is to continue the current program, and because the current program's goal and responsibility are to provide service when requested within the constraints of available funding and personnel, it is conceivable that BDM activity by WS could occur anywhere in the State. Thus, this EA analyzes the potential effects of such efforts wherever and whenever they may occur as part of the current program. The EA emphasizes important issues as they relate

to specific areas whenever possible. However, the issues that pertain to the various types of bird damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard WS Decision Model, as discussed in Section 4.2.3, and WS Directive 2.105 (The WS Integrated Wildlife Service Program) demonstrate 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 in the State (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 AUTHORITY AND COMPLIANCE

1.7.1 Authority of Federal and State Agencies in Bird Damage Management in Illinois[1]

1.7.1.1 WS Legislative Authorities

The primary statutory authority for the WS program is the Animal Damage Control Act of 1931 (7 U.S.C. 426-426c; 46 Stat. 1468), which provides that:

Section 426. Predatory and other wild animals; eradication and control; investigations, experiments, and tests by Secretary of Agriculture; cooperation with other agencies.

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.

Section 426b. Authorization of expenditures for the eradication and control of predatory and other wild animals.

The Secretary of Agriculture is authorized to make such expenditures for equipment, supplies, and materials, including the employment of persons and means in the District of Columbia and elsewhere, and to employ such means as may be necessary to execute the functions imposed upon him by 426 of this title."

Section 426c. Control of nuisance mammals and birds and those constituting reservoirs of zoonotic diseases; exception.

On and after December 22, 1987, 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 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] See Chapter 1 of USDA (1994) for a complete discussion of Federal laws pertaining to WS.

1.7.1.2 Illinois Department of Natural Resources (IDNR)

The IDNR is responsible under Illinois Conservation Law (ILCS) Chapter 520 of the Wildlife Code for managing most wildlife species in the State. ILCS5/2.2 identifies protected birds as "*both game and non-game (except the House Sparrow, Passer domesticus; European Starling, Sturnus vulgaris; and Rock Dove or Domestic Pigeon, Columba livia).*" The IDNR issues WS a Class C (Governmental) Nuisance Wildlife Control Permit and Scientific Collection Permit (Appendix C) which allows the take and salvaging of State-protected bird species for depredation purposes. In addition, the [redacted] (Appendix D).

1.7.1.3 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 MBTA 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' interactions with the USFWS under these two laws.

1.7.2 Compliance With Other Federal Laws and Executive Orders

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.

1.7.2.1 National Environmental Policy Act (NEPA)

WS prepares analysis of the environmental effects of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in Illinois. When WS operational assistance is requested by another Federal agency, NEPA compliance is the responsibility of the other Federal agency. However, WS could agree to complete NEPA documentation at the request of the other Federal agency.

1.7.2.2 Endangered Species Act (ESA)

It is Federal policy, under the ESA, that all Federal agencies will seek to conserve threatened and endangered (T&E) species, and will 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 will 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). WS initiated formal consultation with the USFWS on several species not covered by the 1992 B.O. and the results of that consultation are pending. In addition, WS is in the process of initiating formal consultation at the programmatic level to reevaluate the 1992 B.O. and to fully evaluate potential effects on T&E species listed or proposed for listing since the 1992 FWS B.O.

1.7.2.3 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 by any entities, except as permitted by the USFWS; therefore, the USFWS issues permits to requesters for reducing bird damage.

WS provides on-site assessments for persons experiencing migratory bird damage to obtain information on which to base damage management recommendations. Damage management recommendations could be in the form of technical assistance or operational assistance. In some cases of bird damage, WS provides recommendations to the USFWS for the issuance of depredation permits to private entities or other agencies. The ultimate responsibility for issuing such permits rests with the USFWS. European starlings, feral domestic pigeons, English sparrows and domestic waterfowl are not classified as protected migratory birds and therefore have no protection under this Act. USFWS depredation permits are also not required to kill red-winged and rusty blackbirds, cowbirds, all grackles, and crows found committing or about to commit depredation upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance (50 CFR 21.43).

1.7.2.4 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods used or recommended by the WS program in Illinois are registered with and regulated by the EPA and the Illinois Departments of Agriculture (IDA) and Public Health (IDPH) and are used by WS in compliance with labeling procedures and requirements.

1.7.2.5 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 actions on tribal lands are only conducted at the tribe's request and under signed agreement; thus, the tribes have control over any potential conflict with cultural resources on tribal properties. WS activities as described under the proposed action do not cause ground disturbances nor do they otherwise have the potential to markedly affect visual, audible, or atmospheric elements of historic properties and are thus not undertakings as defined by the NHPA. BDM could benefit historic properties if such properties were being damaged by birds. In those cases, the officials responsible for management of such properties would make the request and would have decision-making authority over the methods to be used. Harassment techniques that involve noise-making could conceivably disturb users of historic properties if they were used at or in close proximity to such properties; however, it would be an exceedingly rare event for noise-producing devices to be used in close proximity to such a property unless the resource being protected from bird damage was the property itself, in which case the primary effect would be beneficial. Also, the use of such devices is generally short-term and could be discontinued if any conflicts with historic properties arose. WS has determined BDM actions are not

undertakings as defined by the NHPA because such actions do not have the potential to result in changes in the character or use of historic properties.

1.7.2.6 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 waters of the United States is subject to permitting specified under Subchapter IV (Permits and Licenses) of this Act. Section 401 (Certification) specifies additional requirements for permit review particularly at the State level. WS consults with appropriate 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 wetlands will be affected by proposed actions.

1.7.2.7 Executive Order 13112 On Invasive Species

Executive Order 13112 - Invasive Species directs Federal agencies to use their programs and authorities to prevent the spread or to control populations of invasive species that cause economic or environmental harm, or harm to human health. In Illinois, 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.

1.7.2.8 Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds

Executive Order 13186 - This EO identifies the responsibilities of federal agencies to protect migratory birds. This Order, requires that agencies that may have an impact upon migratory birds develop a Memorandum of Understanding (MOU) with the U.S. Fish & Wildlife Service within two years that promotes the conservation of migratory bird populations. The requirements of this Order is in line with the vision of the WS program that strives to develop and use wildlife damage management strategies that are biologically, environmentally, and socially sound. WS' goal is to reduce damage caused by wildlife while at the same time reducing wildlife mortality.

1.7.2.9 Memoranda Of Understanding (MOU) Between State Agencies and WS in Illinois

An MOU (Appendix C) among the [redacted], and WS was developed in 1999. The purpose of the MOU is to: 1) establish a cooperative working relationship between the MOU participants and WS for the planning, coordination, and implementation of wildlife damage management programs developed to prevent, minimize or alleviate damage caused by wild animal species to agriculture, horticulture, animal husbandry, forestry, wildlife, human health and safety, and other property; and 2) facilitate exchange of information that is of mutual interest to MOU participants and the public. This MOU encourages [redacted] to collaborate with WS in

programs in Illinois to achieve mutual objectives. WS consults with these agencies in the process of assisting the public in resolving wildlife damage conflicts, and these agencies refer appropriate wildlife damage complaints to WS.

1.7.2.10 Illinois Nuisance Wildlife Control Permit

WS applies for a Nuisance Wildlife Control Permit from the IDNR for the purpose of addressing wildlife damage problems involving species regulated or protected by Illinois law. In this procedure, an annual report of activities related to these species is provided to the IDNR.

2.0 CHAPTER 2: ISSUES

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental effects 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 effects in Chapter 4.

2.1 SUMMARY OF 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 wildlife, including target, nontarget and T&E species
- Effects on human health and safety
- Effects on socio-economics of the human environment
- Humaneness and animal welfare concerns of methods used by WS

2.2 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

2.2.1 Effects on Wildlife

2.2.1.1 Effects on Target Bird 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 those which may be affected by WS' BDM activities in Illinois in that more than just a few individuals would likely be killed by WS' use of lethal control methods under the proposed action in any single year. Those species include European starlings, feral domestic pigeons, and English sparrows. These three species are all nonnative exotics. Other species that have been or may be killed in relatively low numbers include blackbirds (including common grackles, red-winged blackbirds and brown-headed cowbirds), Canada geese, gulls, mallards, killdeer, mourning doves, American kestrels, and red-tailed hawks. These species are primarily removed from airport environs during activities to protect air passenger safety.

2.2.1.2 Effects on Nontarget 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 nontarget species, particularly T&E species. WS' standard operating procedures include measures intended to mitigate or reduce the effects on nontarget species populations and are presented in Chapter 4.

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the Endangered Species Act (ESA) concerning potential effects 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).

Some nontarget species may actually benefit from BDM. Prime examples are the benefit to native cavity nesting bird species that results from any reduction in starling populations or the benefit to a number of bird species, including some T&E species, that results from reductions in populations of brown-headed cowbirds which parasitize nests of other birds.

2.2.2 Effects on Human Health and Safety

2.2.2.1 Safety and Efficacy of Chemical Control Methods

The public is sometimes concerned about chemical use in bird control programs because of potential adverse effects on people from being exposed either 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 European starlings or blackbirds in damage situations. DRC-1339 use is regulated by the EPA through FIFRA, by Illinois pesticide laws, and by WS Directives. Another chemical method that could be used is Avitrol® which is classified as an avian distressing agent and is normally used to deter target bird species from using certain problem areas. Other chemicals available for use include the tranquilizer alpha-chloralose (for capturing nuisance waterfowl and pigeons) anthraquinone (Flight Control), and methyl and di-methyl anthranilate (artificial grape flavoring, which also has bird repellent capabilities).

2.2.2.2 Effects on Human Health And Safety From Non-chemical BDM Methods

Some people may be concerned that WS' use of firearms and pyrotechnic bird scaring devices could cause injuries to people. WS personnel occasionally use firearms, pneumatic guns (i.e., air rifles), and shotguns to remove or scare birds such as roosting European starlings and blackbirds, and feral domestic pigeons that are causing damage. Shotguns may also be used on airports to scare or remove birds which pose a threat to aircraft or air passenger safety. WS frequently uses pyrotechnics in noise harassment programs to disperse or move birds. There is some potential fire hazard to private property from pyrotechnic use. In Illinois, during FY 1997-99, WS conducted over 200 damage management events using firearms or air guns which involved the discharge of over 2,000 projectiles without any injuries occurring. Similarly, over 200 pyrotechnic events were conducted which were aimed at harassment of various animals and involved the discharge of nearly 10,000 pyrotechnics during the same period without any accidents.

2.2.2.3 Effects on Human Health and Safety From Not Conducting BDM to Reduce Human / Aggressive Bird Confrontations, Disease Threats or Outbreaks and Bird Strike Hazards at Airports

The concern stated here is that 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, the transmission of bird-borne diseases, and bird strikes on aircraft would not be reduced to acceptable levels. In Illinois, WS conducts approximately fifteen projects annually to address human health and safety concerns at business facilities, private property, or for 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 unacceptably 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 1.3.2. Many cases of subclinical histoplasmosis are associated with sites known to have infective levels of the organism and mis-diagnosis could occur in situations where low exposure rates occur (Kentucky Epidemiological Notes & Reports, 1992, Lenhart, et. al. 1997). Programs aimed at sanitizing such sites typically include reducing the use of the area by birds.

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

As discussed in Subsection 1.3.3, WS frequently assists airports in Illinois who seek to resolve wildlife hazards to air passengers. Airport managers and air safety officials are concerned that the absence of a WS BDM program could lead to the complex wildlife hazard problems faced by these facilities to be unresolved. Therefore, potential effects of not conducting such work could lead to an increased incidence of injuries or loss of human lives from bird strikes to aircraft.

2.2.3 Effects on Socio-cultural and Economics of the Human Environment

2.2.3.1 Effects on Human Affectionate-Bonds With Individual Birds and on Aesthetic Values of Wild Bird Species

Some individual members or groups of wild and feral domestic bird species habituate and learn to live in close proximity to humans. Some people in these situations feed such birds and/or otherwise develop emotional attitudes toward such animals that result in aesthetic enjoyment. In addition, some people consider individual wild birds as “pets”, or exhibit affection toward these animals. Examples would be people who visit a city park to feed waterfowl or pigeons and homeowners who have bird feeders or bird houses. Many people do not develop emotional bonds with individual wild animals, but experience aesthetic enjoyment from observing them.

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 wild birds in a particular area would be more limited if the birds are removed or relocated. However, immigration of birds from other areas could possibly replace the birds removed or relocated during a damage management action. The opportunity to view or feed other wildlife would also be available if an individual makes the effort to visit other parks or areas with adequate habitat and local populations of the species of interest. In addition, WS BDM actions rarely remove all birds or even all birds of one species from a locale where actions occur. The capture and euthanization of waterfowl may result in the complete removal of all of these birds from a specific pond, but adjacent ponds in nearby neighborhoods will likely contain other waterfowl. Some people do not believe that geese, or nuisance blackbird or European starling roosts should even be harassed to stop or reduce damage problems. Some of them are concerned that their ability to view birds is lessened by WS nonlethal harassment efforts.

Some individuals are offended by the presence of English sparrows, blackbirds, and European starlings. To such people, these species represent pests which are nuisances and intruders into the natural order in the United States and vectors of diseases transmissible to humans. Their overall enjoyment of other birds is diminished by what they view as a destructive presence of such species. They are offended that such birds proliferate in such numbers and appear to remain unchecked.

2.2.3.2 Effects on Aesthetics and Value of Property Damaged by Birds

Property owners who have pigeons roosting or nesting on their buildings or waterfowl grazing on turf areas are generally concerned about the negative aesthetic appearance of bird droppings and the damage to 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 nonlethal wildlife management methods, loss of property use (including public and private swimming areas), 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 about health and safety issues.

2.2.4 Humaneness and Animal Welfare Concerns of Methods Used by WS

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife, is important and very complex and 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.*"

The American Veterinary Medical Association (1987) describes suffering as a " . . . *highly unpleasant emotional response usually associated with pain and distress*". The American Veterinary Medical Association (AVMA) (1987) further states that suffering " . . . *can occur without pain . . .*" and " . . . *pain can occur without suffering . . .*" Since the concept of suffering carries with it the implication of a time frame, a case could be made that there is " *. . . little or no suffering where death comes immediately . . .* " (CDFG 1991), as in situations where taking involves shooting.

Defining pain as a component in humaneness of proposed wildlife damage management methods is a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain. 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 wildlife damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public need to recognize the complexity of defining suffering, since " . . . *neither medical or veterinary curricula explicitly address suffering or its relief*" (AVMA 1987, CDFG 1991).

Humaneness is, to a large extent, a person's perception of harm or pain inflicted on an animal. People will likely perceive the humaneness of various actions differently. For example, efforts to relocate certain animals from areas where damage is occurring would appear to be "humane" but often causes sufficient stress in the animals that they die during or soon after relocation. The challenge in addressing this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and available funding.

WS has improved the selectivity and humaneness of management techniques through research and development with its operational and research programs. WS' National Wildlife Research Center is continuing to bring new findings and products into practical use. Until new findings and products are found that are effective and practical, a certain amount of animal suffering could occur when some BDM methods are used, whether non-lethal or lethal, in situations where other effective and/or practical damage management methods are not available.

Illinois WS personnel are experienced and professional in their selection and use of management methods so that they are as humane as possible under the constraints of current technology, workforce and funding. Mitigation measures/standard operation procedures used to maximize humaneness are listed in Chapter 4.

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 Illinois 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, or impossible, to achieve, nor would it be desirable.

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 effects, one EA analyzing impacts for the entire State may provide a better analysis than multiple EA's covering smaller zones.

2.3.2 Effects of Hazing Programs on Livestock

Some individuals have raised concerns that noise from pyrotechnics used to harass birds could startle livestock and cause them to run through fences and be injured. WS employees experienced in using pyrotechnics have noted that most animals habituate relatively easily to noises from the pyrotechnics. However, personnel avoid shooting pyrotechnics near identified livestock facilities where operators have expressed concerns.

2.3.3 Effects On Public Use of Migratory Birds

Many migratory bird species offer enjoyment to bird watchers and hunters and provide a significant economic contribution in Illinois. During 1996, more than 3.7 million Illinois residents 16 years old or older engaged in activities such as wildlife watching, hunting, and fishing. In pursuit of these recreational activities, they, and nonresidents of Illinois, spent $3.4 billion for expenses related to travel, equipment, feed, licenses, wildlife club membership and other associated costs (USDI-USFWS-USDC 1996). Because migratory birds are such a significant economic and recreational resource, there may be concerns that WS BDM actions related to managing damage by migratory birds, especially waterfowl, might negatively affect these factors.

The effect of WS actions taken upon migratory birds is limited to areas where damage is occurring. The number of birds in these specific situations represent an insignificant portion of the total population in Illinois. Actions taken to resolve damage situations typically involve only a portion of the birds present or that are actually causing the damage. Therefore, actions taken by WS (see Section 5.1.1.1 for a more detailed description of current actions) will not adversely impact the public's ability to use birds for recreational purposes.

2.3.4 WS' Effect on Biodiversity

The WS program does not attempt to eradicate any species of wildlife in Illinois. WS operates in accordance with international, Federal and State laws, and regulations enacted to ensure species viability. Effects on target and nontarget species populations because of WS' lethal BDM activities are minor as shown in Section 5.1. The effects 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.

2.3.5 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 predetermined threshold level. Such policy, however, would be 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 assistance, and it is program policy to aid each requester to minimize losses. WS uses the Decision Model thought process discussed in Chapter 4 to determine appropriate strategies.

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

2.3.6 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 non-Federal sources may include State general appropriations, local government funds (county or city), corporate or industry funds, or private funds which are all applied toward program operations. Federal, State, and local officials have decided that some BDM by WS should be conducted by appropriating funds. Additionally, wildlife damage management is appropriate 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 resources (i.e., wildlife).

A minimal Federal appropriation is allotted for the maintenance of a WS office in Illinois. The bulk of the WS program is fee-based. Technical assistance is provided to requesters 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. Therefore, the costs of BDM activities by WS in Illinois are reimbursed by the requestor.

2.3.7 Cultural Resource Concerns

The National Historic Preservation Act (NHPA) of 1966, and its implementing regulations (36 CFR 800), requires Federal agencies to determine whether activities they propose constitute "undertakings" that can result in changes in the character or use of historic properties and, if so, 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. WS BDM actions do not cause ground disturbances nor do they otherwise normally have the potential to affect visual, audible, or atmospheric elements of historic properties and are thus not undertakings as defined by the NHPA. Harassment techniques that involve noise-making could conceivably disturb users of historic properties if they were used at or in close proximity to such properties. However, it would be an exceedingly rare event for noise-producing devices to be used in close proximity to such a property unless the resource being protected from bird damage was the property itself, in which case the primary effect would be beneficial. Also, the use of such devices is generally short-term and could be discontinued if any conflicts arose with the use of historic properties.

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

Environmental Justice (EJ) is a movement promoting the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. EJ, also known as Environmental Equity, has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status.

EJ is a priority both within APHIS and WS. Executive Order 12898 requires Federal agencies to make EJ part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA.

All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to insure EJ. WS personnel use wildlife damage management methods as selectively and environmentally conscientiously as possible. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental effects to minority and low-income persons or populations.

2.3.9 Cost Effectiveness of BDM

Another way of stating this issue is by asking 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 1997) 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 or 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 incidences of illness among unknown numbers 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 European 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 four-to-one (USDA 1998). Although this type of analysis is not available for Illinois feedlots and dairies because of the limitation of types of BDM activities conducted, the Arizona analysis indicate blackbird and European starling control at dairies and feedlots is cost-effective.

2.3.10 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. BDM 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.

3.0 CHAPTER 3: OBJECTIVES

Chapter Three examines objectives of the BDM program in Illinois. The Government Performance and Results Act of 1993 requires that Federal agencies develop program strategies and set goals which are measurable. Further, entities which cooperate with WS in BDM projects have developed objectives related to resolving wildlife damage. These goals may be driven by policy, governmental regulation, welfare of employees and the public, corporate image, customer satisfaction, or a combination of any of these. WS pursues goals related to wildlife damage management as set forth in the WS programmatic Strategic Plan (USDA-APHIS-ADC, 1989). Such goals may be reflected in local and state level wildlife damage management programs conducted by WS throughout the United States. Goals discussed in this EA reflect the most reasonable outcome of an effective BDM program in which cooperators and WS participate.

3.1 SUMMARY OF OBJECTIVES

WS will measure achievement of objectives for BDM direct assistance programs in Illinois by attaining and/or maintaining an "adequate grade," as defined in section 3.3 and 3.4 for a set of defined objectives presented below:

- Reductions in bird-caused human health and safety incidents and/or maintenance of previously attained reductions calculated as damage losses averted or resources saved.
- Reductions in damage to agriculture caused by birds and/or maintenance of previously attained reductions calculated as damage losses averted or resources saved.
- Reductions in damage to property caused by birds and/or maintenance of previously attained reductions calculated as damage losses averted or resources saved.
- Reductions in damage to natural resources caused by birds and/or maintenance of previously attained reductions calculated as damage losses averted or resources saved.

3.2 DESCRIPTION OF OBJECTIVES

Objectives of the proposed action will be discussed and ways that achievement of these objectives will be measured are presented. Measurement of success in wildlife damage management projects is difficult and may sometimes be subjective. The purpose of this discussion is to inform the public regarding views about damage caused by birds, and expectations, or objectives of both WS and those who participate with WS in programs to reduce that damage.

3.2.1 Reductions in Damage to Agriculture

Agriculture is a leading industry in Illinois, generating more than $9 billion annually. Products include a wide selection of commodities, including swine, cattle, corn, wheat, oats, sorghum, hay, sheep, poultry, fruits and vegetables, and specialty crops, such as buckwheat, horseradish, ostriches, fish, and Christmas trees. Illinois is a national leader in soybean, corn, and swine production and exports nearly $4 billion of agricultural commodities annually to other countries. WS has received requests for assistance related to damage by birds to several of these resources in the past. Some examples include: blackbird damage to corn; Canada goose damage to corn and soybeans; and disease threats to cattle from foraging and loafing European starlings (USDA-WS MIS Database). Complainants sometimes feel that their livelihoods are threatened and have usually tried unsuccessfully to resolve such damage through various self-help techniques. Reducing damage to resources is often considered by farmers as necessary to ensure an adequate income or to avoid serious problems with farm operations. The aim of WS BDM programs will be to provide solutions to bird damage situations which will allow agricultural producers to obtain a net gain in production as a result of a reduction in bird damage. Prudent measures for reducing or eliminating bird-caused damage will be recommended to requesters or implemented by WS in direct assistance programs. Such activities may include any of the approved methods summarized in Subsection 4.2.4, and may be directed toward resolving damage caused by any bird species including, but not limited to, those listed in Subsection 1.2.

3.2.2 Reductions in Bird-Caused Human Health and Safety Incidents

A number of complainants who seek assistance from WS regarding real or potential threats to human health and safety are usually concerned with unsanitary conditions created by excessive deposits of bird droppings. Although most people are not very familiar with diseases associated with bird roosts where droppings abound, they feel uncomfortable or threatened by the filth and perceived threats. Some individuals seem informed about potential diseases and discuss them readily. More than 80% of calls for assistance with bird problems in urban areas of Illinois are the result of concerns for threats to human health and safety (USDA-WS MIS Database). Some complaints related to human health and safety are also made because birds are creating fire hazards by building nests around electrical wires and lighting, or because birds, such as adult Canada geese, are being aggressive toward humans (USDA-WS MIS Database).

Birds pose considerable threats to air passenger safety at airports (USDOT 1997). Although very few flights result in plane crashes and the death of those aboard, some people are apprehensive about flying because of the threat of a bird/aircraft strike. For them, resolution of threats to aircraft traffic posed by birds at airports is very important. WS receives several requests each year from airport managers for assistance in resolving damage threats posed by birds as part of their program to ensure safety at airports.

Resolving bird damage of this nature is the primary goal of both those experiencing damage and WS. Programs are tailored to achieve this end, and cooperators and WS actively participate in various increments of a project. Such activities may include any of the approved methods summarized in Subsection 4.2.4, and may be directed toward resolving damage caused by any bird species including, but not limited to, those listed in Subsection 1.2.

3.2.3 Reductions in Damage to Property Caused by Birds

During FY 1996 - 99 average annual losses to bird damage in Illinois was $843,262 (USDA-WS MIS Database). Birds were the major damaging agents among wildlife groups during this period accounting for 62% of all property damage losses recorded by WS. Types of property damaged included, but is not limited to, aircraft, residential and non-residential buildings, golf courses, crops, landscape ornamentals and shrubs, equipment and machinery, electrical utilities, bridges, and recreational beaches (USDA-WS MIS Database). Sometimes damages could be rectified through cleaning damaged property, or repairing it, as in cases where excessive bird droppings fouled clothing, lawn furniture, sidewalks or structures, caused the degradation of painted surfaces, or where bird strikes to aircraft damaged components of the airplane. Such repair or cleanup costs are sometimes factored in as part of the damage values. Damage resulting from bird consumption of garden products or fruits was irreconcilable and costs of replanting or purchasing what was grown at a commercial source may have been factored into the loss value. These loss values represent real investments by persons who experienced damage. That segment of the public which contacts WS regarding damage to property usually have specific objectives in mind. These objectives always include eliminating damage, or reducing it to acceptable levels. WS works with individuals and entities to design professional and responsible programs based on sound wildlife management to address such damage. Methods developed for implementation to reduce or eliminate damage to property may include any of the approved methods summarized in Subsection 4.2.4 and may be directed toward resolving damage caused by any bird species including, but not limited to, those listed in Subsection 1.2.

3.2.4 Reductions in Damage to Natural Resources Caused by Birds

Natural resource damage by birds in Illinois is rare, but consists of incidents such as predation on game fish or fry at sites such as State fish hatcheries. Natural resource managers and the public are often concerned with

total elimination of such damage because natural resources are often viewed as rare, and some are unrenewable. WS cooperates with individuals seeking resolution of damage to natural resources in programs which are often designed on a case by case basis because of the frequently unique nature and setting of such damage. Consideration for preserving other valuable resources is often requisite to such damage management activities. For instance, WS participated with [redacted] to conduct a program to protect California least terns (*Sterna antillarum brownii*), an endangered species, from predation by peregrine falcons (listed as endangered at the time of the project but presently not listed) (B. Dunlap WS, Pers. Comm. 2000). A complex program was necessary in order to accommodate both species while seeking the preservation of one. Such programs have specific guidelines and objectives with measurable results. WS may develop other programs in Illinois to address bird damage to natural resources in the future. Such activities may include any of the approved methods summarized in Subsection 4.2.4, and may address damage by any bird species including, but not limited to, those listed in Subsection 1.2.

3.3 METHODS FOR MEASURING ACCOMPLISHMENTS OF OBJECTIVES IN DIRECT ASSISTANCE PROGRAMS

All BDM program objectives discussed have reductions in damage as a common denominator. However, quantifying levels of reductions in damage, or documenting degrees of reduction in damage is sometimes difficult. Participants with WS in BDM programs often are not familiar with attaching dollar loss values to previously existing damage, and records of costs related to attempts to deal with bird damage are poorly kept. For that reason, historical loss values are sometimes missing and WS derives only current loss values when a site is inspected during damage evaluation activities. This situation is further complicated by the fact that no scientifically based method for standardizing calculations of losses related to human health and safety threats exist. Valuable information about dollar costs to the public regarding human health and safety threats, or actual damage or death to humans, may not be reported because of the absence of established loss values. However, some factors related to expectations of cooperators regarding damage abatement may be used to provide acceptable indicators of accomplishment in BDM programs. In addition, factors measurable by WS can serve to supplement or further validate those indicators.

Losses in general are often thought of in terms of what is damaged or destroyed when birds become a problem. Such things as acres of crops or pounds of fish eaten, or damages to airplanes resulting from bird strikes are concrete losses which are directly apparent. However, other losses just as meaningful are financial costs for equipment replacement, repair, medical costs for injuries or disease, cost of seeds for replanting of crops, cost of cleaning areas damaged by bird droppings, and many others. There are also often collateral costs which are an outgrowth of bird damage, or subsequent efforts to address it. These latter two types of indirect losses are often overlooked. Losses of this nature, such as lost time because of work stoppages, extra man hours required to address incidents which occur as a result of bird damage, loss in yields because of later replanting of crops, or reduction of egg production among hens because of a chronic disease transmitted by birds may account for an excessive quantity of total losses occurring as a result of bird damage. For the purposes of this EA, WS will define damage losses in the following ways:

A. Losses directly related to the presence of damaging birds such as, but not limited to:
   - Birds consuming field crops or contaminating and rendering unusable a measurable quantity of stored grain or livestock feed
   - The death of trees as a result of excessive droppings deposited in a roost site
   - The consumption of fish by predaceous birds
   - Birds of prey killing songbirds, pets or threatened or endangered species
   - A bird strike to an airplane which damages the plane or injures or kills people
   - Increased man hours or material for cleanup or repair of damage caused by birds
   - Costs of BDM programs or techniques for reducing or eliminating the damage posed by birds

B. Losses indirectly related to the presence of damaging birds such as, but not limited to:
   - Veterinary costs and husbandry costs for animals infected or infested by bird- borne diseases, or parasites
   - Decreased production among livestock as a result of the presence of a disease introduced by birds
   - Reduced yield in crops because of late replanting where birds have destroyed or caused damage to such crops
   - Medical costs and lost days of work associated with contraction and treatment of bird-borne diseases among humans

3.3.1 Qualitative Methods

3.3.1.1 Cooperator Assessment of Work Plan Accomplishments as a Measure of Achieving Objectives

Communications between cooperators and WS during implemented programs are evolving processes in which information is shared about progress, problems and contingencies. Through the process, both parties have opportunity to develop possible changes in program activities, address safety and protocol issues, and obtain further information about each other's roles. Cooperators also have the opportunity to critique and grade a program's effectiveness. This input will be used to determine efficacy of damage reductions by WS in BDM programs. WS personnel may gather this information during visits to the project site during discussions with cooperator management, or through voluntary written information provided by the cooperator. Present Federal restrictions prohibit WS from conducting customer satisfaction surveys. However, informal gathering of such information can be done and documented by the local WS Office.

In direct assistance BDM programs, WS presents cooperators with a general work plan outlining what will be done during a project. Descriptions may include what resources are to be protected, the species responsible, the methods to be used, and any additional site-specific information needed. These work plans are designed with consideration for cooperator needs, WS policy and procedure, best management practices for the specific project, and sound wildlife management practices. To obtain a measurement of objectives for a BDM program, WS will categorize opinions of cooperators about effectiveness into the following numeric rating groups of 0 or 1:

A. Adequate (rating of 1): Cooperator opinions gathered by verbal or written communication and kept on file in WS records on that project will fit this category when the cooperator makes a statement that affirms that a program has been successful in resolving totally, or in an acceptable part, the damage related to the species being addressed. Normally this input will be sought from the primary contact person the cooperator has assigned.

   Most BDM projects in the Illinois WS program are dated and last for one year or less. Often cooperators request the renewal of such programs under new cooperative agreements at or near the expiration date of such agreements. WS will interpret the request by a cooperator for a renewal of the program as a grade of "adequate" and an indicator that the program has satisfactorily achieved damage reduction objectives, unless the cooperator states that renewal is sought so that damage reduction goals can be met. When this is the case, a record of the transaction will be filed in the local WS office. This may be a written record provided by the cooperator or a daily entry by the project specialist or supervisory biologist regarding a verbal statement by the cooperator.

   Some BDM programs in Illinois are requested because cooperators have sought a continuation of such projects in anticipation of a recurrence of damage factors which have

historically been very costly. In some instances, such as the recurrence of human health and safety threats and damage to property by feral domestic pigeons and European starlings and blackbirds, cessation of programs by WS has resulted in damage levels returning to pre-program proportions in less than three years. In such instances, cooperators are concerned with reducing damage to acceptable levels during initial programs, and maintaining those reductions in subsequent programs. This will be a factor used to determine accomplishment of objectives in BDM programs in Illinois where cooperators have indicated, and WS has concluded, that initial objectives have been met but new programs have been requested. When other programs are negotiated by cooperators to retain damage reduction levels previously gained, statements by them about that maintenance will be indicators that the objectives were met. In subsequent programs, where maintaining the reduced damage levels previously achieved are an objective, statements by cooperators which indicate that an acceptable level of damage reduction has been maintained will be placed on record at the local WS office as evidence of achievement of objectives. These ratings will become part of the grading process outlined in this Section of which an example is presented in Table 3-1.

B. Inadequate (rating of 0): Statements by cooperators indicating that acceptable damage reduction levels were not achieved or maintained will be placed on record at the local WS office to indicate less than satisfactory achievement of objectives for that BDM program as measured by cooperator opinion. Such statements may be records of verbal communication with the cooperator by the BDM program specialist or the supervisory biologist or may be written documentation by the cooperator. These ratings will become part of the grading process outlined in this Section of which an example is presented in Table 3-1.

3.3.2 Quantitative Methods

3.3.2.1 Observed / Calculated Damage Reductions as a Measure of Achieving Objectives

Damage assessments by WS personnel are usually conducted when visiting a damage site and developing recommendations for solutions. Since these assessments usually occur before any work is done at a site, WS will use such evaluations to derive benchmark values for bird damage losses, which might occur without intervention of direct assistance programs. Such values may be used for site-specific reference or may be used to establish indices for similar bird damage projects.

Using damage loss values for site specific determination as to whether or not objectives have been met will be accomplished by comparing time-framed loss values before damage management activities began with time-framed loss values during or immediately following a BDM program. For instance, losses incurred by a cooperator during a one-year interval prior to WS activities could be calculated, and one-year losses occurring during, or following, a WS implemented BDM program could be compared. If latter losses for a comparable time interval are less than former losses, the project will be given an adequate rating (rating of 1). If this is not the case and the latter losses are greater than or equal to the former losses, an inadequate rating (rating of 0) will be given.

The following rules may be used by WS to obtain benchmark and comparison data:

- WS BDM program managers may use any reasonable time-frame for damage-loss value calculations, but pre- and post-time frames will be equal in the number of days being evaluated. Blocks of time used for calculations could be any time frame from a few days to one year. This would depend on the length of time cooperators have tracked losses, what

elements of loss have been tracked, and length of a BDM program implemented, or length of time a BDM program continues through cooperative agreement renewals.

- WS BDM program managers may use any component of a specific project to calculate losses for analysis and conclusions. For instance, if WS conducts a BDM program at an airport to protect public safety from damage or threat by Canada geese, the BDM program manager may use the presence of the species on the airfield following the program as the indicator of accomplishment.

3.3.2.2 Observed / Calculated Resources Saved as a Measure of Achieving Objectives

As discussed earlier in this section, cooperators sometimes request and receive WS BDM services to protect resources because historical evidence related to their projects demonstrates that during periods of time in which no BDM activities are conducted, damage by birds increases to unacceptable proportions. In these continuing programs, previous time-framed damage-loss values may be outdated or unavailable. In these instances, WS often establishes the saving of resources as objectives either in work plan outlines or in communications with cooperators. Saving resources which might otherwise be lost to damage by wildlife is an important priority to many resource managers who cooperate with WS. In addition, this aspect of agency mission objectives is considered by some to be pivotal to sound wildlife damage management (C. Brown, WS-ERO and M. Bodenchuk WS-UT, Pers. Comm. 1999). Resources saved might be viewed as that component of resources which are not destroyed, threatened, or reduced in value by the activity of damaging wildlife, or that portion of resources, such as manpower, equipment, material, or effort not expended to combat losses to wildlife. Projects that result in the saving of any resources that would have been lost without a BDM program will be given an adequate rating (rating of 1). Those projects that do not meet this criterion will be given an inadequate rating (rating of 0). Resources saved as a result of BDM programs in Illinois may be used by some WS program managers as a component for determining whether objectives are achieved.

In order to appropriately determine resources saved in BDM programs, it is essential to identify the nature of damage to certain resources, and the way that such damage can occur. For instance, the presence of a flock of birds on the runway of an airport, during times when flights are arriving or departing, presents a threat to both aircraft and occupants therein (USDOT 1997) although no damage has yet occurred. Again, the presence of a chronic bird roost in a neighborhood can provide an environment beneath the roost for the development of the infectious fungal agent *Histoplasma capsulatum* and provide a histoplasmosis threat to the local residents. Although no case of histoplasmosis occurring among residents may be directly linked to the roost site, simply because the microscopic spores that cause the disease cannot be tracked, health professionals acknowledge that a threat of the disease exists for humans in the immediate area (Lenhart, et. al. 1997). In both of these examples the resource is human health and safety and the damage is a safety or disease threat. It follows then, that if a BDM action or program disperses a flock of birds from a runway and thereby eliminates the threat to the safety of 250 air passengers, or disperses a flock of birds from a chronic residential roost where histoplasmosis may be a threat to 100 residents, both programs may be evaluated for resources saved. On the one hand, the airport action preserved 250 human lives from a potential safety threat and on the other, the residential action preserved 100 human lives from a potential health threat. WS addresses resource protection with consideration for such potential damage, and in calculating what resources are saved as a result of BDM programs this kind of damage will be factored into deriving conclusions about achieving objectives.

Determining the value and quantity of resources saved as a result of BDM programs becomes more straightforward when known losses can be calculated from historical data about a site where bird damage has occurred. However it is an extremely complicated issue, primarily because indices for resources lost during periods of no BDM activities are often incomplete or lacking and changes in the value or quantity of a managed resource are sometimes continuous. For example, the number of human lives protected by a BDM program at an airport that scares birds from the vicinity of runways changes from hour-to-hour and day-to-day. Again, a resource such as an agricultural crop changes in value by the season and amount of effort expended by the farmer to tend it. There are, however, some instances in which known resources are expended or lost in the absence of BDM activities and these can be compared to the same or similar resource savings or losses during BDM programs to derive values for resources saved. An example might be a situation where a utility power company expended 200 additional man hours for two consecutive years to replace transformers destroyed by electrical shorts resulting from roosting birds on power lines, but when a BDM program was instituted, no bird-caused outages or destroyed transformers occurred during the year-long program. The following year, another BDM program was initiated and records of the utility company showed that again, no additional man-hours were expended resolving outages caused by birds for the second year. It follows that 400 man hours, or their dollar equivalent, represented resources saved by the utility company. Likewise, during a BDM project to reduce human health and safety threats arising from roosting European starlings at a factory, the WS program manager may select the number of employee-hours that workers had to work on surfaces fouled with bird droppings before initiation of a project and compare this to the same number of employee-hours that workers had to work on surfaces fouled with droppings within a duplicate time interval during, or following, a BDM program. The WS BDM program manager might also choose to count the number of employees who were exposed to accumulations of bird droppings before initiation of a BDM program and compare that number to those exposed at the same site during, or after, a BDM program. This would allow comparison of the number of potential disease exposures between the two time periods. In either scenario, a score of "adequate" or "inadequate" (1 or 0, respectively) would be obtained and could be used as part of the evaluation to determine whether or not objectives were met for the program.

3.4 DETERMINATION OF OVERALL OBJECTIVE GRADE

Success in meeting objectives for the Statewide BDM program will be determined using any combination which incorporates both qualitative and quantitative data, but the choice of components may depend on the availability and appropriateness of data. Therefore, a WS program manager may use cooperator assessments, combined with observed/ calculated damage reductions, or cooperator assessments combined with observed / calculated resources saved to formulate a conclusion of record for the BDM program. Likewise, the WS program manager may use cooperator assessments and a combination of observed/calculated damage reductions and observed/calculated resources saved to formulate a conclusion of record. This latter method is depicted in Table 3-1. A typical record would always contain cooperator input grades, and could contain both damage reduction and resources saved grades, or only one of the two. Each separate record would have at least two grades.

Conclusions about accomplishments related to objectives in a statewide BDM program will be derived using both cooperator input (qualitative information)and WS calculated data (quantitative information), as available and appropriate, in the following way:

- A numeric rating will be obtained for each project by averaging together the qualitative and quantitative ratings that are derived from evaluating each specific program.
- A majority (51% or greater) grade of "Adequate" based on pooled grades from all BDM projects in Illinois during the selected time frame will satisfy a conclusion that the program successfully met objectives set forth.

- WS BDM program managers will calculate and record a conclusion concerning program objectives on an annual basis for the overall statewide BDM program. This record will be derived by calculating a grade for each cooperative program upon its completion to derive individual values to be pooled for final statewide conclusions about accomplishment of objectives.

A prototypical summary of individual projects with project grades, final totals and calculation of the annual BDM grade is presented in Table 3-1. This prototypical program depicts the completion and scoring of 10 BDM programs during the year and indicates that eight of ten programs received an "adequate (rating of 1)" from cooperators and eight programs received an "adequate" rating as determined by WS calculations. Following the formula in the table, a final grade of 80% is derived. Since a grade of 51% was needed, the imaginary BDM program was successful in meeting objectives.

Table 3-1. Summary Of Prototypical Cooperative BDM Programs With Derived Grades And Calculated Score From Pooled Results For The Purpose Of Determining Success In Meeting Overall BDM Program Objectives.

COOPERATIVE PROGRAMS	A COOPERATOR GRADE (0 or 1)	B DAMAGE REDUCTION GRADE (0 or 1)	C RESOURCES SAVED GRADE (0 or 1)
1. Agricultural Protection Program # 1	1	1	
2. Agricultural Protection Program # 2	0	1	
3. Human Health And Safety Protection Program # 1	1		1
4. Human Health And Safety Protection Program # 2	1	1	
5. Human Health And Safety Protection Program # 3	1	1	
6. Natural Resources Protection Program # 1	0		1
7. Natural Resources Protection Program # 2	1		0
8. Property Protection Program # 1	1	0	
9. Property Protection Program # 2	1		1
10. Property Protection Program # 3	1	1	
NUMERICAL TOTALS	8	5	3
FINAL SCORE IN PERCENT $\frac{1/2A + ½(B+C)}{\text{\# Programs}} \times 100 = \frac{4 + 4}{10} \times 100 = 80\%$			

4.0 CHAPTER 4: ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternatives analyzed in detail are:

1) Alternative 1 - Continue the Current Federal BDM Program. This is the Proposed Action as described in Chapter 1 and is the "No Action" Alternative as defined by the Council on Environmental Quality for analysis of ongoing programs or activities.

2) Alternative 2 - Nonlethal BDM Only By WS. This Alternative consists of BDM programs involving only nonlethal activities by WS.

3) Alternative 3 - Technical Assistance Only. Under this Alternative, WS would not conduct any direct operational BDM activities in Illinois. If requested, affected requesters would be provided with technical assistance information only.

4) Alternative 4 - No Federal WS BDM. This Alternative consists of no Federal BDM program by WS.

4.1 DESCRIPTION OF THE ALTERNATIVES

4.1.1 Alternative 1 - Continue the Current Federal BDM Program (Proposed Action/No 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.

The proposed action is to continue the current portion of the WS program in Illinois that responds to requests for BDM to protect human health and safety, aviation, agricultural crops, turf, livestock feed, livestock, livestock health, property, threatened and endangered species, other wildlife, other natural resources, and aquaculture in the State of Illinois. A major component of the current program consists of an Integrated Wildlife Damage Management (IWDM) approach to address human health and safety threats and property damage associated with large concentrations of birds at roosts and other sites at both public and private facilities in 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 European starlings and blackbirds at requesting dairies and feedlots, and to meet requests to minimize damage or the risk of damage to agriculture, other wildlife species, 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 damage management assistance in which professional WS Specialists or Wildlife Biologists conduct damage management actions. An IWDM approach would continue to be implemented which would allow use of any legal technique or method, used singly or in combination, to meet requester needs for resolving conflicts with birds. Agricultural producers and others requesting assistance would be provided with information regarding the use of effective nonlethal and lethal techniques. Lethal methods used by WS would include shooting, trapping, nest and/or egg destruction, DRC-1339 (Starlicide®), Avitrol®, or euthanasia following live capture by trapping, hand capture, nets, or use of the tranquilizer alpha-chloralose (A-C). Nonlethal methods used by WS may include pruning or thinning of trees, porcupine wire deterrents, wire barriers and deterrents, the tranquilizer A-C, live-capture by cages, nets, net guns, hand nets, drop nets, rocket nets, followed by translocation of captured birds, chemical repellents (e.g., methyl and di-methyl anthranilate, or anthraquinone), and harassment. In many situations, the implementation of nonlethal methods such as exclusion-type barriers would be the

responsibility of the requester which means that, in those situations, WS' only function would be to implement lethal methods if determined to be necessary. BDM by WS would be allowed in the State, when requested, on private property or public facilities where a need has been documented, upon completion of an *Agreement for Control* or *Cooperative Service Agreement*. 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.

4.1.2 Alternative 2 - Nonlethal BDM Only by WS

This Alternative would require WS to use nonlethal methods only to resolve bird damage problems. Persons receiving technical assistance could still resort to lethal methods that were available to them. 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. Appendix B describes a number of nonlethal methods available for use by WS under this Alternative.

4.1.3 Alternative 3 - Technical Assistance Only

This Alternative would not allow for WS operational BDM in Illinois. WS would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, or others could conduct BDM using traps, shooting, Avitrol®, or any nonlethal method that is legal. Avitrol® could only be used by State certified pesticide applicators. Currently, DRC-1339 and alpha-chloralose are only available for use by WS employees. Therefore, use of these chemicals by private individuals would be illegal. Appendix B describes a number of methods that could be employed by private individuals or other agencies after receiving technical assistance advice under this Alternative.

4.1.4 Alternative 4 - No WS BDM

This Alternative would eliminate WS involvement in BDM in Illinois. WS would not provide direct operational or technical assistance and requesters of WS services would have to conduct their own BDM without WS input. Information on BDM methods would still be available to producers and property owners through such sources as USDA Agricultural Extension Service offices, universities, or pest control organizations. 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.

4.2 BDM STRATEGIES AND METHODOLOGIES AVAILABLE TO WS IN ILLINOIS

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.

4.2.1 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-effective[2] manner while minimizing the potentially harmful effects on humans, target and nontarget species, and the environment. IWDM may incorporate cultural practices (e.g., animal husbandry), habitat modification (e.g., exclusion), animal behavior modification (e.g., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

4.2.2 The IWDM Strategies That WS Employs

4.2.2.1 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 supplies or materials that are of limited availability for non-WS entities to use. Technical assistance may be provided through 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.

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

4.2.2.2 Direct Damage Management Assistance

This is the performance 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 direct damage management by WS. 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 problems are complex.

4.2.2.3 Examples of WS Direct Operational and Technical Assistance in BDM in Illinois

Management of Hazards to Aircraft and Air Passengers in Illinois. WS participates with the Federal Aviation Administration under a MOU to provide information or services, upon request, to airports in Illinois. WS sometimes evaluate wildlife hazards at airports upon request, provides such airports with Wildlife Hazard Assessments which outline wildlife hazards found, and assists airports in developing Wildlife Hazard Management Plans to address wildlife threats. WS also sometimes assists airports in obtaining USFWS depredation permits for the purpose of managing hazard threats posed by migratory birds. IWDM strategies are employed and recommended for these facilities.

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

WS' current program utilizes three full-time employees, plus another five full-time employees on an intermittent basis, to conduct IWDM programs and to monitor wildlife hazards at airports to insure the protection of human lives and aircraft. In addition to direct operational activities consisting of various harassment, live capture with translocation, and lethal removal techniques aimed at potentially injurious wildlife, WS personnel provide ongoing technical advice to airport managers about how to reduce the presence of wildlife in airport environs. WS may also oversee various habitat management projects implemented by airport personnel in order to provide technical expertise about methods. In addition, WS promotes improved bird strike record keeping and maintains a program of bird identification and monitoring of bird numbers at participating airports.

WS may receive requests in the future from airports previously discussed, or any other airports in Illinois, for assistance in resolving wildlife hazards to aviation. WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA which are appropriate for use in airport environments.

Feral Domestic Pigeon Problems. Feral domestic pigeons are responsible for the majority of nuisance bird damage and human health and safety requests for assistance in Illinois. The most common situation with this species involves pigeons roosting and nesting on buildings and structures. The main problem is from the birds' droppings which cause concerns for diseases associated with bird droppings in Illinois, and an unsightly mess, which 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, 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 operational projects. These projects have included activities to reduce local pigeon numbers in or at several facilities 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.

Management of Damage Caused by Waterfowl in Urban Areas. Canada geese and mallard ducks (*Anas platyrhynchos*) have populations in most major cities in Illinois. These species concentrate in areas where water is available such as swimming pools, various sized ponds and small lakes at business parks, golf courses, 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 564 calls for assistance with damage caused by waterfowl during FY 1997-99. 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 provided as 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 environmental manipulation such as netting, grid wire exclusion systems and changing the vegetation to deter nesting. If non-lethal strategies are unsuccessful, WS may sometimes recommend a USFWS depredation permit be granted to the requester for nest and egg destruction or egg addling. Potential waterfowl damage management actions in Illinois includes a capture and euthanization program implemented in cooperation with the IDNR. In these programs,

WS may use corral-capture, net guns, rocket nets, hand nets, hand capture, cage traps, drop nets, or alpha-chloralose to capture birds which would then be transported to State-approved processing plants and the meat donated to charitable organizations (provided that the meat prove suitable for human consumption after appropriate tests are completed). In instances where human health and safety threats cannot be resolved through non-lethal methods, selective lethal removal of a few waterfowl could be performed. 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.

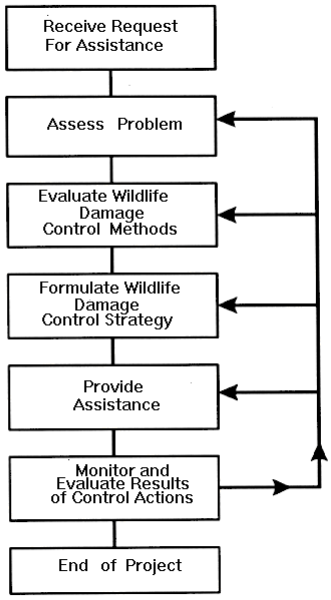
WS may receive requests for assistance in managing damage caused by urban waterfowl from Federal, State or local government agencies, businesses, or private individuals in Illinois in the future. WS may provide technical or direct operational assistance to requesters in an effort to resolve damage problems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

Management of Damage Caused by European Starlings. WS works in cooperation with the [redacted], corporations, and the general public to resolve conflicts created by roosts of European starlings. The accumulation of feces at these roost sites from these birds may create situations where fungal spores (i.e., histoplasmosis, discussed previously) may be created, posing health threats to people in the area. These roosts may occur in trees in urban areas or in factories, where the birds find warmth during the winter months. In urban areas, roosts may be dispersed with the use of pyrotechnics. In many of the factories where roosts occur, though, pyrotechnic use is forbidden due to the potential of explosion from volatile materials produced at the factories. In these situations, use of toxicants and traps are the allowable methods.

4.2.3 WS Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints that are depicted by the WS Decision Model described by Slate et al., in 1992 (Figure 4-1). WS personnel are frequently contacted after requesters have tried or considered nonlethal methods and found them to be impractical, too costly, or inadequate for acceptably reducing damage. 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, methods deemed to be practical for the situation are incorporated into a management strategy. After this 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 documenting process, but a mental problem-solving process common to most, if not all, professions.

Figure 4-1. APHIS-WS Decision Model.



4.2.4 Bird Damage Management Methods Available for Use

4.2.4.1 Nonchemical, Nonlethal Methods

Agricultural producer and property owner practices consist primarily of nonlethal preventive methods such as cultural methods and habitat modification[3]. Animal behavior modification refers to tactics that alter the behavior of birds to reduce damages. Some, but not all, of these tactics include the following:

- Exclusions, such as netting;
- Propane exploders (to scare birds);
- Pyrotechnics (to scare birds);
- Distress calls and sound producing devices (to scare birds);
- Visual repellents and scaring tactics;
- Relocation or dispersal of damaging birds to other areas;
- Nest destruction of the target species before eggs or young are in the nest;
- 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 (e.g., clover traps, decoy traps, nest box traps, mist nets, corrals); and
- Lure crops/alternate foods are crops planted or other food resources provided to mitigate the potential loss of higher value crops.

4.2.4.2 Chemical, Nonlethal Methods (See Appendix B for detailed descriptions and Appendix E for EPA labels and MSDS)

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

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 baits consisting of bread or corn are fed directly to the target birds.

Methyl Anthranilate (MA) and **Di-methyl Anthranilate** (artificial grape flavoring food additive) has been shown to be an effective repellent for many bird species, including waterfowl. 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.

Other repellents: Other bird repellents that might become available include anthraquinone (Avery et al. 1997) and charcoal particles (e.g., adhered to livestock feed).

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[3] *Cultural methods* generally involve modifications to the protected resources (e.g., feeding livestock at night when birds are not present), while *habitat modification* involves change to the general environment (e.g., managing for tall grass stands).

4.2.4.3 Mechanical, Lethal Methods

Egg addling/oiling/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.

Decoy and nest box traps are sometimes used by WS to capture blackbirds, European starlings, English sparrows and pigeons. 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 calls of the decoys attract other birds into the trap. Birds taken in these traps are euthanized.

Shooting is more effective as a dispersal technique than as a way to reduce European starling or blackbird numbers. The number that can be killed by shooting is generally very small in relation to the number involved in damage situations. Usually only a few dozen birds can be shot from individual flocks that can number anywhere from a few hundred to many thousands or hundreds of thousands before the rest of the birds become gun shy. Shooting, however, can be helpful in some situations to supplement and reinforce other dispersal techniques. It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Shooting with rifles, shotguns, or pneumatic guns 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.

Sport hunting can be part of a BDM strategy to enhance the effectiveness of harassment techniques. For example, WS sometimes directs sport hunters to contact IDNR about areas where Canada geese causing damage may be hunted. Although sport hunting is not an operational activity of WS, it can be incorporated into general recommendations to resolve damage issues.

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

4.2.4.4 Chemical, Lethal Methods

DRC-1339 is a slow acting avicide for reducing damage from several species of birds, including blackbirds, European starlings, pigeons, crows, ravens, magpies, and gulls. DRC-1339 is highly toxic to sensitive species but only slightly toxic to nonsensitive birds, predatory birds and mammals. This chemical would be the primary lethal chemical method used for feral domestic pigeon, starling, and blackbird damage management under the current program.

Carbon dioxide (CO_2) gas is an AVMA approved euthanasia method 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 birds are placed in a container or chamber into which CO_2 gas is released. The birds quickly expire after inhaling the gas.

4.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered, but not analyzed in detail. These include the following.

4.3.1 Lethal BDM Only by WS

Under this Alternative, WS would not conduct any nonlethal control of birds for BDM purposes in the State, but would only conduct lethal BDM. This Alternative was eliminated from further analysis because it was in direct conflict with WS and State policies and some bird damage problems can be resolved effectively through nonlethal means. For example, a number of damage problems involving the encroachment of injurious birds into buildings can be resolved by installing barriers or repairing of structural damage to the buildings, thus excluding the birds. Further, such damage situations as immediately clearing a runway of a large flock of injurious birds could not be implemented immediately, while scaring them away through noise harassment might resolve the air passengers' threat immediately. In addition, a lethal-only program does not satisfy some wildlife management objectives of the IDNR and do not meet lethal standard conditions of USFWS.

4.3.2 Compensation for Bird Damage Losses

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 and provide funds 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 Illinois, damage reported to WS by all species of birds exceeded $10 million during FY 1999, yet the current WS program of abating such damage only cost about $477,000 reimbursed by the requestor of services. It should be noted that this damage value does not constitute the total damage caused by birds in the State of Illinois, but only that reported to WS in Illinois. The total loss is expected to be much greater than this figure.
- 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 reduce threats to human health and safety, nor could it compensate for disease exposure or loss of life.

4.3.3 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, State, local and Federal government lands wherever a cooperative program was initiated in the State.

In Illinois, eradication of native bird species (the European starling, English sparrow, and feral domestic pigeon are not native to North America) is not a desired population management goal of State agencies. Although generally difficult to achieve, eradication of a local population of feral domestic pigeons or European

starlings may be the goal of individual, site-specific BDM projects in fulfillment of Executive Order 13112 On Invasive Species (see Subsection 1.7.2.7). This is because feral domestic pigeons and European 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 people.
- Because blackbirds and European starlings are migratory and most winter populations in Illinois may be comprised in part of winter migrants from northern latitudes, eradication would have to be targeted at the 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.

4.4 MITIGATION AND STANDARD OPERATING PROCEDURES FOR BIRD DAMAGE MANAGEMENT TECHNIQUES

4.4.1 Mitigation in Standard Operating Procedures (SOPs)

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for effects that otherwise might result from that action. The current WS program, nationwide and in Illinois, 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' Standard Operating Procedures include:

- The WS Decision Model thought process which is used to identify effective wildlife damage management strategies and their effects.
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid effects to T&E species.
- EPA-approved label directions are followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects to the environment when chemicals are used in accordance with label directions.
- All WS employees in the State who use restricted chemicals are trained and certified by, or else operate under the direct supervision of, program personnel or others who are experts in the safe and effective use of chemical BDM materials.
- The presence of nontarget species is monitored before using toxicants to reduce the risk of significant mortality of nontarget species populations.
- Research is being conducted to improve BDM methods and strategies so as to increase selectivity for target species, to develop effective nonlethal control methods, and to evaluate nontarget hazards and environmental effects.

Some additional mitigating factors specific to the current program include:

- Management actions would be directed toward localized populations or groups of target species and/or individual offending members of those species. Generalized population suppression across the State, or even across major portions of the State, would not be conducted.
- WS uses BDM devices and conducts activities for which the risk of hazards to public safety and hazard to the environment have been determined to be low according to a formal risk assessment (USDA 1997, Appendix P). Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazards to the public is even further reduced.

4.4.2 Additional Mitigation Specific to the Issues

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

4.4.2.1 Effects on Target Species Populations

BDM activities are directed to resolving bird damage problems by taking action against individual problem birds, or local populations or groups, not by attempting to eradicate populations in the entire area or region. Furthermore, WS take is monitored by comparing numbers of birds killed by species or species group (e.g., blackbirds) with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause significant adverse effects to the viability of native species populations (See Chapter 5).

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

WS personnel are trained and experienced to select the most appropriate method for taking problem animals and excluding nontargets. Observations of birds feeding at feedlots, dairies, staging areas, or other control project are made to determine if nontarget or T&E species would be at risk from BDM activities.

WS has consulted with the USFWS regarding potential effects of control methods on T&E species, and abides by reasonable and prudent alternatives (RPAs) and/or reasonable and prudent measures (RPMs) established as a result of that consultation. For the full context of the Biological Opinion see the ADC FEIS, Appendix F (USDA 1997). Further consultation on species not covered by or included in that formal consultation process will be initiated with the USFWS and WS will abide by any RPAs, RPMs, and terms and conditions that result from that process to avoid jeopardizing any listed species. WS will further consult with the IDNR in situations where T&E species may be effected by WS actions.

WS uses chemical methods for BDM that have undergone rigorous research to prove their safety and lack of serious effects on nontarget animals and the environment.

5.0 CHAPTER 5: ENVIRONMENTAL CONSEQUENCES

Chapter Five 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 effects 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 effects 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 Effects: Discussed in relationship to each of the Alternatives analyzed, with emphasis on potential cumulative effects from methods employed, and including summary analysis of potential cumulative impacts to target and nontarget species, including T&E species.

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

Effects 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).

5.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

5.1.1 Effects on Target Species Bird Populations

5.1.1.1 Alternative 1 - Continue the Current Federal Bird Damage Management Program (The Proposed Action/No Action as Described in Chapter 1)

Analysis of this issue is limited primarily to those species most often killed during WS BDM programs. The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1994). Magnitude is described in USDA (1994) 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 5-1 shows the numbers of birds killed by species and method as a result of WS BDM activities in Illinois from FY 1997 through FY 1999.

Tables 5-1a-c. Birds Killed by WS by All Methods in Illinois for Bird Damage Management in Fiscal Years 1997 through 1999.

Table 5-1a. Fiscal Year 1997				
Species	***Cage Trap***	***Trap, Other***	***Shooting***	***DRC-1339***
Blackbirds, Red-winged			182	
Crows, American			6	
Geese, Canada			214	
Gulls, Herring			10	
Gulls, Ring-billed			248	
Kestrels, American		1		
Mallards		9	147	
Pigeons, Feral (Rock Dove)	74		436	
Sparrows, English (House)			5	
Starlings European		16	69	1,780

Table 5-1b. Fiscal Year 1998				
Species	***Cage Trap***	***Trap, Other***	***Shooting***	***DRC-1339***
Crows, American			14	
Dove, Mourning			27	
Geese, Canada		47	463	
Gulls, Herring			14	
Gulls, Ring-billed		1	156	
Hawks, Red-tailed		1		
Herons, Great Blue			1	
Kestrels, American		4		
Mallards			152	
Pigeons, Feral (Rock Dove)	222		64	277
Sparrows, English (House)			3	
Starlings European		4	104	11,982
Swallows, Barn			7	

Table 5-1c. Fiscal Year 1999				
Species	***Cage Trap***	***Trap, Other***	***Shooting***	***DRC-1339***
Crows, American	1			
Dove, Mourning			3	
Ducks, Dabbling (Other)			1	
Duck, Diving (All)			1	
Geese, Canada		25	229	
Gulls, Herring			9	
Gulls, Ring-billed		1	191	
Kestrels, American		19	9	
Mallards			121	
Meadowlarks, Eastern			1	
Pigeons, Feral (Rock Dove)	488	19	290	1,428
Sparrows, English (House)	2	3	69	
Starlings European	1,702	2,350	226	10,840

European Starling and Blackbird Population Effects: Colonization of North America by the European starling began on March 6, 1890 when 80 European starlings were released into New York's Central Park by a Mr. Eugene Scheifflin, a member of the Acclimatization Society. 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 Illinois; and by 1946 to California and Canadian coasts (Miller 1975). In just 50 short years the European starling had colonized the United States and expanded into Canada and Mexico. After 80 years of the initial introduction, they had become one of the most common birds in North America (Feare 1984).

Precise counts of blackbird and European starling populations do not exist but one estimate placed the United States summer population of the blackbird group at more than one 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 European starlings in winter roosts (Bookhout and White 1981). Meanley and Royal (1976) estimated 538 million blackbirds and European starlings in winter roosts across the country during the winter of 1974-75. Of this total, 74%, or 259 million of these birds were in the east.

An extensive population survey by Dolbeer and Stehn published in 1979 showed that, in the southeastern U.S., the number of breeding European starlings increased between 1966 and 1976. Breeding Bird Survey (BBS) data from Sauer et al. 1999 indicate an increase in the European starling breeding population in the U.S., a slight decrease in the eastern BBS region, and is stable in Illinois, from 1966 -1999. Overall, red-winged blackbirds (stable), brown-headed cowbirds (decreasing), and

common grackles (stable) showed a slight decrease in populations nationwide and in the eastern BBS region, but are stable in Illinois for the same period.

The nationwide European starling population has been estimated at 140 million (Johnson and Glahn 1994). The winter European starling population in the eastern U. S. was estimated by Meanley and Royall (1976) to be more than 87 million. The eastern U. S. population of the remaining blackbird group was estimated at 285.5 million.

All of the above information suggests that populations of European 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 are extensive 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. State nuisance animal removal permits, though, are required from the IDNR before blackbirds (excluding European starlings) are killed.

During FY 1997 - 99, Illinois WS took 182 blackbirds at all project sites in the State in all damage situations. During the same period in Illinois, WS killed 29,073 European starlings during all program activities in Illinois. This is an annual average of 61 blackbirds and 9,691 European starlings for the three-year period. This is an average annual kill for the entire blackbird group of 9,752 for the period. Between FY 1996 and FY 1998, States in the WS Eastern Region reported a total kill of 371,105 blackbirds and 387,982 European starlings for the three-year period. The average annual reported kill was 11,246 blackbirds and 129,327 European starlings (USDA-WS MIS Database). No other sources of major human-caused blackbird and European 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). As previously discussed, regional annual populations of the blackbird group in the eastern U. S. is at least 372 million, of which an estimated 140 million are European starlings (Meanley and Royall 1976 and Johnson and Glahn 1994). Estimated natural mortality of the blackbird group should, therefore, total between 186 and 241.8 (average 213.9) million birds annually. Average annual kills of blackbirds and European starlings in Illinois (9,752) has been less than 0.005% of the estimated average natural mortality of these populations, and would be expected to be no more than 1% of total average mortality in any single year under the current program. The average annual number of blackbirds and European starlings killed in the Illinois WS BDM program (9,752) amounts to less than 0.003% of the southeastern U.S. wintering population (350 million). Regionally, WS' reported kill averages 253,029 blackbirds and European starlings annually, which accounts for approximately 0.12% of the natural annual mortality and only 0.07% of the regional wintering population.

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 effects would include those killed by the Illinois WS program with other known human-caused mortality. Given that the maximum annual mortality (Table 5-1c, FY 1999) of 15,118 blackbirds and European starlings caused by the Illinois WS program has not accounted for more than .004% of the regional blackbird/European starling population of 372.5 million (Meanley and Royall 1976) and should not exceed 1% of the population in any future year, the proposed damage management projects implemented under this Alternative would have no significant impact on overall breeding populations.

As nonnative European starlings exhibit negative effects on, and competition with, native birds (Ehrlich et al., 1988), they 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.

American Crow Population Effects: American crows have a wide range and are extremely abundant, being found in most of the United States (National Audubon Society, 2000). They are found in both urban and rural environments and in Illinois, sometimes forming large communal roosts in cities. Roosts of more than 5,000 birds have been documented by WS (T. Grimm, K. Gustad, J. Sengl, WS Pers. Comm. 2001) in at least six Illinois counties. In the U. S., some crow roosts may reach a half-million birds (National Audubon Society, 2000). This species is exempted 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, agricultural 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 Illinois through 520 ILCS 5/2.18 which establishes regulations for a hunting season to take crows and allows take of this species under the same conditions of depredation as outlined in 50CFR.

BBS Data (Sauer et al. 1999) indicate that American crow populations increased in the U.S., the eastern BBS region, and Illinois from 1966-99. WS killed an average of 7 American crows per year in Illinois during FY 1997-99. Comparable numbers of this species could be killed in future programs by WS in Illinois. During this period, BBS data indicates that crow populations trends continued to rise in the State.

Feral Domestic Pigeon Population Effects: The feral domestic pigeon, also known as the rock dove, is an introduced nonnative species in North America. BBS data indicate the species has been stable across the United States from 1967 through 1999, rising slightly in the Eastern BBS region, and decreasing in Illinois (Sauer et al. 1999). The species is not protected by Federal or State law. Any BDM activity 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 it would be requested by the affected property owner or administrator. Although regional population effects would be minor, even if large 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. In addition, local reductions or elimination of pigeon flocks would be considered a positive impact to those individuals who are offended by the presence of these birds, and whose enjoyment of native songbirds is diminished by their presence. However, major population reduction in some localities may be considered to have negative effects by some individuals.

Between FY 1997 and FY 1999, WS took an average of 1,099 pigeons per year statewide, primarily to reduce sanitation problems and human health and safety threats associated with accumulations of droppings in areas used by humans. Comparable numbers of this species could be killed in future programs by WS in Illinois. This relatively small number of pigeons taken at multiple sites had little effect on overall pigeon populations in Illinois.

Waterfowl Population Effects: WS does not usually conduct operational killing of waterfowl, although a few Canada geese and ducks are killed each year at airports as part of wildlife hazard management programs for these facilities. Additional Canada geese were killed that posed direct threats to public safety and attacked people during the nesting season. Almost all geese taken under these conditions were resident birds (i.e., geese that do not follow traditional migratory routes, instead have taken up residence in the State, these are typically the subspecies *Branta canadensis maxima*). BDM activities by WS for these species at other sites has been nearly all nonlethal, and, therefore, results in no direct impact on populations of these species. Sport hunters kill controlled numbers of these species under the close regulatory management of the USFWS and the IDNR. In Illinois during FY 1997-99, WS took an average of 326 Canada geese and 144 wild ducks per year. Comparable numbers of these species could be killed in future programs by WS in Illinois. Based on current populations and trends, reduction in numbers through such programs would not be expected to have any negative effects on populations of these species in the State, or regionally. BBS population trend data indicates that U.S. and eastern BBS regions saw steady increases in both Canada goose and mallard populations. In fact, eastern population trends increased 21.6% and Illinois populations of Canada geese showed a 1,400% increase over the past 15 years, while mallard populations increased by 100%. These increasing populations of both Canada geese and mallards in Illinois and in the east supports a conclusion that the WS BDM activities have not resulted in any significant direct or indirect adverse effects on these species.

Harassment by WS employees may negatively affect geese or ducks in the short term, especially if weather is particularly cold, because the birds are expending energy that they would otherwise not have to. However, there are likely no long term significant negative effects due to harassment (John Taylor, USFWS, Pers. Comm. 1997).

A likely benefit to these species is that the success of the overall program would probably increase the tolerance of agricultural producers and the urban public to the presence of ducks and geese in both rural and urban environments.

American Coot Population Effects: American coots are common, duck-sized, blackish-gray birds with a white bill, belonging to the Family Gaviidae. They are distributed over most of the lower 48 States and in Canada (Sauer et al. 1999). Coots migrate through Illinois to more southern destinations, in the fall. They are omnivorous, with aquatic and terrestrial plants and invertebrates making up most of their diet.

WS in Illinois has not conducted any activities aimed at addressing damage caused by American coots. No coots were taken by WS in the State during FY 1997-99. However, since coots have the potential to threaten public safety at or near airports, WS may be requested to address such damage in Illinois. BBS data indicate the coot population has decreased across the eastern United States but has increased in the U.S. as a whole from 1966 through 1999 (Sauer et al. 1999). Since no activities by WS to address coot damage in Illinois have been performed for the past three fiscal years, minimal damage management activity related to this species is expected. No significant effects on the American coot are expected to occur as a result of WS BDM activities.

English Sparrow Population Effects: English sparrows, or house sparrows, were introduced to North America from England in 1850 and have spread throughout the continent (Fitzwater 1994). The species is not protected by Federal or State laws. Like European starlings and pigeons, because of their negative effects and competition with native bird species, English sparrows are considered by many wildlife biologists, ornithologists, and naturalists to be an undesirable component of North American native ecosystems. English sparrows are found in nearly every habitat except dense forest, alpine, and desert environments. They prefer human-altered habitats, and are abundant on farms and in cities and suburbs (Robbins et al. 1983).

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). Bird counts in Illinois during successive years from 1966-96 indicate that English sparrow populations are somewhat higher in the State than the national average and though declines parallel national trends, Illinois only saw a decline of 2.3% per year over the same period. 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 Illinois and the region, BBS and the Audubon Society's, Christmas bird count (Saur 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 Illinois would not be likely to have any significant impact on regional populations of this species. In the three-year period from FY 1997-99, WS killed an average of only 27 English sparrows per year (Tables 5-1a-c) which should be an exceedingly minor component of overall English sparrow populations and overall English sparrow mortality. Comparable numbers of this species could be killed in future programs by WS in Illinois. As 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. Some individuals who watch or feed English sparrows, or those who might have established human-affectionate bonds with individual birds would be offended by reductions in populations or removal of individual birds.

Mourning Dove Population Effects: Mourning doves 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. Illinois maintains a hunting season each year. BBS data indicates that mourning dove population trends were decreasing slightly in the U.S., but rising in the Eastern BBS Region, and Illinois from 1967-99 (Sauer et al., 1999). Mourning doves have become common inhabitants of urban environments in Illinois, 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). In Illinois, WS killed an average of 10 mourning doves per year during FY 1997-99. These birds were taken in programs to protect human safety at airports. Comparable numbers of this species could be killed in future programs by WS in Illinois. Based on population trends for this species in Illinois, WS BDM activities will not have a significant impact on the species.

Killdeer Population Effects: Killdeer, the largest of North American plovers, are migratory, and are commonly seen in open terrain such as plowed fields, golf courses, and short grass prairies (Nat. Audubon Soc., 2000) This species has become a common inhabitant of airports in the U. S. also (USDA-Wildlife Services, Unpublished Data). At such facilities, they frequent fringe areas of runways and taxiways, often spending extended time on paved areas. Such behavior causes birds to present considerable hazards to arriving and departing aircraft. Small flocks of killdeers, numbering less than 25 birds, are frequently found in runway and taxiway areas, respond poorly to various harassment techniques and will frequently return to an area quickly, or simply move to another portion of pavement nearby. Such behavior often necessitates harassment/shooting of a few birds in the flock to disperse remaining birds. Although WS did not kill any killdeer in Illinois during FY 1997-99, the safety threats posed by the presence of these birds on airfields may create situations where localized population control may be necessary.

BBS data indicates that killdeer population trends increased by .3% across the U. S. and by .6% in the eastern BBS region, but have increased by 8.0% in Illinois between 1966-99 (Sauer et al., 1999). This suggests that BDM activity by WS in Illinois will have no negative effects to this 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 high Arctic and extensive tracts of dense forest. Northern birds are migratory. They are birds of both open and wooded areas, particularly wood edges, and are often seen perched conspicuously on a treetop, a telephone pole, or other lookout while hunting (Clark and Wheeler, 1987). BBS trend data for red-tailed hawks reveals that populations have increased across the U. S. (3.1%) and the eastern BBS region (4.3%), but have increased in Illinois by 11.9% from 1966-98 (Sauer et al., 1999).

Red-tailed hawks are frequently found perching and/or hunting at airports. They spend considerable time soaring near runways and taxiways and are sometimes involved in air strikes with aircraft. Raptors (hawks and owls) are involved in 11% of air strikes involving birds in the United States (USDOT, 1998) and red-tailed hawks are one of two most frequently observed hawks at airports in Illinois (L. Schafer, B. Robbins, and D. Arends, WS, Pers. Comm. 2001) and have accounted for 77 strikes with aircraft in Illinois from 1993 to 2000 (S. Wright, WS, FAA Bird Strike Database, Pers. Comm. 2001). WS may kill red-tailed hawks as a last resort effort in programs to protect air passengers and aircraft safety. During FY 1996-99, WS killed one red-tailed hawk in all airport protection programs. During this same period, 271 red-tailed hawks were captured and translocated to areas away from airports for the aircraft and their own protection.

In order to rule out possible effects from other WS programs in States sampled from the BBS database, examination of the WS National MIS Database to determine whether other State WS programs in those States killed red-tailed hawks was conducted. Results revealed that only two States had programs in which hawks were killed during FY 1995-98 (Table 5-2), the time period corresponding to the sampled BBS data. Numbers of red-tailed hawks killed in those States were insignificant relative to local, state, and regional population. The number of red-tailed hawks killed in Illinois is insignificant to the numbers killed in those two States and to the national population.

Table 5-2. Population Trends for Red-tailed Hawks During Two Time Intervals by Selected States in The Southeastern U. S. And Some Northern States Bordering Illinois, And Numbers of This Species Killed in WS Programs by State From October 1994 - September 1998.

STATES	Population Trend for:	Population Trend for:	Red-tailed Hawks Killed for Period:
	1966 - 1998	1996 - 1998	10-94 Through 9-98
ILLINOIS	11.40	12.69	1
ALABAMA	4.24	19.36	0
GEORGIA	3.29	- 13.60	0
KENTUCKY	3.84	28.54	90
TENNESSEE	1.15	- 33.59	2
NORTH CAROLINA	2.85	- 0.37	0
OHIO	2.80	16.52	0
INDIANA	5.56	43.53	0
MISSISSIPPI	23.29	-8.44	0

American Kestrel Population Effects: The widespread American kestrel is the smallest North American falcon and one of the most common raptors. This species is often seen hovering or sitting on exposed perches, such as poles, wires, or treetops, where it hunts for rodents, insect, birds, lizards, or snakes. They are widespread and common throughout North America south of the arctic treeline in most habitats and prefer more open country. Northern populations are migratory, with some birds moving as far south as Central America. They are abundant in the southern U. S. in winter (Clark and Wheeler, 1987). Their habit of hunting open places makes airports particularly attractive. These hawks are the most frequently encountered raptor at airports in Illinois (T. Grimm and A. Spencer, WS Pers. Comm., 2001). Their habit of hovering over a hunting site makes them particularly vulnerable to aircraft traffic. On airports in Illinois, they favor grassed areas alongside runways and taxiways and can be observed hovering directly in approach paths of arriving or departing aircraft. From 1993 to 2000, American kestrels were involved in 117 reported bird strikes at airports in Illinois (S. Wright, WS, FAA Bird Strike Database, Pers. Comm. 2001). During FY 1993-99, WS killed an average of 11 kestrels per year in BDM programs at airports. Comparable numbers of this species could be killed in future programs by WS in Illinois.

BBS data indicates that American kestrel population trends increased in the U. S. (0.1%) and in the eastern BBS region (0.3%), but have increased in Illinois by 8.4% from 1966-1998. This data suggests that no significant negative effects have occurred to this species from any BDM activities by WS in Illinois. No negative effects are expected to occur as a result of future BDM programs by WS in Illinois.

Gulls (Ring-billed and Herring) Population Effects: Ring-billed and herring gulls are the most common and widely distributed of the gulls. Gulls are migratory and are commonly found at freshly plowed fields, landfills, airports and near water. These birds are opportunists, finding food scraps from discarded trash from people, worms on runways and taxiways at airports following rains, bugs

that are unearthed when fields are plowed and at landfills. Such behavior causes these birds to present considerable hazards to arriving and departing aircraft. Small flocks of gulls, typically numbering less than 25 birds, are frequently found in runway and taxiway areas following rains. Harassment techniques are effective in moving these birds, but simply moving them from one end of an airfield to another, representing an aviation threat as they move across the airfield. WS killed 597 ring-billed gulls and 33 herring gulls (33) in Illinois during FY 1997-99 from airport environments for the protection of aviation safety.

BBS data indicates that ring-billed gull population trends increased by 2.4% across their range and have increased by 20.8% in Illinois between 1966-99 (Sauer et al., 1999). BBS data indicates that herring gull population trends decreased by 3.3% across their range but have increased by 0.9% in Illinois between 1966-99 (Sauer et al., 1999). This suggests that minimal BDM activity by WS in Illinois have had and will continue to have no negative effects to these species.

Other Target Species: Target species in addition to those analyzed above that have been killed in small numbers by WS during the past three fiscal years, include; barn swallows (7), eastern meadow larks (1), and great blue herons (1) (Tables 5-1a-c). These birds were taken for the protection of public safety when their presence posed direct and/or immediate threats. Comparable numbers of these species could be killed in future programs by WS in Illinois. Other species that could be killed during BDM include any of the species listed in Section 1.2. None of these species are expected to be taken by WS BDM at any level that would significantly affect populations. Table 5-3 provides an overview of the population trends of the primary and secondary bird species of concern covered by this EA.

Table 5-3. Overview of North American Breeding Bird Survey Trend Results for Bird Species of Concern (1966-1999).

Species	*Population Trend*	*Primary/Secondary Species **
American coot	-5.6	Secondary
American crow	+1.8	Secondary
American kestrel	+8.4	Secondary
American robin	+2.9	Secondary
Barn swallow	+0.6	Secondary
Brown-headed cowbird	+1.3	Secondary
Canada goose	+28.1	Primary
Common grackle	-0.5	Secondary
Downy woodpecker	-0.2	Secondary
Eastern meadowlark	-2.3	Secondary
English/House sparrow	-2.4	Primary
European starling	-0.1	Primary

Species	*Population Trend*	*Primary/Secondary Species **
Feral pigeon (Rock dove)	-1.2	Primary
Great blue heron	+12.5	Secondary
Great horned owl	+2.7	Secondary
Herring gull	+0.9	Secondary
Horned lark	-0.8	Secondary
Killdeer	+8.0	Secondary
Mallard	+5.4	Primary
Mourning dove	+0.4	Secondary
Mute swan	+7.3	Secondary
Northern flicker	-2.5	Secondary
Northern harrier	+4.7	Secondary
Red-headed woodpecker	-2.6	Secondary
Red-tailed hawk	+11.9	Secondary
Red-winged blackbird	-0.2	Secondary
Ring-billed gull	+20.8	Primary
Turkey vulture	+12.7	Secondary

*Note: Primary Species = Species of bird that is likely to be targeted with lethal control activity.
Secondary Species = Species of bird that is not likely to be targeted with lethal control activity.

5.1.1.2 Alternative 2 - Nonlethal BDM Only by WS

Under this Alternative, WS would not take any target species because no lethal methods would be used. Some incidental take of waterfowl may occur as a result of the use of alpha-chloralose, as in the present program. Although WS take of other target bird species such as English sparrows, feral domestic pigeons, blackbirds, and European starlings would not occur, it is likely that private (i.e., individually or through private pest control companies) BDM efforts would increase in the absence of an operational assistance program by WS which includes lethal control options, leading to potentially similar or even greater effects on target and nontarget species populations than those of the current program Alternative. For the same reasons shown in the population effects analysis in section 4.1.1.1, however, it is unlikely that European starlings or other target bird populations would be impacted significantly by implementation of this Alternative. Effects and hypothetical risks of illegal chemical toxicant use by private individuals as a result of this Alternative would likely be greater than the Proposed Action/No Action, about the same as Alternative 3 and less than under Alternative 4.

5.1.1.3 Alternative 3 - Technical Assistance Only

Under this Alternative, WS would have no direct impact on any bird species populations in the State because the program would not conduct any operational BDM activities but would be limited to providing advice only. Private efforts to reduce or prevent bird damage and perceived disease transmission risks could increase which could result in similar or even greater effects on those populations than the current program Alternative. For the same reasons shown in the population effects analysis in section 4.1.1.1, however, it is unlikely that European starlings or other target bird populations would be impacted significantly by implementation of this Alternative. DRC-1339 and the tranquilizer alpha-chloralose are currently only available for use by WS employees. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target and nontarget bird populations. Effects and hypothetical risks of illegal chemical toxicant use under this Alternative would probably be about the same as those under Alternative 2.

5.1.1.4 Alternative 4 - No WS Bird Damage Management

Under this Alternative, WS would have no impact on any bird species populations in the State. Private efforts to reduce or prevent depredations could increase which could result in effects on target species populations to an unknown degree. Effects on target species under this alternative could be the same, less, or more than those of the Proposed Action/No Action depending on the level of effort expended by private persons. For the same reasons shown in the population effects analysis in section 4.1.1.1 it is unlikely that European starlings or other target bird populations would be impacted significantly by implementation of this Alternative. DRC-1339 and the tranquilizer alpha-chloralose are currently only available for use by WS employees. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target and nontarget bird populations.

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

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

Adverse Effects on Nontarget (non-T&E) Species. WS take of nontarget species during BDM activities has been extremely low. The only nontarget bird known to have been killed during BDM operations as described in the Proposed Action/No Action from FY 1997-99 included the eastern meadowlark that was taken during FY 1999 (Table 5-1c). These data indicate that nontarget mortality has only been .003% of the total number of birds killed over the past three years. Although it is possible that some nontarget birds were unknowingly killed by use of DRC-1339 for pigeon, blackbird, or European starling control, the method of application is designed to minimize or eliminate that risk. For example, DRC-1339 treated bait is only applied after a period of prebaiting with untreated bait material, favored by the target species but not the nontarget species, and when nontarget birds are not observed coming to feed at the site.

While every precaution is taken to safeguard against taking nontarget birds, at times changes in local flight patterns and other unanticipated events can result in the incidental take of unintended species. Given the potential for these unanticipated events can occur, they are rare and have resulted in an insignificant number of nontarget birds taken. During FY 1997-99, a total of 8 nontarget birds (mostly feral pigeons), all species combined, were taken.

Beneficial Effects on Nontarget Species. Interspecific nest competition has been well documented in European starlings. Miller (1975) and Barnes (1991) reported European starlings were responsible for a severe depletion of the eastern bluebird (*Sialis sialis*) population due to nest competition. Nest competition by European starlings has also been known to adversely impact American kestrels (sparrow hawks) (Von Jarchow 1943, Nickell 1967, and Wilmer 1987), red-bellied woodpeckers (*Centurus carolinus*), Gila woodpeckers (Centurus uropygialis) (Kerpez et.al. 1990 and Ingold 1994), and wood ducks (*Aix sponsa*) (Shake 1967, Heusmann et.al. 1977, and Grabill 1977). Weitzel (1988) reported nine native species of birds in Nevada had been displaced by starling nest competition, and Mason et al. (1972) reported European starlings evicting bats from nest holes. Control operations as proposed in this Alternative could reduce starling populations, although probably not significantly. Reduction in nest site competition would be a beneficial impact on the species listed above. Although such reductions are not likely to be significant, the benefits would probably outweigh any adverse effects due to nontarget take.

WS BDM activities in Illinois would have no effect on any of the above listed mammals, fish, reptiles, mussels, crustaceans, insects, or plants.

T&E Species Effects. T&E species that are Federally listed (or proposed for listing) for the State of Illinois are found in Appendix F. The 1992 Biological Opinion from the USFWS determined that the only BDM method that might adversely affect the bald eagle was above ground use of strychnine treated bait for "nuisance birds." Strychnine is no longer registered for above ground use and would not be used by WS for BDM in the State. 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. Furthermore, eagles are highly resistant to DRC-1339, with a LD_{50} of more than 100 mg/kg, which is over 1,200 times higher than that of a starling. In tests, dosages of 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 activities in Illinois is not likely to have adverse effects on bald eagles.

The interior least tern was granted endangered status in 1985 and has been estimated at 4,700-5,000 adults. This species breeds along the major tributaries of the Mississippi River drainage basin from eastern Montana south to Texas and east to western Illinois, Missouri, Arkansas and Louisiana. Characteristic riverine nesting sites are dry, flat, sparsely vegetated sand-and gravel bars within a wide, unobstructed, water-filled river channel. They feed on small fish captured in the shallow water of rivers and lakes, choosing almost any fish species between one-half to three inches in length. The ADC FEIS concluded that control of least tern nest predators such as American crows, American kestrels, and great horned owls could have a positive effect on populations of this species. Because DRC-1339 and Avitrol® are not applied in or near water and least terns feed in water and do not feed on grains or other bait materials used, no primary effects from chemical methods in the Illinois WS BDM programs are expected. No effects on this species from other actions of the BDM program conducted by WS in Illinois are expected. No secondary effects on least terns, from any activity of the Illinois BDM program, are expected.

Mitigation measures to avoid T&E effects were described in Chapter 3 (Subsection 3.4.2.2) and are also described in Subsection 4.1.4.1. 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 effects on mammalian or non-T&E bird

scavengers from the Proposed Action/No Action. None of the other control methods described in the Proposed Action/No Action Alternative pose any hazard to nontarget or T&E species.

5.1.2.2 Alternative 2 - Nonlethal BDM Only by WS

Under this Alternative, WS take of nontarget animals would be less than that of the Proposed Action/No Action because no lethal control actions would be taken by WS. However, nontarget take would not differ substantially from the current program because the current program takes very few nontarget animals. On the other hand, people whose bird damage problems were not effectively resolved by nonlethal control methods would likely resort to other means of lethal control such as use of shooting by private persons or even illegal use of chemical toxicants. This could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than the Proposed Action/No Action. For example, shooting by persons not proficient at bird identification could lead to killing of nontarget birds. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local nontarget species populations, including T&E species. In an incident in southern Illinois near Mascoutah in 1999, an Illinois farmer treated wheat seeds with Furidan® (F. Riecks, IDPH, Pers. Comm., 2000). This illegal application of a product killed over 15,000 blackbirds and many other birds, including raptors. Hazards to raptors, including bald eagles and falcons, could, therefore, be greater under this Alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

5.1.2.3 Alternative 3 - Technical Assistance Only

Alternative 3 would not allow any WS direct operational BDM in Illinois. There would be no impact on nontarget or T&E species by WS activities from this Alternative. Technical assistance or self-help information would be provided at the request of producers and others. Although technical support might lead to more selective use of control methods by private parties than that which might occur under Alternative 2, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods leading to greater take of nontarget wildlife than under the Proposed Action/No Action. It is possible that frustration similar to that discussed under Alternative 2, caused by the inability to reduce damage and associated losses, could lead to illegal use of chemical toxicants which could lead to unknown effects on local nontarget species populations, including some T&E species. In an incident in southern Illinois near Mascoutah in 1999, an Illinois farmer treated wheat seeds with Furidan®. This illegal application of a product killed over 15,000 blackbirds and many other birds, including raptors. Hazards to raptors, including bald eagles, could, therefore, be greater under this Alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

5.1.2.4 Alternative 4 - No WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. Nontarget take should not differ substantially from the current program because the current program takes very few nontarget animals. However, parties with bird damage problems would likely resort to other means of control such as use of shooting by private persons or even illegal use of chemical toxicants. There would be no impact on nontarget or T&E species by WS BDM activities from this Alternative. However, private efforts to reduce or prevent depredations could increase which could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than under the Proposed Action/No Action. It is hypothetically possible that frustration caused by the inability to

reduce damage and associated losses could lead to illegal use of chemical toxicants which could impact local nontarget species populations, including some T&E species. In an incident in southern Illinois near Mascoutah in 1999, an Illinois farmer treated wheat seeds with Furidan®. This illegal application of a product killed over 15,000 blackbirds and many other birds, including raptors. Hazards to raptors, including bald eagles, could, therefore, be greater under this Alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

5.1.3 Effects on Human Health and Safety

5.1.3.1 Effects of Chemical BDM Methods on Human Health

5.1.3.1.1 Alternative 1 - Continue the Current Program (Proposed Action/No Action)

DRC-1339. DRC-1339 is the primary lethal chemical BDM method that would be used under the current program Alternative. The Illinois WS program used an average of 1,509 grams per year of DRC-1339 during FY 1997-99. This chemical is one of the most extensively researched and evaluated avicides 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:

- The use of DRC-1339 is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops intended for human consumption.
- DRC-1339 is highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation and moisture. 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 of DRC-1339 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). Notwithstanding, the extremely controlled and limited circumstances in which DRC-1339 is used would prevent any exposure of the public to this chemical.

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

Avitrol® (4-Aminopyridine). Avitrol® is another chemical method that might be used by WS in BDM. 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 or as a powder. It is formulated in such a way that ratios of treated baits to untreated baits are no greater than 1:9. The Illinois WS program has not used any Avitrol® for over eight years. Although it is not likely that this product will be used, it is included in this Assessment in the event the need to use it may arise. 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 by 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. Notwithstanding, 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 nonlethal BDM chemicals that might be used or recommended by WS would include repellents such as methyl or di-methyl anthranilate (grape flavoring used in foods and soft drinks sold for human consumption), which has been used as an area repellent, anthraquinone which is presently marketed as Flight Control, and the tranquilizer drug alpha-chloralose. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or FDA. Any operational use of chemical repellents would be in accordance with labeling requirements under FIFRA and State pesticide laws and regulations which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that the use of registered chemical products would avoid significant adverse effects on human health.

Based on a thorough Risk Assessment, APHIS concluded that, when chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations and such use has negligible effects on the environment (USDA 1997).

5.1.3.1.2 Alternative 2 - Nonlethal BDM Only by WS

Alternative 2 would not allow for any lethal methods use by WS in the State. WS could only implement nonlethal methods such as harassment and exclusion devices and materials. Nonlethal methods could, however, include the tranquilizer drug alpha-chloralose and chemical repellents, such as anthraquinone and methyl anthranilate (currently registered with the Food and Drug Administration for human consumption as an artificial grape flavoring), which might raise concerns about human health risks. Such chemicals must

undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or FDA. Any operational use of chemical repellents and tranquilizer drugs would be in accordance with labeling requirements under FIFRA and State pesticide laws and regulations and FDA rules which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health.

Excessive cost or ineffectiveness of nonlethal techniques could result in some entities rejecting WS' assistance and resorting to other means of BDM. Such means could include illegal pesticide uses. Evidence of illegal pesticide use was found near Mascoutah, IL in 1999 where wheat, treated with Furidan®, was used to kill several thousand blackbirds.

5.1.3.1.3 Alternative 3 - Technical Assistance Only

Alternative 3 would not allow any direct operational BDM assistance by WS in the State. WS would only provide advice and, in some cases, equipment or materials (i.e., by loan or sale) to other persons who would then conduct their own damage management actions. Concerns about human health risks from WS' use of chemical BDM methods would be alleviated because no such use would occur. DRC-1339 is only registered for use by WS personnel and would not be available for use by private individuals. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and leading to a greater risk than the Proposed Action/No Action Alternative. However, because some of these private parties would be receiving advice and instruction from WS, concerns about human health risks from chemical BDM methods use should be less than under Alternative 2. 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' assistance. Use of Avitrol® in accordance with label requirements should preclude any hazard to members of the public. Hazards to humans and pets could be greater under this Alternative if chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS' use of DRC-1339 and Avitrol®, could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program Alternative.

5.1.3.1.4 Alternative 4 - No WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. Concerns about human health risks from WS' use of chemical BDM methods would be alleviated because no such use would occur. DRC-1339 is only registered for use by WS personnel and would not be available for use by private individuals. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the current program Alternative. 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' assistance. Use of Avitrol® in accordance with label requirements should preclude any hazard to members of the public. However, hazards to humans and pets could be greater under this Alternative if other chemicals that are less selective or that cause secondary

poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS' controlled use of DRC-1339 and Avitrol®, could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program Alternative.

5.1.3.2 Effects on Human Safety of Nonchemical BDM Methods

5.1.3.2.1 Alternative 1 - Continue the Current Program (Proposed Action/No Action)

Nonchemical BDM methods that might raise safety concerns include shooting with firearms and harassment with pyrotechnics. Only WS personnel who are experienced in handling and using firearms will use them. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. The Illinois WS program has caused no accidents involving the use of firearms or pyrotechnics. A formal risk assessment of WS' operational management methods found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no significant effects on human safety from WS' use of these methods is expected.

5.1.3.2.2 Alternative 2 - Nonlethal BDM Only by WS

Under this Alternative, WS would not engage in or recommend use of any lethal nonchemical BDM methods. Risks to human safety from WS' use of pyrotechnics would be similar to the current program Alternative. However, increased use of firearms and pyrotechnics by less experienced or poorly trained private individuals would probably occur. Without the lethal reinforcement of nonlethal harassment techniques or selective removal of individual animals causing damage that are unaffected by nonlethal strategies, risks to human safety, particularly at airports, would increase under this Alternative.

5.1.3.2.3 Alternative 3 - Technical Assistance Only

Under this Alternative, WS would not engage in direct operational use of any nonchemical BDM methods. Risks to human safety from WS' use of firearms and pyrotechnics would be lower than the current program Alternative, but not significantly because Illinois WS' current BDM program has an excellent safety record in which no accidents involving the use of these devices have occurred. Increased use of firearms and pyrotechnics by less experienced and poorly or improperly trained private individuals would probably occur without WS direct operational assistance which would likely increase human safety risks somewhat. Similar to Alternative 2, however, it is unlikely that these increased risks would become significant.

5.1.3.2.4 Alternative 4 - No WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. Concerns about human health risks from WS' use of nonchemical BDM methods would be alleviated because no such use would occur. The use of firearms or pyrotechnics by WS would not occur in BDM activities in the State. However, private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the current program

Alternative. Commercial pest control services would be able to use pyrotechnics or firearms in BDM programs and this activity would likely occur to a greater extent in the absence of WS' assistance. Hazards to humans and property could be greater under this Alternative if personnel conducting BDM activities using nonchemical methods are poorly or improperly trained. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could also lead to illegal use of such methods. Several local governments in Illinois require special waivers of existing urban firearms or projectile laws before some methods, such as pellet rifles, shotguns, or pyrotechnic launchers, can be used.

5.1.3.3 Effects on Human Health by Injurious Birds for Which BDM is Requested

5.1.3.3.1 Alternative 1 - Continue the Current Program (Proposed Action/No 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 nonlethal 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 nonlethal 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 threats to aviation safety by birds. Through the implementation of an integrated wildlife damage management program, threats caused by birds at airports can be effectively resolved.

5.1.3.3.2 Alternative 2 - Nonlethal BDM Only by WS

Under this Alternative, WS would be restricted to implementing only nonlethal methods in providing assistance with bird damage problems. Entities requesting BDM assistance for human health concerns would only be provided information on nonlethal barriers or exclusion devices, habitat alteration, or other nonlethal methods such as harassment. Because some of these nonlethal methods would likely be effective at the individual sites where they are used, this Alternative would likely create or increase human health risks at other locations to where the birds would then move. Birds moving to airfields would greatly increase the risks to aviation safety. Limitations to the types of control options available to resolve such threats would increase the safety threats and damage caused by birds. Additionally, people requesting assistance may reject WS assistance and seek to achieve bird control by other means. 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 problems would probably increase if private individuals were

unwilling to implement nonlethal control methods because of high cost or lack of faith in their effectiveness, or if they were unable to hire other entities to conduct effective BDM for human health concerns.

5.1.3.3.3 Alternative 3 - Technical Assistance Only

Under this Alternative, WS would not conduct any lethal BDM but would still conduct harassment of European starlings, blackbirds, some geese, and other birds that were causing damage. Threats and damage caused by birds would likely increase without direct assistance where WS currently provides assistance, including numerous airports throughout the State. With WS technical assistance but no direct operational assistance, entities requesting BDM for human health concerns would may; (1) not take any action themselves, which would increase the risk of human and safety risks caused by birds, (2) implement WS recommendations for nonlethal barriers and exclusions site-by-site which can only resolve limited concerns, or (3) undertake or hire bird control operations that may be less effective. Under this Alternative, human health problems could increase if private individuals were unable to achieve effective BDM with technical assistance alone, or if they were unable to hire other entities to conduct effective BDM for human health concerns.

5.1.3.3.4 Alternative 4 - No WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. Concerns about human health risks from WS' use of chemical BDM methods would be alleviated because no such use would occur. DRC-1339 is only registered for use by WS personnel and would not be available for use by private individuals. Private efforts to reduce or prevent threats to public safety caused by birds would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the current program Alternative. 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' assistance. Use of Avitrol® in accordance with label requirements should preclude any hazard to members of the public. However, hazards to humans and pets could be greater under this Alternative if other chemicals that are less selective or that cause secondary poisoning are used. Furthermore, use of Avitrol® is not recommended at airports as it often causes treated birds to fly into landing/departing patterns of aircraft. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS' controlled use of DRC-1339 and Avitrol®, could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program Alternative.

5.1.4 Effects on Aesthetics

5.1.4.1 Effects on Human Affectionate-Bonds With Individual Birds and on Aesthetic Values of Wild Bird Species

5.1.4.1.1 Alternative 1 - Continue the Current Program (Proposed Action/No Action)

Some people who routinely view or feed individual birds such as feral domestic pigeons or urban waterfowl would likely be disturbed by removal of such birds under the current

program. WS is aware of such concerns and takes this into consideration when developing management plans. Some people have expressed opposition to the killing of any birds 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 have no direct connection or opportunity to view or enjoy the particular birds that would be killed by WS' lethal control activities. Lethal control actions would generally be restricted to local sites and to small, unsubstantial percentages of overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant, remaining available for viewing by persons with that interest.

5.1.4.1.2 Alternative 2 - Nonlethal BDM Only by WS

Under this Alternative, WS would not conduct any lethal BDM but would still conduct harassment of European starlings, blackbirds, some geese, and other birds that were causing damage. Some people who oppose lethal control of wildlife by government officials but are tolerant of government involvement in nonlethal wildlife damage management would favor this Alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by the death of individual birds under this Alternative, but might oppose dispersal or translocation of certain birds (Canada geese cannot be translocated). The abundant populations of European starlings, blackbirds, geese and ducks in urban environments would enable people to continue to view them and to establish affectionate bonds with individual wild birds. Although WS would not perform any lethal activities under this Alternative, private entities would not be prohibited from conducting lethal BDM, which means the effects would then be similar to the current program Alternative.

5.1.4.1.3 Alternative 3 - Technical Assistance Only

Under this Alternative, WS would not conduct any direct operational BDM but would still provide technical assistance or self-help advice to persons requesting assistance with bird damage. WS would also not conduct any harassment of European starlings, blackbirds, geese or other birds that were causing damage. Some people who oppose direct operational assistance in wildlife damage management by the government officials but favor government technical assistance would favor this Alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS' activities under this Alternative because no direct action by WS employees would be taken. However, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the current program Alternative.

5.1.4.1.4 Alternative 4 - No WS Bird Damage Management

Under this Alternative, WS would not conduct any lethal removal of birds nor would the program conduct any harassment of European starlings, blackbirds, geese or other birds. 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' activities under this Alternative. However, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the current program Alternative.

5.1.4.2 Effects on Aesthetic Values of Property Damaged by Birds

5.1.4.2.1 Alternative 1 - Continue the Current Program (Proposed Action/No Action)

Under this Alternative, operational assistance in reducing nuisance pigeon and other bird problems in which droppings from the birds cause unsightly mess would improve aesthetic values of affected properties in the view of property owners and managers. In addition, individuals who object to the presence of invasive nonnative species, such as European starlings, domestic feral pigeons, and English sparrows, and whose aesthetic enjoyment of other birds is diminished by the presence of such species, will be positively affected by programs which result in reductions in the presence of such birds.

Relocation or dispersal of nuisance roosting or nesting populations of birds (e.g., blackbird, European starling roosts, heron rookeries) 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 who may assist in monitoring the birds' movements is generally conducted to assure that they do not reestablish in other undesirable locations.

Live capture and euthanization by WS of waterfowl causing damage would aesthetically improve sites such as residential neighborhoods, business parks, recreational parks, and public property since such relocation of offending birds would reduce droppings and sometimes alleviate damage to lawns and water bodies. However, removal of some geese or ducks might reduce opportunities for the public to view the birds at those sites. Some people might, therefore, object to capturing birds and euthanizing them. With populations of waterfowl in urban areas at unprecedented numbers in Illinois, those who wish to view these species should be able to find them in abundance nearby and would still be able to pursue this pastime without undue difficulty. In addition, rarely does a WS BDM action related to waterfowl result in the removal of all birds from one site, and, as discussed elsewhere, new birds often quickly move into an area where birds have been removed.

Lethal removal of birds, including geese and ducks, from airports should not affect the public's enjoyment of the aesthetics of the environment since airport property is closed to the public and access to view birds at these sites is either restricted to viewing from a location outside boundary fences or is forbidden, and feeding of wildlife on airports is usually forbidden.

5.1.4.2.2 Alternative 2 - Nonlethal BDM Only by WS

Under this Alternative, WS would be restricted to nonlethal methods only. Nuisance pigeon problems would have to be resolved by nonlethal barriers and exclusion methods. Assuming property owners would choose to allow and pay for the implementation of these types of methods, this Alternative would result in nuisance pigeons and other birds relocating to other sites where they would likely cause or aggravate similar problems for other property owners. Therefore, this Alternative would most likely result in more property owners experiencing adverse effects on the aesthetic values of their properties than the current program Alternative.

5.1.4.2.3 Alternative 3 - Technical Assistance Only

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

Relocation of nuisance roosting or nesting population of birds (e.g., blackbird, European starling roosts, heron rookeries) through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. If WS has only provided technical assistance to local residents or municipal authorities, coordination with local authorities to monitor the birds' movements to assure that the birds do not reestablish in other undesirable locations might not be conducted. In addition, technical assistance only could result in a greater chance of adverse effects on aesthetics of property owners at other locations than the current program Alternative.

5.1.4.2.4 Alternative 4 - No WS Bird Damage Management

Under this Alternative, the lack of any operational or technical assistance in reducing nuisance pigeon and other bird problems in which droppings from the birds cause unsightly mess would mean aesthetic values of some affected properties would continue to be adversely affected if the property owners were not able to achieve BDM some other way. In many cases, this type of aesthetic "damage" would worsen because property owners would not be able to resolve their problems and bird numbers would continue to increase.

5.1.5 Humaneness of Lethal Bird Control Methods

5.1.5.1 Alternative 1 - Continue the Current Program (Proposed Action/No Action)

Under this Alternative, methods viewed by some persons as inhumane would continue to be used in BDM by WS. These methods would include shooting and toxicants/chemicals such as DRC-1339 and Avitrol®.

Shooting, when performed by experienced professionals, usually results in a quick death for target birds. 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.

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. However, the method appears to result in a less stressful death than that 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. Despite the apparent painlessness of the effects of this chemical, however, 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. In most cases where Avitrol® is used, only a small percentage of the birds are affected and killed by the chemical with the rest being merely dispersed. In experiments to determine suffering, stress, or pain in affected animals, Rowsell et. al. (1979) tested Avitrol® on pigeons and observed subjects for clinical, pathological, or neural changes indicative of pain or distress. None were observed. Conclusions of the study were that the chemical met the criteria for a humane pesticide. Notwithstanding, some persons would view Avitrol® as inhumane treatment of the birds that are affected by it based on the birds' distress-like behavior.

Occasionally, birds captured alive by use of the tranquilizer alpha-chloralose, cage traps, or by hand or with nets would be euthanized. The most common method of euthanization would be by cervical dislocation or CO_2 gas which are described and approved by AVMA as humane euthanasia methods (AVMA 1993). Most people would view AVMA-approved euthanization methods as humane.

5.1.5.2 Alternative 2 - Nonlethal BDM Only by WS

Under this Alternative, lethal methods viewed as inhumane by some persons would not be used by WS. However, it is expected that many requesters of BDM assistance would reject nonlethal methods recommended by WS and/or would not be willing to pay the extra cost of implementing and maintaining them and would seek Alternative lethal means.

Since DRC-1339 would not be available to non-WS entities, the only chemical BDM method that could be legally used by these entities would be Avitrol®. Avitrol® would most likely be viewed as less humane than DRC-1339 because of the distress behaviors that it causes.

Shooting could be used by non-WS entities and, similar to the Current Program Alternative, would be viewed by some persons as inhumane.

Alpha-chloralose would not be available to non-WS entities. However, live trapping/capture by other methods and euthanization by cervical dislocation or CO_2 gas could be used by these entities.

Overall, it is likely that BDM would actually be somewhat less humane with this Alternative than under the current program Alternative.

5.1.5.3 Alternative 3 - Technical Assistance Only

Under this Alternative, WS would not conduct any lethal or nonlethal BDM, but would provide self-help advice only. Thus, lethal methods viewed as inhumane by some persons would not be used by WS.

Without WS direct operational assistance, it is expected that many requesters of BDM would reject nonlethal recommendations or would not be willing to pay the extra cost of implementing and maintaining them and would seek Alternative lethal means.

Similar to Alternative 2, DRC-1339 would no longer be available for use since it is only registered for use by or under the direct supervision of WS personnel. Thus, the only chemical BDM method legally available would be Avitrol® which is viewed by some people as less humane than DRC-1339.

The other lethal method that would likely be used more by non-WS entities would be shooting, which would also be viewed by some persons as inhumane.

Alpha-chloralose would not be available to non-WS entities. However, live trapping/capture by other methods and euthanization by cervical dislocation or CO_2 gas could be used by these entities.

Overall, BDM under this Alternative would likely be somewhat less humane than the Current Program Alternative but slightly more humane than Alternative 2.

5.1.5.4 Alternative 4 - No WS Bird Damage Management

Under this Alternative, lethal methods viewed as inhumane by some persons would not be used by WS. However, it is expected that many requesters of BDM assistance would reject the use of nonlethal methods as being impractical or too expensive to implement and maintain, and would seek other lethal means.

Similar to Alternative 2, DRC-1339 would no longer be available for use since it is only registered for use by or under the direct supervision of WS personnel. Thus, the only chemical BDM method legally available would be Avitrol® which would be viewed by many persons as less humane than DRC-1339. In these situations, BDM would most likely be less humane than under the current program Alternative.

Shooting could be used by non-WS entities and, similar to the current program Alternative, would be viewed by some persons as inhumane. Alpha-chloralose would not be available to non-WS entities. However, live trapping/capture by other methods and euthanasia by cervical dislocation or CO_2 gas could be used by these entities.

Overall, it is likely that BDM would actually be somewhat less humane with this Alternative than under the current program Alternative, somewhat less humane than under Alternative 2, and somewhat less humane than under Alternative 3.

5.2 CUMULATIVE IMPACTS OF BDM METHODS

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time. The potential for cumulative impacts for all four Alternatives presented in this EA are examined in the following Subsections.

5.2.1 Alternative 1 - Continue the Current Program (Proposed Action/No Action)

Under the current program, WS addresses damage associated with birds in a number of situations throughout the State and is expected to continue at the present level or to increase slightly in the near future. The WS BDM program is the primary Federal program with BDM responsibilities, but some State and local government agencies may conduct BDM activities in Illinois. Through ongoing coordination with these agencies, WS is aware of such BDM activities and sometimes provides technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with such agencies in the same area but may conduct BDM activities at adjacent sites within the same time frame. In addition, commercial pest control companies may conduct BDM activities in the same area. The potential cumulative

impacts analyzed below could occur either as a result of WS BDM program activities over time, or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

5.2.1.1 Cumulative Impact Potential From Chemical Components of Alternative 1

BDM programs which include lethal population management components using pesticides may have the greatest potential for cumulative impacts on the environment as such impacts relate to the deposition of chemical residues in the physical environment and environmental toxicosis. The avicide DRC-1339 and the frightening agent Avitrol® are the only two chemicals that may be used by the Illinois WS BDM program for the purpose of obtaining lethal effects on birds. These two chemicals have been evaluated for possible residual effects which might occur from buildup of the chemicals in soil, water, or other environmental sites. DRC-1339 exhibits a low persistence in soil or water, and bioaccumulation of the chemical is unlikely (USDA 1997). In addition, the relatively small quantity of DRC-1339 used in BDM programs in Illinois, the chemical's instability which results in speedy degradation of the product (see Subsection 5.1.3.1 and Appendix B), and application protocol used in WS programs further reduces the likelihood of any environmental accumulation. DRC-1339 is not used by any other entities in Illinois.

In BDM programs in Illinois, WS may use Avitrol® in small quantities (see Subsection 5.1.3.1 and Appendix B). Most applications would not be in contact with soil. No application would be in contact with surface or ground water. Uneaten baits would be recovered and disposed of according to EPA pesticide label specifications.

Avitrol® is occasionally used by private pest control companies in Illinois to address damage associated with birds, such as domestic feral pigeons, European starlings, and English sparrows. No precise usage data is available from commercial pest control operators regarding use of Avitrol®.

Avitrol® exhibits a high persistence in soil and water but, according to literature, does not bioaccumulate (USDA 1997 and EXTOXNET 2000). Because of Avitrol®'s characteristic of binding to soils, it is not expected to be present in surface or ground water as a result of its use on land (EPA 1980). A combination of chemical characteristics and baiting procedure used by WS reduces the likelihood of environmental accumulation of Avitrol® as a result of potential use in WS BDM programs in Illinois. The EPA has not required studies on the fate of Avitrol® in the soil because, based on use patterns of the avicide, soil residues are expected to be low (EPA 1980).

Based on use patterns, chemical and physical characteristics of pesticides used in Illinois BDM programs, and factors related to environmental fate of DRC-1339 and Avitrol®, no cumulative impacts are expected from this lethal chemical components used in the WS BDM program.

Non-lethal chemicals used in the Illinois BDM program are discussed in Subsection 4.2.4 and in Appendix B. Characteristics of these chemicals and use patterns by those who employ them in Illinois indicate that no significant cumulative impacts related to environmental fate are expected from their use in BDM programs in the State.

Another potential cumulative impact related to the use of chemical methods in the current Illinois BDM program is the potential for such techniques to have adverse effects on populations of target or nontarget species, including T & E species. Aspects of current Illinois BDM program methods and a discussion of current trends in potentially affected bird populations is presented in detail in Subsections 5.1.1 and 5.1.2. As discussed, current program activities have had no observable

cumulative effects on bird populations in the State from FY 97-99. Trends indicate that bird populations of potentially affected species have either increased, remained stable, or decreased slightly for Illinois and the Eastern BBS region.

5.2.1.2 Cumulative Impact Potential From Non-Chemical Components of Alternative 1

Nonchemical methods of the WS BDM program in Illinois may include exclusion through use of various barriers, habitat modification of structures or vegetation, live trapping and translocation or euthanasia of birds, harassment dispersal of birds or bird flocks, and shooting of some birds.

Shooting is one component of the nonchemical WS BDM program in Illinois, the deposition of lead shot in the environment is, therefore, a factor considered in this EA. Threats of lead toxicosis to waterfowl from the deposition of lead shot in waters where such species feed was observed more than one hundred years ago (Sanderson and Belrose 1986). As a result of discoveries made regarding impacts to several species of ducks and geese, federal restrictions were placed on the use of lead shot for waterfowl hunting in 1991. Regulations regarding this are found in 50CFR20.21. The IDNR addresses the use of lead shot related to waterfowl hunting in 520ILCS 5/2.18-1 Shotgun pellets–Regulations. Language used by 520ILCS 5/2.18-1 states that "it shall be lawful ... to use ... either lead or steel shotgun pellets in taking such waterfowl ..., except ... at specific sites where there are documented cases of lead poisoning of waterfowl and all alternative methods of alleviating lead poisoning (such as dewatering, flooding and/or tillage) have been determined to be unsuccessful in preventing lead poisoning losses of waterfowl. At such specific sites, shot shell ammunition containing non-toxic pellets, such as steel, shall be used." Similar language in 50CFR20.21further directs hunters that: "While possessing shot (either in shotshells or as loose shot for muzzleloading) other than steel shot, or bismuth-tin (97 parts bismuth: 3 parts tin with 1 percent residual lead) shot, or tungsten-iron (40 parts tungsten: 60 parts iron with 1 percent residual lead) shot, or tungsten-polymer (95.5 parts tungsten: 4.5 parts Nylon 6 or 11 with 1 percent residual lead) shot, or tungsten matrix (95.5 parts tungsten: 4.1 parts polymer with 1 percent residual lead) shot or such shot approved as nontoxic by the Director pursuant to procedures set forth in 20.134, provided that: (1) This restriction applies only to the taking of Anatidae (ducks, geese [including brant] and swans), coots (*Fulica americana*) and any species that make up aggregate bag limits during concurrent seasons with the former in areas described in Sec. 20.108 as nontoxic shot zones...." Nontoxic shot zones are defined in 50CFR20.108 in the following citation: "Beginning September 1, 1991, the contiguous 48 United States, and the States of Alaska and Hawaii, the Territories of Puerto Rico and the Virgin Islands, and the territorial waters of the United States, are designated for the purpose of Sec. 20.21 (j) as nontoxic shot zones for hunting waterfowl, coots, and certain other species. 'Certain other species' refers to those species, other than waterfowl or coots, that are affected by reason of being included in aggregate bags and concurrent seasons."

All WS BDM shooting activities conform to Federal, State and local laws. In some programs, WS finds it necessary to shoot waterfowl under existing permits granted by USFWS (See Subsection 1.7.2.3), usually in airport wildlife hazard management programs where ducks or geese near aircraft operations jeopardize air passenger safety. WS uses steel shot during activities. Consequently, no deposition of lead in nontoxic shot zones occurs as a result of WS BDM actions in Illinois. No cumulative impacts are expected relative to toxic shot and shooting as a method in the Illinois WS BDM program. In addition, WS will evaluate other BDM actions which entail the use of shot on a case by case basis to determine if deposition of lead shot poses any risk to nontarget animals, such as domestic livestock, in scenarios such as that discussed in Subsection 2.3.2. If such risk exists, WS will use nontoxic shot in those situations.

Some potential exists for cumulative impacts to human health and safety related to harassment of roosting bird flocks such as American crows, blackbirds, and European starlings in urban environments. If birds are dispersed from one site and relocate in another where human exposure to concentrations of bird droppings over time occurs, human health and safety threats can occur (See Subsection 1.3.2). However, WS uses IWDM strategies to address such bird damage in Illinois. Such strategies may result in the implementation of habitat modifications to problem areas or population reductions of American crow, blackbird and European starling numbers which are causing human health and safety impacts. The potential for harassment/dispersal and subsequent relocation of flocks of birds to produce cumulative impacts as a result of their presence in areas of human use is therefore reduced or eliminated by the overall WS BDM strategy. Consequently, no cumulative impacts are expected from the use of harassment or other dispersal methods which might relocate flocks of roosting American crows, blackbirds, or European starlings to other human-occupied sites.

No cumulative impacts affecting target or nontarget species of wildlife, including threatened and endangered species, are expected as a result of this Alternative.

5.2.2 Alternative 2 - Nonlethal BDM Only by WS

Under this Alternative, WS would be restricted to implementing only nonlethal methods in providing assistance with bird damage problems. Entities requesting BDM assistance for damage concerns would only be provided information on nonlethal barriers or exclusion devices, habitat alteration, or other nonlethal methods such as harassment for most species. An exception might be that harassment dispersal of bird roosts could still be performed by WS.

As some of these nonlethal methods would likely be effective at the individual sites where they were used, this Alternative could create or increase human health risks and property damage at other locations where the birds would be moved. Therefore, a nonlethal only program by WS might result in increasing and recurrent problems of this nature. The scope of human health threats and property damage could conceivably increase as birds causing damage continued to increase in numbers and occupy areas of human use. However, no cumulative impacts directly related to the chemical or nonchemical methods used under this Alternative would be expected.

No cumulative impacts affecting target or nontarget species of wildlife, including threatened and endangered species, are expected as a result of this Alternative.

5.2.3 Alternative 3 - Technical Assistance Only

With WS technical assistance but no direct operational assistance, entities requesting BDM for human health and safety concerns, property, agricultural, or natural resource damage would either: (1) not take any action, resulting in the risk of damage by birds continuing in each situation as numbers of damaging birds maintained or increased; (2) implement WS recommendations for nonlethal barriers and exclusions site-by-site, which could result in some birds, such as European starlings, pigeons, or English sparrows, relocating to other buildings, structures, or tree roosts and thereby creating or increasing damage risks at new sites; or (3) undertake or hire bird damage control using dispersal methods, cage traps, shooting, or Avitrol®. Under this Alternative, bird-caused damage could increase if private individuals were unable to achieve effective BDM with technical assistance alone. This could result in cumulative damage effects to human health and safety, property, agriculture, or natural resources similar to Alternative 2.

Some cumulative impacts to waterfowl populations might occur from implementation of this alternative. Under this alternative, populations of ducks and geese inhabiting urban areas could be expected to increase, which normally results in an increase in levels of certain waterfowl diseases, such as avian cholera and botulism (Davidson and Nettles 1997), which are lethal to such species.

5.2.4 Alternative 4 - No WS Bird Damage Management

With no WS assistance, private individuals, communities, and government officials might either: (1) take no action, resulting in the risk of bird-caused damage to continue; (2) implement control actions that would be ineffective in resolving the problem or simply move the problem to another area; or (3) undertake or hire bird damage management using various exclusionary or bird-dispersal techniques, cage traps, shooting, or Avitrol®. A primary difference between this Alternative and the Proposed Action/No Action is that DRC-1339 would not be available. Under this Alternative, bird damage problems could increase if private individuals were unable to find and implement effective means of controlling those species causing damage. This increase might result in cumulative impacts to agriculture, human health and safety, property, or natural resources as a result of increased levels of unresolved bird damage.

Some cumulative impacts to waterfowl populations might occur from implementation of this Alternative. Under this Alternative, urban populations of ducks and geese could be expected to increase, which normally results in an increase in levels of certain waterfowl diseases such as avian cholera and botulism (Davidson and Nettles 1997), which are lethal to such species.

No cumulative impacts affecting nontarget species of wildlife, including threatened and endangered species, are expected as a result of this Alternative.

Table 5-4 summarizes the expected effects of each of the Alternatives on each of the issues.

Table 5-4. Relative Comparison of Anticipated Effects From Alternatives In This EA.

Issues/Effects	*Alt. 1 Current Program*	*Alt. 2 Nonlethal Only*	*Alt. 3 Technical Assistance Only*	*Alt. 4 No Federal Program*
Target Species Effects	**Low effect - reductions in bird numbers would not significantly affect species populations.**	**Low effect - reductions in bird numbers would not occur or would also be insignificant.**	**Low effect - reductions in bird numbers may occur but would also be insignificant to populations. Possible cumulative effects to waterfowl through overpopulation and disease threat in urban areas**	**Low effect - reductions in bird numbers less likely w/o WS assistance, but would be insignificant to populations if they occurred. Possible cumulative effects to waterfowl through overpopulation and disease threat in urban areas**
Effects to Non-target Species	**Low effect - methods used by WS would be highly selective with very little risk to nontarget species.**	**Low effect but greater than Alt. 1 - people with bird problems may resort to less selective lethal methods if they reject recommended nonlethal methods.**	**Low effect but greater than Alt. 1, but less than Alt. 2 - people with bird problems may resort to less selective lethal methods, but less likely with WS TA.**	**Low effect but greater than Alts. 1, 2, or 3 - people with bird problems may resort to less selective lethal methods w/o WS assistance.**
Human Health and Safety - Risks of Adverse Effects from BDM Methods	**Low risk - methods used by WS would be safe with no probable risk of human health or safety effects.**	**Low risk but slightly greater than Alt. 1 - people with bird problems may resort to illegal lethal chemical or other methods that pose human health/safety risks.**	**Low risk but slightly greater than Alt. 1, slightly less than Alt. 2 - people with bird problems may resort to illegal lethal or other chemical methods that pose human health/safety risks; less likely with WS TA.**	**Low risk but greater than Alts. 1, 2, 3 - people with bird problems may resort to illegal lethal chemical or other methods that pose human health/safety risks; most likely w/o WS direct or TA assistance.**

Issues/Effects	*Alt. 1* *Current Program*	*Alt. 2* *Nonlethal Only*	*Alt. 3* *Technical Assistance Only*	*Alt. 4* *No Federal Program*
Human Health and Safety - Risks of Adverse Effects from Bird Damage	**Low risk - bird damage problems most likely to be resolved without creating or moving problems elsewhere.**	**Higher Risk - e.g., pigeons and starlings would move to other sites which can create health risks at new sites. Possible cumulative effects.**	**Higher Risk, but less than Alt. 2 - e.g., TA recipients might be able to achieve pigeon removal, but less likely w/o WS direct assistance. Possible cumulative effects.**	**Higher Risk than Alt. 1,2, but less than Alt. 3 -persons with BDM problems might be able to achieve success, but less likely w/o WS direct or TA assistance. Possible cumulative effects.**
Aesthetic Enjoyment of Birds	**Low to Moderate effect (at local levels only) - WS BDM does not adversely affect overall bird species populations but may be local reductions (e.g., feral pigeon BDM).**	**Low effect - bird numbers in BDM situations would remain high or would increase, unless nonlethal recommendations were rejected and bird numbers were reduced by non-WS entities.**	**Low effect (at local levels) - bird numbers in BDM situations would remain high or would increase unless TA recipients implemented lethal methods successfully.**	**Low effect - bird numbers in BDM situations would remain high or would increase unless bird numbers are reduced by non-WS entities.**
Aesthetic Damage by Birds	**Low effect - bird damage problems most likely to be resolved without creating or moving problems elsewhere.**	**Low to Moderate effect - e.g., pigeons would move to other sites which can create aesthetic damage problems at new sites.**	**High, greater than Alts. 1,2 less than Alt. 4 - nuisance bird problems less likely to be resolved w/o WS assistance.**	**High - nuisance bird problems less likely to be resolved w/o WS assistance.**
Humaneness of Lethal BDM Methods	**Low to Moderate effect - methods viewed by some people as inhumane would be used, but current program would still be largely nonlethal.**	**Lower effect than Alt. 1 - but some people with bird problems may resort to other, less selective lethal methods than those used by WS.**	**Lower effect than Alt. 1, but greater than Alt. 2 - some people with bird problems may resort to other, less selective methods, but less likely with WS TA assistance.**	**Lower effect than Alt. 1, 3 but greater than Alt. 2 - some people with bird problems may resort to other, less selective methods w/o WS direct or TA assistance.**

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APPENDIX A

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APPENDIX B

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

NONLETHAL METHODS - NONCHEMICAL

Agricultural producer and property owner practices. These consist primarily of nonlethal preventive methods, such as cultural methods and habitat modification. Cultural methods and other management techniques are implemented by the agricultural producer or property owners/managers. Resource owners/managers may be encouraged to use these methods, based on the level of risk, need, and professional judgement on their effectiveness and practicality.

> **Cultural methods.** These may include altering planting dates so that crops are not young and more vulnerable to damage when the damage-causing species is present, or the planting of crops that are less attractive or less vulnerable to such species (e.g., wintering geese). At feedlots or dairies, cultural methods generally involve modifications to the level of care or attention given to livestock which may vary depending on the age and size of the livestock. Animal husbandry practices include, but are not limited to, techniques such as night feeding, indoor feeding, closed barns or corrals, removal of spilled grain or standing water, and use of bird-proof feeders (Johnson and Glahn 1994). In using some of these practices, though, additional concerns may be raised, such as increasing feed size may reduce consumption by European starlings but may be cost-prohibitive for the producer or increase consumption by larger birds (Twedt and Glahn 1984).
>
> **Environmental/Habitat modification** is often an integral part of BDM. Wildlife production and/or presence is 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 bird species or to repel certain birds. In most cases, the resource or property owner is responsible for implementing habitat modifications, with WS providing 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 at or near airports to reduce bird aircraft strike problems by eliminating bird nesting, roosting, loafing, or feeding sites. Generally, many bird problems on airport properties can be minimized through management of vegetation and water from areas adjacent to aircraft runways. Habitat management is often necessary to minimize damage caused by blackbirds and European starlings that form large roosts during late summer, autumn, and winter. Bird activity can be greatly reduced at roost sites by removing all the trees or selectively thinning the stand. Roosts often will form at traditional sites. In these situations, substantial habitat alteration may be the best way to permanently stop such activity at a site (USDA 1997).

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 that are included in this category are:

- Bird-proof barriers
- Propane exploders
- Pyrotechnics
- Distress calls and sound producing devices, including electronic guards
- Chemical frightening agents
- Repellents
- Scare crows
- Mylar tape
- Harassment with vehicles or trained dogs

These techniques are generally only practical for small areas. Scaring devices, such as distress calls, helium filled eye spot balloons, raptor effigies and silhouettes, mirrors, and moving disks, can be effective but usually for only a short time before birds become accustomed and learn to ignore them (Arhart 1972, Rossbach 1975, Conover 1982, Shirota et al. 1983, Schmidt and Johnson 1984, Mott 1985, Graves and Andelt 1987, and Bomford 1990). Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, and Tobin et al. 1988).

Bird-proof barriers can be effective but are often cost-prohibitive, particularly because of the aerial mobility of birds which requires overhead barriers, as well as, peripheral fencing or netting. Exclusion adequate to stop bird movements can also restrict movements of livestock, people and other wildlife (Fuller-Perrine and Tobin 1993). Heavy plastic strips hung vertically in open doorways have been successful in some situations in excluding birds from buildings used for indoor feeding or housing of livestock (Johnson and Glahn 1994). Plastic strips, however, can prevent or substantially hinder the filling of feed troughs or feed platforms at livestock feeding facilities. Such strips can also be covered up when the feed is poured into the trough by the feed truck. They are not practical for open-air feedlot operations that are not housed in buildings.

Monofilament wires can effectively deter gull use of specific areas where they are causing a nuisance (Blokpoel and Tessier 1984; Belant and Ickes 1996). The birds apparently fear colliding with the wires and avoid flying into areas where the method has been employed. The WS program in Washington has effectively utilized steel wires to deter gulls from preying on salmon fingerlings at the base of dams.

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 Corrigan 1994). The sharp points inflict temporary discomfort on the birds as they try to land which deters them from roosting. Drawbacks of this method are that some pigeons 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 exploders, pyrotechnics, electronic guards, scare crows, and audio distress/predator vocalizations are effective in many situations for temporarily 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 (Arhart 1972, Rossbach 1975, Shirota et.al. 1983, Schmidt and Johnson 1984, Mott 1985, and Bomford 1990). Williams (1983) reported an approximate 50% reduction in blackbirds at two south Texas feedlots as a result of pyrotechnics and propane cannon use. However, they are often not practical in dairy or feedlot situations because of the disturbance to livestock, although livestock can generally be expected to habituate to the noise. Birds, too, quickly learn to ignore scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Visual scaring techniques, such as use of mylar tape (highly reflective surface produces flashes of light that startles birds), eye-spot balloons (the large eyes supposedly give birds a visual cue that a large predator is present), flags, effigies (scarecrows), sometimes are effective in reducing bird damage. Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et.al. 1986 and Tobin et.al. 1988). These techniques, although temporary at best, may be adequate to resolve certain problems. The effectiveness of these techniques may be expanded with the use of additional methods, such as shooting, to limit the habituation of the birds to these scare 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. Additionally, the IDNR discourages and generally does not permit the translocation of Canada geese due to the present high population of these birds throughout the State.

However, there are exceptions for relocating birds. Relocation of damaging birds might be a viable solution and acceptable to the public when the birds were considered to have high value, such as raptors, or T&E species. In these

cases, WS would consult with the USFWS and/or IDNR 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 had limited effectiveness because problem bird species are highly mobile and can easily return to damage sites from long distances.

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 proven effective in some applications.

Cage 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 entrapped. 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 traps, as applied and used by WS, pose no danger to pets or the public. If a pet is accidentally captured in such traps, it can be released unharmed.

Nest box traps may be used by WS for corrective damage management and are effective in capturing local breeding and post breeding European starlings and other targeted secondary cavity nesting birds (DeHaven and Guarino 1969, Knittle and Guarino 1976). Nest box traps are effective in capturing local breeding and post breeding European starlings in limited areas (DeHaven and Guarino 1969; Knittle and Guarino 1976). Trapped birds are typically euthanized. Relocation to other areas following 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.

Mist nets are more commonly used for capturing small-sized birds, such as English sparrows and finches, but can be used to capture larger birds such as ducks and ring-neck pheasants or even smaller nuisance hawks and owls. This method 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 during their molt or other birds which are shy to other types of capture.

Bal-chatri traps are small traps used for capturing birds of prey, such as hawks and eagles. Live bait, such as pigeons, European starlings, or rodents, are used to lure raptors into landing on the trap (Hygnstrom and Craven 1994) where nylon nooses entangle their feet and hold the bird. The trap is made of chicken wire or other wire mesh material which is formed into a Quonset hut-shaped cage that holds the live bait. The outside top and sides are covered with many nooses, consisting of strong monofilament line or stiff nylon string.

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, requiring considerable time and planning to implement, and may attract additional birds to the area. This method is part of the integrated BDM strategy for reducing crop damage by sandhill cranes and Canada geese in some WS programs [redacted].

NONLETHAL METHODS - CHEMICAL

Mesurol (**Methiocarb** or 4-methylthio-3,5-xylyl N-nethylcarbamate) is a 75% wettable powder aversive conditioning chemical is used for egg treatment to reduce predation on the eggs of protected, threatened or endangered species. It is a restricted-use pesticide which is acutely toxic to birds, fish and aquatic invertebrates. Formulations used by WS for protection of eggs of species of concern are somewhat toxic to animals which feed upon them. Animals are made ill from food materials treated with methiocarb and tend to avoid feeding on items similar in appearance. By presenting treated eggs in locations at or near where species to be protected nest, it may be possible to condition crows to avoid feeding on similar looking eggs located in the same area. Such avoidance responses may be acquired over a period of time and may require repeated exposures in order to be maintained. Occasionally, birds may die after feeding upon treated eggs, but most birds exposed to treated eggs survive. Methiocarb is injected into an egg with a hypodermic needle and the egg is sealed. Eggs are marked as poison and EPA label specifications for use of treated eggs provide for mitigation practices and procedures to protect nontarget animals of concern from feeding on them. Methiocarb is approved for use only by APHIS Certified Applicators or persons under their direct supervision.

Methyl and di-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 and di-methyl anthranilate (MA) (grape-flavored food additive) has been shown to be an effective repellent for many bird species, including waterfowl (Dolbeer et al. 1993). 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/bee[4]), nontoxic to rats in an inhalation study (LC_{50} > 2.8 mg/L[5]), and of relatively low toxicity to fish and other invertebrates. MA 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 FDA (Dolbeer et al. 1992).

Water surface and turf applications of MA are generally considered expensive. For example, the least intensive application rate required by label directions is 20 lbs. of product (8 lbs. active ingredient) per acre of surface water at a cost of about $64/lb. with retreating required every 3-4 weeks. An example of the level of expense involved is a golf course in Rio Rancho, 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 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 nonirritating 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.

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, European starlings rejected grain to which charcoal particles were adhered (L. Clark, NWRC, 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). Compounds extracted from common spices used in cooking and applied to perches in cage tests have been shown repellent characteristics against roosting European starlings (Clark 1997). Naphthalene (moth balls) was found to be ineffective in repelling European starlings (Dolbeer et al. 1988).

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 tractile 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.

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

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

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 nonlethal in that a small portion of the birds are generally killed (Johnson and Glahn 1994). Prebaiting is usually necessary to achieve effective bait acceptance by the target species. This chemical is registered for use on pigeons, crows, gulls, blackbirds, European 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. Biodegradation is expected to be slow in soil and water, with a half-life ranging from three to 22 months. However, Avitrol® may form covalent bonds with humic materials, which may serve to reduce its availability for intake by organisms from water, is nonaccumulative 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 (LD_{50}) 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 nontarget indicator species tested on this compound (USDA 1997, Appendix P).

Alpha-chloralose (A-C) is a central nervous system depressant used as an immobilizing agent to capture and remove nuisance waterfowl 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. A-C 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. A-C 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. Bioaccumulation in plants and animal tissue is believed to be low. A-C is used in other countries as an avian and mammalian toxicant. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about two to 30 times lower than the LD_{50}. Mammalian data indicate higher LD_{50} 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, nontarget 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 number 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, or group of birds numbering less than 50 at one location. 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 nonlethal 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 centerfire rifles 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. All firearm safety precautions are followed by WS 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 every 3 years 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.

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 IDNR and USFWS for certain species. This method provides sport and food for hunters and requires no cost to the landowner. Sport hunting is occasionally recommended if it can be conducted safely for pigeon damage management around feedlots, dairies, airports, and other facilities. It is occasionally used for managing damage caused by European starlings, English sparrows, Canada geese, and other waterfowl.

Snap traps are modified rat snap traps used to remove individual woodpeckers, European starlings, and other cavity using birds. The trap treadle is baited with peanut butter or other food attractants and attached near the damage area caused by the offending bird. These traps pose no imminent danger to pets or the public, and are usually located in positions inaccessible to people and most non-avian animals. They are very selective because they are usually set in the defended territory of the target 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, IDA, and IDPH) or by the FDA. WS personnel that use restricted-use chemical methods are certified as pesticide applicators by IDA or IDPH and are required to adhere to all certification requirements set forth in FIFRA and Illinois pesticide control laws and regulations. Chemicals are only used on private, public, or tribal property sites with authorization from the property owner/manager.

CO_2 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. CO_2 gas is released into the bucket or chamber and birds quickly die after inhaling the gas. This method is approved as a euthanizing agent by the American Veterinary Medical Association. CO_2 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. In its frozen form, it is commonly known as dry ice. The use of CO_2 by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by the public.

Egg oiling is a method for suppressing reproduction of nuisance birds by spraying a small quantity of food grade vegetable oil or mineral 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 renest. 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 blackbird, European starling, and pigeon damage management in the proposed action. For more than 30 years, DRC-1339 has proven to be an effective method of European 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 and European starling problems at feedlots (West and Besser 1976, Glahn 1982, Glahn et al. 1987). 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, European 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 nonsensitive birds, predatory birds, and mammals. For example, European 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 European 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 nonsensitive. Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to nontarget and T&E species (USDA 1997). Secondary poisoning has not been observed with DRC-1339 treated baits. During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1981). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds and European 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 humane manner producing a quiet and apparently painless death. DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultraviolet 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 (1994) 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.

APPENDIX C

PERMITS FOR WS BDM PROGRAMS IN ILLINOIS

APPENDIX D

MEMORANDA OF UNDERSTANDING AMONG ENTITIES COOPERATING WITH WILDLIFE SERVICES IN THE BDM PROGRAM IN ILLINOIS

MEMORANDUM OF UNDERSTANDING

among

and

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES (WS),

To conduct wildlife damage management activities in the State of Illinois

ARTICLE 1

The purpose of this Memorandum of Understanding (MOU) is to:

1) establish a cooperative working relationship between the MOU participants and WS for the planning, coordination, and implementation of wildlife damage management programs developed to prevent, minimize or alleviate damage caused by wild animal species to agriculture, horticulture, animal husbandry, forestry, wildlife, human health and safety, and other property; and
2) facilitate exchange of information that is of mutual interest to MOU participants and the public.

ARTICLE 2

Authority exists under the Animal Damage Control Act of March 2, 1931 (7 USC 426-426c) and the Rural Development, Agriculture, and Related Agencies Appropriations Act, 1988 (P.L. 100-202) for the Secretary of Agriculture to cooperate with States, individuals, public and private agencies, organizations, and institutions to control mammals and birds injurious to agriculture, horticulture, forestry, animal husbandry, wildlife, and public health and safety.

ARTICLE 3

The [redacted], and WS agree:

A) To meet individually or collectively on an annual or as-needed basis to discuss mutual wildlife damage management program issues, concerns, priorities, accomplishments, resource needs, available technology, and procedures. Any meeting held to discuss wildlife damage management issues may be called by any party to this MOU.

B) That wildlife damage management activities and related field investigations will be consistent with sound (i.e., scientifically-supported) wildlife management practices and will give full consideration to the protection of the public, other beneficial or nontarget wildlife, domestic animals, and the environment.

C) To cooperate in managing problems caused by wildlife, including agricultural depredation, hazards or threats to human health and safety, and damage to natural resources, property, and other resources.

D) That WS's participation in wildlife damage management activities will consist of providing technical and/or operational assistance to individuals, groups, businesses, and public or private agencies and organizations experiencing wildlife conflicts.

ARTICLE 4

WS agrees:

A) To conduct its wildlife damage management responsibilities as defined under this MOU.

B) To consult, as necessary, with MOU participants, appropriate agencies, and the public to formulate and implement wildlife damage management plans and reach agreements on cooperative work and procedures.

C) To submit reports outlining accomplishments, activities, and other pertinent information relative to WS activities within Illinois to other MOU participants, as requested.

D) To coordinate wildlife damage management activities with similar programs in adjacent States to ensure uniformity in procedures and practices.

E) To conduct wildlife damage management activities in accordance with applicable Federal, State, and local laws and regulations and in a manner that will ensure that unintentional adverse effects on wildlife and fisheries resources, the total environment, and human health and safety are minimized.

ARTICLE 5

[redacted] **agree:**

A) To cooperate with WS to address problems associated with wildlife in the State of Illinois, including State-managed and migratory birds, and to make available for this cooperation such resources as may be required and mutually agreed upon.

B) That validation of this MOU by the subscribed signatories does not preclude participation by other State agencies or groups expressing an interest and need in wildlife damage management activities at a later date.

C) To cooperate with WS to develop, evaluate, register, and release tools, techniques, and/or chemicals that may be useful in managing wildlife damage to crops, livestock, and other agriculture, human health and safety, natural resources, or other property.

D) That the [redacted] will provide WS the necessary authorities for WS personnel to address problems involving State-regulated animals.

E) That depredation issues relating to bats within the State will be referred to the [redacted]. In situations where rabies is confirmed or suspected in the bat colony, the [redacted] will be notified. WS actions relating to bats will be coordinated through the [redacted] and [redacted]. In situations which require that a bat colony be removed, WS will be notified and assist with the removal.

F) That wildlife has the potential for creating hazards for aircraft, particularly in and around airfields. The MOU participants will cooperate, within their available means, with WS to protect public safety in and around airfields from threats caused by wildlife.

ARTICLE 6

This MOU defines, in general terms, the basis on which the participating parties will cooperate and does not constitute a financial obligation or serve as a basis for expenditures. Any funds transferred between parties of this MOU will be conducted in accordance with their prescribed financial procedures and will be subject to a written Cooperative Service Agreement entered into by the respective parties.

ARTICLE 7

Pursuant to Section 22, Title 41, Unites States Code, no member of or delegate to Congress shall in their official capacity be admitted to any share or part of this MOU or to any benefit to arise therefrom.

ARTICLE 8

This MOU shall supersede all existing MOU's, supplements, and amendments between WS and the participants.

ARTICLE 9

This MOU shall become effective upon the date of final signature and shall continue indefinitely. This MOU may be amended at any time by mutual agreement of the parties in writing. It may be terminated by any of the parties upon sixty (60) days written notice to the other parties.

Signatures

[redacted] Date

[redacted] Date

[redacted] Date

[redacted] Date

Gary E. Larson Date
Eastern Regional Director, USDA/APHIS/Wildlife Services

APPENDIX E

MATERIAL SAFETY DATA SHEETS AND PESTICIDE LABELS FOR PESTICIDES USED IN THE ILLINOIS WILDLIFE SERVICES BDM PROGRAM

APPENDIX F

LIST OF FEDERALLY AND STATE LISTED THREATENED AND ENDANGERED SPECIES IN ILLINOIS

FISH

Endangered

Acipenser fulvescens (lake sturgeon)
Etheostoma camurum (bluebreast darter)
Etheostoma exile (Iowa darter)
Etheostoma histrio (Harlequin darter)
Hybognathus hayi (cypress minnow)
Ichthyomyzon fossor (northern brook lamprey)
Macrhybopsis gelida (sturgeon chub)
Moxostoma valenciennesi (greater redhorse)
Nocomis micropogon (river chub)
Notropis anogenus (pugnose shiner)
Notropis boops (bigeye shiner)
Notropis heterolepis (blacknose shiner)
Notropis maculatus (taillight shiner)
Notropis texanus (weed shiner)
Noturus stigmosus (northern madtom)
Platygobio gracilis (flathead chub)
Pteronotropis hubbsi (bluehead shiner)
Scaphirhynchus albus (pallid sturgeon)**

Threatened

Catostomus catostomus (longnose sucker)
Coregonus artedi (cisco or lake herring)
Fundulus diaphanus (banded killifish)
Lampetra aepyptera (least brook lamprey)
Lepomis symmetricus (bantam sunfish)
Moxostoma carinatum (river redhorse)
Notropis chalybaeus (ironcolor shiner)
Notropis heterodon (blackchin shiner)

AMPHIBIANS

Endangered

Ambystoma x platineum (silvery salamander)
Cryptobranchus alleganiensis (hellbender)
Desmognathus fuscus (dusky salamander)

Threatened

Ambystoma jeffersonianum (Jefferson salamander)
Hemidactylium scutatum (four-toed salamander)
Hyla avivoca (bird-voiced treefrog)
Pseudacris streckeri illinoensis (Illinois chorus frog)

REPTILES

Endangered

Clemmys guttata (spotted turtle)
Kinosternon flavescens (Illinois mud turtle)
Macroclemys temminckii (alligator snapping turtle)
Masticophis flagellum (coachwhip)
Nerodia fasciata (broad-banded water snake)
Pseudemys concinna (river cooter)
Sistrurus catenatus catenatus (eastern massasauga)
Thamnophis sauritus (eastern ribbon snake)

Threatened

Clonophis kirtlandii (Kirtland's snake)
Crotalus horridus (timber rattlesnake)
Elaphe guttata emoryi (great plains rat snake)
Emydoidea blandingii (Blanding's turtle)
Heterodon nasicus (western hognose snake)
Nerodia cyclopion (Mississippi green water snake)
Tantilla gracilis (flathead snake)

BIRDS

Endangered

Ammodramus henslowii (Henslow's sparrow)
Asio flammeus (short-eared owl)
Bartramia longicauda (upland sandpiper)
Botaurus lentiginosus (American bittern)
Buteo swainsoni (Swainson's hawk)
Charadrius melodus (piping plover)**
Chlidonias niger (black tern)
Circus cyaneus (northern harrier)
Egretta caerulea (little blue heron)
Egretta thula (snowy egret)
Falco peregrinus (peregrine falcon)
Ictinia mississippiensis (Mississippi kite)
Laterallus jamaicensis (black rail)
Limnothlypis swainsonii (Swainson's warbler)
Nyctanassa violacea (yellow-crowned night-heron)
Nycticorax nycticorax (black-crowned night-heron)
Pandion haliaetus (osprey)
Phalaropus tricolor (Wilson's phalarope)
Rallus elegans (king rail)
Sterna antillarum (least tern)**
Sterna forsteri (Forster's tern)
Sterna hirundo (common tern)
Thryomanes bewickii (Bewick's wren)
Tympanuchus cupido (greater prairie-chicken)
Tyto alba (common barn-owl)
Xanthocephalus xanthocephalus (yellow-headed blackbird)

Threatened

Buteo lineatus (red-shouldered hawk)
Certhia americana (brown creeper)
Gallinula chloropus (common moorhen)
Grus canadensis (sandhill crane)
Haliaeetus leucocephalus (bald eagle)*
Ixobrychus exilis (least bittern)
Lanius ludovicianus (loggerhead shrike)
Podilymbus podiceps (pied-billed grebe)

MAMMALS

Endangered

Corynorhinus rafinesquii (eastern big-eared bat)
Myotis austroriparius (southeastern bat)
Myotis grisescens (gray bat)**
Myotis sodalis (Indiana bat)**
Neotoma floridana (eastern woodrat)

Threatened

Lontra canadensis (river otter)
Ochrotomys nuttalli (golden mouse)
Oryzomys palustris (marsh rice rat)

INVERTEBRATES

Endangered

Snails

Discus macclintocki (pleistocene disc)**

Mussels

Cumberlandia monodonta (spectacle case mussel)
Cyprogenia stegaria (fanshell mussel)**
Epioblasma triquetra (snuffbox mussel)
Lampsilis abrupta (pink mucket)**

Threatened

Mussels

Alasmidonta viridis (slippershell mussel)
Cyclonaias tuberculata (purple wartyback)
Ellipsaria lineolata (butterfly)
Elliptio crassidens (elephant-ear mussel)

Lampsilis fasciola (wavy-rayed lampmussel)
Lampsilis higginsii (Higgins eye)**
Obovaria subrotunda (round hickorynut mussel)
Plethobasus cooperianus (orange-foot pimpleback)**
Plethobasus cyphyus (sheepnose mussel)
Pleurobema clava (clubshell mussel)**
Pleurobema cordatum (Ohio pigtoe)
Pleurobema rubrum (pyramid pigtoe)
Potamilus capax (fat pocketbook pearly mussel)**
Ptychobranchus fasciolaris (kidneyshell mussel)
Quadrula cylindrica (rabbitsfoot mussel)
Simpsonaias ambigua (salamander mussel)
Toxolasma lividus (purple lilliput mussel)
Villosa fabalis (rayed bean mussel)
Villosa iris (rainbow mussel)
Villosa lienosa (little spectacle case mussel)

Elliptio dilatata (spike)
Fusconaia ebena (ebonyshell)
Ligumia recta (black sandshell)

Crustaceans
Caecidotea lesliei (isopod)
Crangonyx anomalus (amphipod)
Crangonyx antennatus (amphipod)
Crangonyx packardi (amphipod)
Gammarus acherondytes (Illinois cave amphipod)**
Orconectes indianensis (Indiana crayfish)
Orconectes kentuckiensis (Kentucky crayfish)
Orconectes lancifer (oxbow crayfish)
Orconectes placidus (crayfish)
Stygobromus iowae (Iowa amphipod)

Crustaceans
Gammarus bousfieldi (Bousfield's amphipod)

Dragonflies
Somatochlora hineana (Hine's emerald dragonfly)**

Dragonflies
Nannothemis bella (elfin skimmer)

Leafhoppers
Paraphlepsius lupalus (leafhopper)

Leafhoppers
Aflexia rubranura (redveined prairie leafhopper)

Butterflies and Moths
Atrytone arogos (arogos skipper)
Calephelis muticum (swamp metalmark)
Lycaeides melissa samuelis (Karner blue butterfly)**
Papaipema eryngii (rattlesnake-master borer moth)

Butterflies and Moths
Hesperia metea (cobweb skipper)
Hesperia ottoe (ottoe skipper)
Speyeria idalia (regal fritillary)

LICHENS

Endangered
Phaeophyscia leana (Lea's bog lichen)

PLANTS

Endangered

Adoxa moschatellina (moschatel)
Alnus incana ssp rugosa (speckled alder)
Amelanchier interior (shadbush)
Amelanchier sanguinea (shadbush)
Ammophila breviligulata (beach grass)
Amorpha nitens (smooth false indigo)
Arctostaphylos uva-ursi (bearberry)
Artemisia dracunculus (false tarragon)
Asclepias lanuginosa (woolly milkweed)
Asclepias meadii (Mead's milkweed)*
Asclepias ovalifolia (oval milkweed)
Asclepias stenophylla (narrow-leaved green milkweed)
Asplenium bradleyi (Bradley's spleenwort)
Asplenium resiliens (black spleenwort)
Astragalus crassicarpus var trichocalyx (large ground plum)
Astragalus tennesseensis (Tennessee milk-vetch)
Bartonia paniculata (screwstem)
Beckmannia syzigachne (American slough grass)
Berberis canadensis (Allegheny barberry)
Berchemia scandens (supple-jack)
Betula alleghaniensis (yellow birch)
Betula populifolia (gray birch)
Bidens beckii (water marigold)
Botrychium matricariifolium (daisyleaf grape fern)
Botrychium multifidum (northern grape fern)
Botrychium simplex (grape fern)
Bouteloua gracilis (blue grama)
Bumelia lanuginosa (wooly buckthorn)
Calamagrostis insperata (bluejoint grass)
Calla palustris (water arum)
Calopogon tuberosus (grass pink orchid)
Camassia angusta (wild hyacinth)
Cardamine pratensis var palustris (cuckoo flower)
Carex alata (winged sedge)
Carex arkansana (Arkansas sedge)
Carex aurea (golden sedge)
Carex brunnescens (brownish sedge)
Carex canescens var disjuncta (silvery sedge)
Carex chordorrhiza (cordroot sedge)
Carex crawfordii (crawford sedge)
Carex cryptolepis (sedge)
Carex decomposita (cypress-knee sedge)
Carex disperma (shortleaf sedge)
Carex echinata (little prickly sedge)
Carex garberi (elk sedge)
Carex gigantea (large sedge)
Carex lucorum (sedge)
Carex nigromarginata (black-edged sedge)

Threatened

Agalinis skinneriana (pale false foxglove)
Arenaria patula (slender sandwort)
Aristolochia serpentaria var hastata (narrow-leaved snakeroot)
Aster furcatus (forked aster)
Besseya bullii (kitten tails)
Boltonia decurrens (decurrent false aster)*
Botrychium biternatum (southern grape fern)
Cakile edentula (sea rocket)
Carex communis (fibrous-rooted sedge)
Carex intumescens (swollen sedge)
Carex oxylepis (sharp-scaled sedge)
Carex prasina (drooping sedge)
Carex viridula (little green sedge)
Carex willdenowii (Willdenow's sedge)
Carex woodii (pretty sedge)
Chamaedaphne calyculata (leatherleaf)
Cimicifuga rubifolia (black cohosh)
Cirsium hillii (Hill's thistle)
Cirsium pitcheri (Pitcher's (dune) thistle)*
Corallorhiza maculata (spotted coral-root orchid)
Cyperus grayioides (Gray's umbrella sedge)
Cypripedium candidum (white lady's-slipper orchid)
Drosera intermedia (narrow-leaved sundew)
Eleocharis rostellata (beaked spike rush)
Epilobium strictum (downy willow herb)
Equisetum pratense (meadow horsetail)
Erythronium mesochoreum (white dog-tooth violet)
Eupatorium incarnatum (thoroughwort)
Galium labradoricum (bog bedstraw)
Helianthus angustifolius (narrow-leaved sunflower)
Juniperus communis (common juniper)
Lactuca hirsuta (wild lettuce)
Larix laricina (tamarack)
Lathyrus ochroleucus (pale vetchling)
Lechea intermedia (pinweed)
Liatris scariosa var nieuwlandii (blazing star)
Matelea obliqua (climbing milkweed)
Melanthium virginicum (bunch-flower)
Melothria pendula (squirting cucumber)
Oenothera perennis (small sundrops)
Orobanche ludoviciana (broomrape)
Planera aquatica (water elm)
Potamogeton gramineus (pondweed)
Quercus montana (rock chestnut oak)
Quercus phellos (willow oak)
Ranunculus rhomboideus (prairie buttercup)
Rhynchospora alba (beaked rush)
Rubus pubescens (dwarf raspberry)

Carex oligosperma (few-seeded sedge)
Carex physorhyncha (Bellow's-beak sedge)
Carex reniformis (reniform sedge)
Carex striatula (lined sedge)
Carex trisperma (three-seeded sedge)
Carex tuckermanii (Tuckerman's sedge)
Carya pallida (pale hickory)
Castilleja sessiliflora (downy yellow painted cup)
Ceanothus herbaceus (redroot)
Chamaesyce polygonifolia (seaside spurge)
Chimaphila maculata (spotted wintergreen)
Chimaphila umbellata (pipsissewa)
Cimicifuga americana (American bugbane)
Cimicifuga racemosa (black cohosh)
Circaea alpina (small enchanter's nightshade)
Cladrastis lutea (yellowwood)
Clematis crispa (blue jasmine)
Clematis occidentalis (mountain clematis)
Clematis viorna (leatherflower)
Collinsia violacea (violet collinsia)
Comptonia peregrina (sweet-fern)
Conioselinum chinense (hemlock parsley)
Cornus canadensis (bunchberry)
Corydalis aurea (golden corydalis)
Corydalis halei (Hale's corydalis)
Corydalis sempervirens (pink corydalis)
Corylus rostrata (beaked hazelnut)
Cynosciadium digitatum (finger dog-shade)
Cyperus lancastriensis (galingale)
Cypripedium acaule (lady's-slipper orchid)
Cypripedium parviflorum (small yellow lady's-slipper orchid)
Cypripedium reginae (showy lady's-slipper orchid)
Cystopteris x laurentiana (laurentian fragile fern)
Dalea foliosa (leafy prairie clover)**
Dennstaedtia punctilobula (hay-scented fern)
Draba cuneifolia (whitlow grass)
Drosera rotundifolia (round-leaved sundew)
Dryopteris celsa (log fern)
Echinodorus tenellus (small burhead)
Eleocharis olivacea (capitate spike rush)
Eleocharis pauciflora (few-flowered spike rush)
Equisetum scirpoides (dwarf scouring rush)
Equisetum sylvaticum (horsetail)
Eriophorum virginicum (rusty cotton grass)
Eryngium prostratum (eryngo)
Euonymus americanus (strawberry bush)
Euphorbia spathulata (spurge)
Filipendula rubra (queen-of-the-prairie)
Fimbristylis vahlii (Vahl's fimbristylis)
Galactia mohlenbrockii (Boykin's dioclea)
Salvia azurea ssp pitcheri (blue sage)
Scirpus hallii (Hall's bulrush)
Scirpus polyphyllus (leafy bulrush)
Solidago sciaphila (cliff goldenrod)
Styrax americana (storax)
Sullivantia renifolia (sullivantia)
Thuja occidentalis (arbor vitae)
Tofieldia glutinosa (false asphodel)
Tomanthera auriculata (earleaf foxglove)
Tradescantia bracteata (prairie spiderwort)
Trientalis borealis (star-flower)
Triglochin maritimum (arrow-grass)
Triglochin palustris (arrow-grass)
Urtica chamaedryoides (nettle)
Veratrum woodii (false hellebore)
Veronica scutellata (marsh-speedwell)
Viburnum molle (arrowwood)
Viola conspersa (dog violet)

Galium lanceolatum (wild licorice)
Galium virgatum (dwarf bedstraw)
Gaultheria procumbens (wintergreen)
Geranium bicknellii (northern cranesbill)
Glyceria arkansana (manna grass)
Gymnocarpium dryopteris (oak fern)
Gymnocarpium robertianum (scented oak fern)
Hackelia americana (stickseed)
Halesia carolina (silverbell tree)
Helianthus giganteus (tall sunflower)
Heliotropium tenellum (slender heliotrope)
Heteranthera reniformis (mud plantain)
Hexalectris spicata (crested coral-root orchid)
Hudsonia tomentosa (false heather)
Hydrocotyle ranunculoides (water-pennywort)
Hydrolea uniflora (one-flowered hydrolea)
Hymenoxys herbacea (lakeside daisy)*
Hypericum adpressum (shore St. John's wort)
Hypericum kalmianum (kalm St. John's-wort)
Iliamna remota (Kankakee mallow)
Iresine rhizomatosa (bloodleaf)
Isoetes butleri (quillwort)
Isotria medeoloides (small whorled pogonia)
Isotria verticillata (whorled pogonia)*
Juncus alpinus (Richardson's rush)
Juncus vaseyi (Vasey's rush)
Juniperus horizontalis (trailing juniper)
Justicia ovata (water willow)
Lathyrus japonicus var glaber (beach pea)
Lespedeza leptostachya (prairie bush clover)*
Lesquerella ludoviciana (silvery bladder pod)
Lonicera dioica var glaucescens (red honeysuckle)
Lonicera flava (yellow honeysuckle)
Luzula acuminata (wood rush)
Lycopodium clavatum (common clubmoss)
Lycopodium dendroideum (ground pine)
Lycopodium inundatum (bog clubmoss)
Lysimachia fraseri (loosestrife)
Lysimachia radicans (creeping loosestrife)
Malus angustifolia (narrow-leaved crabapple)
Matelea decipiens (climbing milkweed)
Medeola virginiana (indian cucumber root)
Melanthera nivea (white melanthera)
Melica mutica (two-flowered melic grass)
Milium effusum (millet grass)
Mimulus glabratus (yellow monkeyflower)
Mirabilis hirsuta (hairy umbrella-wort)
Nothocalais cuspidata (prairie dandelion)
Opuntia fragilis (fragile prickly pear)
Orobanche fasciculata (clustered broomrape)

Oxalis illinoensis (Illinois wood sorrel)
Panicum boreale (northern panic grass)
Panicum columbianum (panic grass)
Panicum joorii (panic grass)
Panicum ravenelii (Ravenel's panic grass)
Panicum yadkinense (panic grass)
Paspalum dissectum (bead grass)
Penstemon brevisepalus (short-sepaled beardstongue)
Penstemon grandiflorus (large-flowered beardtongue)
Phacelia gilioides (phacelia)
Phlox pilosa ssp sangamonensis (sangamon phlox)
Pinus banksiana (jack pine)
Pinus echinata (shortleaf pine)
Pinus resinosa (red pine)
Plantago cordata (heart-leaved plantain)
Platanthera ciliaris (yellow fringed orchid)
Platanthera clavellata (wood orchid)
Platanthera flava var flava (tubercled orchid)
Platanthera flava var herbiola (tubercled orchid)
Platanthera leucophaea (white fringed orchid)*
Platanthera psycodes (purple fringed orchid)
Poa alsodes (woodland bluegrass)
Poa languida (woodland bluegrass)
Poa wolfii (meadow bluegrass)
Pogonia ophioglossoides (snake-mouth)
Polanisia jamesii (James clammyweed)
Polygala incarnata (pink milkwort)
Polygonatum pubescens (small solomon's seal)
Polygonum arifolium (halbred-leaved tearthumb)
Polygonum careyi (Carey's smartweed)
Populus balsamifera (balsam poplar)
Potamogeton praelongus (pondweed)
Potamogeton pulcher (pondweed)
Potamogeton robbinsii (pondweed)
Potamogeton strictifolius (pondweed)
Potentilla millegrana (cinquefoil)
Primula mistassinica (bird's-eye primrose)
Ptilimnium nuttallii (mock bishop's weed)
Puccinellia pallida (pale manna-grass)
Pycnanthemum albescens (white mountain mint)
Pycnanthemum torrei (mountain mint)
Quercus nuttallii (Nuttall's oak)
Ranunculus cymbalaria (seaside crowfoot)
Rhamnus alnifolia (alder buckthorn)
Rhynchospora glomerata (clustered beaked rush)
Ribes hirtellum (northern gooseberry)
Rosa acicularis (rose)
Rubus odoratus (purple flowering raspberry)
Rubus setosus (bristly blackberry)
Rudbeckia missouriensis (Missouri orange coneflower)

Sabatia campestris (prairie rose gentian)
Sagittaria longirostra (arrowleaf)
Salix serissima (autumn willow)
Salix syrticola (sand-dune willow)
Sambucus pubens (red-berried elder)
Sanguisorba canadensis (American burnet)
Sarracenia purpurea (pitcher plant)
Saxifraga virginiensis (early saxifrage)
Schizachne purpurascens (false melic grass)
Scirpus cespitosus (tufted bulrush)
Scirpus hattorianus (bulrush)
Scirpus paludosus (alkali bulrush)
Scirpus purshianus (weak bulrush)
Scirpus smithii (Smith's bulrush)
Scirpus verecundus (bashful bulrush)
Shepherdia canadensis (buffalo berry)
Silene ovata (ovate catchfly)
Silene regia (royal catchfly)
Silphium trifoliatum (rosinweed)
Sisyrinchium atlanticum (blue-eyed grass)
Sisyrinchium montanum (blue-eyed grass)
Sorbus americana (American mountain-ash)
Sparganium americanum (bur-reed)
Sparganium chlorocarpum (greenfruited bur-reed)
Spiranthes lucida (yellow-lipped ladies' tresses)
Spiranthes romanzoffiana (hooded ladies' tresses)
Spiranthes vernalis (ladies' tresses)
Stellaria pubera (great chickweed)
Stenanthium gramineum (grass-leaved lily)
Stylisma pickeringii (patterson bindweed)
Styrax grandifolia (bigleaf snowbell bush)
Symphoricarpos albus var albus (snowberry)
Synandra hispidula (hairy synandra)
Talinum calycinum (large flower-of-an-hour)
Thalia dealbata (powdery thalia)
Thelypteris noveboracensis (New York fern)
Thelypteris phegopteris (long beech fern)
Tilia heterophylla (white basswood)
Triadenum virginicum (marsh St. John's wort)
Trichomanes boschianum (filmy fern)
Trifolium reflexum (buffalo clover)
Trillium cernuum (nodding trillium)
Trillium erectum (purple trillium)
Trillium viride (green trillium)
Ulmus thomasii (rock elm)
Utricularia cornuta (horned bladderwort)
Utricularia intermedia (flatleaf bladderwort)
Utricularia minor (small bladderwort)
Vaccinium corymbosum (highbush blueberry)
Vaccinium macrocarpon (large cranberry)

Vaccinium oxycoccos (small cranberry)
Valeriana uliginosa (marsh valerian)
Valerianella chenopodiifolia (corn salad)
Valerianella umbilicata (corn salad)
Veronica americana (American brookline)
Viola canadensis (Canada violet)
Viola incognita (hairy white violet)
Viola primulifolia (primrose-leaf violet)
Viola viarum (plains violet)
Waldsteinia fragarioides (barren strawberry)
Woodsia ilvensis (rusty woodsia)
Zigadenus glaucus (white camass)

Source: IL. ENDANGERED SPECIES PROTECTION BOARD, 524 South Second Street, Springfield, Illinois 62701