ENVIRONMENTAL ASSESSMENT

REDUCING BIRD DAMAGE

IN THE STATE OF IOWA

In cooperation with:

United States Department of Interior
United States Fish and Wildlife Service
Migratory Bird Program
Region 3

Prepared by:

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

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Executive Summary

Iowa's bird species have many positive values and is an important part of life in the state. However, as human populations expand, and land is used for human needs, there is increasing potential for conflicting human/wildlife interactions. This Environmental Assessment (EA) analyzes the potential environmental impacts of alternatives for the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services' (WS) involvement in the reduction of conflicts by birds in Iowa, including damage to property, agriculture, and natural resources, and risks to human and livestock health and safety. The proposed bird damage management (BDM) activities could be conducted on public and private property when the property owner or manager requests assistance and/or when assistance is requested by an appropriate state, federal, tribal or local government agency.

The preferred alternative considered in the EA would be to continue and expand the current Integrated Wildlife Damage Management (IWDM) program. The IWDM strategy encompasses the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational assistance including non-lethal and lethal management methods, as described in the WS Decision Model (Slate et al. 1992). When appropriate, non-lethal methods like physical exclusion, altering cultural practices, habitat modification, repellents or harassment would be recommended and utilized to reduce damage. In other situations, lethal methods including the use of shooting, toxicants, nest/egg removal, live capture and euthanasia would be recommended and used by WS. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods. Other alternatives examined in the EA include an alternative in which WS is restricted to the use and recommendation of only non-lethal BDM methods, and an alternative in which WS does not become involved in BDM (Chapter 2). All WS activities would continue to be conducted in accordance with applicable state, federal, and local laws and regulations.

The EA provides a detailed analysis of impacts of each alternative on target bird populations, non-target species including state and federally listed threatened and endangered species, human health and safety, and aesthetics.

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ACRONYMS

APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BBS	Breeding Bird Survey
BDM	Bird Damage Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
ECOFRAM	Ecological Committee on FIFRA Risk Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
FR	Federal Register
FY	Fiscal Year
IDALS	Iowa Department of Agriculture and Land Stewardship
IDPH	Iowa Department of Public Health
IDNR	Iowa Department of Natural Resources
IDOT	Iowa Department of Transportation
MA	Methyl Anthranilate
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
NAS	National Audubon Society
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWRC	National Wildlife Research Center
ROD	Record of Decision
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WS	Wildlife Services

CHAPTER 1: NEED FOR ACTION AND SCOPE OF ANALYSIS

1.1 INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with the needs of wildlife, which increases the potential for conflicting human/wildlife interactions. Human/wildlife conflict issues are complicated by the wide range of public responses to wildlife and wildlife damage. What may be unacceptable damage to one person may be a normal cost of living with nature to someone else. Wildlife damage management (WDM) is the science of reducing damage or other problems associated with wildlife, and is recognized as an integral part of wildlife management (The Wildlife Society 2010). The relationship in American culture of wildlife values and wildlife damage can be summarized in this way:

> *Animals have either positive or negative values, depending on varying human perspectives and circumstances (Decker and Goff 1987). Animals are generally regarded as providing economic, recreational and aesthetic benefits, and the mere knowledge that animals exist is a positive benefit to many people. However, the activities of some animals may result in economic losses to agriculture and damage to property. Sensitivity to varying perspectives and values is required to manage the balance between human and animal needs. In addressing conflicts, managers must consider not only the needs of those directly affected by damage but a range of environmental, sociocultural and economic considerations as well.*

This Environmental Assessment (EA) evaluates the potential environmental effects of alternatives for WS' involvement in bird damage management in Iowa. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program is the federal agency authorized to protect American resources from damage associated with wildlife (the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c)). WS is a cooperatively funded, service-oriented program that receives requests for assistance with wildlife damage management from private and public entities, including tribes and other governmental agencies. As requested, WS cooperates with land and wildlife management agencies to reduce wildlife damage effectively and efficiently in accordance with applicable federal, state, and local laws and Memoranda of Understanding (MOUs) between WS and other agencies.

WS' activities are conducted to prevent or reduce wildlife damage to agricultural, industrial and natural resources, property, livestock, and threats to public health and safety on private and public lands in cooperation with federal, state and local agencies, tribes, private organizations, and individuals. The WS program uses an integrated wildlife damage management (IWDM) approach (WS Directive 2.105[1]) in which a combination of methods may be used or recommended to reduce wildlife damage. Program activities are not based on punishing offending animals but are conducted to reduce damage and risks to human and livestock health and safety, and are used as part of the WS Decision Model (Slate et al. 1992).

WS chose to prepare this EA to facilitate planning, interagency coordination and the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. In addition, this EA has been prepared to evaluate and determine if there are any potentially significant or cumulative impacts from the proposed damage management program.

[1]The WS Policy Manual (http://www.aphis.usda.gov/wildlifedamage) provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

1.2 NEED FOR ACTION

Some species of wildlife have adapted to and have thrived in human-altered habitats. Those species, in particular, are often responsible for the majority of conflicts between humans and wildlife that lead to requests for assistance to reduce damage to resources and to reduce threats to human safety. This EA evaluates the individual projects conducted by WS in Iowa to manage damage and threats to agricultural resources, property, natural resources, and threats to humans associated with the bird species listed in Appendix C.

Both sociological and biological carrying capacities must be applied when resolving wildlife damage problems. The wildlife acceptance capacity, or cultural carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations. Biological carrying capacity is the land or habitat's ability to support healthy populations of wildlife without degradation to the species' health or their environment during an extended period of time (Decker and Purdy 1988). Those phenomena are especially important because they define the sensitivity of a person or community to a wildlife species. For any given damage situation, there are varying thresholds of tolerance exhibited by those people directly and indirectly affected by the species and any associated damage. This damage threshold determines the wildlife acceptance capacity. While the habitat might have a biological carrying capacity to support higher populations of wildlife, in many cases, the wildlife acceptance capacity is lower (Hardin 1986). Once the wildlife acceptance capacity is met or exceeded, people begin to implement population or damage management to alleviate damage or address threats to human health and safety.

The alleviation of damage or other problems caused by or related to the behavior of wildlife is termed wildlife damage management and is recognized as an integral component of wildlife management (Leopold 1933, The Wildlife Society 2010, Berryman 1991). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated and the need for damage management is derived from the specific threats to resources. Wildlife species have no intent to do harm. They utilize habitats (e.g., reproduce, walk, forage) where they can find a niche. If their activities result in lost economic value of resources or threaten human safety, people characterize this as damage. When damage exceeds or threatens to exceed an economic threshold and/or poses a threat to human safety, people often seek assistance. The threshold triggering a request for assistance is often unique to the individual person requesting assistance and can be based on many factors (e.g., economic, social, aesthetics). Therefore, how damage is defined is often unique to the individual person and damage occurring to one individual may not be considered damage by another individual. However, the use of the term "*damage*" is consistently used to describe situations where the individual person has determined the losses associated with wildlife is actual damage requiring assistance (i.e., has reached an individual threshold). The term "*damage*" is most often defined as economic losses to resources or threats to human safety, but the term "*damage*" could also include a loss in aesthetic value and other situations where the actions of wildlife are no longer tolerable to an individual person.

Wildlife management is often based on harmonizing wildlife populations and human perceptions, in a struggle to preserve rare species, regulate species populations, oversee consumptive uses of wildlife, and conserve the environment that provides habitat for wildlife resources. Increasingly, cities, towns, parks, airports, and private properties have become sites of some of the greatest challenges for wildlife management (Adams et al. 2006). When the presence of a prolific, adaptable species is combined with human expansion, land management conflicts often develop. Birds are generally regarded as providing ecological, educational, economic, recreational, and aesthetic benefits (Decker and Goff 1987), and there is enjoyment in knowing wildlife exists and contributes to natural ecosystems (Decker and Goff 1987).

Birds add an aesthetic component to the environment, sometimes provide opportunities for recreational hunting, and like all wildlife, provide people with valued close contact with nature. Many people, even those people experiencing damage, consider those species of birds addressed in this EA to be a charismatic and valuable component of their environment; however, tolerance differs among individuals. Because of their

prolific nature, site tenacity, longevity, size, and tolerance of human activity, many bird species are often associated with situations where damage or threats can occur. For example, free-ranging waterfowl are extremely adaptable and may use the resources provided by humans in urban landscapes for nesting, raising young, molting, feeding, and loafing.

Birds are difficult to manage because they are highly mobile, able to exploit a variety of habitat types within a given area, and cannot be permanently excluded from large areas. It is rarely desirable or possible to remove or disperse all problem birds from an area, but with a proper management scheme, the number of birds and associated problems may be reduced to a level that can be tolerated. Additionally, management of bird-related problems often exceeds the capabilities of individual people to reduce damage to tolerable levels. In Iowa, problem situations associated with birds typically involve, but are not limited to, unacceptable accumulations of feces in public-use areas, damage to agricultural and natural resources, and unacceptable safety hazards (e.g., aircraft striking birds). Those problems frequently occur on private properties, natural/habitat restoration sites, corporate and industrial sites, airports, in residential communities, apartment/condominium complexes, municipal parks, schools, hospitals, office complexes, roadways, and other areas.

The need for action to manage damage and threats associated with birds arises from requests for assistance[2] received by WS and the USFWS to reduce and prevent damage associated with birds from occurring to four major categories (USDA 2005*a*, USDA 2007, USDA 2013). Those four major categories include agricultural resources, natural resources, property, and threats to human safety. WS have identified those bird species most likely to be responsible for causing damage to those four categories based on previous requests for assistance and assessments of the threat of bird strike hazards at airports. Table 1.1 lists the number of technical assistance and direct control projects involving bird damage or threats of bird damage by the four major resource types in Iowa from the federal fiscal year[3] (FY) 2011 through FY 2015. Technical assistance has been provided by WS to those persons requesting assistance with resolving damage or the threat of damage by providing information and recommendations on methods and techniques to reduce damage that can be conducted by the requestor without WS' direct involvement in managing or preventing the damage. Direct control includes damage management activities that are directly conducted by or supervised by personnel of WS. WS' technical assistance and direct control activities will be discussed further in Chapter 2 of this EA.

Many of the bird species addressed in this EA can cause damage to or pose threats to a variety of resources. Most requests for assistance received by WS are related to threats associated with those bird species causing human health and safety concerns. Large flocks of birds increase risks of disease transmission and unsafe working conditions from fecal matter being deposited. Bird strikes can also cause substantial damage to aircrafts, which could require costly repairs. In some cases, bird strikes can lead to the catastrophic failure of the aircraft, which can threaten passenger and crew safety. Many of the species addressed in this assessment are gregarious (i.e., form large flocks) species especially during the fall and spring migration periods. Although damage and threats can occur throughout the year, damage or the threat of damage is highest during those periods when birds are concentrated into large flocks, such as migration periods and during winter months when food sources are limited. For some bird species, high concentrations of birds can be found during the breeding season where suitable nesting habitat exists. The flocking behavior of many bird species during migration periods can pose increased risks when those species occur near or on airport properties. An aircraft striking multiple birds not only can increase the damage to the aircraft, but also increases the risk that a catastrophic failure of the aircraft might occur, especially if multiple birds are ingested into aircraft engines.

[2]WS only conducts bird damage management after receiving a request for assistance. Before initiating bird damage activities, a Memorandum of Understanding, cooperative service agreement, or other comparable document must be signed between WS and the cooperating entity, which lists all the methods the property owner or manager will allow to be used on property they own and/or manage.

[3]The federal fiscal year begins on October 1 and ends on September 30 the following year.

Table 1.1 – Birds species addressed by WS in Iowa from FY 2011 – FY 2015 by the resource types damaged

	Resource*					Resource*			
Species	**A**	**H**	**N**	**P**	**Species**	**A**	**H**	**N**	**P**
Red-winged Blackbird	0	178	0	3	**Yellow-headed Blackbirds**	0	2	0	0
Blackbird (mixed species)	0	32	0	0	**Bobolinks**	0	1	0	0
Snow Buntings	0	2	0	0	**Double-crested Cormorants**	0	1	0	0
Brown-headed Cowbirds	0	78	0	0	**American Crow**	0	501	0	392
Dickcissels	0	1	0	0	**Eurasian Collared-Dove**	0	31	0	0
Mourning Dove	1	397	0	14	**Short-billed Dowitchers**	0	1	0	0
Mallard Ducks	0	82	0	3	**Redhead Ducks**	0	2	0	0
Ring-necked Ducks	0	2	0	0	**Lesser Scaup**	0	3	0	0
Northern Shovelers	0	7	0	0	**Blue-winged Teal**	0	63	0	0
Green-winged Teal	0	1	0	0	**Wood Ducks**	0	59	0	0
Bald Eagle	0	6	0	0	**Great Egrets**	0	2	0	0
American Kestrel	0	90	0	0	**House Finches**	0	1	0	0
Northern Flickers	0	2	0	0	**Canada Geese**	66	527	0	185
Feral Geese	0	0	0	1	**Lesser Snow Geese**	0	4	0	0
Greater White-fronted Geese	0	2	0	0	**Marbled Godwits**	0	1	0	0
Common Grackle	0	151	0	5	**Bonaparte's Gulls**	0	8	0	0
Franklin's Gulls	0	32	0	0	**Herring Gull**	0	4	0	4
Ring-billed Gull	0	47	0	6	**Cooper's Hawk**	0	6	0	0
Northern Harrier (Marsh Hawk)	0	18	0	0	**Red-tailed Hawk**	1	657	0	16
Rough-legged Hawk	0	36	0	0	**Sharp-shinned Hawk**	0	2	0	0
Swainson's Hawk	0	3	0	0	**Great Blue Heron**	0	15	0	4
Dark-eyed Junco	0	7	0	0	**Killdeer**	0	313	0	0
Eastern Kingbird	0	13	0	0	**Western Kingbird**	0	5	0	0
Horned Larks	0	54	0	0	**Lapland Longspurs**	0	1	0	0
Eastern Meadowlarks	0	153	0	0	**Northern Mockingbird**	0	1	0	0
Nighthawks (All)	0	1	0	0	**Osprey**	0	4	0	0
Barred Owl	0	1	0	0	**Burrowing Owl**	0	1	0	0
Common Barn Owl	0	1	0	0	**Great-horned owl**	0	18	0	7
Short-eared Owl	0	2	0	0	**American White Pelican**	0	2	0	0
Ring-necked Pheasant	0	9	0	0	**Feral Pigeon**	114	836	0	639
American Robin	0	87	0	0	**Upland Sandpipers**	0	3	0	0
Chipping Sparrows	0	1	0	0	**House/English Sparrow**	113	442	0	250
European Starling	444	823	0	448	**Bank Swallow**	0	2	0	0
Barn Swallow	0	33	0	3	**Cliff Swallow**	0	1	0	0
Tree Swallow	0	13	0	0	**Black Terns**	0	6	0	0
Forster's Terns	0	2	0	1	**Wild Turkeys**	0	43	0	0
Turkey Vulture	1	216	1	33	**Greater Yellowlegs**	0	1	0	0
Trumpeter Swan	0	1	0	0					
					Total	740	6,154	1	2,014

*A=Agriculture, H=Human Health and Safety, N=Natural Resources, P=Property

During requests for assistance received by WS, cooperators often report or WS verifies through site visits, damage associated with various species of birds. Between FY 2011 and FY 2015, bird damage has been reported to WS or has been verified to exceed $924,930 (see Table 1.2). Damages have been reported or

verified as occurring primarily to property and agricultural resources. The majority of damage that occurred was by European starlings. However, feral pigeons, great blue herons, and house sparrows also greatly contributed to the bird damage reported to or verified by WS.

Table 1.2 – Reported or WS verified monetary damage by resource caused by birds in Iowa

Resource Type	Year					Total
	2011	2012	2013	2014	2015	
Agriculture	$106,230	$82,300	$30,000	$22,000	$39,000	**$279,530**
Property	$5,500	$16,800	$417,250	$3,500	$44,500	**$487,550**
Human Health and Safety	$7,000	$1,550	$53,100	$4,200	$92,000	**$157,850**
Total	**$118,730**	**$100,650**	**$500,350**	**$29,700**	**$175,500**	**$924,930**

Table 1.2 only reflects damage that has been reported to or verified by WS based on requests received for assistance. Monetary damage for natural resources was not reported or verified by WS; however, assigned monetary damage to natural resources can be difficult, especially when factoring in the lost aesthetic value when natural resources are damaged by birds. Similarly, placing a monetary value on threats to human safety can be difficult. Therefore, these values do not represent the true value of damage caused by birds to these resources. Monetary damage reported in Table 1.2 reflects damage that has occurred and that has been reported to WS, but is not reflective of all bird damage occurring in the state, since not all bird damage or threats are reported to WS in Iowa. Information regarding bird damage to agricultural resources, property, natural resources, and threats to human safety are discussed in the following subsections of the EA.

Need to Resolve Bird Damage to Agricultural Resources

According to the National Agricultural Statistics Service (NASS), Iowa had approximately 30.6 million acres of farm land in 2012 with a market value of agricultural products sold estimated at about $30.8 billion (NASS 2014). A total of 56.3% of these sales were in crops and 43.7% were in livestock (NASS 2014). The top grossing crop industries in 2012 included corn ($11.7 billion), soybeans ($5.3 billion), greenhouse, nursery and floriculture products ($99 million), and vegetables, potatoes, and melons ($19 million) (NASS 2014). The 2012 livestock inventory estimated approximately 3.9 million head of cattle, 20.5 million hogs and pigs, and 52.2 million poultry layers within Iowa (NASS 2014).

A variety of bird species can cause damage to agricultural resources. Damage and threats of damage to agricultural resources is often associated with bird species that exhibit flocking behaviors (e.g., house sparrows, European starlings) or colonial nesting behavior (e.g., pigeons and gulls). Damage occurs through direct consumption of agricultural resources, the contamination of resources from fecal droppings, or the threat of disease transmission to livestock from contact with fecal matter. As shown in Table 1.1, many of the bird species addressed have been identified as causing or posing threats to agricultural resources.

Damage to Aquaculture Resources

Damage to aquaculture resources occurs primarily from the economic losses associated with birds consuming fish and other commercially raised aquatic organisms. Damage can also result from the death of fish and other aquatic wildlife from injury associated with bird predation, as well as the threat of disease transmission from one impoundment to another or from one aquaculture facility to other facilities as birds move between

sites. The introduction of a disease can result in substantial economic losses since the entire impoundment is likely to become infected, which can result in extensive mortality.

During a survey of aquaculture facilities in the northeastern United States, 76% of respondents identified the great blue heron as the bird of highest concern regarding predation (Glahn et al. 1999). Glahn et al. (1999) found that 80% of the aquaculture facilities surveyed in the northeastern United States perceived birds as posing an economic threat due to predation, which coincided with 81% of the facilities surveyed having birds present on aquaculture ponds.

The market value of aquaculture products sold within Iowa was worth approximately $7.7 million during 2012 (NASS 2014). The aquaculture products propagated at facilities in Iowa include catfish, trout, other food fish (e.g. tilapia), baitfish, ornamental fish, sport or game fish, and other aquaculture products (e.g. alligators, frogs, leeches, eels, salamanders, and turtles) (NASS 2014). Most of the hatcheries within Iowa, however are used to raise fish for recreation (Clayton 2009). The most common species of sport or game fish propagated were channel catfish and largemouth bass, followed by smallmouth bass and bluegills (Clayton 2009). WS receives requests for assistance on damage to aquaculture resources on occasion from both state and private fish hatcheries. Requests for assistance usually involve assisting with the application for depredation permits to USFWS or providing technical assistance and recommendations to alleviate depredation of fish from birds. Most requests for assistance at aquaculture facilities in Iowa involve great blue herons, double-crested cormorants, and belted kingfishers.

Damage and Threats to Livestock Operations

Damage to livestock operations can occur from several bird species in Iowa. Economic damage can occur from bird consumption of livestock feed, from birds feeding on livestock, and from the increased risks of disease transmission associated with large concentrations of birds. Although damage and disease threats to livestock operations can occur throughout the year, damage is highest during those periods when birds are concentrated into large flocks, such as migration periods and during winter months when food sources are limited. For some bird species, high concentrations of birds can be found during the breeding season where suitable nesting habitat exists, such as barn swallows. Of primary concern to livestock operations in Iowa are European starlings, house sparrows, and to a lesser extent feral pigeons. Starlings have been reported by cooperators as being responsible for causing in excess of $50,000 in loss due to contamination and consumption of livestock feed at dairy and feedlot operations throughout Iowa.

The flocking behavior of European starlings, house sparrows, and feral pigeons either from feeding, roosting and/or nesting behavior can lead to economic losses to agricultural producers from the consumption of livestock feed. Economic damages associated with starlings and blackbirds feeding on livestock rations has been documented in France and Great Britain (Feare 1984), and in the United States (Besser et al. 1968, Dolbeer et al. 1978, Glahn and Otis 1981, Glahn 1983, Glahn and Otis 1986). Starlings damage an estimated $800 million worth of agricultural resources per year across the United States (Pimentel et al. 2000). 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. Livestock feed and rations are often formulated to ensure proper health of the animal. Higher fiber roughage in livestock feed is often supplemented with corn, barley, and other grains to ensure weight gain and in the case of dairies to produce milk. Livestock are unable to select for certain ingredients in livestock feed, while birds often can selectively choose to feed on the corn, barley, and other grains formulated in livestock feed. Livestock feed provided in open troughs is most vulnerable to feeding by birds. Birds often select for those components of feed that are most beneficial to the desired outcome of livestock. When large flocks of birds selectively forage for components in livestock feeds, the composition and the energy value of the feed can be altered, which can negatively affect the health and production of livestock. The removal of this high-energy source by birds, 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.

Forbes (1995) reported European starlings consumed 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 per minute. Glahn (1983) reported that 25.8% of farms in Tennessee experienced starling depredation problems of which 6.3% experienced considerable economic loss.

Economic losses can also result from raptors, particularly red-tailed hawks, feeding on domestic fowl such as chickens and waterfowl. Free-ranging fowl or fowl allowed to range outside of confinement for a period are particularly vulnerable to predation by raptors. For example, predation by red-tailed hawks on domestic pigeons was reported to WS during FY 2012. From FY 2011 to FY 2015, WS has provided assistance to three game farms that raise ring-necked pheasants and bobwhite quail. One game farm lost at least 20 game birds from predation by red-tailed hawks in FY 2015.

Threats of Disease Transmission to Livestock

Large concentrations of birds feeding, roosting, and/or loafing at livestock operations increase risks of disease transmission from fecal matter being deposited in areas where livestock feed, water, and are housed. Birds feeding in open troughs on livestock feed can leave fecal deposits, which can be consumed by livestock. Fecal matter can also be deposited in sources of water for livestock, which increases the likelihood of disease transmission and can contaminate other surface areas where livestock can encounter fecal matter deposited by birds. Many bird species, especially those encountered at livestock operations, are known to carry infectious diseases which can be excreted in fecal matter and pose not only a risk to individual livestock operations, but can be a source of transmission to other livestock operations as birds move from one area to another. A number of diseases that could affect livestock have been associated with pigeons, European starlings, blackbirds, and house sparrows and are described in Table 1.3 (Weber 1979).

Table 1.3 – 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	arthritis, skin lesions, necrosis, septicemia, lameness	serious hazard for the swine industry, rejection of swine meat at slaughter due to septicemia, also affects dogs
Salmonellosis	all domestic animals	abortions, mortality in young, decrease in milk production, colitis	over 1700 serotypes
Pasteurellosis	cattle, swine, horses, rabbits, chickens, turkey	sudden death without illness, pneumonia, mastitis, abortions, septicemia, abscesses	also affects cats and dogs
Avian tuberculosis	chickens, turkeys, swine, cattle, horses, sheep	emaciation, decrease in egg production, death, mastitis	also affects cats and dogs
Streptococcosis	cattle, swine, sheep, horses, chickens, turkeys, geese, ducks, rabbits	emaciation, death, mastitis, abscesses, inflammation of the heart	feral pigeons are susceptible and aid in transmission
Yersinosis	cattle, sheep, goats, horses, turkeys, chickens, ducks	abortion	also affects dogs and cats
Vibriosis	cattle and sheep	infertility or early embryonic death, abortion in late pregnancy	of great economic importance
Listeriosis	chickens, ducks, geese, cattle, horses, swine, sheep, goat	difficulty swallowing, nasal discharge, paralysis of throat and facial muscles	also affects cats and dogs

Viral:			
Meningitis	cattle, sheep, swine, poultry	inflammation of the brain, newborns unable to suckle	associated with listeriosis, salmonellosis, cryptococcosis
Encephalitis (7 forms)	horses, turkeys, ducks	drowsiness, inflammation of the brain	mosquitos serve as vectors
Mycotic (fungal):			
Aspergillosis	cattle, chickens, turkeys, and ducks	difficulty breathing, death, abortions	common in turkey poults
Blastomycosis	cattle, sheep, swine	weight loss, fever, cough, bloody sputum and chest pains.	rarely affects horses, dogs, and cats
Candidiasis	cattle, swine, sheep, horses, chickens, turkeys	mastitis, diarrhea, vaginal discharge, aborted fetuses	causes unsatisfactory growth in chickens
Cryptococcosis	cattle, swine, horses	chronic mastitis, decreased milk flow and appetite loss	also affects dogs and cats
Histoplasmosis	horses cattle and swine	chronic cough, loss of appetite, weakness, depression, diarrhea, extreme weight loss	also affects dogs; actively grows and multiplies in soil and remains active long after birds have departed
Coccidiosis	poultry, cattle, and sheep	bloody diarrhea, dehydration, retardation of growth	almost always present in house sparrows; also found in pigeons and European starlings
Protozoal:			
American trypanosomiasis	horses cattle and swine	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	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	abortion, arthritis, conjunctivitis, enteritis	also affects dogs and cats and many wild birds and mammals
Q fever	affects cattle, sheep, goats, and poultry	abortion	can be transmitted by infected ticks

Although birds are known to be carriers of diseases (vectors) that are transmissible to livestock, the rate that transmission occurs is unknown, but is likely to be low. Since many sources of disease transmission exist, identifying a specific source can be difficult. Because birds are known to be vectors of disease, the threat of transmission increases when large numbers of birds are defecating and contacting surfaces and areas used by livestock.

Carlson et al. (2011) reported that European starlings have the potential to transmit *salmonella* to livestock through droppings in feed troughs and contaminating drinking water troughs; they found that the probability of *salmonella* contamination of feed and water troughs increased as the presence of starlings increased. Birds also cause damage by defecating on fences, shade canopies, and other structures, which can accelerate corrosion of metal components and can be aesthetically displeasing. Large concentrations of birds at livestock feeding operations can also pose potential health hazards to feedlot/dairy operators and their personnel through directly contacting fecal droppings or by droppings creating unsafe working conditions.

Wild and domestic waterfowl are the acknowledged natural reservoirs for a variety of avian influenza viruses (Davidson and Nettles 1997, Alexander 2000, Stallkecht 2003, Pedersen et al. 2010). Avian influenza typically circulates among those birds without clinical signs and is not an important mortality factor in wild waterfowl (Davidson and Nettles 1997, Stallknecht 2003, Clark and Hall 2006). However, the potential for avian influenza to produce devastating disease in poultry makes its occurrence in waterfowl an important concern (Davidson and Nettles 1997, USDA 2005*b*, Clark and Hall 2006, Gauthier-Clerc et al. 2007). During

2015, Iowa experienced a widespread outbreak of highly pathogenic avian influenza among poultry farms when over 31.5 million poultry were affected at 77 sites across 18 counties in the state (IDALS 2015). Of the affected poultry, approximately 24.7 million were layers, 5.6 million birds were pullets, and 1.1 million were turkeys (IDALS 2015). The 2015 outbreak of avian influenza resulted in the loss of approximately $1.2 billion and 8,400 jobs across Iowa (Wappes 2015).

Damage to Agricultural Crops

Besser (1985) estimated damage to agricultural crops associated with birds exceeded $100 million (over $223 million in today's dollar value) annually in the United States. Bird damage to agricultural crops occurs primarily from the consumption of sprouting crops (*i.e.*, loss of the crop and revenue), but also consists of trampling of emerging crops by waterfowl, damage to fruits associated with feeding, and fecal contamination. In 2012, the sale of all crops totaled $17.4 billion in Iowa (NASS 2014). Damage to agricultural field crops, as reported to WS in Iowa, occurs primarily from Canada geese and flocks of mixed species blackbirds. WS has occasionally received requests to provide recommendations for non-lethal harassment to disperse Canada geese and blackbirds from newly planted agricultural fields in Iowa.

Waterfowl can graze and trample a variety of crops, including alfalfa, barley, corn, soybeans, wheat, rye, and oats (Cleary 1994). For example, a single intense grazing event by Canada geese in fall, winter, or spring can reduce the yield of winter wheat by 16 to 30% (Fledger et al. 1987), and reduce growth of rye plants by more than 40% (Conover 1988). However, some research has reported that grazing by geese during the winter may increase rye or wheat seed yields (Clark and Jarvis 1978, Allen et al. 1985). Since 1985, agricultural practices have changed resulting in intensive wheat growing methods with much higher yields of approximately 100 bushels per acre, but these crops are unable to sustain even light grazing pressure without losing yield. Associated costs with agricultural damage involving waterfowl include costs to replant grazed crops, implement non-lethal wildlife management practices, purchase replacement hay, and decreased yields.

Bird damage to sweet corn can also result in economic losses to producers with damage often amplified since even minor damage to sweet corn caused by birds makes the entire ear of corn unmarketable because damage is unsightly to the consumer (Besser 1985). Large flocks of red-winged blackbirds are responsible for most of the damage reported to sweet corn with damage also occurring from grackles and starlings within the United States (Besser 1985). Damage occurs when birds rip or pull back the husk exposing the ear for consumption. Most bird damage occurs during the development stage known as the milk and dough stage (when the kernels are soft and filled with a milky liquid), which the birds puncture to ingest the contents. Once punctured, the area of the ear damaged often discolors and is susceptible to disease introduction into the ear (Besser 1985). Damage usually begins at the tip of the ear as the husk is ripped and pulled back, but can occur anywhere on the ear (Besser 1985).

Damage can also occur to sprouting corn as birds pull out the sprout or dig the sprout up to feed on the seed kernel (Besser 1985). Damage to sprouting corn occurs primarily from crows but red-winged blackbirds, grackles, common ravens, and starlings are known to cause damage to sprouting corn (Mott and Stone 1973, Johnson and Glahn 1994). Damage to sprouting corn is likely localized and highest in areas where breeding colonies exist in close proximity to agricultural fields planted with corn (Mott and Stone 1973, Rogers and Linehan 1977). Rogers and Linehan (1977) found that grackles damaged two corn sprouts per minute on average when present at a field planted near a breeding colony.

In 2012, 408 farms produced grapes in Iowa, having a market value of $1.6 million in grape products sold (NASS 2014). Besser (1985) estimated bird damage to grapes, cherries, and blueberries exceed $1 million (over $2.2 million in today's dollar value) dollars annually in the United States. Anderson et al. (2013) estimated bird damage to wine grapes in Michigan to exceed $2 million annually. Starlings, robins, and wild turkeys have been documented as causing damage to grapes (Anderson et al. 2013). WS has provided

technical assistance to grape producers throughout the state of Iowa. Grape producers have reported damage from American robins and blackbirds and have estimated losses into the thousands.

Need to Resolve Threats that Birds Pose to Human Safety

Several bird species listed in Table 1.1 can be closely associated with human habitation and often exhibit gregarious roosting behavior, such as vultures, waterfowl, crows, starlings, and pigeons. The close association of those bird species with human activity can pose threats to human safety from disease transmission, threaten the safety of air passengers if birds are struck by aircraft, excessive droppings can be aesthetically displeasing, and aggressive behavior, primarily from waterfowl, can pose risks to human safety. Birds have caused $157,850 of monetary damage to human health and safety that was reported to or verified by WS in Iowa from FY 2011 to FY 2015, which is an average of $31,570 per year. However, it is extremely difficult to place a monetary value on human lives and their safety.

Threat of Disease Transmission to Humans

Birds can play an important role in the transmission of zoonotic diseases (i.e., animal diseases transmissible to humans) where humans may encounter fecal droppings of those birds. As many as 65 different diseases transmittable to humans or domestic animals have been associated with pigeons, European starlings, and house sparrows; the more common zoonotic diseases affecting humans are described in Table 1.4 (Weber 1979). Few studies are available on the occurrence and transmission of zoonotic diseases in wild birds. Study of this issue is complicated by the fact that some disease-causing agents associated with birds may also be contracted from other sources. The risk of disease transmission from birds to humans is likely very low. The presence of disease causing organisms in bird feces is a result of the pathogens being present in the environment in which birds live. Birds likely acquire disease-causing organisms through ingestion of pathogens that originated in the environment. Disease-causing organisms do not originate within birds (i.e., birds do not produce disease-causing organisms), but those birds can act as reservoirs and vectors for disease causing organisms that are of concern to human safety.

Of concern, is the ability of birds to obtain disease causing organisms and transport those organisms to other areas, especially to areas with high amounts of human activity. With the ability to fly and move from one location to another, birds can obtain a disease causing organism at one location and transfer the disease causing organism from that location to another location. Human exposure to fecal droppings through contact or through the disturbance of accumulations of fecal droppings where disease organisms are known to occur increases the likelihood of disease transmission. Birds can be closely associated with human habitation where interaction with birds or fecal droppings can occur. Many bird species often exhibit gregarious behavior, which can lead to accumulations of fecal droppings in areas where those species forage or loaf. Accumulations of feces can be considered a threat to human health and safety due to the close association of those species of birds with human activity. Accumulations of bird droppings in public areas are aesthetically displeasing and are often found in areas where humans may be exposed.

In most cases in which human health concerns are a major reason for requesting assistance, no actual cases of bird transmission of disease to humans have been proven to occur. Thus, the primary reason for requesting assistance is the risk of disease transmission.

The most common strains of avian influenza found in wild birds are low pathogenic strains (Stallknecht 2003, Pedersen et al. 2010), but high pathogenic strains have also been found to exist in wild waterfowl species (Brown et al. 2006, Keawcharoen et al. 2008). Although avian influenza is primarily a disease of birds, there are concerns over the spread of the Asian H5N1 highly pathogenic strain that has shown transmission to humans with potential for mortalities (Gauther-Clerc et al. 2007, Peiris et al. 2007). Outbreaks of other avian influenza strains have also shown potential to be transmissible to humans during severe outbreaks when

people handle infected poultry (Koopmans et al. 2004, Tweed et al. 2004). A pandemic outbreak of avian influenza could have impacts on human health and economics (World Health Organization 2005, Peiris et al. 2007).

Escherichia coli are fecal coliform bacteria associated with fecal material of warm-blooded animals. There are over 200 specific serological types of *E. coli* with the majority of serological types being harmless (Sterritt and Lester 1988). Probably the best-known serological type of *E. coli* is *E. coli* O157:H7, which is can adversely affect human health. This serotype is usually associated with cattle (Gallien and Hartung 1994) but can be moved and transmitted by birds. Many communities monitor water quality at swimming beaches and lakes, but lack the financial resources to pinpoint the source of elevated fecal coliform counts. When fecal coliform counts at swimming beaches exceed established standards, the beaches are temporarily closed which can adversely affect the enjoyment of the area by the public, even though the serological type of the *E. coli* is unknown. In FY 2014, WS provided technical assistance to alleviate the disease threat of *E. coli* at a swimming beach a lake near Des Moines, Iowa.

Table 1.4 - Diseases transmissible to humans that are associated with feral domestic pigeons, European starlings, and house sparrows. Information from Weber (1979)

Disease	Human Symptoms	Potential for Human Fatality
Bacterial:		
Erysipeloid	skin eruption with pain, itching; headaches, chills, joint pain, prostration, fever, vomiting	sometimes - particularly to young children, elderly or immunocompromised people
Salmonellosis	gastroenteritis, septicemia, persistent infection	possible, especially in individuals weakened by other disease or old age
Pasteurellosis	respiratory infection, nasal discharge, conjunctivitis, bronchitis, pneumonia, appendicitis, urinary bladder inflammation, abscessed wound infections	rarely
Listeriosis	conjunctivitis, skin infections, meningitis in newborns, abortions, premature delivery, stillbirth	sometimes - particularly with newborns
Viral:		
Meningitis	inflammation of membranes covering the brain , dizziness, and nervous movements	possible - can also result as a secondary infection with listeriosis, salmonellosis, cryptococcosis
Encephalitis (7 forms)	headache, fever, stiff neck, vomiting, nausea, drowsiness, disorientation	mortality rate for eastern equine encephalitis may be around 60%
Mycotic (fungal):		
Aspergillosis	affects lungs and broken skin, toxins poison blood, nerves, and body cells	rarely
Blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	rarely
Candidiasis	infection of skin, fingernails, mouth, respiratory system, intestines, and urogenital tract	rarely
Cryptococcosis	lung infection, cough, chest pain, weight loss, fever or dizziness, also causes meningitis	Possible - especially with meningitis
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
Protozoal:		
American trypanosomiasis	infection of mucous membranes of eyes or nose, swelling	possible death in 2-4 weeks
Toxoplasmosis	inflammation of the retina, headaches, fever, drowsiness, pneumonia, strabismus, blindness, hydrocephalus, epilepsy, and deafness	possible
Rickettsial /Chlamydial:		
Chlamydiosis	pneumonia, flu-like respiratory infection, high fever,	occasionally, restricted to old, weak or

	chills, loss of appetite, cough, severe headaches, generalized aches and pains, vomiting, diarrhea, hepatitis, insomnia, restlessness, low pulse rate	those with concurrent diseases
Q fever	sudden pneumonitis, chills, fever, weakness, severe sweating, chest pain, severe headaches and sore eyes	possible

While transmission of diseases or parasites from birds to humans has not been well documented, the potential exists (Luechtefeld et al. 1980, Wobeser and Brand 1982, Hill and Grimes 1984, Pacha et al. 1988, Blankespoor and Reimink 1991, Graczyk et al. 1997, Saltoun et al. 2000, Kassa et al. 2001). In some cases, infections may even be life threatening, especially for immunocompromised and immunosuppressed people (Roffe 1987, Graczyk et al. 1998). Even though many people are concerned about disease transmission from feces, the probability of contracting a disease from feces is believed to be small. Financial costs related to human health threats involving birds may include testing of water for *coliform* bacteria, cleaning and sanitizing public-use areas, contacting and obtaining assistance from public health officials, and implementing non-lethal and lethal methods of wildlife damage management to reduce risks. WS recognizes and defers to the authority and expertise of local and state health officials in determining what does or does not constitute a threat to public health.

Threat of Aircraft Striking Wildlife at Airports and Military Installations

In addition to threats of zoonotic diseases, birds also pose a threat to human safety from being struck by aircraft. Birds struck by aircraft, especially when ingested into engines, can lead to structural damage to the aircraft and can cause catastrophic engine failure. The civil and military aviation communities have acknowledged that the threat to human health and safety from aircraft collisions with wildlife is increasing (Dolbeer 2000, MacKinnon et al. 2004). Collisions between aircraft and wildlife are a concern throughout the world because wildlife strikes threaten passenger and crew safety (Thorpe 1996), result in lost revenue, and repairs to aircraft can be costly (Linnell et al. 1996, Robinson 1996). Aircraft collisions with wildlife can also erode public confidence in the air transportation industry as a whole (Conover et al. 1995).

When birds enter or exit a roost in flight lines at or near airports or when present in large flocks foraging on or near an airport, those bird species represent a safety threat to aviation. Vultures and raptors can also present a risk to aircraft because of their large body mass and slow-flying or soaring behavior. Vultures are considered the most hazardous bird for an aircraft to strike based on the frequency of strikes, effect on flight, and amount of damage caused by vultures throughout the country (Dolbeer et al. 2000). Mourning doves also present risks when their late summer behaviors include creating large roosting and loafing flocks. Their feeding, watering, and gritting behavior on airport turf and runways further increases the risk of bird-aircraft collisions.

From 1990 through 2015, 568 birds have been reported as struck by aircraft in Iowa as well as 529 strikes that were from an unknown bird (FAA 2016). This comprises 96% of the total wildlife strikes reported (FAA 2016). During this time, the most common strikes were associated with killdeer (94), swallows (92), hawks and kestrels (56), sparrows (55), starlings (46), and pigeons and doves (36) (FAA 2016). The number of actual bird strikes is likely to be much greater since an estimated 80% of civil bird strikes may go unreported (Linnell et al. 1999, Cleary et al. 2005, Wright and Dolbeer 2005). Generally, bird collisions occur when aircraft are near the ground during take-off or landing.

Birds being struck by aircraft can cause substantial damage. Bird strikes can cause catastrophic failure of aircraft systems (e.g., ingesting birds into engines), which can cause the plane to become uncontrollable and can lead to crashes. Injuries also occur from bird strikes to pilots and passengers. In October 1993, a captain was injured when a duck shattered the windshield of an aircraft during takeoff at Sioux Gateway in Iowa, resulting in an emergency landing (USDA 2015). In July 2007, an aircraft had to conduct an emergency landing at Walker Field in Iowa after reporting it hit an unidentified bird during takeoff (USDA 2015). During the emergency landing, the pilot was unable to stop the aircraft on the remaining runway, which

caused the plane to hit a fence, run into a ditch, and nose over, resulting in $210,000 in damage (UDSA 2015). From 1990 to 2015 at least 24 flights at various airports in Iowa took precautionary landings after a bird strike and at least 16 pilots aborted take-off to ensure the aircraft was not damaged and safe to fly (FAA 2016).

Additional Human Safety Concerns Associated with Birds

As people are increasingly living with wildlife, the lack of harassing and threatening behavior by people toward many species of wildlife, especially around urban areas, has led to a decline in the fear wildlife have toward humans. When wildlife species begin to habituate to the presence of people and human activity, a loss of apprehension occurs that can cause those species to exhibit threatening behavior toward people. This threatening behavior continues to increase as human populations expand and the populations of those species that adapt to human activity increase. Threatening behavior can be in the form of aggressive posturing, a general lack of apprehension toward people, or even physical attacking. Although birds attacking people occurs rarely, aggressive behavior by birds does occur, especially during nest building and the rearing of eggs and chicks. Raptors can aggressively defend their nests, nesting areas, and young, and may swoop and strike at pets, children, and adults.

In addition to raptors, waterfowl can also aggressively defend their nests and nestlings during the nesting season. Waterfowl aggressively defend their nests, nesting areas, and young, and may attack or threaten pets, children, and adults. Feral waterfowl often nest in high densities in areas used by humans for recreational purposes such as industrial areas, parks, beaches, and sports fields (VerCauteren and Marks 2004). If people unknowingly approach waterfowl or their nests at those locations, injuries could occur if waterfowl react aggressively to the presence of those people or pets.

Additionally, slipping hazards can be created by the buildup of feces from birds on docks, walkways, and other foot traffic areas. To avoid those conditions, regular cleanup is often required to alleviate threats of slipping on fecal matter, which can be economically burdensome. WS provides assistance to several ethanol plants in Iowa to alleviate slipping hazards and threats of disease transmission from fecal matter in Iowa. WS works with over 14 ethanol facilities throughout the state to address human health and safety concerns due to droppings from feral pigeons and European starlings. Turkey vultures have also caused human health and safety concerns due to excessive droppings. WS has provided assistance to over 12 municipalities, one power plant, and one grain elevator to address human health and safety concerns from turkey vulture droppings.

Need to Resolve Bird Damage Occurring to Property

As shown in Table 1.1, some of the bird species addressed in this assessment are known to cause damage to property in Iowa. Property damage can occur in a variety of ways and can result in costly repairs and clean-up. Bird damage to property occurs through direct damage to structures, through roosting behavior, and through their nesting activities. One example of direct damage to property occurs when vultures tear roofing shingles or pull out latex caulking around windows. Accumulations of fecal droppings can cause damage to buildings and statues. Woodpeckers also cause direct damage to property through excavating holes in buildings, either for nesting purposes or to locate food; this can remove insulation and allows water and other wildlife to enter the building. Aircraft striking birds can also cause substantial damage requiring costly repairs and aircraft downtime. Direct damage can also result from birds that act aggressively toward their reflection in mirrors and windows, which can scratch the glass and surrounding paint and siding.

Birds frequently damage structures on private property and public facilities with fecal contamination. Accumulated bird droppings can reduce the functional life of some building roofs by 50% (Weber 1979). 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 and bird

droppings causing power outages by shorting out transformers and substations. This has resulted in hundreds of thousands of dollars of outage time for power companies. In addition to causing power outages noted above, property damage from turkey vultures can include tearing and consuming latex window caulking or rubber gaskets sealing window panes, asphalt and cedar roof shingles, vinyl seat covers from boats, patio furniture, and ATV seats. Turkey vultures and hawks also cause damage to cell phone and radio towers by roosting on critical tower infrastructure.

Gulls, raptors, waterfowl, shorebirds, and pigeons/doves are the bird groups most frequently struck by aircraft in the United States (Dolbeer et al. 2015). When struck, 29% of the reported waterfowl strikes resulted in damage, compared to 21% of strikes involving raptors, 21% of the reported gull strikes, 7% of strikes associated with pigeons and doves, and 2% of strikes involving shorebirds (Dolbeer et al. 2015). In total since 1990 in the United States, aircraft strikes involving birds have resulted in $631.8 million in reported damages to aircraft and $76.4 million in other monetary losses, including lost revenue, cost of putting passengers in hotels, re-scheduling flights, and flight cancellations (Dolbeer et al 2015). From 1990 to 2015, over $587,000 in damage to aircrafts has been reported as a results of bird strikes in Iowa (FAA 2016).

Damage to property associated with large concentrations of roosting birds occurs primarily from accumulations of droppings and feather debris. Birds that routinely roost and loaf in the same areas often leave large accumulations of droppings and feather debris, which is aesthetically displeasing and can cause damage to property. The recurring presence of fecal droppings under bird roosts can lead to repeated cleaning costs for property owners. Fecal accumulation from birds roosting at power plants, industrial parks, and ethanol plants can lead to property damage to the facility, as well as become a health hazard for workers. Costs associated with property damage include labor and disinfectants to clean and sanitize fecal droppings, implementation of non-lethal wildlife management methods, loss of property use, loss of aesthetic value of flowers, gardens, and lawns consumed by geese, loss of customers or visitors irritated by walking in fecal droppings, repair of golf greens, and replacing grazed turf. According to Allan et al. (1995), the costs of re-establishing overgrazed lawns and cleaning waterfowl feces from sidewalks have been estimated at more than $60 per bird (over $95 in today's dollar value).

The attraction of landfills as a food source for gulls has been well-documented (Patton 1988, Belant et al. 1995, Gabrey 1997, Belant et al. 1998). Large numbers of gulls are attracted to landfills as feeding and loafing areas throughout North America. In the Midwestern United States, landfills often serve as foraging and loafing areas for gulls throughout the year, attracting larger populations during winter (Washburn 2012). Landfills have even been suggested as contributing to the increase in gull populations (Verbeek 1977, Patton 1988, Belant and Dolbeer 1993*a*, Belant and Dolbeer 1993*b*, Belant et al. 1993). Gulls that visit landfills may loaf and nest on nearby rooftops, causing health concerns and structural damage to buildings and equipment. Bird conflicts associated with landfills include accumulation of feces on equipment and buildings, distraction of heavy machinery operators, and the potential for birds to transmit disease to workers on the site. The tendency for gulls to carry waste off site results in the deposition of garbage on surrounding industrial and residential areas, which creates a nuisance, as well as increases the risks of disease transmission.

Need to Resolve Bird Damage Occurring to Natural Resources

No monetary damage to natural resources has been reported in the past five years; however assigning a value to damage to natural resources can be difficult. Birds can negatively affect natural resources through habitat degradation, competition with other wildlife, and through direct depredation on natural resources. Habitat degradation occurs when large concentrations of birds in a localized area negatively affect characteristics of the surrounding habitat, which can then adversely affect other wildlife species and become aesthetically displeasing. Competition can occur when two species compete (usually to the detriment of one species) for available resources, such as food or nesting sites. Direct depredation occurs when predatory bird species feed

on other wildlife species, which can negatively influence those species' populations, especially when depredation occurs on threatened and endangered (T&E) species.

Waterfowl, especially Canada geese, may cause unsanitary, unaesthetically pleasing fecal accumulations in natural areas, such as state and federal parks and recreational areas. When waterfowl reside near recreational swimming areas, the accumulation of fecal matter can contaminate the water, forcing the area to be closed to swimming. The EPA established recreational water quality criteria for freshwater that recommend that water body geometric mean levels should not be greater than 30 cfu of enterococci per 100 mL and 126 cfu of *E. coli* per 100 mL to maintain an estimated illness rate of 32 per 1,000 primary contact recreators (EPA 2012). Swimmers were cautioned to avoid the water in Buckeye Lake, located east of Columbus, Ohio in July 2014 due to the *E. coli* levels reaching a record high that was 40 times greater than federal safety threshold; the accumulation of geese and gull feces was identified as a contributing factor that led to these high levels (Associated Press 2014). Not only are geese known for contaminating water sources, but they are also known to cause degradation to habitat.

WS provides assistance to state fish hatcheries on occasion in Iowa when they are experiencing depredation from various bird species. Depredation at state fish hatcheries limits the amount of fish that can be stocked into public waterways. Stocked fish provide recreational opportunities for anglers. The most common species of sport or game fish propagated in Iowa are channel catfish and largemouth bass, followed by smallmouth bass, walleye, and bluegills (Clayton 2009).

1.3 NATIONAL ENVIRONMENTAL POLICY ACT AND WS DECISION-MAKING

All federal actions are subject to the National Environmental Policy Act (NEPA) (Public Law 9-190, 42 USC 4321 et seq.), including the actions of WS. The WS program follows the Council on Environmental Quality (CEQ) regulations implementing the NEPA (40 CFR 1500 et seq.) along with USDA (7 CFR 1b) and APHIS Implementing Guidelines (7 CFR 372) as part of the decision-making process. NEPA sets forth the requirement that all federal actions be evaluated in terms of their potential to significantly affect the quality of the human environment for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. In part, the CEQ regulates federal activities affecting the physical and biological environment through regulations in 40 CFR 1500-1508. The NEPA and the CEQ guidelines generally outline five broad types of activities that a federal agency must accomplish as part of projects they conduct. Those five types of activities are public involvement, analysis, documentation, implementation, and monitoring.

Pursuant to the NEPA and the CEQ regulations, WS is preparing this EA to document the analyses associated with proposed federal actions and to inform decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse effects.

This EA will serve as a decision-aiding mechanism to ensure that WS infuse the policies and goals of the NEPA and the CEQ into the actions of each agency. This EA will also aid WS with clearly communicating the analysis of individual and cumulative impacts of proposed activities to the public. In addition, the EA will facilitate planning, promote interagency coordination, and streamline program management analyses between WS and the Iowa Department of Natural Resources (IDNR). Section 1.5 discusses the roles of each agency. This EA was prepared by integrating as many of the natural and social sciences as warranted, based on the potential effects of the alternatives. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

WS initially developed the issues and alternatives associated with bird damage management in consultation with the IDNR. To assist with identifying additional issues and alternatives to managing damage, WS will make this EA available to the public for review and comment prior to the issuance a Decision (either a

Finding of No Significant Impact (FONSI) or a Notice of Intent to prepare and Environmental Impact Statement).

1.4 DECISIONS TO BE MADE

Based on agency relationships, MOUs, and legislative authorities, WS is the lead agency for this EA, and therefore, responsible for the scope, content, and decisions made. Management of migratory birds is the responsibility of the USFWS. As the authority for the overall management of bird populations, the USFWS was involved in the development of the EA and provided input throughout the EA preparation process to ensure an interdisciplinary approach according to the NEPA and agency mandates, policies, and regulations. The IDNR is responsible for managing wildlife in the State of Iowa, including birds. The IDNR establishes and enforces regulated hunting seasons, including the establishment of seasons that allow the removal of some of the bird species addressed in this assessment.

For migratory birds, the IDNR can establish hunting seasons for those species under frameworks determined by the USFWS. WS' activities to reduce and/or prevent bird damage would be coordinated with the USFWS and the IDNR, which would ensure WS' actions are incorporated into population objectives established by those agencies. The take of many of the bird species addressed in this EA can only occur when authorized by a depredation permit issued by the USFWS and/or the IDNR; therefore, the take of those bird species by WS to alleviate damage or reduce threats of damage would only occur at the discretion of those agencies. In addition, WS' annual take of birds to alleviate damage or threats of damage would only occur at levels authorized by those agencies as specified in depredation permits.

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

- How can WS best respond to the need to reduce bird damage in Iowa?
- Do the alternatives have significant cumulative impacts meriting an Environmental Impact Statement (EIS)?

1.5 SCOPE OF ANALYSIS

Geographical Area and Types of Land Designations and Ownership Included in this EA

Federal, State, County, City, and Private Lands

Under two of the alternatives, WS could continue to provide bird damage management activities on federal, state, county, municipal, and private land in Iowa when a request is received for such services by the appropriate resource owner or manager. In those cases where a federal agency requests WS' assistance with managing damage caused by birds, the requesting agency would be responsible for analyzing those activities in accordance with the NEPA. However, this EA would cover such actions if the requesting federal agency determined the analyses and scope of this EA were appropriate for those actions and the requesting federal agency adopted this EA through their own Decision based on the analyses in this EA. Therefore, actions taken on federal lands have been analyzed in the scope of this EA.

Native American Lands and Tribes

The WS program in Iowa would only conduct damage management activities on tribal lands when requested by a Native American tribe. Activities would only be conducted after a MOU or cooperative service agreement had been signed between WS and the tribe requesting assistance. Therefore, the tribe would determine when WS' assistance is required and what activities would be allowed. Because tribal officials

would be responsible for requesting assistance from WS and determining what methods would be available to alleviate damage, no conflict with traditional cultural properties or beliefs would be anticipated. Those methods available to alleviate damage associated with birds on federal, state, county, municipal, and private properties under the alternatives analyzed in this EA would be available for use to alleviate damage on tribal properties when the use of those methods has been approved by the tribe requesting WS' assistance. Therefore, the activities and methods addressed under the alternatives would include those methods that could be employed on Native American lands, when requested and agreed upon between the tribe and WS.

Affected Environment and Site-Specificity

This EA analyzes the potential impacts of bird damage management based on previous activities conducted on private and public lands in Iowa where WS and the appropriate entities have entered into a MOU, cooperative service agreement, or other comparable document. This EA also addresses the potential impacts of bird damage management on areas where additional agreements may be signed in the future. Because the need for action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional damage management efforts could occur. Thus, this EA anticipates the potential expansion and analyzes the impacts of such efforts as part of the alternatives.

Upon receiving a request for assistance, the proposed action alternative or those actions described in the other alternatives could be conducted on private, federal, state, tribal, and municipal lands in Iowa to reduce damages and threats associated with birds to agricultural resources, natural resources, property, and threats to human safety. Assistance requests to resolve bird damage could occur, but are not necessarily limited to, areas in and around commercial, industrial, public, and private buildings, facilities and properties and at other sites where birds may roost, loaf, feed, nest, or otherwise occur. Examples of areas where bird damage management activities could be conducted are: residential buildings, golf courses, athletic fields, recreational areas, swimming beaches, parks, corporate complexes, subdivisions, businesses, industrial parks, schools, agricultural areas, wetlands, restoration sites, cemeteries, public parks, bridges, industrial sites, urban/suburban woodlots, hydro-electric dam structures, reservoirs and reservoir shore lands, nuclear, hydro and fossil power plant sites, substations, transmission line rights-of-way, landfills, on ship fleets, military bases, or at any other sites where birds may roost, loaf, or nest. Damage management activities could be conducted at agricultural fields, vineyards, orchards, farmyards, dairies, ranches, livestock operations, grain mills, and grain handling areas (e.g., railroad yards) where birds destroy crops, feed on spilled grains, or contaminate food products for human or livestock consumption. Additionally, activities could be conducted at airports and surrounding properties where birds represent a threat to aviation safety.

Many of the bird species addressed in this EA can be found statewide and throughout the year; therefore, damage or threats of damage can occur wherever those birds occur. Planning for the management of bird damage must be viewed as being conceptually similar to other entities whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they would occur are unknown, but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, and insurance companies. Some of the sites where bird damage could occur can be predicted; however, specific locations or times where such damage would occur in any given year cannot be predicted. The threshold triggering an entity to request assistance from WS to manage damage associated with birds is often unique to the individual; therefore, predicting where and when such a request for assistance would be received by WS is difficult. This EA emphasizes major issues as those issues related to specific areas whenever possible; however, many issues apply wherever bird damage occurs and those issues are treated as such in this EA.

Chapter 2 of this EA identifies and discusses issues relating to bird damage management in Iowa. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions

conducted by WS (see Chapter 2 for a description of the WS Decision Model and its application). Decisions made using the model would be in accordance with WS' directives[4] and Standard Operating Procedures (SOPs) described in this EA as well as relevant laws and regulations.

The analyses in this EA are intended to apply to any action that may occur in any locale and at any time within Iowa. In this way, WS believes it meets the intent of the NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with the NEPA and still be able to accomplish the program's mission.

Authority and Role of Federal and State Agencies Involved in this EA

WS' Legislative Authority

The primary statutory authorities for the WS program are the Act of March 2, 1931 (46 Stat. 1468; 7 USC 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c). The WS program is the lead federal authority in managing damage to agricultural resources, natural resources, property, and threats to human safety associated with wildlife. WS' directives define program objectives and guide WS' activities to manage wildlife damage management.

USFWS' Authority

The USFWS mission is to conserve, protect, and enhance fish and wildlife along with their habitats for the continuing benefit of the American people. Responsibilities are shared with other federal, state, tribal, and local entities; however, the USFWS has specific responsibilities for the protection of T&E species, migratory birds, inter-jurisdictional fish, and certain marine mammals, as well as for lands and waters that the USFWS administers for the management and protection of those resources. The USFWS also manages lands under the National Wildlife Refuge System.

The USFWS is responsible for managing and regulating take of bird species that are listed as migratory under the Migratory Bird Treaty Act (MBTA) and those that are listed as T&E under the Endangered Species Act (ESA). The take of migratory birds is prohibited by the MBTA. However, the USFWS can issue depredation permits for the take of migratory birds when certain criteria are met pursuant to the MBTA. Depredation permits are issued to take migratory birds to alleviate damage and threats of damage. Under the permitting application process, the USFWS requires applicants to describe prior non-lethal damage management techniques that have been used. In addition, the USFWS can establish orders that allow for the take of those migratory birds addressed in those orders without the need for a depredation permit.

The USFWS authority for migratory bird management is based on the MBTA of 1918 (as amended), which implements treaties with the United States, Great Britain (for Canada), Mexico, Japan, and Russia. Section 3 of this Act authorized the Secretary of Agriculture:

> *"From time to time, having due regard to the zones of temperature and distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, to determine when, to what extent, if at all, and by what means, it is compatible with the terms of the convention to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations, which regulations shall become effective when approved by the President."*

[4]WS' Directives could be found at the following web address: http://www.aphis.usda.gov/wildlife_damage/ws_directives.shtml.

The authority of the Secretary of Agriculture, with respect to the MBTA, was transferred to the Secretary of the Interior in 1939 pursuant to Reorganization Plan No. II. Section 4(f), 4 FR 2731, 53 Stat. 1433. The USFWS also has statutory authority for enforcing the Fish and Wildlife Improvement Act of 1978 (16 USC 7.12) and the Fish and Wildlife Act of 1956 (16 USC 742 a-j).

United States Environmental Protection Agency (EPA)

The EPA is responsible for implementing and enforcing the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which regulates the registration and use of pesticides, including repellents for dispersing birds and avicides for use to lethally remove birds.

United States Food and Drug Administration (FDA)

The FDA is responsible for protecting the public health by assuring the safety, efficacy, and security of human and veterinary drugs, biological products, medical devices, our nation's food supply, cosmetics, and products that emit radiation. The FDA regulates veterinary drugs that may be used to immobilize and/or euthanize birds.

Iowa DNR

The IDNR is a major cooperating agency with WS to help resolve wildlife damage and currently has a signed MOU with WS establishing this cooperative relationship. The IDNR has the responsibility to enhance the natural resources within the state by managing fish and wildlife programs, ensuring the health of Iowa's forests and prairies, and providing recreational opportunities through state parks. The IDNR has the authority to protect and preserve the wild mammals, fish, birds, reptiles, and amphibians of the state and enforce by proper actions and proceedings, the laws, rules, and regulations relating to them. Per the MOU, the IDNR assumes the primary responsibility for responding to requests for damage management assistance involving state regulated wildlife species while WS is responsible for migratory birds, federally protected species, wildlife hazards at airports, and wildlife species not regulated by the state. The IDNR is responsible for diagnosing, tracking, and researching wildlife related issues. The IDNR also provides WS with licensing to control offending wildlife and allows WS to lethally remove wildlife determined to be detrimental to human safety at airports. Finally, the IDNR, in part with the Iowa Department of Agriculture and Land Stewardship (IDALS) and Iowa Department of Public Health (IDPH), have the primary responsibility of providing educational assistance, informational publications, and appropriate research related to the prevention and management of wildlife damage, pathology, and epidemiology to the public.

IDALS

The IDALS is another major cooperating agency with WS to help resolve wildlife damage. The mission of the IDALS is to provide leadership for all aspects of agriculture, ensure consumer protection, and promote the responsible use of natural resources. The IDALS also has authorization over disease control for animals and reportable animal diseases. The IDALS currently has a signed MOU with WS, which establishes this cooperative relationship between IDALS and WS and outlines the roles and responsibilities of each agency in resolving wildlife damage issues in Iowa. Under the MOU, the IDALS provides information to cooperating agencies on the management of diseases and wildlife damage affecting livestock or wildlife. The IDALS is also responsible for administering and maintaining relevant pesticide certification requirements as they apply to wildlife damage management. Finally, the IDALS, in part with the IDNR and IDPH, have the primary responsibility of providing educational assistance, informational publications, and appropriate research related to the prevention and management of wildlife damage, pathology, and epidemiology to the public.

IDPH

The mission of the IDPH is to promote and protect the health of Iowans. The IDPH currently has a MOU with WS, which establishes a cooperative relationship between the two agencies and outlines the roles and responsibilities for resolving wildlife damage in Iowa. Per the MOU, the IDPH collects information about reportable diseases and human health conditions within the state. The IDPH provides technical guidance on public health related issues and potential human health problems caused or spread by wildlife. Finally, the IDPH, in part with the IDNR and IDALS, have the primary responsibility of providing educational assistance, informational publications, and appropriate research related to the prevention and management of wildlife damage, pathology, and epidemiology to the public.

Iowa Department of Transportation (IDOT), Office of Aviation

The IDOT Office of Aviation is a major cooperating agency with WS to help resolve wildlife damage management at airports. The IDOT Office of Aviation is authorized to promote and assist in the general development of aeronautics. The IDOT Office of Aviation also is responsible for establishing and enforcing aeronautical laws and conducting safety inspections of landing areas. The IDOT currently has a MOU with WS, which establishes a cooperative relationship between the two agencies and outlines the roles and responsibilities for resolving wildlife damage. Per the MOU, the IDOT Office of Aviation has primary responsibility for the safe operation of airports and refers wildlife hazards identified on or around airports to WS.

Documents Related to this EA

Proposal to Permit Take as provided under the Bald and Golden Eagle Protection Act Final Environmental Assessment: Developed by the USFWS, this EA evaluated the issues and alternatives associated with the promulgation of new regulations to authorize the "*take*" of bald eagles and golden eagles as defined under the Bald and Golden Eagle Protection Act. The preferred alternative in the EA evaluated the authorization of disturbance take of eagles, the removal of eagle nests where necessary to reduce threats to human safety, and the issuance of permits authorizing the lethal take of eagles in limited circumstances, including authorizing take that is associated with, but is not the purpose of, an action (USFWS 2009*a*). A Decision and Finding of No Significant Impact (FONSI) was made for the preferred alternative in the EA. The selected alternative in the EA established new permit regulations for the "*take*" of eagles (see 50 CFR 22.26) and a provision to authorize the removal of eagle nests (see 50 CFR 22.27). The USFWS published a Final Rule on September 11, 2009 (74 FR 46836-46879).

Resident Canada Goose Management - Final Environmental Impact Statement: The USFWS has issued a FEIS on the management of resident Canada geese (USFWS 2005). Pertinent and current information available in the FEIS has been incorporated by reference into this Decision. The FEIS may be obtained by contacting the Division of Migratory Bird Management, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, MBSP-4107, Arlington, Virginia 22203 or by downloading it from the USFWS website at http://www.fws.gov/migratorybirds/issues/cangeese/finaleis.htm.

USFWS Light Goose Management – Final Environmental Impact Statement: The USFWS has issued a FEIS, which analyzes the potential environmental impacts of management alternatives for addressing problems associated with overabundant light goose populations. The "*light*" geese referred to in the FEIS include the lesser snow goose (*Chen caerulescens caerulescens*), greater snow goose (*C. c. atlantica*), and the Ross's goose (*C. rossii*), and that nest in Arctic and sub-Arctic regions of Canada and migrate and winter throughout the United States. A ROD and Final Rule were published by the USFWS and the final rule went into effect on December 5, 2008. Information from the USFWS FEIS on light goose management (USFWS 2007*a*) has been incorporated by reference into this EA.

***WS' Environmental Assessments*:** WS has previously developed an EA that analyzed the need for action to manage damage associated with several bird species (USDA 2007). WS also prepared an EA and a supplement to the EA to evaluate the need to manage damage associated with rock doves, European starlings, and house sparrows (USDA 2005*a*; USDA 2013). These EAs and Supplement identified the issues associated with managing damage associated with birds and analyzed alternative approaches to meet the specific needs identified in these documents while addressing the identified issues.

Since activities conducted under the previous EAs and Supplement will be re-evaluated under this EA to address the new need for action and the associated affected environment, the previous EAs and Supplement that addressed birds will be superseded by this analysis and the outcome of the Decision issued.

Public Involvement

Issues and alternatives related to bird damage management as conducted by WS in Iowa were initially developed by WS in consultation with the USFWS and the IDNR. Issues were defined and preliminary alternatives were identified through the scoping process. As part of this process, and as required by the CEQ and APHIS' NEPA implementing regulations, this document will be noticed to the public through legal notices published in local print media, through direct mailings to parties that have requested to be notified or have been identified to have an interest in the reduction of threats and damage associated with birds, and by posting the EA on the APHIS website at http://www.aphis.usda.gov/wildlifedamage/nepa.

WS and the USFWS will provide for a minimum of a 30-day comment period for the public and interested parties to provide new issues, concerns, and/or alternatives. Through the public involvement process, WS will clearly communicate to the public and interested parties the analyses of potential environmental impacts on the quality of the human environment. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA should be revisited and, if appropriate, revised prior to issuance of a Decision.

Rational for Preparing an EA Rather than an EIS

Wildlife damage management falls within the category of federal or other regulatory 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. Although WS can predict some of the possible locations or types of situations and sites where some kinds of wildlife damage would occur, the program cannot predict the specific locations or times at which affected resource owners would determine a damage problem has become intolerable to the point that they request assistance from WS. WS has the discretion to determine the geographic scope of their analyses under the NEPA. The intent in developing this EA is to determine if the proposed action would potentially have significant individual and/or cumulative impacts on the quality of the human environment that would warrant the preparation of an EIS or a finding of no significant impact (FONSI). In terms of considering cumulative effects, one EA analyzing impacts for the entire state will provide a more comprehensive and less redundant analysis than multiple EAs covering smaller areas.

Environmental Status Quo

As defined by the NEPA implementing regulations, the "*human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment*" (40 CFR 1508.14). Therefore, when a federal agency analyzes its potential impacts on the "*human environment*", it is reasonable for that agency to compare not only the effects of the federal action, but also the potential impacts that occur or would occur in the absence of the federal action. This concept is

applicable to situations involving federal assistance in managing damage associated with resident wildlife species managed by the state natural resources agency, invasive species, or unprotected wildlife species.

Most native wildlife species are protected under state or federal law. For some bird species, harvest during the hunting season is regulated pursuant to the MBTA by the USFWS through the issuance of frameworks that include the allowable length of hunting seasons, methods of removal, and allowed harvest, which are implemented by the IDNR. Under the blackbird depredation order (50 CFR 21.43), blackbirds can be removed by any entity without a depredation permit when those species identified in the order are found committing or about to commit damage or posing a human safety threat. In addition, Muscovy ducks can also be removed in Iowa pursuant to a control order without the need for a permit. Pursuant to the MBTA, the USFWS can issue depredation permits to those entities experiencing damage associated with birds, when deemed appropriate. Free-ranging or feral domestic waterfowl, European starlings, feral pigeons, mute swans, ring-necked pheasants, wild turkeys, monk parakeets, Eurasian collared-doves, and house sparrows are not protected from removal under the MBTA and can be addressed without the need for a depredation permit from the USFWS. However, a permit or authorization from the IDNR may be required to take those species.

When a non-federal entity (e.g., agricultural producers, health agencies, municipalities, counties, private companies, individuals) takes an action to alleviate bird damage, the action is typically not subject to compliance with the NEPA due to the lack of federal involvement[5] in the action. Under such circumstances, the environmental baseline or status quo must be viewed as an environment that includes those resources as they are managed or impacted by non-federal entities in the absence of the federal action being proposed. Therefore, in those situations in which a non-federal entity has decided that a management action directed towards birds should occur and even the particular methods that would be used, WS' involvement in the action would not affect the environmental status quo. WS' involvement would not change the environmental status quo if the requestor had conducted the action in the absence of WS' involvement in the action.

Compliance with Laws and Statutes

Several laws or statutes authorize, regulate, or otherwise would affect WS' activities under the alternatives. WS complies with all applicable federal, state, and local laws and regulations in accordance with WS Directive 2.210. Those laws and regulations relevant to managing bird damage in the state are addressed below:

Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-711; 40 Stat. 755), as amended

The MBTA makes it unlawful to pursue, hunt, take, capture, kill, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, nests, or eggs (16 USC 703-711). A list of bird species protected under the MBTA can be found in 50 CFR 10.13.
The MBTA also provides the USFWS regulatory authority to protect families of migratory birds. The law prohibits any "*take*" of migratory bird species by any entities, except as permitted by the USFWS. Under permitting guidelines in the Act, the USFWS may issue depredation permits to requesters experiencing damage caused by bird species protected under the Act. Information regarding migratory bird permits can be found in 50 CFR 13 and 50 CFR 21. All actions analyzed in this EA would be conducted in compliance with the regulations of the MBTA, as amended.

The law was further clarified to include only those birds afforded protection from take in the United States by the Migratory Bird Treaty Reform Act of 2004. Under the Reform Act, the USFWS published a list of bird species not protected under the MBTA (70 FR 12710-12716). Non-native bird species, such as free-ranging

[5]If a federal permit is required to conduct damage management activities, the issuing federal agency would be responsible for compliance with the NEPA for issuing the permit.

or feral domestic waterfowl, mute swans, ring-necked pheasants, monk parakeets, feral pigeons, Eurasian collared-doves, European starlings, and house sparrows are not protected from take under the MBTA. A permit from the USFWS to take those species is not required.

In addition to the issuance of depredation permits for the take of migratory birds, the Act allows for the establishment of depredation orders that allow migratory birds to be taken without a depredation permit when certain criteria are met.

Depredation Order for Canada Geese at Agricultural Facilities (50 CFR 21.51)

Under 50 CFR 21.51, the IDNR may authorize agricultural producers that are actively engaged in commercial agriculture to conduct and implement direct damage management activities including lethal and non-lethal strategies on resident Canada geese when the geese are committing depredation to agricultural crops and when necessary to resolve or prevent injury to agricultural crops or other agricultural interests from resident Canada geese. Management activities involving the take of resident geese may be conducted between May 1 and August 31 and the destruction of resident Canada geese nests and eggs may take place between March 1 and June 30.

Depredation Order for Blackbirds, Cowbirds, Grackles, Crows, and Magpies (50 CFR 21.43)

Pursuant to the MBTA under 50 CFR 21.43, a depredation permit is not required to lethally take blackbirds when those species are found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance (Sobeck 2010). Those bird species that can be lethally taken under the blackbird depredation order that are addressed in the assessment include American crows, red-winged blackbirds, yellow-headed blackbirds, common grackles, and brown-headed cowbirds.

Control Order for Muscovy Ducks (50 CFR 21.54)

Muscovy ducks are native to South America, Central America, and Mexico with a small naturally occurring population in southern Texas. Muscovy ducks have also been domesticated and have been sold and kept for food and as pets in the United States. In many states, Muscovy ducks have been released or escaped captivity and have formed feral populations, especially in urban areas, that are non-migratory. The USFWS has issued a Final Rule on the status of the Muscovy duck in the United States (75 FR 9316-9322). Since naturally occurring populations of Muscovy ducks are known to inhabit parts of south Texas, the USFWS has included the Muscovy duck on the list of bird species afforded protection under the MBTA at 50 CFR 10.13 (75 FR 9316-9322). To address damage and threats of damage associated with Muscovy ducks, the USFWS has also established a control order for Muscovy ducks under 50 CFR 21.54 (75 FR 9316-9322). Under 50 CFR 21.54, Muscovy ducks, and their nests and eggs, may be removed or destroyed without a depredation permit from the USFWS at any time in the United States, except in Hidalgo, Starr, and Zapata Counties in Texas (75 FR 9316-9322).

Bald and Golden Eagle Protection Act (16 USC 668)

Populations of bald eagles showed periods of steep declines in the lower United States during the early 1900s attributed to the loss of nesting habitat, hunting, poisoning, and pesticide contamination. To curtail declining trends in bald eagles, Congress passed the Bald Eagle Protection Act (16 USC 668) in 1940 prohibiting the take or possession of bald eagles or their parts. The Bald Eagle Protection Act was amended in 1962 to include the golden eagle and is now referred to as the Bald and Golden Eagle Protection Act. Certain populations of bald eagles were listed as *"endangered"* under the Endangered Species Preservation Act of 1966, which was extended when the modern ESA was passed in 1973. The *"endangered"* status was

extended to all populations of bald eagles in the lower 48 States, except populations of bald eagles in Minnesota, Wisconsin, Michigan, Washington, and Oregon, which were listed as *"threatened"* in 1978. As recovery goals for bald eagle populations began to be reached in 1995, all populations of eagles in the lower 48 States were reclassified as *"threatened"*. In 1999, the recovery goals for populations of eagles had been reached or exceeded and the eagle was proposed for removal from the ESA. The bald eagle was officially de-listed from the ESA on June 28, 2007 with the exception of the Sonora Desert bald eagle population. Although officially removed from the protection of the ESA across most of its range, the bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act.

Under the Bald and Golden Eagle Protection Act (16 USC 668-668c), the take of bald eagles is prohibited without a permit from the USFWS. Under the Act, the definition of "*take*" includes actions that "*pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb*" eagles. The regulations authorize the United States Fish and Wildlife Service to issue permits for the take of bald eagles and golden eagles on a limited basis (see 74 FR 46836-46837, 50 CFR 22.26, 50 CFR 22.27). As necessary, WS would apply for the appropriate permits as required by the Bald and Golden Eagle Protection Act.

Endangered Species Act (ESA)

The Endangered Species Act (ESA) recognizes that our natural heritage is of *"esthetic, ecological, educational, recreational, and scientific value to our Nation and its people*." The purpose of the Act is to protect and recover species that are in danger of becoming extinct. Under the ESA, species may be listed as endangered or threatened. Endangered is defined as a species that is in danger of becoming extinct throughout all or a significant portion of its range while threatened is defined as a species likely to become endangered in the foreseeable future. Under the ESA, *"all federal departments and agencies shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of the Act"* (Sec.2(c)). Additionally, the Act requires that, *"each Federal agency shall in consultation with and with the assistance of the Secretary, insure 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 or result in the destruction or adverse modification of habitat of such species…..each agency will use the best scientific and commercial data available"* (Sec.7 (a) (2)). WS consults with the USFWS as necessary to ensure that the agencies actions, including the actions proposed in this EA, are not likely to jeopardize the existence of endangered or threatened species or their habitat.

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

The NHPA and its implementing regulations (36 CFR 800) require federal agencies to initiate the Section 106 process if an agency determines that the agency's actions are undertakings as defined in Sec. 800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects on historic properties. If the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency official has no further obligations under Section 106. None of the bird damage management methods described in this EA that might be used under the alternatives causes major ground disturbance, any physical destruction or damage to property, any alterations of property, wildlife habitat, or landscapes, nor involves the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that could be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, the site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

Noise-making methods, such as firearms, that are used at or in close proximity to historic or cultural sites for the purposes of hazing or removing nuisance wildlife have the potential for audible effects on the use and enjoyment of historic property. However, such methods would only be used at a historic site at the request of the owner or manager of the site to resolve a damage problem, which means the use of those methods would be to the benefit of the historic property. A built-in minimization factor for this issue is that virtually all the methods involved would only have temporary effects on the audible nature of a site and can be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. Site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary in those types of situations.

Environmental Justice - Executive Order 12898

Executive Order 12898 promotes the fair treatment of people of all races, income levels, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental justice is a priority within APHIS and WS. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies, and activities on minorities and persons or populations of low income. APHIS implements Executive Order 12898 principally through its compliance with the NEPA. All WS' activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. WS' personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. It is not anticipated that the use of methods would result in any adverse or disproportionate environmental impacts to minorities and persons or populations of low income.

Protection of Children - Executive Order 13045

Children may suffer disproportionately for many reasons from environmental health and safety risks, including the development of their physical and mental status. Because WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, WS has considered the impacts that this proposal might have on children. WS would only employ and/or recommend legally available and approved methods under the alternatives where it is highly unlikely that children would be adversely affected. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing this proposed action.

Responsibilities of Federal Agencies to Protect Migratory Birds - Executive Order 13186

Executive Order 13186 requires each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations, to develop and implement a MOU with the USFWS that shall promote the conservation of migratory bird populations. WS has developed a draft MOU with the USFWS as required by this Executive Order and is currently waiting for USFWS approval. WS would abide by the MOU once it is finalized and signed by both parties.

Invasive Species - Executive Order 13112

Executive Order 13112 establishes guidance to federal agencies to prevent the introduction of invasive species, provide for the control of invasive species, and to minimize the economic, ecological, and human health impacts that invasive species cause. The Order states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law: 1) reduce invasion of exotic species and the associated damages, 2) monitor invasive species populations and provide for restoration

of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education of invasive species.

The Native American Graves and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal projects would discontinue until a reasonable effort has been made to protect the items and the proper authority has been notified.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

The FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The EPA is responsible for implementing and enforcing the FIFRA. All chemical methods employed and/or recommended by the WS' program in Iowa pursuant to the alternatives would be registered with the EPA and IDALS, when applicable. All chemical methods would be employed by WS pursuant to label requirements when providing direct operational assistance under the alternatives. In addition, WS would recommend that all label requirements be adhered to when recommending the using of chemical methods while conducting technical assistance projects under the alternatives.

New Animal Drugs for Investigational Use

The FDA can grant permission to use investigational new animal drugs (see 21 CFR 511). The sedative drug alpha-chloralose is registered with the FDA to capture waterfowl, coots, and pigeons. The use of alpha-chloralose by WS was authorized by the FDA, which allows use of the drug as a non-lethal form of capture. The use of alpha-chloralose as a method for resolving waterfowl damage and threats to human safety is discussed in Appendix B of this EA.

Occupational Safety and Health Act of 1970

The Occupational Safety and Health Act of 1970 and its implementing regulations (29 CFR 1910) on sanitation standards states that, "*Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practical, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected*." This standard includes birds that may cause safety and health concerns at workplaces.

Iowa Wildlife Laws, Regulations, and Policies Regarding Bird Damage Management

Iowa Code Chapters 481-484 contain fish, game, and wildlife law for the State of Iowa. Bird damage-related laws and regulations are summarized below:

1. Iowa Code §481A.59 – Makes it unlawful for any person, except the owner or owner's representative, to shoot, maim, injure, steal, capture, detain, or to interfere with any homing pigeon, commonly called "carrier pigeon", which shall at the time, have the name, initials, or other identification of its owner, stamped, marked, or attached thereon; or to remove any mark, band, or other means of identification from such pigeons which has the name, initials, or emblem of the owner stamped or marked upon it.
2. Iowa Code §481B. – Establishes a list of wildlife species designated by the state of Iowa as threatened and endangered and makes it unlawful for a person to take, possess, transport, import, export, process, sell or offer for sale, buy or offer to buy, transport or receive shipment of any species on the list.

3. Iowa Code Chapter 481B.8 – Allows endangered or threatened species on the state list to be removed, captured, or destroyed with a permit issued by the director if good cause is shown and where necessary to reduce damage to property or to protect human health.
4. Iowa Code Chapter 481C – Creates a wild animal depredation unit and gives the department of natural resources the authority to provide depredation permits to any landowner who incurs crop, horticultural product, tree, or nursery damage of $1,000 or more due to wild animals.

Iowa Administrative Code (IAC) Chapters 76 – 116 also contain fish, game, and wildlife law for the State of Iowa. Bird damage related laws and regulations are summarized below:

5. IAC §571.76.1 – States certain species of nongame shall not be protected. 76.1(1) *Birds.* The European starling and the house sparrow shall not be protected.
6. IAC §571.77.2 – Provides the list of endangered, threatened, and special concern animals.
7. IAC §571.77.3 – Provides the list of endangered, threatened, or special concern plants.
8. IAC §571.100.1 – Establishes the crow hunting season, bag and possession limit, and states that crow season is open to the entire state.
9. IAC §571.100.2 – States there is a continuous open season for the taking of pigeons within the entire state and no bag or possession limit. Pigeons causing health or safety hazard can also be taken by trapping or any current EPA and Iowa regulated pesticide, repellent, or toxic perches, excluding strychnine-based products, and the person or organization engaging in the use of a toxic substance will provide proper removal and disposal of all pigeons taken by such means.
10. IAC §571.114.1-17 – Establishes the nuisance wildlife control program and provides all of the laws and regulations pertaining to the nuisance wildlife control program, including the permit process, records and record keeping, the annual activity report, capture methods, and carcass disposal.
11. IAC §571.114.12 – Establishes regulations for nuisance wildlife control programs related to endangered and threatened species.
12. IAC §571.114.13 - Discusses laws and regulations related to Special Canada Goose Control permits.

Pesticide Act of Iowa

Iowa's pesticide regulations are found in Iowa Code Title V, Chapter 206. This act contains the regulations, processes, and requirements to regulate and control pesticides in the public interest, by their registration, use, and application. The secretary of agriculture has the power and duty to make appropriate rules as well as monitor and review agents, inspectors, and employees associated with pesticides. The regulations covered by this act include the processes, requirements, and fees for applicator's licensing and certification, registration of pesticides, distribution and sale of pesticides, restricted use pesticides, pesticide accident guidelines, pesticide container disposal, and the repercussions of violations of said regulations. This act also prohibits the sale, purchase, application or use of chlordane and daminozide.

CHAPTER 2: ISSUES AND ALTERNATIVES

Chapter 2 contains a discussion of the issues that will receive detailed environmental impact analysis in Chapter 3 (Environmental Effects), a description of the damage management strategies available for inclusion in the alternatives, a discussion of the WS Decision model (Slate et al. 1992), and SOPs for bird damage management. Pertinent portions of the effected environment will be included in this chapter in the discussion of issues used to develop SOPs. Chapter 2 also discusses the alternatives that were developed to address the identified issues and the alternatives considered but not analyzed in detail, with rationale. This chapter also contains a description of the IWDM strategies that are typically used to manage wildlife damage, including a description of WS' operational, technical, and research assistance and the decision model used to resolve wildlife complaints. The issues, management strategies, and SOPs collectively formulated the alternatives.

2.1 ISSUES USED TO DEVELOP ALTERNATIVES

Issues are concerns of the public and/or professional community raised regarding potential adverse effects that might occur from a proposed action. Such issues must be considered in the NEPA decision-making process. Issues related to managing damage associated with birds were developed by WS in consultation with the USFWS and the IDNR. The issues analyzed in detail are the following:

Issue 1 - Effects of Damage Management Activities on Target Bird Populations

A common issue when addressing damage caused by wildlife is the potential impact of management actions on the populations of target species. Methods available to resolve damage or threats to human safety are categorized into non-lethal and lethal methods. Non-lethal methods available can disperse or otherwise make an area unattractive to target species causing damage, which reduces the presence of those species at the site and potentially the immediate area around the site where non-lethal methods were employed. Lethal methods would result in local population reductions in the area where damage or threats were occurring. The number of target species that could be removed from the population using lethal methods under the alternatives would be dependent on the number of requests for assistance received, the number of individual birds involved with the associated damage or threat, and the efficacy of methods employed. Under certain alternatives, both non-lethal and lethal methods could be recommended, as governed by federal, state, and local laws and regulations.

The analysis for magnitude of impact on the populations of those species addressed in the EA would be based on a measure of the number of individuals killed from each species in relation to that species' abundance. Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations would be based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations would be based on population trends and harvest trend data, when available. Management actions would be monitored by comparing the number removed with overall populations or trends in the population. All lethal removal of birds by WS would occur at the requests of a cooperator seeking assistance and only after the removal of those birds species has been permitted by the USFWS pursuant to the MBTA, when required.

Issue 2 - Effects on Non-target Wildlife Species Populations, Including T&E Species

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on non-target species, including threatened and endangered species. Methods available to resolve damage or threats of damage can be categorized as lethal and non-lethal. Non-lethal methods disperse or otherwise make an area where damage is occurring unattractive to the species (target species) causing the damage, thereby reducing the presence of those species in the area. However, non-lethal methods also have the potential to inadvertently disperse non-target wildlife. Lethal methods remove individuals of the species (target species)

causing the damage, thereby reducing the presence of those species in the area and the local population. However, lethal methods also have the potential to inadvertently capture, injure, or kill non-target wildlife.

The Endangered Species Act (ESA) makes it illegal for any person to '*take*' any listed endangered or threatened species or their critical habitat. The ESA defines take as, "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1531-1544). Critical habitat is a specific geographic area or areas that are essential for the conservation of a threatened or endangered species. The Act requires that federal agencies conduct their activities in a way to conserve species. It also requires that federal agencies consult with the appropriate implementing agency (either the USFWS or the National Marine Fisheries Service) prior to undertaking any action that may take listed endangered or threatened species or their critical habitat pursuant to Section 7(a)(2) of the ESA.

Issue 3 - Effects of Damage Management Methods on Human Health and Safety

An additional issue often raised is the potential risks to human health and safety associated with employing methods to manage damage caused by target species. Both chemical and non-chemical methods have the potential to have adverse effects on human safety. Risks can occur to persons employing methods and to persons coming into contact with methods. Risks can be inherent to the method itself or related to the misuse of the method.

Safety of Chemical Methods Employed

The issue of using chemical methods as part of managing damage associated with wildlife relates to the potential for human exposure either through direct contact with the chemical, or exposure to the chemical from wildlife that have been exposed. Under the alternatives identified, the use of chemical methods would include avicides, immobilizing drugs, reproductive inhibitors, and repellents. Avicides are those chemical methods used to lethally remove birds. DRC-1339 is an avicide currently being considered for use to manage damage in this assessment. DRC-1339 is registered for use by WS for management of damage associated with feral pigeons, blackbirds, cowbirds, grackles, European starlings, crows, magpies, herring gulls, and ring-billed gulls.

Several avian repellents are commercially available to disperse birds from an area or discourage birds from feeding on desired resources. Avitrol is an avian repellent available for use to manage damage associated with blackbirds, European starlings, brown-headed cowbirds, common grackles, house sparrows, feral pigeons, and crows. Other repellents are also available with the most common ingredients being polybutene, anthraquinone, and methyl anthranilate.

Alpha-chloralose, a sedative, is also being considered as a method that could be employed under the alternatives to manage damage associated with waterfowl. Alpha-chloralose could be used to sedate waterfowl temporarily and lessen stress on the animal from handling and transportation from the capture site. Drugs delivered to immobilize waterfowl would occur on site with close monitoring to ensure proper care of the animal. Alpha-chloralose is fully reversible with a full recovery of sedated animals occurring.

Chemical methods are further discussed in Appendix B of this EA. The use of chemical methods is regulated by the EPA through the FIFRA, by the IDALS, by the FDA, and by WS directives.

Safety of Non-Chemical Methods Employed

Most methods available to alleviate damage and threats associated with birds are considered non-chemical methods. Non-chemical methods employed to reduce damage and threats to safety caused by birds, if misused, could potentially be hazardous to human safety. Non-chemical methods are also discussed in detail

in Appendix B. Many of the non-chemical methods are only activated when triggered by attending personnel (e.g., cannon nets, firearms, pyrotechnics, lasers, remote control vehicles), are passive live-capture methods (e.g., walk-in style live-traps, mist nets), or are passive harassment methods (e.g., effigies, exclusion, anti-perching devices, electronic distress calls).

The primary safety risk of most non-chemical methods occurs directly to the applicator or those persons assisting the applicator. However, risks to others do exist when employing non-chemical methods, such as when using firearms, cannon nets, or pyrotechnics. Most of the non-chemical methods available to address bird damage would be available for use under any of the alternatives and could be employed by any entity, when permitted. Risks to human safety from the use of non-chemical methods will be further evaluated as this issue relates to the alternatives in Chapter 3.

Issue 4 - Effects on the Aesthetic Values of Birds

Another issue is the concern that the proposed action or the other alternatives would result in the loss of aesthetic benefits of target birds to the public, resource owners, or residents in the area where damage management activities occur. Wildlife generally is regarded as providing utilitarian, monetary, recreational, scientific, ecological, economic, existence and historic values (Decker and Goff 1987, Conover 2002), and the mere knowledge that wildlife exists is a positive benefit to many people. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful.

The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public shares a similar bond with animals and/or wildlife in general and in modern societies, large percentages of households have indoor or outdoor pets. However, some people may consider individual wild animals and birds as "*pets*" or exhibit affection toward those animals, especially people who enjoy viewing wildlife. Therefore, the public reaction is variable and mixed to wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to manage conflicts/problems between humans and wildlife.

Wildlife populations provide a wide range of social and economic benefits (Decker and Goff 1987). Those benefits include direct benefits related to consumptive and non-consumptive uses, indirect benefits derived from vicarious wildlife related experiences, and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (Bishop 1987). Direct benefits are derived from a personal relationship with animals. Direct benefits may be derived from direct consumptive use (e.g., using parts of or the entire animal) or non-consumptive use (e.g., viewing or photographing the animal in nature) (Decker and Goff 1987).

Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

Public attitudes toward wildlife vary considerably. Some people believe that all wildlife should be captured and translocated to another area to alleviate damage or threats to protected resources. Some people directly affected by the problems caused by wildlife strongly support removal. Individuals not directly affected by the harm or damage may be supportive, neutral, or totally opposed to any removal of wildlife from specific locations. Some people totally opposed to wildlife damage management want agencies to teach tolerance for damage and threats caused by wildlife, and that wildlife should never be killed or even harassed. Some of the

people who oppose removal of wildlife do so because of human-affectionate bonds with individual wildlife. Those human-affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment. The effects on the aesthetic value of birds from implementation of the identified alternatives, including the proposed action, are analyzed in Chapter 3.

2.2 DAMAGE MANAGEMENT STRATEGIES AVAILABLE FOR INCLUSION IN THE ALTERNATIVES

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 the most cost-effective manner, while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate modification of 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, elimination of invasive species (e.g., European starlings) or any combination of these, depending on the circumstances of the specific damage problem.

IWDM Strategies

Operational Damage Management Assistance – Direct Control

Operational damage management assistance, otherwise referred to as direct control, includes damage management activities that are directly conducted by or supervised by personnel of WS. Operational damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone and there is a written MOU, cooperative service agreement, or other comparable document between WS and the entity requesting assistance. The initial investigation defines the nature, history, and extent of the problem, species responsible for the damage, and methods available to resolve the problem. The professional skills of WS' personnel are often required to resolve problems, especially if restricted-use chemicals are necessary or if the problems are complex.

To address the anticipated needs of property owners/managers with bird damages that may request WS' assistance with lethal methods to alleviate their damages, WS would submit an application for a one-year depredation permit to the USFWS estimating the maximum number of birds of each species to be lethally removed as part of an integrated approach. The USFWS would conduct an independent review of the application, and if acceptable, issue a permit as allowed under the depredation permit regulations. WS could request an amendment of their permit to increase the number of birds that could be removed to address unpredicted and emerging bird damages/conflicts. Each year, WS would submit an application for renewal of their permit, and using adaptive management principles, would adjust numbers of birds to meet anticipated needs, based upon management actions in the previous year and anticipated damages and conflicts in the next year. The USFWS would review these applications annually, and issue permits as allowed by regulations. All alterations in the number of birds to be removed would be checked against the impacts analyzed in this EA. All management actions by WS would comply with appropriate federal, state, and local laws.

Technical Assistance/Education and Outreach

The WS program regularly provides technical assistance to individuals, organizations, and other federal, state, and local government agencies for managing bird damage. Technical assistance includes collecting information about the species involved, the nature and extent of the damage, and previous methods that the cooperator has attempted to resolve the problem. WS then provides information on appropriate methods that

the cooperator may consider to resolve the damage themselves. Types of technical assistance projects may include a visit to the affected property, written communication, telephone conversations, or presentations to groups such as homeowner associations or civic leagues. In some instances, wildlife-related information provided to the requestor by WS results in tolerance/acceptance of the situation. In other instances, management options are discussed and recommended.

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 mammal damage problems.

Education is an important element of WS program activities because wildlife damage management is about finding compromise and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, WS provides lectures, courses, and demonstrations to producers, homeowners, state and county agents, colleges and universities, and other interested groups. Cooperating agencies frequently collaborate with other entities in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that other wildlife professionals and the public are periodically updated on recent developments in damage management technology, programs, laws and regulations, and agency policies.

Research and Development/NWRC

The National Wildlife Research Center (NWRC) functions as the research arm of WS by providing scientific information and development of methods for wildlife damage management that are effective and environmentally responsible. Research biologists with the NWRC work closely with wildlife managers, researchers, and others to develop and evaluate damage management techniques. For example, research biologists from the NWRC were involved with developing and evaluating mesurol for reducing crow predation on eggs. NWRC biologists have authored hundreds of scientific publications and reports, and are respected worldwide for their expertise in wildlife damage management.

WS' Decision Making Procedures

Decision Model

WS' personnel use a thought process for evaluating and responding to damage complaints that is depicted by the WS Decision Model (WS Directive 2.201) and described by Slate et al. (1992). WS' personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for effectively reducing damage. WS' personnel assess the problem and then evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic, and social considerations. Following this evaluation, methods deemed practical for the situation would be incorporated into a damage management strategy. After this strategy had been implemented, monitoring would be conducted and evaluation would continue to assess the effectiveness of the strategy. If the strategy was effective, no further management would be needed. In terms of the WS Decision Model, most efforts to manage damage consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The WS Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions, including WS.

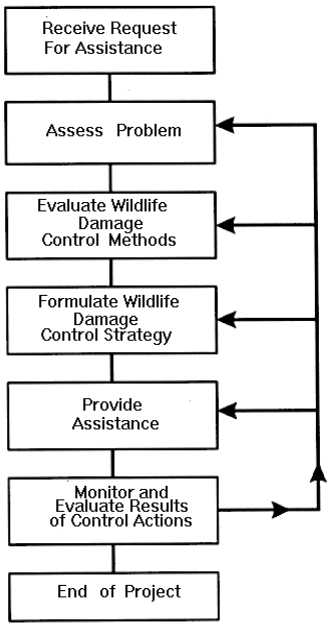


Figure 2.1 - WS Decision Model as presented by Slate et al. (1992) for developing a strategy to respond to a request for assistance with human-wildlife conflicts.

Community-based Decision Making

The WS program follows the "*co-managerial approach*" to solve wildlife damage or conflicts as described by Decker and Chase (1997). Within this management model, WS could provide technical assistance regarding the biology and ecology of birds and effective, practical, and reasonable methods available to the local decision-maker(s) to reduce damage or threats. This could include non-lethal and lethal methods. WS and other state and federal wildlife management agencies may facilitate discussions at local community meetings when resources are available. Resource owners and others directly affected by bird damage or conflicts have direct input into the resolution of such problems. They may implement management recommendations provided by WS or others, or may request management assistance from WS, other wildlife management agencies, local animal control agencies, or private businesses or organizations.

By involving decision-makers in the process, damage management actions can be presented to allow decisions to involve those individuals that the decision-maker(s) represents. Requests for assistance to manage birds often originate from the decision-maker(s) based on community feedback or from concerns about damage or threats to human safety. As representatives, the decision-maker(s) are able to provide the information to local interests either through technical assistance provided by WS or through demonstrations and presentations by WS on activities to manage damage. This process allows decisions on activities to be made based on local input.

2.3 STANDARD OPERATING PROCEDURES (SOPs) FOR BIRD DAMAGE MANAGEMENT

SOPs improve the safety, selectivity, and efficacy of those methods available to resolve or prevent damage. The current WS program uses many such SOPs. Those SOPs would be incorporated into activities conducted by WS when addressing bird damage and threats.

Some key SOPs pertinent to the proposed action and alternatives include the following:

- The WS Decision Model, which is designed to identify effective wildlife damage management strategies and their impacts, would be consistently used and applied when addressing bird damage.

- EPA-approved label directions would be followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects occur to the environment when chemicals are used in accordance with label directions.

- Material Safety Data Sheets for pesticides would be provided to all WS' personnel involved with specific damage management activities.

- All personnel who would use chemicals are trained and certified to use such substances or would be supervised by trained or certified personnel.

- All personnel who use firearms would be trained according to WS' Directives.

- Management actions would be directed toward specific birds posing a threat to human safety or causing damage to agricultural, natural resources, or property.

- Personnel would be trained in the latest and most humane devices/methods for removing problem birds.

- WS' use of euthanasia methods would comply with WS Directive 2.505.

- Carcasses of birds retrieved after damage management activities have been conducted would be disposed of in accordance with WS Directive 2.515, including any permits required by the USFWS and IDNR.

Several additional SOPs are applicable to the alternatives and the issues identified, including the following:

Issue 1 - Effects of Damage Management Activities on Target Bird Populations

- Lethal removal of birds by WS would be reported and monitored by WS and by the USFWS to evaluate population trends and the magnitude of WS' removal of birds in the state.

- WS would monitor bird damage management activities to ensure activities do not adversely affect bird populations.

- Preference would be given to non-lethal methods, when practical and effective. If practical and effective non-lethal control methods are not available and if lethal control methods are available and appropriate for WS to implement, WS may implement lethal methods.

- WS' personnel would be present during the use of most live-capture methods (e.g., mist nets, cannon nets, rocket nets) to ensure birds captured would be addressed in a timely manner to minimize the stress of being restrained.

- The removal of birds would only occur when authorized by the USFWS and/or IDNR, when applicable, and only at levels authorized.

Issue 2 - Effects on Non-target Wildlife Species Populations, Including T&E Species

- When conducting removal operations via shooting, identification of the target animal would occur prior to application.

- WS' personnel would use bait, trap placements, and capture devices that are strategically placed at locations likely to capture a target animal and minimize the potential of non-target animal captures.

- Any non-target animals captured in cage traps, nets, or any other restraining device would be released whenever it is possible and safe to do so.

- Personnel would be present during the use of live-capture methods or live-traps would be checked frequently to ensure non-target species are released immediately or are prevented from being captured.

- The presence of non-target species would be monitored before using DRC-1339 to reduce the risk of mortality of non-target species' populations.

- Only non-toxic shot would be used when employing shotguns to lethally remove bird species.

Issue 3 - Effects of Damage Management Methods on Human Health and Safety

- Damage management activities would be conducted professionally and in the safest manner possible. Damage management activities would be conducted away from areas of high human activity. If this were not possible, then activities would be conducted during periods when human activity is low (e.g., early morning) whenever possible.

- Damage management via shooting would be conducted during times when public activity and access to the control areas are reduced/restricted.

- All chemical methods used by WS or recommended by WS would be registered with the EPA and the IDALS.

- WS' employees who use alpha chloralose would participate in approved training courses concerning immobilizing drugs.

- WS would adhere to all established withdrawal times when using immobilizing drugs for the capture of waterfowl that are agreed upon by WS, the USFWS, the IDNR, and veterinarian authorities. Although unlikely, in the event that WS is requested to immobilize waterfowl either during a period of time when harvest of waterfowl is occurring or during a time where the withdrawal period could overlap with the start of a harvest season, WS would euthanize the animal or mark the animal as not safe for human consumption.

Issue 4 - Effects on the Aesthetic Values of Birds

- All methods or techniques applied to resolve damage or threats to human safety would be agreed upon by entering into a cooperative service agreement, MOU, or comparable document prior to the implementation of those methods.

2.4 ALTERNATIVES CONSIDERED IN DETAIL

The following alternatives were developed to address the identified issues associated with managing damage caused by birds:

Alternative 1 - Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)

The proposed action/no action alternative would continue the current implementation of an adaptive integrated approach utilizing non-lethal and lethal techniques, as deemed appropriate using the WS Decision Model, to reduce damage and threats caused by birds. A major goal of the program would be to resolve and prevent bird damages and to reduce threats to human safety. To meet this goal, WS, in cooperation with the USFWS and in consultation with the IDNR, would continue to respond to requests for assistance with, at a minimum, technical assistance, or when funding is available, operational damage management. Funding could occur through federal appropriations or from cooperative funding.

The adaptive approach to managing damage associated with birds would integrate the use of the most practical and effective methods to resolve a request for damage management as determined by site-specific evaluation to reduce damage or threats to human safety for each request after applying the WS Decision Model. City/town managers, agricultural producers, property owners, and others requesting assistance would be provided information regarding the use of appropriate non-lethal and lethal techniques. WS would work with those persons experiencing bird damage in addressing those birds responsible for causing damage as expeditiously as possible. To be most effective, damage management activities should begin as soon as birds begin to cause damage. Bird damage that has been ongoing can be difficult to resolve using available methods since birds are conditioned to feed, roost, loaf, and are familiar with a particular location. Subsequently, making that area unattractive using available methods can be difficult to achieve once damage has been ongoing. The USFWS could continue to issue depredation permits to WS and to those entities experiencing bird damage when requested by the entity and when deemed appropriate by the USFWS for those species that require a permit.

Under this alternative, WS could respond to requests for assistance by: 1) taking no action, if warranted, 2) providing only technical assistance to property owners or managers on actions they could take to reduce damages caused by birds, or 3) providing technical assistance and direct operational assistance to a property owner or manager experiencing damage. The removal of birds can only legally occur as authorized by the IDNR, and through the issuance of a depredation permit by the USFWS and only at levels specified in the permit, unless those bird species are afforded no protection under the MBTA or a depredation/control order has been established by the USFWS, in which case no permit for removal is required. When applying for a depredation permit, the requesting entity submits with the application the number of birds requested to be taken to alleviate the damage. Therefore, under this alternative, the USFWS could: 1) deny an application for a depredation permit when requested to alleviate bird damage, 2) could issue a depredation permit at the removal levels requested, or 3) could issue permits at levels below those removal levels requested.

Property owners or managers may choose to implement WS' recommendations on their own (i.e., technical assistance), use contractual services of private businesses, use volunteer services of private organizations, use the services of WS (i.e., direct operational assistance), or take no action.

The property owner or manager may choose to apply for their own depredation permit from the USFWS to lethally remove birds, as required by the implementing regulations of the MBTA for depredation control (see

50 CFR 21.41). The USFWS requires non-lethal methods be used and shown ineffective or impractical before the USFWS will issue a depredation permit. In this situation, WS could evaluate the damage and complete a Migratory Bird Damage Report, which would include information on the extent of the damages, the number of birds present, and a recommendation for the number of birds that should be taken to best alleviate the damages.

Following USFWS review of a complete application for a depredation permit from a property owner or manager and the Migratory Bird Damage Report, a depredation permit could be issued to authorize the lethal removal of a specified number of birds as part of an integrated approach. Upon receipt of a depredation permit, the property owner, manager, or appropriate subpermittee may commence the authorized activities and must submit a written report of their activities upon expiration of their permit. Permits may be renewed annually as needed to resolve damage or reduce threats to human safety. Property owners or managers could conduct management using those methods legally available. Most methods discussed in Appendix B that are available for use to manage bird damage would be available to all entities. The only methods currently available that would not be available for use by those persons experiencing bird damage is the avicide DRC-1339 and the immobilizing drug alpha-chloralose, which can only be used by WS.

Non-lethal methods include, but are not limited to, habitat/behavior modification, nest/egg destruction, lure crops, visual deterrents, live traps, translocation, exclusionary devices, frightening devices, alpha-chloralose, reproductive inhibitors, and chemical taste repellents (see Appendix B for a complete list and description of potential methods). Lethal methods considered by WS include live-capture followed by euthanasia, DRC-1339, the recommendation of harvest during hunting seasons, and firearms. WS would employ humane methods of euthanasia recommended by the American Veterinary Medical Association (AVMA) such as, cervical dislocation or carbon dioxide to euthanize target birds once those birds were live-captured using other methods. Carbon dioxide is an acceptable form of euthanasia for birds while cervical dislocation is a conditionally acceptable[6] method of euthanasia (AVMA 2013). The use of firearms could also be used to euthanize birds live-captured; however, the use of firearms for euthanasia is considered a conditionally acceptable method for wildlife (AVMA 2013).

Lethal and non-lethal methods are intended to be short-term attempts at reducing damage occurring at the time those methods are employed. Long-term solutions to managing bird damage would include limited habitat manipulations and changes in cultural practices that are addressed further below and in Appendix B.

Alternative 2 - Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, WS would be restricted to only using non-lethal methods to resolve damage caused by birds (Appendix B). Lethal methods could continue to be used under this alternative by those persons experiencing damage without involvement by WS. In situations where non-lethal methods were impractical or ineffective to alleviate damage, WS could refer requests for information regarding lethal methods to the state, local animal control agencies, or private businesses or organizations. Property owners or managers may choose to implement WS' non-lethal recommendations on their own or with the assistance of WS, implement lethal methods on their own via the permitting process through the USFWS as outlined above, or request assistance (non-lethal or lethal) from a private or public entity other than WS.

Alternative 3 – No Bird Damage Management Conducted by WS

This alternative precludes any activities by WS to reduce threats to human health and safety, and alleviate damage to agricultural resources, property, and natural resources. WS would not be involved with any aspect

[6]The AVMA (2013) defines conditional acceptable as "...[methods] *that by the nature of the technique or because of greater potential for operator error or safety hazards might not consistently produce humane death or are methods not well documented in the scientific literature"*.

of bird damage management. All requests for assistance received by WS to resolve damage caused by birds would be referred to the USFWS, the IDNR, and/or private entities. This alternative would not deny other federal, state, and/or local agencies, including private entities from conducting damage management activities directed at alleviating damage and threats associated with birds. Many of the methods listed in Appendix B would be available for use by other agencies and private entities, unless otherwise noted in the Appendix, to manage damage and threats associated with birds.

Despite no involvement by WS in resolving damage and threats associated with birds, those persons experiencing damage caused by birds could continue to resolve damage by employing those methods legally available since the removal of birds could occur either through the issuance of depredation permits by the USFWS; harvest during the hunting seasons, and blackbirds could be removed at any time when found committing or about to commit damage or posing a human safety threat under a depredation order; Muscovy ducks could be removed under the control order, and non-native bird species could be removed without the need for a depredation permit issued by the USFWS. All methods described in Appendix B would be available for use by those persons experiencing damage or threats except for the use of alpha-chloralose for waterfowl, DRC-1339 for crows, pigeons, blackbirds, starlings, cowbirds, grackles, magpies and gulls, which can only be used by WS.

2.5 ALTERNATIVES AND STRATEGIES NOT CONSIDERED IN DETAIL

In addition to those alternatives analyzed in detail, several alternatives were identified by WS and the USFWS; however, those alternatives will not receive detailed analyses in this EA for the reasons provided. Those alternatives considered, but not analyzed in detail include:

Use of Non-lethal Methods before Lethal Methods

This alternative would require that all non-lethal methods or techniques described in Appendix B be applied to all requests for assistance to reduce damage and threats to safety from birds prior to applying lethal methods. If the use of all non-lethal methods fails to resolve the damage situation or reduce threats to human safety at each damage situation, lethal methods would be employed to resolve the request. Non-lethal methods would be applied to every request for assistance regardless of severity or intensity of the damage or threat until deemed inadequate to resolve the request. This alternative would not prevent the use of lethal methods by those persons experiencing bird damage.

Those persons experiencing damage often employ non-lethal methods to reduce damage or threats prior to contacting WS. Verification of the methods used would be the responsibility of WS. No standard exists to determine requester diligence in applying those methods, nor are there any standards to determine how many non-lethal applications are necessary before the initiation of lethal methods. Thus, only the presence or absence of non-lethal methods can be evaluated. The proposed action (Alternative 1) is similar to a non-lethal before lethal alternative because the use of non-lethal methods is considered before lethal methods by WS (WS Directive 2.101). Adding a non-lethal before lethal alternative and the associated analysis would not add additional information to the analyses in this EA.

Use of Lethal Methods Only by WS

This alternative would require the use of lethal methods only to reduce threats and damage associated with birds. However, non-lethal methods can be effective in preventing damage in certain instances. Under WS Directive 2.101, WS must consider the use of non-lethal methods before lethal methods. Therefore, this alternative was not considered in detail.

Trap and Translocate Birds Only

Under this alternative, all requests for assistance would be addressed using live-capture methods or the recommendation of live-capture methods. Birds would be live-captured using alpha-chloralose, live-traps, cannon nets, rocket nets, bow nets, or mist nets. All birds live-captured through direct operational assistance by WS would be translocated. Translocation sites would be identified and have to be approved by the USFWS, the IDNR, and/or the property owner where the translocated birds would be placed prior to live-capture and translocation. Live-capture and translocation could be conducted as part of the alternatives analyzed in detail. However, the translocation of birds could only occur under the authority of the USFWS and/or IDNR. Therefore, the translocation of birds by WS would only occur as directed by those agencies. When requested by the USFWS and/or the IDNR, WS could translocate birds under any of the alternatives analyzed in detail, except under the no involvement by WS alternative (Alternative 3). Since WS does not have the authority to translocate birds in the state unless permitted by the USFWS and/or the IDNR, this alternative was not considered in detail.

The translocation of birds, that have caused damage to other areas following live-capture, generally would not be effective or cost-effective. Translocation is generally ineffective 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 translocation would most likely result in bird damage problems at the new location. In addition, hundreds or thousands of birds would need to be captured and translocated to solve some damage problems (e.g., urban blackbird roosts); therefore, translocation would be unrealistic. Translocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of the stress to the translocated animal, poor survival rates, and the difficulties that translocated wildlife have with adapting to new locations or habitats (Nielsen 1988).

Compensation for Bird Damage

The compensation alternative would require WS to establish a system to reimburse persons impacted by bird damage. Under such an alternative, WS would continue to provide technical assistance to those persons seeking assistance with managing damage. In addition, WS would conduct site visits to verify damage. Analysis of this alternative indicated that a compensation only alternative had many drawbacks. Compensation would: 1) require large expenditures of money and labor to investigate and validate all damage claims, and to determine and administer appropriate compensation, 2) most likely be below full market value, 3) give little incentive to resource owners to limit damage through improved cultural or other practices and management strategies, and 4) not be practical for reducing threats to human health and safety.

Technical Assistance Only

This alternative would restrict WS to only providing technical assistance (advice) on BDM. Producers, property owners, agency personnel, or others could obtain permits from the USFWS and/or the IDNR as needed and could conduct bird damage management using any of the legally available non-lethal and lethal techniques. Technical assistance information is also readily available from entities other than WS such as the USFWS, universities, extension agents, FAA, and private individual and organizations. Environmental impacts of this alternative are likely to be similar to Alternative 3. Consequently, the agencies have determined that detailed analysis of this alternative would not contribute substantive new information to the understanding of environmental impacts of damage management alternatives and have chosen to not analyze this alternative in detail.

CHAPTER 3: ENVIRONMENTAL EFFECTS

Chapter 3 provides information needed for making informed decisions in selecting the appropriate alternative to address the need for action described in Chapter 1 and the issues described in Chapter 2. This chapter analyzes the environmental consequences of each alternative as those alternatives relate to the issues identified.

Environmental consequences can be direct, indirect, and cumulative.

Direct Effects: Caused by the action and occur at the same time and place.

Indirect Effects: These are impacts caused by an action that are later in time or farther removed in distance, but are still reasonably foreseeable.

Cumulative Effects: As defined by CEQ (40 CFR 1508.7), these 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.

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.

3.1 ISSUES CONSIDERED IN DETAIL AND THEIR ASSOCIATED IMPACTS BY ALTERNATIVE

The proposed action/no action alternative serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. The analysis also takes into consideration mandates, directives, and the procedures of WS, the USFWS, and the IDNR.

Issue 1 - Effects of Damage Management Activities on Target Bird Populations

Population Impact Analyses of the Alternatives

The alternatives were developed in response to the issues identified in Chapter 2. The issue of the potential impacts of conducting the alternatives on the populations of target bird species is analyzed for each alternative below.

Information on bird populations and trends are often derived from several sources including the Breeding Bird Survey (BBS), the Christmas Bird Count (CBC), the Partners in Flight Landbird Population database, published literature, and harvest data. Further information on those sources of information is provided below.

Breeding Bird Survey (BBS)

Bird populations can be monitored by using trend data derived from data collected during the BBS. Under established guidelines, observers count birds at established survey points for a set duration along a pre-determined route, usually along a road. Routes are 24.5 miles long and are surveyed once per year with the observer stopping every 0.5 miles along the designated route. The numbers of birds observed and heard within 0.25 miles of each survey point during a 3-minute sampling period are recorded. Surveys were started in 1966 and are conducted in June, which is generally considered as the period of time when those birds present at a location are likely breeding in the immediate area. The BBS is conducted annually in the United States, across a large geographical area, under standardized survey guidelines. The BBS is a large-scale

inventory of North American birds coordinated by the United States Geological Survey, Patuxent Wildlife Research Center (Sauer et al. 2014). The BBS is a combined set of over 3,700 roadside survey routes primarily covering the continental United States and southern Canada. The primary objective of the BBS has been to generate an estimate of population change for all breeding birds. Populations of birds tend to fluctuate, especially locally, because of variable local habitat and climatic conditions. Trends can be determined using different population equations and tested to identify whether it is statistically significant.

Current estimates of population trends from BBS data are derived from hierarchical model analysis (Link and Sauer 2002, Sauer and Link 2011) and are dependent upon a variety of assumptions (Link and Sauer 1998). The statistical significance of a trend for a given species is also determined using BBS data (Sauer et al. 2014).

Christmas Bird Count (CBC)

The CBC is conducted in December and early January annually by numerous volunteers under the guidance of the National Audubon Society (NAS). The CBC reflects the number of birds frequenting a location during the winter months. Participants count the number of birds observed within a 15-mile diameter circle around a central point (177 mi^2). The CBC data does not provide a population estimate, but the count data can be used as an indicator of trends in the population of a particular bird species over time. Researchers have found that population trends reflected in CBC data tend to correlate well with those from censuses taken by more stringent means (NAS 2010).

Partners in Flight Landbird Population Estimate

The BBS data are intended for use in monitoring bird population trends, but it is also possible to use BBS data to develop a general estimate of the size of bird populations. Using relative abundances derived from the BBS, Rich et al. (2004) extrapolated population estimates for many bird species in North America as part of the Partners in Flight Landbird Population Estimate database. The Partners in Flight system involves extrapolating the number of birds in the 50 quarter-mile circles (total area/route = 10 mi^2) survey conducted during the BBS to an area of interest. The model used by Rich et al. (2004) makes assumptions on the detectability of birds, which can vary for each species. Some species of birds that are more conspicuous (visual and auditory) are more likely to be detected during bird surveys when compared to bird species that are more secretive and do not vocalize often. Information on the detectability of a species is combined to create a detectability factor, which may be combined with relative abundance data from the BBS to yield a population estimate (Rich et al. 2004). The Partners in Flight Science Committee (2013) updated the database in 2013 to reflect current population estimates.

Annual Harvest Estimates

The populations of several migratory bird species are sufficient to allow for annual harvest seasons that typically occur during the fall migration periods of those species. Migratory bird hunting seasons are established under frameworks developed by the USFWS and implemented by the IDNR. Those species addressed in this EA that have established hunting seasons include Canada geese, greater white-fronted geese, snow geese, mallards, blue-winged teals, lesser scaups, Northern shovelers, redheads, ring-necked ducks, wood ducks, mourning doves, Eurasian collared-doves, ring-necked pheasants, wild turkeys, and American crows.

For crows, removal can also occur under the blackbird depredation order established by the USFWS pursuant to the MBTA. Therefore, the removal of crows can occur during annual hunting seasons and under the blackbird depredation order that allows crows to be removed to alleviate damage and to alleviate threats of damage. For many migratory bird species considered harvestable during a hunting season, the number of

birds harvested during the season is reported by the USFWS and/or the IDNR in published reports. Harvest estimates can also be used to monitor trends in bird populations over time.

Bird Conservation Regions

Bird Conservation Regions are areas in North America that are characterized by distinct ecological habitats that have similar bird communities and resource management issues. The State of Iowa lies within the Eastern Tallgrass Prairie (Bird Conservation Region 22), the Prairie Potholes (Bird Conservation Region 11), and the Prairie Hardwood Transition (Bird Conservation Region 23). The majority of the State of Iowa lies within Eastern Tallgrass Prairie (Bird Conservation Region 22).

Alternative 1 - Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)

Under the proposed action, WS would continue to provide both technical assistance and direct operational assistance using methods described in Appendix B to those persons requesting assistance with managing damage and threats associated with birds. WS' lethal removal is monitored by comparing numbers of animals killed with overall populations or trends in populations to assure the magnitude of removal is maintained below the level that would cause significant adverse impacts to the viability of native species' populations. The potential impacts on the populations of target bird species from the implementation of the proposed action are analyzed for each species below. Unless noted otherwise, the state population estimate listed for each species analyzed below was obtained from PFSC (2013). Breeding Bird Survey (BBS) population trends from 1966 to 2013 for Iowa and the regions that the state falls within (the Eastern Tallgrass Prairie, the Prairie Potholes, and the Prairie Hardwood Transition) are listed for each species when available (Sauer et al. 2014). The statistical significance of a trend for a given species that is determined by the BBS data is color coded: a black percentage indicates a statistically insignificant positive or negative trend, a red percentage indicates a statistically significant negative trend, and a blue percentage indicates a statistically significant positive trend (Sauer et al. 2014).

Non-lethal methods can disperse or otherwise make an area unattractive to birds causing damage; thereby, reducing the presence of birds at the site and potentially the immediate area around the site where non-lethal methods are employed. Non-lethal methods would be given priority when addressing requests for assistance (WS Directive 2.101). However, non-lethal methods would not necessarily be employed or recommended to resolve every request for assistance if deemed inappropriate by WS' personnel using the WS Decision Model. For example, if a cooperator requesting assistance has already used non-lethal methods, WS would not likely recommend or continue to employ those particular methods since their use has already been proven ineffective in adequately resolving the damage or threat.

Many non-lethal methods are used to exclude, harass, and disperse target wildlife from areas where damage or threats are occurring. When effective, non-lethal methods would disperse birds from the area resulting in a reduction in the presence of those birds at the site where those methods were employed. However, birds responsible for causing damage or threats are moved to other areas with minimal impact on those species' populations. Non-lethal methods are not employed over large geographical areas or applied at such intensity that essential resources (*e.g.*, food sources, habitat) would be unavailable for extended durations or over a wide geographical scope that long-term adverse effects would occur to a species' population. Non-lethal methods are generally regarded as having minimal impacts on overall populations of wildlife since individuals of those species are unharmed. The use of non-lethal methods would not have adverse impacts on bird populations in the state under any of the alternatives.

The use of lethal methods could result in local population reductions in the area where damage or threats were occurring since birds would be removed from the population. Lethal methods are often employed to reinforce

non-lethal methods and to remove birds that have been identified as causing damage or posing a threat to human safety. The use of lethal methods would result in local reductions of birds in the area where damage or threats were occurring. The number of birds removed from the population using lethal methods would be dependent on the number of requests for assistance received, the number of birds involved with the associated damage or threat, and the efficacy of methods employed.

WS may recommend birds be harvested during the regulated hunting and/or trapping season for those species in an attempt to reduce the number of birds causing damage. Managing bird populations over broad areas could lead to a decrease in the number of birds causing damage. Establishing hunting and trapping seasons and the allowed take during those seasons is the responsibility of the IDNR. WS does not have the authority to establish hunting or trapping seasons or to set allowed harvest numbers during those seasons. However, the harvest of those birds with hunting and/or trapping seasons would be occurring in addition to any take that could occur by WS under the alternatives or recommended by WS.

Generally, WS only conducts damage management on species whose population densities are high or concentrated and usually only after they have caused damage. No indirect effects were identified for this issue. The issue of the potential impacts of conducting the alternatives on the populations of those target bird species addressed in this EA is analyzed for each alternative below. Table 3.1 summarizes WS' proposed annual removal and translocation for birds analyzed in this EA.

Table 3.1 – Summary of WS proposed annual removal and translocation of birds analyzed in this EA.

Species	WS Proposed Removal	WS Proposed Translocation	Species	WS Proposed Removal	WS Proposed Translocation
American crow	1,000	0	House sparrow (English)	4,000 + 20 nests	0
American kestrel	50	50	Killdeer	350	0
American robin	150 + 20 nests	0	Lapland longspur	20 + 20 nests	0
American white pelican	100	0	Laughing gull	100 + 10 nests	0
Bald eagle	0*	0	Lesser scaup	20 + 20 nests	0
Bank swallow	20	50	Mallard (domestic/wild)	250 + 10 nests	50
Barn owl	0*	0	Marbled godwit	0*	0
Barn swallow	500 + 10 nests	50	Merlin	0	25
Barred owl	20 + 20 nests	0	Mourning dove	2,000 + 10 nests	500
Black tern	0*	0	Mute swan	20 + 20 nests	0
Blue-winged teal	100 + 10 nests	50	Nighthawk (all)	0	25
Bobolink	20 + 20 nests	0	Northern flicker	20 + 20 nests	0
Bonaparte's gull	100	0	Northern harrier	0	50
Brown-headed cowbird	1,000	0	Northern mockingbird	20 + 20 nests	0
Burrowing owl	0*	0	Northern shoveler	20 + 20 nests	0
Canada goose	500 + 10 nests	100	Osprey	0*	0
Cattle egret	20 + 20 nests	0	Pileated woodpecker	10 + 10 nests	0
Chipping sparrow	20 + 20 nests	0	Purple finch	20 + 20 nests	0
Cliff swallow	500 + 100 nests	50	Red-bellied woodpecker	20 + 20 nests	0
Common grackle	500 + 20 nests	0	Redhead	20 + 20 nests	0
Cooper's hawk	20 + 10 nests	50	Red-headed woodpecker	20	0
Dark-eyed junco	20 + 20 nests	0	Red-tailed hawk	100 + 10 nests	200
Dickcissel	20 + 20 nests	0	Red-winged blackbird	1,000	0
Double-crested cormorant	20 + 20 nests	0	Ring-billed gull	500 + 10 nests	0
Downy woodpecker	20 + 20 nests	0	Ring-necked duck	20 + 20 nests	0
Eastern kingbird	20 + 20 nests	0	Ring-necked pheasant	20 + 20 nests	0
Eastern meadowlark	50	0	Feral pigeon (rock dove)	50,000 + 100 nests	0
Eurasian-collared dove	75	0	Rough-legged hawk	10 + 10 nests	25
European starling	150,000	0	Rough-winged swallow	20 + 10 nests	50
Ferruginous hawk	0	25	Sharp-shinned hawk	10	50
Forster's tern	0*	0	Short-billed dowitcher	0*	0
Franklin's gull	500 + 10 nests	0	Short-eared owl	0*	0

Free-ranging or feral domestic waterfowl[7]	20 + 20 nests	0	Snow bunting	0*	0
Great black-backed gull	100 + 10 nests	0	Snow goose	50 + 10 nests	50
Great blue heron	75	0	Swainson's hawk	0*	0
Great egret	0*	0	Tree swallow	20 + 10 nests	50
Great-horned owl	20 + 10 nests	25	Trumpeter swan	0*	0
Greater white-fronted goose	20 + 20 nests	0	Turkey vulture	200	0
Greater yellowlegs	0*	0	Upland sandpiper	0*	0
Green heron	20 + 20 nests	0	Western kingbird	20 + 20 nests	0
Hairy woodpecker	20 + 20 nests	0	Western meadowlark	50	0
Herring gull	500 + 10 nests	0	Wild turkey	20 + 20 nests	0
Horned lark	50	0	Wood duck	20 + 20 nests	0
House finch	20 + 20 nests	0	Yellow-headed blackbird	100	0

*WS only conducts non-lethal harassment on this species

American Crow Biology and Population Impacts

IA population estimate: 280,000
BBS IA, 1966-2013: -0.93%
BBS Eastern Tallgrass Prairie, 1966-2013: 0.14%
BBS Prairie Potholes, 1966-2013: -1.97%
BBS Prairie Hardwood Transition, 1966-2013: 0.50%
BBS Prairie Hardwood Transition, 2003-2013: 0.36%
WS removal as % of state population: 0.36%

WS proposed removal: 1,000
BBS IA, 2003-2013: 0.16%
BBS Eastern Tallgrass Prairie, 2003-2013: -0.50%
BBS Prairie Potholes, 2003-2013: - 4.10%

American crows are highly adaptable and will live in any open place that offers a few trees to perch in and a reliable food source. Crows regularly use both natural and human-created habitats, including farmlands, pastures, landfills, city parks, golf courses, cemeteries, yards, vacant lots, highway turnarounds, feedlots, and the shores of rivers, streams, and marshes. Crows tend to avoid unbroken expanses of forest, but do show up at forest campgrounds and travel into forests along roads and rivers (Verbeek and Caffrey 2002). American crows are considered common year-round residents of Iowa (Burnett et al. 1998*a*). Large flocks of crows tend to concentrate in some areas where abundant food and roosting sites are available. In the fall and winter, crows often form large roosting flocks in urban areas. These large flocks disperse to different feeding areas during the day. Crows will fly up to 6-12 miles from the roost to a feeding site each day (Johnson 1994). The number of crows observed during the CBC has shown a general increasing trend since 1966 although populations have shown a slight decline in the past ten years (NAS 2010).

The number of crows addressed in Iowa by all entities to alleviate damage is shown in Table 3.2. Crows can be harvested during a split season occurring from mid-October through November and mid-January through March. There is no estimate for the number of crows harvested annually during the hunting season. The removal by all non-WS entities is unknown due to the Federal Depredation Order (50 CFR 21.43) for blackbirds that was established by the USFWS (Sobeck 2010). Under the depredation order, no federal permit is required to remove blackbirds, cowbirds, grackles, crows, and magpies if they are committing 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.

[7] Free-ranging or feral domestic waterfowl refers to captive-reared, domestic, of some domestic genetic stock, or domesticated breeds of ducks, geese, and swans. Examples of domestic waterfowl include, but are not limited to, mute swans, Muscovy ducks, Pekin ducks, Rouen ducks, Cayuga ducks, Swedish ducks, Chinese geese, Toulouse geese, Khaki Campbell ducks, Embden geese, and pilgrim geese. Feral ducks may include a combination of mallards, Muscovy duck, and mallard-Muscovy hybrids.

Table 3.2 – Number of crows addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits		
		WS' Removal[1]	Authorized Removal for Other Entities[2]	Removal by Other Entities[2]
2011	101	4	0	0
2012	22,589	212	0	0
2013	94,298	88	0	0
2014	72,767	322	0	0
2015	495,820	227	0	0
Averages	**137,115**	**171**	**0**	**0**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Direct, Indirect, and Cumulative Effects:
WS proposed removal is not expected to create adverse direct or indirect effects on the American crow population. Although non-WS removal is unknown, crows have maintained a historically increasing population that has remained viable enough to support an annual hunting season and a Federal Blackbird Depredation Order. Therefore, WS does not expect there to be significant adverse cumulative impacts to crow populations. Additionally, the USFWS could impose restrictions on the depredation harvest as needed to assure cumulative removal does not adversely affect the continued viability of crow populations. This should also assure that cumulative impacts on crow populations would have no significant impact on the quality of the human environment. WS also does not expect crow populations to be impacted enough to limit the ability of those persons interested in harvesting crows during the regulated hunting season.

American Kestrel Biology and Population Impacts

IA population estimate: 37,000
WS proposed number translocated: 50
BBS IA, 1966-2013: 1.54%
BBS Eastern Tallgrass Prairie, 1966-2013: 0.34%
BBS Prairie Potholes, 1966-2013: -1.93%
BBS Prairie Hardwood Transition, 1966-2013: -1.02%
BBS Prairie Hardwood Transition, 2003-2013: -1.42%
WS removal as % of state population: 0.14%

WS proposed removal: 50
BBS IA, 2003-2013: 1.91%
BBS Eastern Tallgrass Prairie, 2003-2013: 0.16%
BBS Prairie Potholes, 2003-2013: -1.37%
Cumulative removal as % of state population: 0.24%

American kestrels are the smallest and most common North American falcon (Smallwood and Bird 2002). Their range includes most of North America except the far northern portions of Alaska and Canada (Smallwood and Bird 2002). Kestrels can be observed across Iowa year-round (Burnett et al. 1998*a*). Kestrels prefer open habitat with adequate perch sites from which to hunt, however, they will also hunt by hovering (Smallwood and Bird 2002). Nests are located in tree cavities, rock crevices or in the nooks of buildings (Smallwood and Bird 2002). The number of American kestrels observed during the CBC had shown a general increasing trend in Iowa since 1966 although winter observations have experienced slight declines in the past twenty years (NAS 2010).

Most requests for assistance associated with American kestrels are received from airports where kestrels are posing an aircraft strike hazard. As part of an integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/translocate) to disperse or move kestrels when appropriate and safe. The number of kestrels live captured and translocated from FY 2011 to FY 2015 is shown in Table 3.3. While translocation of raptors can be effective, trapping and translocation is not always possible when birds persist on the airfield or when birds return to the airport after being translocated. The

number of kestrels addressed in Iowa by all entities to alleviate damage is shown in Table 3.4. The highest combined authorized removal by non-WS entities (37 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.3 – Number of American kestrels live captured and translocated by WS in Iowa from FY 2011 to FY 2015

Year	WS Authorized Translocation[2]	WS' Translocation[1]
2011	50	0
2012	*	2
2013	50	0
2014	50	1
2015	50	0
Average	**50**	**1**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal occurs under a depredation permit issued to WS in Iowa and Missouri
* Data not available

Table 3.4 – Number of American kestrels addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	5	10 + 10 nests	1	37	2
2012	6	*	0	22	0
2013	33	10 + 10 nests	4	22	2
2014	62	10 + 10 nests	1	22	1
2015	184	100 + 10 nests	3	37	4
Average	**58**	**33 + 10 nests**	**2**	**28**	**2**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:

WS' proposed removal is only a fraction of a percent of the statewide population and therefore WS' proposed removal will have no adverse direct or indirect effects on American kestrel populations. Kestrels are afforded protection under the MBTA and removal is only allowed through the issuance of a depredation permit and only at those levels stipulated in the permit. The potential authorized removal from all non-WS entities combined with WS proposed removal is also not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and IDNR pursuant to the MBTA ensures removal by WS and all other entities occurs within allowable removal levels to achieve the desired population objectives for American kestrels in Iowa.

Additionally, WS could live-capture and translocate up to 50 American kestrels. WS' proposed translocation of up to 50 kestrels is expected to have no adverse direct effects on the American kestrel population. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, kestrels could be translocated during their nesting season, which could lower nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of American kestrels. Kestrels captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands

appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". The translocation of American kestrels can only occur when permitted by the USFWS. Therefore, all removal, including live-capture and translocation by WS is authorized and occurs at the discretion of the USFWS, which ensures cumulative take is considered as part of population management objectives for American kestrels.

American Robin Biology and Population Impacts

IA population estimate: 6,400,000
BBS IA, 1966-2013: 2.17%
BBS Eastern Tallgrass Prairie, 1966-2013: 1.64%
BBS Prairie Potholes, 1966-2013: 2.20%
BBS Prairie Hardwood Transition, 1966-2013: 0.83%
BBS Prairie Hardwood Transition, 2003-2013: 1.41%
WS removal as % of state population: 0.002%

WS proposed removal: 150 + 20 nests (and eggs)
BBS IA, 2003-2013: 2.75%
BBS Eastern Tallgrass Prairie, 2003-2013: 1.27%
BBS Prairie Potholes, 2003-2013: 2.79%
Cumulative removal as % of state population: 0.005%

The American robin, one of the most easily recognized birds in North America, can be found throughout the United States (Vanderhoff et al. 2014). Robins are found across the state of Iowa and can be seen throughout the year when they occasionally remain throughout the winter (Burnett et al. 1998*a*; Vanderhoff et al. 2014). Preferred habitat includes edge environments in close proximity to open areas with short grass for feeding, making suburban and other human modified landscapes ideal habitat (Vanderhoff et al. 2014). Robins regularly nest and raise two broods of chicks per season (Vanderhoff et al. 2014). Nests are located in trees, on the tops of tree stumps, in road banks, on cliffs, on buildings or on other man-made structures (Vanderhoff et al. 2014). Robins are highly social during the non-breeding season, forming flocks as large as 250,000 birds for migration, feeding and roosting (Vanderhoff et al. 2014). American robins will also roost communally with European starlings and common grackles (Vanderhoff et al. 2014). The number of American robins observed in Iowa during the CBC has shown a variable, but overall increasing trend since 1966 (NAS 2010).

The number of American robins addressed by WS and the total number of robins removed by all entities from FY 2011 to FY 2015 to alleviate damage and threats associated with these birds are shown in Table 3.5. The highest combined authorized removal by non-WS entities (150 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.5 – Number of American robins addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	0	20	0	10 + 0 nests	2 + 0 nests
2012	0	*	0	0 + 10 nests	0 + 1 nest
2013	160	20	3	150 + 10 nests	3 + 2 nests
2014	595	20	39	150 + 10 nests	39 + 3 nests
2015	375	20	2 + 9 nests	50 + 10 nests	9 + 6 nests
Average	**226**	**20**	**9 + 2 nests**	**72 + 8 nests**	**11 + 2 nests**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
WS proposed removal of American robins is only a fraction of a percent of the state population. Therefore, WS proposed removal level will have no adverse direct or indirect effects on American robin populations. Additionally, the potential authorized removal from all non-WS entities combined with WS proposed removal is not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the IDNR pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for robins in Iowa.

American White Pelican Biology and Population Impacts

IA population estimate: N/A
WS proposed removal: 100
BBS Prairie Potholes, 1966-2013: 6.10%
BBS Prairie Potholes, 2003-2013: 7.34%
BBS Prairie Hardwood Transition, 1966-2013: 20.18%
BBS Prairie Hardwood Transition, 2003-2013: 28.96%

The American white pelican is a large, white bird that is typically found in breeding colonies in the northern and western portions of North America and wintering along the southern coasts of North America (Knopf and Evans 2004). Most of the American white pelicans seen in Iowa are passing through in the spring and fall during migration between breeding and wintering areas. However, the first nesting colony of pelicans since 1909 was documented in 2007 on two islands in the Mississippi River in Iowa (USFWS 2012). American white pelicans were once considered threatened until the early 1960s when populations started to recover (Knopf and Evans 2004). Populations are continuing to increase at a rate of at least 3% each year (Knopf and Evans 2004). The number of American white pelicans observed during the CBC has shown an increasing trend since 1966, especially within the last ten years (NAS 2010). The population of American white pelicans is estimated to be approximately 180,000 individuals and they are listed as a species of least concern according to the IUCN (Birdlife International 2016).

The number of American white pelicans addressed by all entities in Iowa from FY 2011 to FY 2015 to alleviate damage and threats associated with these birds are shown in Table 3.6.

Table 3.6 – Number of American white pelicans addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	0	0	0	0	0
2012	0	*	0	0	0
2013	0	0	0	0	0
2014	23	0	0	0	0
2015	32	100	0	0	0
Average	**11**	**25**	**0**	**0**	**0**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
American white pelicans would continue to be addressed using primarily non-lethal harassment and dispersal methods. Although no state population estimates for American white pelicans are available, the removal of 100 pelicans by WS would represent 0.06% of the global population. Based on the best scientific data, WS proposed removal level will have no adverse direct or indirect effects on American white pelican populations.

Since no other entities were issued depredation permits by USFWS, the cumulative removal of American white pelicans would be the same as WS' removal. Since this is a fraction of a percent, WS does not expect there to be any adverse cumulative impacts on the American white pelican population. Additionally, all removal of American white pelicans would occur within the levels permitted by the USFWS and IDNR pursuant to the MBTA, which would ensure removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for pelicans in Iowa.

Bald Eagle Biology and Population Impacts

BBS IA, 1966-2013: 32.33%
BBS Eastern Tallgrass Prairie, 1966-2013: 15.44%
BBS Prairie Potholes, 1966-2013: 15.93%
BBS Prairie Hardwood Transition, 1966-2013: 13.13%
BBS IA, 2003-2013: 31.50%
BBS Eastern Tallgrass Prairie, 2003-2013: 22.21%
BBS Prairie Potholes, 2003-2013: 27.48%
BBS Prairie Hardwood Transition, 2003-2013: 15.85%

The bald eagle is a large raptor easily identified by its distinctive white head and tail (Buehler 2000). During the migration period, eagles can be found throughout the U.S. (Buehler 2000). Bald eagles breed primarily in Alaska and Canada; however, they have been documented nesting in all of the 48 contiguous states (Buehler 2000). In Iowa, eagle nests have been found in every county but Osceola and Union counties since 1977 (Fritzell 2015). Bald eagles are more commonly seen wintering in Iowa after migrating south from northern states and Canada, with the largest concentration of wintering eagles along the Mississippi River in northeastern Iowa (Dyar 2010, Fritzell 2015). In Iowa, migrating eagles start to arrive as early as September and peak arrival is during January (Dyar 2010). Bald eagles are primarily associated with aquatic habitats and open water (Buehler 2000).

The number of bald eagles observed in Iowa during the CBC has shown a dramatic increasing trend since 1966 (NAS 2010). The greatest number of birds observed during the CBC in Iowa was 4,892 in 2013, with an average of 3,181 observed each year over the last decade (NAS 2010). Using data from the BBS, Partners in Flight Science Committee (2013) estimated the statewide breeding population of bald eagles was 0.30% of the global population but no figure was given. However, the Partners in Flight Science Committee (2013) does give an estimate of 300,000 for the global breeding population of bald eagles. From volunteer eagle nest surveys, the IDNR received reports of 349 eagle territories in the states in which approximately 61% were reported as active (Fritzell 2015). In January 2014, 4,957 bald eagles were counted during the Midwinter Bald Eagle Survey, which was above the average number of eagles (2,911 birds) surveyed during the last ten years (Fritzell 2015).

Certain populations of bald eagles were listed as "*endangered*" under the Endangered Species Preservation Act of 1966 which was extended when the modern ESA was passed in 1973. The "*endangered*" status was extended to all populations of bald eagles in the lower 48 states, except populations of bald eagle in Minnesota, Wisconsin, Michigan, Washington, and Oregon, which were listed as "*threatened*" in 1978. As recovery goals for bald eagle populations began to be reached in 1995, all populations of eagles in the lower 48 states were reclassified as "*threatened*". In 1999, the recovery goals for populations of eagles had been reached or exceeded and the eagle was proposed for removal from the ESA. The bald eagle was officially de-listed from the ESA on June 28, 2007 with the exception of the Sonora Desert bald eagle population. Although officially removed from the protection of the ESA across most of its range, the bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act.

Populations of bald eagles showed periods of steep declines in the lower U.S. during the early 1900s attributed to the loss of nesting habitat, hunting, poisoning, and pesticide contamination. To curtail steep declining trends in bald eagles, the Bald Eagle Protection Act was passed in 1940 prohibiting the take or

possession of bald eagles or their parts. The Bald Eagle Protection Act was amended in 1962 to include the golden eagle and is now referred to as the Bald and Golden Eagle Protection Act.

As was discussed in Chapter 1, under the Bald and Golden Eagle Protection Act, the definition of "*take*" includes actions that "*molest*" or "*disturb*" eagles. For the purposes of the Act, under 50 CFR 22.3, the term "*disturb*" as it related to take has been defined as "*to agitate or bother a bald…eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.*" The Bald and Golden Eagle Protection Act allows the USFWS to permit the take of eagles when "*necessary for the protection of…other interests in any locality*" after determining the take is "*…compatible with the preservation of the bald eagle*" (16 U.S.C. 668a). The USFWS developed an EA that evaluated alternatives and issues associated with regulations establishing new permits for the take of eagles pursuant to the Act (USFWS 2009*a*). Based on the evaluations in the EA and a FONSI, the selected alternative in the EA established new permit regulations for the "*take*" of eagles (see 50 CFR 22.26) and a provision to authorize the removal of eagle nests (see 50 CFR 22.27).

WS has previously received requests for assistance associated with bald eagles posing threats at or near airports. The large body size and soaring behavior of eagles can pose threats of aircraft strikes when eagles occur in close proximity to airports. From FY 2011 through FY 2015, WS used non-lethal methods to disperse six bald eagles at various airports in Iowa (two in FY 2012, two in FY 2014, and two in FY 2015).

Direct, Indirect, and Cumulative Effects:

Given the definition of "*molest*" and "*disturb*" under the Act as described above, the use of harassment methods to disperse eagles posing threats at or near airports could constitute "*take*" as defined under the Act and therefore requires a permit from the USFWS. WS would only employ harassment methods to disperse a bald eagle from airports or surrounding areas when authorized and permitted by the USFWS pursuant to the Act. Therefore, if no permit is issued by the USFWS to harass bald eagles that are posing a threat of aircraft strike, no harassment would be conducted by WS. No lethal take of bald eagles would occur under this proposed action alternative. WS would abide by all measures and stipulations provided by the USFWS in permits issued for the harassment of bald eagles at airports to reduce aircraft strikes. The USFWS fully evaluated and determined that the issuance of permits for harassment of eagles to WS or other entities would have no significant impacts in a separate analysis (USFWS 2009*a*). Therefore when conducted under a permit issued by USFWS, harassment of bald eagles by WS is not expected to create significant adverse direct, indirect, or cumulative effects to bald eagle populations.

Barn Swallow Biology and Population Impacts

IA population estimate: 1,100,000
WS proposed number translocated: 50
BBS IA, 1966-2013: -0.09%
BBS Eastern Tallgrass Prairie, 1966-2013: -0.45%
BBS Prairie Potholes, 1966-2013: -0.91%
BBS Prairie Hardwood Transition, 1966-2013: -0.06%
BBS Prairie Hardwood Transition, 2003-2013: -0.35%
WS removal as % of state population: 0.05%

WS proposed removal: 500 + 10 nests (and eggs)
BBS IA, 2003-2013: 0.2%
BBS Eastern Tallgrass Prairie, 2003-2013: -0.52%
BBS Prairie Potholes, 2003-2013: -0.31%
Cumulative removal as % of state population: 0.05%

Barn swallows, which are considered the most common swallow in the state, arrive in Iowa as early as mid-April to start nesting (Burnett et al. 1998*b*; Dinsmore 2003). They are common in open rural areas throughout the state and are known to nest in barns and other building, under bridges, in culverts, and along the entrance of caves (Buckelew Jr. and Hall 1994). Barn swallows usually produce two clutches per season, averaging 4-

5 eggs per clutch (Brown and Brown 1999). After nesting, barn swallows migrate south to their wintering grounds in Central and South America (Brown and Brown 1999).

The number of barn swallows addressed in Iowa by all entities to alleviate damage is shown in Table 3.7. WS is also authorized to trap and translocate up to 50 barn swallows annually, but WS did not live-trap and translocate any barn swallows during FY 2011 through FY 2015. The highest combined authorized removal by non-WS entities (100 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.7 – Number of barn swallows addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	0	20 + 10 nests	0	20	1
2012	0	*	0	20	2
2013	77	20 + 10 nests	5	0 + 20 nests	0 + 2 nests
2014	823	20 + 10 nests	5	10 + 20 nests	6 + 2 nests
2015	684	500 + 10 nests	11	100 + 20 nests	10 + 0 nests
Average	**317**	**140 + 10 nests**	**4**	**30 + 20 nests**	**4 + 1 nest**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Although the barn swallow population trend has been slightly declining since 1966, WS proposed removal is only a fraction of a percent of the state population. Based on the best scientific data, WS proposed removal level will have no adverse direct or indirect effects on barn swallow populations. The potential authorized removal from all non-WS entities combined with WS proposed removal is also only a fraction of a percent of the state population and therefore it is not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the IDNR pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for barn swallows in Iowa.

Additionally, WS could live-capture and translocate up to 50 barn swallows. WS' proposed translocation of up to 50 barn swallows is expected to have no adverse direct effects on the barn swallow population in Iowa. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, barn swallows could be translocated during their nesting season which could lower nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of barn swallows in Iowa. Barn swallows captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". The translocation of barn swallows can only occur when permitted by the USFWS. Therefore, all removal, including live-capture and translocation by WS, is authorized and occurs at the discretion of the USFWS, which ensures cumulative take is considered as part of population management objectives for barn swallows.

Blue-winged Teal Biology and Population Impacts

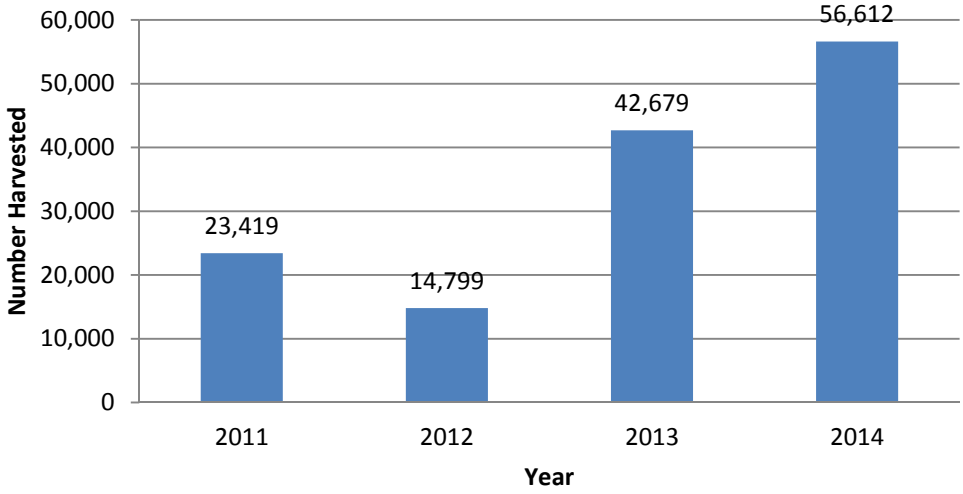
WS proposed removal: 100 + 10 nests (and eggs)
BBS IA, 1966-2013: -0.41%
BBS Eastern Tallgrass Prairie, 1966-2013: -0.52%
BBS Prairie Potholes, 1966-2013: 1.72%
BBS Prairie Hardwood Transition, 1966-2013: -4.14%
BBS Prairie Hardwood Transition, 2003-2013: -3.59%

WS proposed number translocated: 50
BBS IA, 2003-2013: 0.62%
BBS Eastern Tallgrass Prairie, 2003-2013: 9.08%
BBS Prairie Potholes, 2003-2013: 5.36%

Blue-winged teal are small, dabbling ducks that breed throughout the north-central United States, including Iowa (Rohwer et al. 2002). They migrate south in the fall beginning as early as September, making them one of the earliest North American ducks to migrate south (Rohwer et al. 2002). After wintering in South and Central America, the spring migration begins in January and February and continues through May (Rohwer 2002). The number of blue-winged teal observed during the CBC conducted annually in Iowa has shown a variable pattern since 1966 (NAS 2010). The estimated population for blue-winged teal was 8.5 ± 0.4 million in 2015, which is 73% above the long-term average (USFWS 2015*a*).

Like other waterfowl species, blue-winged teal can be harvested during a regulated hunting season. Blue-winged teal can be harvested during a split season that occurs from October through December. Since 2014, blue-winged teal can also be harvested in September during a Special September Teal Season, which gives hunters additional time to harvest teal. This early season is intended to be a three year experiment conducted by the IDNR, and the continuation of this season beyond the three years is unknown. The estimated number of blue-winged teal harvested from 2011 to 2014 during the annual hunting season is shown in Figure 3.1 (Raftovich et al. 2012, Raftovich and Wilkins 2013, Raftovich et al. 2015).

Figure 3.1 - Blue-winged teal harvested annually in Iowa, 2011-2014



The number of blue-winged teal addressed in Iowa by WS and other entities to alleviate damage is shown in Table 3.8. The annual harvest of blue-winged teal in Iowa ranged from 14,799 to 56,612 since 2011; WS' proposed removal of 100 blue-winged teal would only account for a range of 0.2% and 0.7% of the annual harvest. WS is also authorized to live-trap and translocate up to 50 blue-winged teal annually, but WS has not translocated any blue-winged teal from FY 2011 through FY 2015. The highest authorized removal for non-

WS entities (150 birds) in addition to the WS proposed removal and the highest number of blue-winged teal harvested since 2011 was used to assess the cumulative removal.

Table 3.8 – Number of blue-winged teal addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	2	20 + 10 nests	0	0	0
2012	35	*	0	0	0
2013	51	20 + 10 nests	0	0	0
2014	168	20 + 10 nests	7	150	7
2015	9	100 + 10 nests	0	0	0
Average	**53**	**40 + 10 nests**	**1**	**30**	**1**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed removal level is expected to have no adverse direct or indirect effects on blue-winged teal populations within the state. The blue-winged teal population has remained stable enough to accommodate an annual hunting season and has even allowed for the IDNR to initiate an experimental additional early hunting season for blue-winged teal. WS's proposed removal is also only a small percentage of the hunter harvest from the last five years. Furthermore, the removal of blue-winged teal by WS to alleviate damage will only occur when permitted by the USFWS and the IDNR pursuant to the MBTA through issuance of depredation permits. The potential authorized removal from all non-WS entities (including the annual harvest) and WS proposed removal is not expected to create adverse cumulative impacts. The removal of blue-winged teal by WS would only occur at levels authorized by USFWS and IDNR to ensure that WS' removal and the removal by all other entities, including annual hunter harvest, would be considered to maintain the desired population management levels of blue-winged teal within Iowa. WS proposed removal is of low magnitude when compared to the annual harvest numbers and therefore is not expected to hinder the ability of those interested persons in harvesting blue-winged teal during the hunting season.

Additionally, WS could be requested to live-capture and translocate up to 50 blue-winged teal. WS' proposed translocation of up to 50 blue-winged teal is expected to have no adverse direct effects on the blue-winged teal population in Iowa. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, blue-winged teal could be translocated during their nesting season which could lower their nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of blue-winged teal in Iowa. Blue-winged teal captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". The translocation of blue-winged teal can only occur when permitted by the USFWS. Therefore, all removal, including live-capture and translocation by WS, is authorized and occurs at the discretion of the USFWS, which ensures cumulative take is considered as part of population management objectives for blue-winged teal.

Brown-headed Cowbird Biology and Population Impacts

IA population estimate: 2,600,000
BBS IA, 1966-2013: 0.30%
BBS Eastern Tallgrass Prairie, 1966-2013: -0.71%
BBS Prairie Potholes, 1966-2013: 0.20%
BBS Prairie Hardwood Transition, 1966-2013: -1.18%
WS removal as % of state population: 0.04%

WS proposed removal: 1,000
BBS IA, 2003-2013: 1.35%
BBS Eastern Tallgrass Prairie, 2003-2013: -0.46%
BBS Prairie Potholes, 2003-2013: 0.71%
BBS Prairie Hardwood Transition, 2003-2013: -1.38%

Brown-headed cowbirds are a species of the blackbird family commonly found in mixed species flocks during migration periods. Cowbirds are a common summer resident across the United States and southern Canada (Lowther 1993). Breeding populations in the northern range of the cowbird are migratory with cowbirds present year-round in much of the Eastern United States and along the West Coast (Lowther 1993). Likely restricted to the range of the bison (*Bison bison*) before the presence of European settlers, cowbirds were a common occurrence on the short-grass plains where they fed on insects disturbed by foraging bison (Lowther 1993). Cowbirds expanded their breeding range as people began clearing forests for agricultural practices (Lowther 1993). Cowbirds are still commonly found in open grassland habitats but also inhabit urban and residential areas. Unique in their breeding habits, cowbirds are known as brood parasites, meaning they lay their eggs in the nests of other bird species (Lowther 1993). Female cowbirds can lay up to 40 eggs per season with eggs reportedly being laid in the nests of over 220 species of birds, of which, 144 species have actually raised cowbird young (Lowther 1993). No parental care is provided by cowbirds with the raising of cowbird young occurring by the host species. Cowbirds can be found in Iowa during the breeding season (Lowther 1993). The number of cowbirds observed during the CBC conducted annually in the state has shown a variable pattern since 1966 (NAS 2010).

Since the removal of blackbird species, including brown-headed cowbirds can occur without the need for a depredation permit when committing or about to commit damage, the number of cowbirds lethally removed by non-WS entities in the state is currently unknown. The number of cowbirds dispersed and lethally removed in Iowa by WS from FY 2011 through FY 2015 can be seen in Table 3.9. Since brown-headed cowbirds often form mixed species flocks with other blackbird species, determining the number of birds of each species present in the mixed species flocks can be difficult. Therefore, when dispersing mixed species flocks, the number of brown-headed cowbirds present in the flocks was unknown. The number of blackbirds dispersed and lethally removed from mixed species flocks by WS is also included in Table 3.9.

Table 3.9 – Number of brown-headed cowbirds and mixed species blackbirds addressed in Iowa by WS, FY 2011 – FY 2015

	Brown-headed cowbirds		Mixed blackbirds	
Year	**Dispersed by WS[1]**	**WS' Removal[1]**	**Dispersed by WS[1]**	**WS' Removal[1]**
2011	0	0	0	0
2012	450	16	0	0
2013	8,835	82	504,403	0
2014	751	60	25,285	0
2015	5,028	264	507,338	0
Average	**3,013**	**84**	**207,405**	**0**

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed annual removal level will have no adverse direct or indirect effects on brown-headed cowbird populations. While non-WS removal is unknown, cowbird populations

have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to brown-headed cowbird populations.

Canada Geese Biology and Population Impacts

IA population estimate: 84,694 (Jones et al. 2014) WS proposed removal: 500 + 10 nests (and eggs)
WS proposed number translocated: 100
BBS IA, 1966-2013: 22.46% BBS IA, 2003-2013: 21.22%
BBS Eastern Tallgrass Prairie, 1966-2013: 17.71% BBS Eastern Tallgrass Prairie, 2003-2013: 15.80%
BBS Prairie Potholes, 1966-2013: 11.89% BBS Prairie Potholes, 2003-2013: 16.30%
BBS Prairie Hardwood Transition, 1966-2013: 16.58%
BBS Prairie Hardwood Transition, 2003-2013: 18.92%
WS removal as % of state population: 0.59% Cumulative removal as % of state population: 63.7%

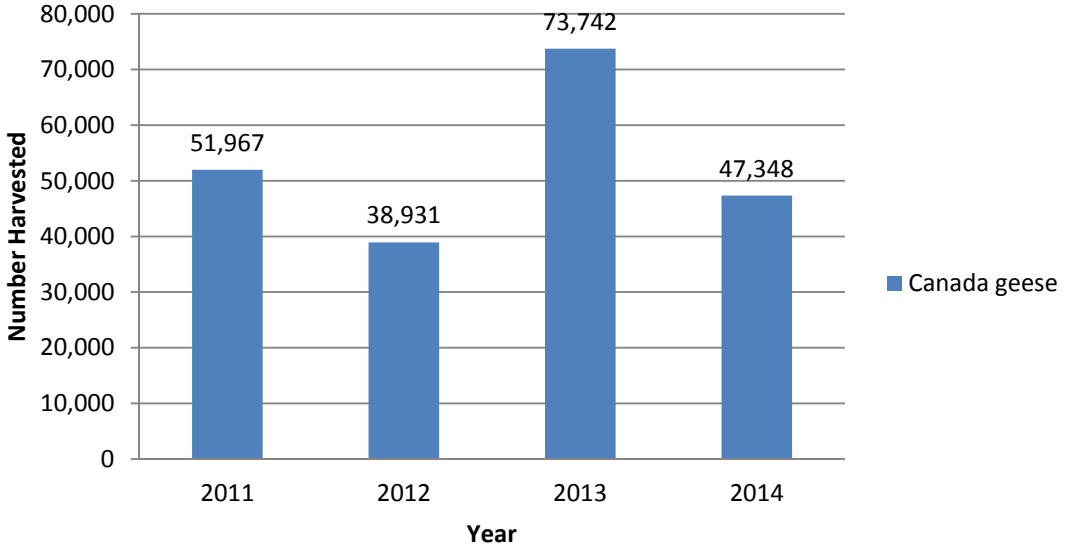
Canada geese are one of the most readily recognized and observable birds in Iowa. They can live approximately 20-25 years in the wild. There are two behaviorally-distinct types of Canada goose populations in Iowa: resident and migratory. Although they may appear similar, they exhibit many different behaviors that affect the management of these birds. Typically resident geese are those that nest south of the Canadian border. Migratory geese nest north of the Canadian border, migrating south beginning in October and returning back to Canada by March to begin nesting.

Iowa's Canada goose population originated from 16 pairs of clipped geese the IDNR held in a 14-acre pen in Ingham Lake Wildlife Management Area in 1964 (Jones et al. 2014). Goose hunting was closed to the surrounding area and in 1967 offspring from those 16 pairs produced the first free-flying geese in Iowa in the 20th century (Jones et al. 2014). The IDNR initiated similar procedures throughout other areas of Iowa to restore viable populations of geese to the state (Jones et al. 2014). The IDNR also translocated geese throughout the state between 1983 and 2001 to help accelerate the expansion of Canada geese (Jones et al. 2014). The highest concentration of geese occur in the Prairie Pothole region of the state in the northwest and north-central Iowa, especially in prairie marshes (Jones et al. 2014).

Iowa CBC data from 1966 through 2014 shows an increasing population trend for Canada geese (NAS 2010). The IDNR monitors the Canada goose population annually since it initiated the restoration program (Jones et al. 2014). The Iowa's population objective is around 100,000 birds to allow for a sustainable hunter harvest of 60,000 geese annually (Jones et al. 2014). From aerial surveys conducted in April, the current Canada goose population in Iowa was estimated at 84,694 individuals in 2014 (Jones 2014).

Canada geese can be harvested during a regular hunting season that traditionally occurs from late September/ early October through January. They can also be harvested during a "Special September Canada Goose Season" that occurs the beginning of September in designated zones. Since migrant geese do not arrive in Iowa until after September, this hunt targets the local goose population in Iowa. Figure 3.2 depicts the total number of hunter harvested geese between 2011 and 2014 (Raftovich et al. 2012, Raftovich and Wilkins 2013, Raftovich et al. 2015).

Figure 3.2 - Canada geese harvested annually in Iowa, 2011-2014



Canada geese are migratory game birds that are afforded federal and state protection. Goose populations are managed by the USFWS and the IDNR pursuant to the MBTA, Federal Regulations (50 CFR 10, 13, 20 & 21), and other federal and state laws, regulations, policies, and court rulings. The number of Canada geese addressed in Iowa by all entities to alleviate damage from FY 2011 to FY 2015 is shown in Table 3.10. WS is also authorized to trap and translocate up to 50 Canada geese annually, but WS did not live-trap and translocate any Canada geese from FY 2011 through FY 2015. The highest authorized removal for non-WS entities (465 birds) in addition to the WS proposed removal and the average number of Canada geese harvested since 2011 (52,997 birds) was used to assess the cumulative removal.

Table 3.10 – Number of Canada geese addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	687	20 + 10 nests	6	310	6
2012	822	*	11	270	8
2013	7,195	20 + 10 nests	12	465	64
2014	17,390	20 + 10 nests	43	300 + 10 nests	40 + 2 nests
2015	17,234	500 + 10 nests	81	450	77
Average	**8,666**	**140 + 10 nests**	**31**	**359 + 2 nests**	**39 + 0 nests**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
WS' proposed removal level will have no adverse direct or indirect effects on the local Canada geese populations. WS proposed removal level would only be a fraction of a percentage of the estimated population. Additionally, WS' proposed removal of 500 individuals would only represent between 0.7% and 1.3% of the annual harvest estimates in Iowa since 2011. WS does not typically remove geese during the migratory period; however, occasionally minimal numbers of geese are removed during this period at airports for the protection of human safety. This minimal removal is not expected to have adverse direct or indirect effects on migratory goose populations.

Canada goose nests are authorized to be destroyed (which may involve treatment of eggs by oiling, puncturing, or addling to inhibit reproduction) by the USFWS through depredation permits issued to WS. Nest destruction methods (i.e., treatment of eggs in the nest) are considered non-lethal when conducted before the development of an embryo. As with the lethal removal of geese, the destruction of nests must be authorized by the USFWS. Therefore, the number of geese lethally removed and the number of nests destroyed by WS annually would occur at levels permitted by the USFWS pursuant to the MBTA.

Despite the high cumulative removal as a percentage of the state population, the population trend for Canada geese has been stable. Therefore, the potential authorized removal from all non-WS entities combined with WS proposed removal and the annual harvest is not expected to create significant impacts to Canada goose populations. Additionally, the removal of Canada geese by WS would only occur at levels authorized by the USFWS and IDNR, which ensures WS' removal and removal by all entities, including hunter harvest, would be considered to achieve the desired population management levels of Canada geese in Iowa. Provided that the goose population allows for an annual harvest, WS' removal could be considered of low magnitude when compared to the number of geese observed in Iowa annually and therefore will not hinder the ability of those interested persons to harvest geese during the hunting season.

Additionally, WS could be requested to live-capture and translocate up to 100 Canada geese. WS' proposed translocation of up to 100 Canada geese is expected to have no adverse direct effects on the geese population in Iowa. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, geese could be translocated during their nesting season, which could lower nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of Canada geese in Iowa. Canada geese captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low.*" The translocation of Canada geese can only occur when permitted by the USFWS and/or IDNR. Therefore, all removal, including live-capture and translocation by WS, is authorized and occurs at the discretion of the USFWS and IDNR, which ensures cumulative take is considered as part of population management objectives for Canada geese.

Cliff Swallow Biology and Population Impacts

IA population estimate: 400,000
WS proposed number translocated: 50
BBS IA, 1966-2013: 16.27%
BBS Eastern Tallgrass Prairie, 1966-2013: 13.79%
BBS Prairie Potholes, 1966-2013: 3.22%
BBS Prairie Hardwood Transition, 1966-2013: 4.58%
BBS Prairie Hardwood Transition, 2003-2013: 5.25%
WS removal as % of state population: 0.13%

WS proposed removal: 500 + 100 nests

BBS IA, 2003-2013: 16.27%
BBS Eastern Tallgrass Prairie, 2003-2013: 17.77%
BBS Prairie Potholes, 2003-2013: 4.43%

Cumulative removal as % of state population: 0.13%

Cliff swallows were originally found nesting in the western mountains of North America, but they have started to expand their range across the Midwest and into eastern portions on North America (Brown and Brown 1995). Cliff swallows can found nesting throughout Iowa (Brown and Brown 1995). Cliff swallows tend to nest in large colonies of up to 3,500 active nests, usually along steep canyons on vertical cliff faces, cave entrances, under bridges, in highway culverts or on other vertical structures (Brown and Brown 1995). Cliff swallows can be found in a wide variety of habitats except heavily forested areas, deserts, and alpine areas (Brown and Brown 1995). After the breeding season, cliff swallows migrate south to winter in South America (Brown and Brown 1995).

The number of cliff swallows addressed in Iowa by all entities to alleviate damage is shown in Table 3.11. WS is also authorized to trap and translocate up to 50 cliff swallows annually, but WS did not live-trap and translocate any cliff swallows during FY 2011 through FY 2015.

Table 3.11 – Number of cliff swallows addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	0	20 + 10 nests	0	0	0
2012	0	*	0	0	0
2013	0	20 + 10 nests	0	0	0
2014	0	20 + 10 nests	0	0	0
2015	100	500 + 100 nests	0	0	0
Average	**20**	**140 + 33 nests**	**0**	**0**	**0**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Since WS' proposed removal is only a fraction of a percent of the state population, WS proposed removal level will have no adverse direct or indirect effects on cliff swallow populations. The potential authorized removal from all non-WS entities combined with WS proposed removal is also only a fraction of a percent of the state population and therefore it is not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the IDNR pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for cliff swallows in Iowa.

Additionally, WS could live-capture and translocate up to 50 cliff swallows. WS' proposed translocation of up to 50 cliff swallows is expected to have no adverse direct effects on the cliff swallow population in Iowa. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, cliff swallows could be translocated during their nesting season, which could lower nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of cliff swallows in Iowa. Cliff swallows captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". The translocation of cliff swallows can only occur when permitted by the USFWS. Therefore, all removal, including live-capture and

translocation by WS, is authorized and occurs at the discretion of the USFWS, which ensures cumulative take is considered as part of population management objectives for cliff swallows.

Common Grackle Biology and Population Impacts

IA population estimate: 2,900,000
BBS IA, 1966-2013: -0.19%
BBS Eastern Tallgrass Prairie, 1966-2013: -1.53%
BBS Prairie Potholes, 1966-2013: 0.33%
BBS Prairie Hardwood Transition, 1966-2013: -2.50%
BBS Prairie Hardwood Transition, 2003-2013: -1.92%
WS removal as % of state population: 0.02%

WS proposed removal: 500 + 20 nests (and eggs)
BBS IA, 2003-2013: -0.45%
BBS Eastern Tallgrass Prairie, 2003-2013: -3.99%
BBS Prairie Potholes, 2003-2013: 0.97%

Grackles can be found throughout the year in Iowa (Peer and Bollinger 1997). Common grackles are a semi-colonial nesting species often associated with human activities. During the migration periods, common grackles can be found in mixed species flocks of blackbirds. The number of common grackles observed in areas surveyed during the CBC has shown a variable trend since 1966, although the number of observations have increased within the last three years (NAS 2010).

Since the removal of blackbird species, including common grackles, can occur without the need for a depredation permit when committing or about to commit damage, the number of common grackles lethally removed by non-WS entities in the state is currently unknown. The number of common grackles dispersed and lethally removed by WS from FY 2011 through FY 2015 can be seen in Table 3.12. Since common grackles often form mixed species flocks with other blackbird species, determining the number of birds of each species present in the mixed species flocks can be difficult. Therefore, when dispersing mixed species flocks, the number of common grackles present in the flocks was unknown. From FY 2011 to FY 2015, an annual average of 207,405 blackbirds were dispersed from mixed species flocks of blackbirds by WS (see Table 3.9).

Table 3.12 – Number of common grackles addressed in Iowa by WS, FY 2011 – FY 2015

Year	Dispersed by WS[1]	WS' Removal[1]
2011	180	13
2012	0	49
2013	20	27
2014	11,806	99
2015	12,210	93 + 3 nests
Average	**4,843**	**56 + 1 nest**

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:
WS' proposed annual removal is only a fraction of a percentage of the state population estimate. Therefore based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on common grackle populations. While non-WS removal is unknown, common grackle populations have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to common grackle populations in Iowa.

Eastern Meadowlark Biology and Population Impacts

IA population estimate: 500,000
BBS IA, 1966-2013: 0.48%
BBS Eastern Tallgrass Prairie, 1966-2013: -2.39%
BBS Prairie Potholes, 1966-2013: -0.50%
BBS Prairie Hardwood Transition, 1966-2013: -3.47%
BBS Prairie Hardwood Transition, 2003-2013: -2.75%
WS removal as % of state population: 0.01%

WS proposed removal: 50
BBS IA, 2003-2013: 1.93%
BBS Eastern Tallgrass Prairie, 2003-2013: -1.73%
BBS Prairie Potholes, 2003-2013: 0.15%
Cumulative removal as % of state population: 0.09%

The Eastern meadowlark is a migratory bird that can be found throughout the eastern states, central and southeastern Arizona, central New Mexico and Southwest Texas (Jaster et al. 2012). In Iowa, Eastern meadowlarks can be found year round throughout the state wherever there is adequate habitat (Jaster et al. 2012). Eastern meadowlarks require open habitat such as pastures, cultivated fields, barrens, orchards, golf courses, airports, reclaimed strip-mines or other types of open area for nesting and feeding (Jaster et al. 2012). During the non-breeding season Eastern meadowlarks are highly social forming flocks of up to 200 birds (Jaster et al. 2012). The number of Eastern meadowlarks observed in Iowa during the CBC has shown a decreasing trend since 1966 (NAS 2010).

The number of Eastern meadowlarks addressed in Iowa by all entities to alleviate damage is shown in Table 3.13. The highest combined authorized removal by non-WS entities (420 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.13 – Number of Eastern meadowlarks addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	204	0	31	250	1
2012	65	*	5	250	1
2013	479	0	5	420	10
2014	275	0	26	420	22
2015	499	200	18	300	30
Average	**304**	**50**	**17**	**328**	**13**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Although the Eastern meadowlark population trend has been slightly declining since 1966, WS proposed removal is only a fraction of a percent of the state population. Also, the removal of Eastern meadowlarks can only occur when permitted by the USFWS through the issuance of depredation permits. Therefore, WS proposed removal level will have no adverse direct or indirect effects on Eastern meadowlark populations. The potential authorized removal from all non-WS entities combined with WS proposed removal is also only a fraction of a percent of the state population and therefore it is not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the IDNR pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for Eastern meadowlarks in Iowa.

Eurasian Collared-Dove Biology and Population Impacts

WS proposed removal: 75

BBS IA, 1966-2013: 38.16%	BBS IA, 2003-2013: 45.91%
BBS Eastern Tallgrass Prairie, 1966-2013: 39.11%	BBS Eastern Tallgrass Prairie, 2003-2013: 40.74%
BBS Prairie Potholes, 1966-2013: 35.70%	BBS Prairie Potholes, 2003-2013: 54.83%

Eurasian collared-doves are nonnative to the United States and therefore are not afforded protection under the MBTA (70 FR 12710-12716). Eurasian collared-doves have successfully spread across much of Mexico and the United States, with the exception of the Northeastern U.S. (Romagosa 2012). Eurasian collared-doves are present year-round in Iowa (Romagosa 2012) and can typically be found among mourning doves and feral pigeons in damage situations. Eurasian collared-doves can be harvested during the mourning dove season from September to November and count towards the daily possession limit of doves. The number of Eurasian collared-doves observed during the CBC has shown an increasing trend in Iowa since 1966 (NAS 2010). The global population estimate of Eurasian collared-doves is estimated at 8,000,000 (PFSC 2013).

Eurasian collared-doves are considered a non-native species in Iowa and are afforded no protection under the MBTA. Therefore, no depredation permits, from either the USFWS or the IDNR, are needed for the removal of Eurasian collared-doves. The number of Eurasian collared-doves lethally removed by other entities to alleviate damage or threats is unknown since the reporting of Eurasian collared-dove removal is not required. The number of Eurasian collared-doves removed during the legal hunting season is also unknown. The number of Eurasian collared-doves dispersed and lethally removed by WS from FY 2011 through FY 2015 can be seen in Table 3.14. Executive Order 13112 states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law; 1) reduce invasion of exotic species and associated damages, 2) monitor invasive species populations, provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education on invasive species.

Table 3.14 – Number of Eurasian collared-doves addressed by WS in Iowa from FY 2011 - FY 2015

Year	Dispersed by WS[1]	WS' Removal[1]
2011	0	0
2012	0	0
2013	18	0
2014	75	4
2015	99	23
Average	**38**	**5**

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:

Although a state population estimate of Eurasian collared-doves was not available, WS' proposed removal would represent 0.0009% of the global population. Additionally, WS' removal of Eurasian collared-doves to reduce damage and threats would be in compliance with Executive Order 13112. Therefore, WS' proposed removal level will have no adverse direct or indirect effects on Eurasian collared-dove populations in Iowa. While non-WS removal is unknown, Eurasian collared-dove populations have historically expanded their range throughout North America. Therefore, WS does not anticipate any significant cumulative impacts to Eurasian collared-dove populations in Iowa. Given the low magnitude of WS' proposed removal along with the rapidly growing regional population of this species, WS' proposed removal is also not expected to hinder the ability of those interested persons in harvesting Eurasian collared-doves during the hunting season.

European Starling Biology and Population Impacts

IA population estimate: 1,300,000
BBS IA, 1966-2013: -1.33%
BBS Eastern Tallgrass Prairie, 1966-2013: -0.41%
BBS Prairie Potholes, 1966-2013: -1.73%
BBS Prairie Hardwood Transition, 1966-2013: -1.46%
BBS Prairie Hardwood Transition, 2003-2013: -1.43%
WS removal as % of state population: 11.5%

WS proposed removal: 150,000
BBS IA, 2003-2013: -1.01%
BBS Eastern Tallgrass Prairie, 2003-2013: -0.66%
BBS Prairie Potholes, 2003-2013: -0.81%

The European starling is an Old World passerine species introduced in the Eastern U.S. in the late 1800's. The starling is found year-round throughout Iowa (Burnett et al. 1998*a*). Starlings nest in cavities and will readily evict most native hole-nesting species. In the absence of natural cavities, they will nest in almost any enclosed area such as a street light, a mail box, or an attic (Brauning 1992). The number of European starlings observed in areas of Iowa surveyed during the CBC has shown a variable trend since 1966; however, the number of observations have slightly decreased within the last ten years (NAS 2010).

European starlings are considered a non-native species in Iowa and are afforded no protection under the MBTA. Therefore, no depredation permits, from either the USFWS or the IDNR, are needed for the removal of starlings. The number of starlings lethally removed by other entities to alleviate damage or threats is unknown since the reporting of starling removal is not required. The number of starlings dispersed and lethally removed by WS from FY 2011 through FY 2015 can be seen in Table 3.15. Executive Order 13112 states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law; 1) reduce invasion of exotic species and associated damages, 2) monitor invasive species populations, provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education on invasive species.

Table 3.15 – Number of European starlings addressed by WS in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	WS' Removal[1]
2011	40,047	65,917
2012	56,054	39,621
2013	51,666	35,970
2014	21,517	14,373
2015	25,014	31,862
Average	**38,860**	**37,549**

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:
WS' removal of European starlings to reduce damage and threats would be in compliance with Executive Order 13112. Although Iowa starling populations have been declining, WS' proposed removal is still considered a low magnitude when compared to the statewide population. WS' proposed removal level will have no adverse direct or indirect effects on European starling populations in Iowa. While non-WS removal is unknown, starling populations have historically expanded their range throughout North America and are considered a non-native species. Therefore, WS does not anticipate any significant cumulative impacts to starling populations in Iowa.

Great Blue Heron Biology and Population Impacts

WS proposed removal: 75
BBS IA, 1966-2013: 7.26%
BBS IA, 2003-2013: 7.72%
BBS Eastern Tallgrass Prairie, 1966-2013: 2.70%
BBS Eastern Tallgrass Prairie, 2003-2013: 0.95%
BBS Prairie Potholes, 1966-2013: 0.42%
BBS Prairie Potholes, 2003-2013: 2.94%
BBS Prairie Hardwood Transition, 1966-2013: -0.39%
BBS Prairie Hardwood Transition, 2003-2013: -0.52%

Great blue herons are a common widespread wading bird that can be found throughout most of North America and can be found year-around in most of the United States (Vennesland and Butler 2011). Great blue herons are considered a common summer resident across the state and the most familiar heron in Iowa (IDNR n.d.). Great blue herons nest along the rivers and lakes throughout Iowa during the summer in colonies made up of typically less than 100 nests (IDNR n.d.). In 2014, 11 active rookeries were reported to the IDNR with a total of 72 active nests surveyed (IDNR 2014). There are no current population estimates for great blue herons in Iowa; however, the population status of great blue herons is not considered to be at risk (Wires et al. 2010). The population of great blue herons in North American is estimated to be at least 83,000 individuals and the population trend has increased over the last 30 years (Wires et al. 2010).

The number of great blue herons addressed in Iowa by all entities to alleviate damage is shown in Table 3.16. The highest combined authorized removal by non-WS entities (165 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.16 – Number of great blue herons addressed in Iowa from FY 2011 - FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	5	10	0	165	16
2012	1	*	0	120	17
2013	3	10	0	110	16
2014	10	10	0	100	3
2015	4	75	1	130	26
Average	**5**	**26**	**0**	**125**	**16**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
The removal of 75 great blue herons by WS would represent 0.09% of the national population estimate (83,000 individuals). Since this is only a fraction of a percent, WS proposed removal level is expected to have no adverse direct or indirect effects on great blue heron populations. The cumulative removal by all entities in Iowa, including WS, would represent 0.29% of the national population estimate. Therefore, the potential authorized removal from all non-WS entities combined with WS proposed removal is also not expected to create adverse cumulative impacts. Additionally, all removal of great blue herons would occur within the levels permitted by the USFWS and IDNR pursuant to the MBTA. The permitting of the removal by the USFWS and the IDNR pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for great blue herons in Iowa.

Gull Biology and Population Impact Analysis

Ring-billed Gull Biology and Population Impact Analysis

WS proposed removal: 500 + 10 nests
BBS Eastern Tallgrass Prairie, 1966-2013: 14.10%
BBS Eastern Tallgrass Prairie, 2003-2013: 22.15%
BBS Prairie Potholes, 1966-2013: 0.30%
BBS Prairie Potholes, 2003-2013: 1.12%
BBS Prairie Hardwood Transition, 1966-2013: 7.85%
BBS Prairie Hardwood Transition, 2003-2013: 6.99%

Ring-billed gulls are inland nesting gulls that are colonial ground nesters on sparsely vegetated islands in large lakes with occasional colonies on mainland peninsulas and near-shore oceanic islands (Pollet et al. 2012). Ring-billed gull populations have experienced large increases in the last 50 years around the Great Lakes and in some locations, populations have increased to the point that these gulls are considered a pest (Wires et al. 2010, Pollet et al. 2012). The number of ring-billed gulls nesting on Lake Erie increased by 161% from 1976 through 2009 (Morris et al. 2011). The ring-billed gull population is estimated to be 1.7 million breeding individuals in North America, with 56,400 breeding pairs located within the Eastern Tallgrass Prairie BCR (Wires et al. 2010). Ring-billed gulls are not known to have nesting colonies in Iowa, but the number of gulls present in the state increases during migration periods and during the winter.

The numbers of ring-billed gulls observed in areas surveyed during the CBC are showing a general increasing trend in the state since 1966 (NAS 2010). The number of gulls observed during the CBC during the past five years has averaged 13,025. The number of ring-billed gulls addressed in Iowa by all entities to alleviate damage is shown in Table 3.17. The highest combined authorized removal by non-WS entities (505 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.17 – Number of ring-billed gulls addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	63	20 + 10 nests	4	240	6
2012	1,002	*	1	230	19
2013	530	20 + 10 nests	38	465	121
2014	40	20 + 10 nests	7	400	140
2015	99	100 + 10 nests	31	505	66
Average	**347**	**40 + 10 nests**	**16**	**368**	**70**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS proposed removal level will not have significant adverse direct or indirect effects on ring-billed gull populations. WS proposed removal of 500 ring-billed gulls would represent 3.8% of the average number of ring-billed gulls observed in Iowa during the CBC in the past five years. The highest combined authorized removal by non-WS entities in addition to WS' proposed removal would represent 7.7% of the average number of ring-billed gulls observed in Iowa during the CBC in the past five years. In addition, WS would only remove ring-billed gulls at levels permitted by the USFWS through the issuance of a depredation permit. The permitting of lethal removal by USFWS pursuant to the MBTA

would ensure the cumulative take of ring-billed gulls occurs within the allowable levels to achieve the desired population objectives for the species. Therefore, WS proposed removal is not expected to have adverse cumulative impacts on ring-billed gull populations.

Since ring-billed gulls typically do not nest in Iowa, the probability that WS would remove a nest is likely to be very low. However, if WS would have the need to remove a nest, impacts due to nest removal and destruction should have little adverse direct or indirect impacts on the ring-billed gull population. Although there may be reduced fecundity for the individual ring-billed gulls affected by nest destruction, this activity has no long term effect on breeding adult ring-billed gulls. The removal of nests must be authorized by the USFWS and the IDNR. Therefore, the number of nests destroyed by WS annually would occur at the discretion of the USFWS and the IDNR.

Herring Gull Biology and Population Impact Analysis

WS proposed removal: 500 + 10 nests
BBS Eastern Tallgrass Prairie, 1966-2013: -0.54%
BBS Prairie Potholes, 1966-2013: -6.26%
BBS Prairie Hardwood Transition, 1966-2013: 1.35%
BBS Prairie Hardwood Transition, 2003-2013: -0.90%
BBS Prairie Potholes, 2003-2013: -3.44%
BBS Eastern Tallgrass Prairie, 2003-2013: -4.66%

Herring gulls are the most common gulls in the Northeastern United States (Pierotti and Good 1994). In the Northeastern United States, herring gulls nest along the Great Lakes and along the Atlantic Coast (Pierotti and Good 1994). However, an estimated 60% of the continental population of herring gulls nest in the Upper Mississippi Valley and Great Lakes (UMVGL) region (Wires et al. 2010). Herring gulls winter throughout the Southeastern United States and up the Mississippi River Valley in areas with adequate open fresh or salt water (Pierotti and Good 1994). In Iowa, herring gulls can be found wintering primarily in the eastern portion of the state along the Mississippi River (Pierotti and Good 1994). Wires et al. (2010) estimated the current population of herring gulls in North America at more than 246,000 breeding individuals. Of those gulls, it is estimated that 6,400 pairs of herring gulls breed in the Eastern Tallgrass Prairie BCR (Wires et al. 2010). According to the UMVGL Waterbird Conservation Plan, herring gulls are considered a species of low concern in North America and the Eastern Tallgrass Prairie BCR (Wires et al. 2010). The number of herring gulls observed in areas surveyed in the state during the CBC showed a variable trend since 1966; however, since the 1990's, the number observed has shown a slight declining trend (NAS 2010). The number of herring gulls observed in Iowa during the CBC has average 1,810 over the past five years.

The number of herring gulls addressed in Iowa by all entities to alleviate damage is shown in Table 3.18. The highest combined authorized removal by non-WS entities (105 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.18 – Number of herring gulls addressed in Iowa from FY 2011 to FY 2015

		Removal under Depredation Permits			
Year	**Dispersed by WS[1]**	**WS Authorized Removal[2]**	**WS' Removal[1]**	**Authorized Removal for Other Entities[3]**	**Removal by Other Entities[3]**
2011	0	20 + 10 nests	0	55	3
2012	1,000	*	0	55	0
2013	0	20 + 10 nests	0	80	3
2014	5	20 + 10 nests	0	105	5
2015	4	20 + 10 nests	0	100	3
Average	**202**	**20 + 10 nests**	**0**	**79**	**3**

[1]Data reported by federal fiscal year

[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:

WS proposed removal of 500 herring gulls would represent 27.6% of the average number of herring gulls observed in Iowa during the CBC in the past five years. However, data from the CBC provides an indication of long-term trends in the number of birds observed wintering in the state and is not representative of estimates for wintering bird populations. The removal of 500 herring gulls would only represent 0.2% of the North American breeding population of herring gulls. Given the low magnitude of this proposed removal level and the fact that WS would only remove herring gulls at the discretion of the USFWS through a depredation permit, WS proposed removal level is not expected to create significant adverse direct or indirect effects on herring gull populations.

The highest combined authorized removal by non-WS entities in addition to WS' proposed removal would represent 33.4% of the average number of herring gulls observed in Iowa during the CBC in the past five years. The cumulative removal of herring gulls would only account for 0.25% of the North American breeding population of herring gulls. In addition, the removal of herring gulls can only occur when permitted by the USFWS through the issuance of depredation permits. All removal, including removal by WS, would be authorized by the USFWS and the IDNR and would occur at the discretion of the USFWS and the IDNR. Therefore, WS proposed removal is not expected to have adverse cumulative impacts on herring gull populations.

Additionally, impacts due to nest removal and destruction should have little adverse direct or indirect impacts on the herring gull population. Herring gulls are a long-lived species and have the ability to identify areas with regular human disturbance and low reproductive success, which could cause them to relocate and nest elsewhere when confronted with repeated nest failures. Although there may be reduced fecundity for the individual herring gulls affected by nest destruction, this activity has no long term effect on breeding adult herring gulls. This method would be used by WS to inhibit nesting in an area experiencing damage due to nesting activity and would be intended to disperse a nesting pair or colony of herring gulls to an area where there were no conflicts. The removal of nests must be authorized by the USFWS and the IDNR. Therefore, the number of nests destroyed by WS annually would occur at the discretion of the USFWS and the IDNR.

Franklin's Gull Biology and Population Impact Analysis

WS proposed removal: 500 + 10 nests
BBS Central BBS Region, 1966-2013: -1.59%
BBS Central BBS Region, 2003-2013: 1.09%
BBS Prairie Potholes, 1966-2013: -1.49%
BBS Prairie Potholes, 2003-2013: 1.01%
BBS Prairie Hardwood Transition, 1966-2013: -0.29%
BBS Prairie Hardwood Transition, 2003-2013: 1.21%

Franklin's gulls depend on prairie marshes in the interior of North America for breeding (Burger and Gochfeld 2009). The breeding range of Franklin's gulls does extend down into northwestern Iowa, but their numbers can increase during migration when they pass through the state (Burger and Gochfeld 2009). Locations of colony sites may shift from year to year as a result of changing water conditions (Burger and Gochfeld 2009). These colony movements make it extremely difficult to accurately monitor the population (Burger and Gochfeld 2009). Surveys which use routes at fixed locations, such as the U.S. Geological Survey's Breeding Bird Survey, are particularly unreliable for this species (Burger and Gochfeld 2009). The Franklin's gull population in North American is estimated at 1.176 million birds (Beyersbergen et al. 2009). According to the UMVGL Waterbird Conservation Plan, Franklin's gulls have a relatively stable population and are considered a species of moderate concern in North America (Wires et al. 2010).

The number of Franklin's gulls addressed in Iowa by all entities to alleviate damage is shown in Table 3.19. The highest combined authorized removal by non-WS entities (225 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.19 – Number of Franklin's gulls addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	0	20 + 10 nests	0	0	0
2012	0	*	0	0	0
2013	569	20 + 10 nests	27	215	103
2014	196	20 + 10 nests	7	225	79
2015	1,282	100 + 10 nests	86	100	86
Average	**409**	**40 + 10 nests**	**24**	**108**	**54**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS proposed removal level will not have significant adverse direct or indirect effects on Franklin's gull populations. WS proposed removal of 500 Franklin's gulls would represent 0.04% of the North American population. The removal of Franklin's gulls by WS to alleviate damage will only occur under depredation permits. The potential authorized removal from all non-WS entities combined with WS' proposed removal would only represent 0.06% of the North American population of Franklin's gulls. In addition, WS would only remove Franklin's gulls at levels permitted by the USFWS through the issuance of a depredation permit. The permitting of lethal removal by USFWS pursuant to the MBTA would ensure the cumulative take of Franklin's gulls occurs within the allowable levels to achieve the desired population objectives for the species. Therefore, WS proposed removal is not expected to have adverse cumulative impacts on Franklin's gull populations.

Additionally, impacts due to nest removal and destruction should have little adverse direct or indirect impacts on the Franklin's gull population. Although there may be reduced fecundity for the individual Franklin's gulls affected by nest destruction, this activity has no long term effect on breeding adult Franklin's gulls. The removal of nests must be authorized by the USFWS and the IDNR. Therefore, the number of nests destroyed by WS annually would occur at the discretion of the USFWS and the IDNR.

Laughing Gull Biology and Population Impact Analysis

WS proposed removal: 100 + 10 nests
BBS Central BBS Region, 1966-2013: 3.49%
BBS United States, 1966-2013: 2.94%
BBS Central BBS Region, 2003-2013: 1.16%
BBS United States, 2003-2013: 2.26%

In the United States, laughing gulls can be found from Maine south along the Atlantic and Gulf coasts during the breeding season and from North Carolina south along the Atlantic and Gulf coast during the rest of the year (Burger 2015). Laughing gulls are occasional visitors of the UMVGL region (Wires et al. 2010). The North American Waterbird Conservation Plan estimates the laughing gull population at 528,000 – 538,000

breeders in North America and considers the species to currently not be at risk (Kushlan et al. 2002). Laughing gulls are known to cause damage or threats of damage at landfills and airports (Burger 2015).

The number of laughing gulls addressed in Iowa by all entities to alleviate damage is shown in Table 3.20.

Table 3.20 – Number of laughing gulls addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	0	20 + 10 nests	0	0	0
2012	0	*	0	0	0
2013	0	20 + 10 nests	0	0	0
2014	0	20 + 10 nests	0	0	0
2015	0	20 + 10 nests	0	0	0
Average	**0**	**20 + 10 nests**	**0**	**0**	**0**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
The best available data estimates the population of laughing gulls in North America to be at least 528,000 breeders (Kushlan et al. 2002). However, because population trends indicate an increasing laughing gull population, the population is likely greater than 528,000 birds. Based on this estimate, the annual removal of up to 100 laughing gulls by WS under the proposed action alternative would represent 0.02% of the population. Based on the best scientific data as well as the increasing population trend, WS proposed removal level will have no adverse direct or indirect effects on laughing gull populations. In the last five years, USFWS has not authorized removal of laughing gulls to any non-WS entity in Iowa, and therefore the cumulative removal can only be assessed as the proposed removal by WS. However, since all removal of laughing gulls can only occur at the discretion of the USFWS when permitted by the USFWS through the issuance of depredation permits, WS does not anticipate any adverse cumulative impacts on laughing gull populations.

Additionally, impacts due to nest removal and destruction should have little adverse direct or indirect impacts on the laughing gull population. Laughing gulls are a long-lived species that have the ability to identify areas with regular human disturbance and low reproductive success, which can cause those birds to relocate and nest elsewhere when confronted with repeated nest failure. Although there may be reduced fecundity for the individual laughing gulls affected by nest destruction, this activity has no long term effect on breeding adult laughing gulls. The removal of nests must be authorized by the USFWS and the IDNR. Therefore, the number of nests destroyed by WS annually would occur at the discretion of the USFWS and the IDNR.

Great Black-backed Gull Population Impact Analysis

WS proposed removal: 100 + 10 nests
BBS United States, 1966-2013: -0.11% BBS United States, 2003-2013: 6.31%

During the breeding season, great black backed gulls can be observed along the Atlantic coast north of Virginia and along the Saint Lawrence River and the Great Lakes (Good 1998). During the non-breeding season, great black-backed gulls can be found along the Atlantic coast from Florida north into the Gulf of Saint Lawrence and inland across New England, New York, and Pennsylvania to the Great Lakes (Good

1998). The population of great black-backed gulls in North America has been estimated at 121,430 breeding individuals (Wires et al. 2010). According to the UMVGL Waterbird Conservation Plan, great black-backed gulls are considered a species of lowest concern in North America (Wires et al. 2010). Great black-backed gulls are typically found within the Eastern Tallgrass Prairie BCR during the nonbreeding season (Wires et al. 2010).

The number of great black-backed gulls addressed in Iowa by all entities to alleviate damage is shown in Table 3.21.

Table 3.21 – Number of great black-backed gulls addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	0	20 + 10 nests	0	0	0
2012	0	*	0	0	0
2013	0	20 + 10 nests	0	0	0
2014	0	20 + 10 nests	0	0	0
2015	0	20 + 10 nests	0	0	0
Average	**0**	**20 + 10 nests**	**0**	**0**	**0**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
The best available data estimates the population of great black-backed gulls in North America to be 121,430 breeding individuals (Wires et al. 2010). Based on this estimate, the annual removal of up to 100 great black-backed gulls by WS under the proposed action alternative would represent 0.08% of the population. Based on the best scientific data and since great black-backed gulls are considered a species of low concern, WS proposed removal level will have no adverse direct or indirect effects on great black-backed gull populations. In the last five years, USFWS has not authorized removal of great black-backed gulls to any non-WS entity in Iowa, and therefore the cumulative removal can only be assessed as the proposed removal by WS. However, since all removal of great black-backed gulls can only occur at the discretion of the USFWS when permitted by the USFWS through the issuance of depredation permits, WS does not anticipate any adverse cumulative impacts on great black-backed gull populations.

Additionally, impacts due to nest removal and destruction should have little adverse direct or indirect impacts on the great black-backed gull population. Since Iowa is outside of the normal breeding range for great black-backed gulls, it is unlikely that WS would remove nests. However, if WS would happen to need to remove a nest, great black-backed gulls are a long-lived species and have the ability to identify areas with regular human disturbance and low reproductive success, which could cause them to relocate and nest elsewhere when confronted with repeated nest failures. Although there may be reduced fecundity for the individual great black-backed gulls affected by nest destruction, this activity has no long term effect on breeding adult great black-backed gulls. This method would be used by WS to inhibit nesting in an area experiencing damage due to nesting activity and would be intended to disperse a nesting pair or colony of great black-backed gulls to an area where there were no conflicts. The removal of nests must be authorized by the USFWS and the IDNR. Therefore, the number of nests destroyed by WS annually would occur at the discretion of the USFWS and the IDNR.

Bonaparte's Gull Biology and Population Impacts

WS proposed removal: 100

Bonaparte's gulls breed throughout the taiga and boreal forests of Canada and Alaska (Burger and Gochfeld 2002). Bonaparte's gulls require large lakes, bogs, muskegs, and marshes within arboreal and subarctic habitats for breeding (Burger and Gochfeld 2002). Due to the breeding habits of Bonaparte's gulls, surveys such as the U.S. Geological Survey's Breeding Bird Survey, do not reliably account for the breeding population (Burger and Gochfeld 2002). The Bonaparte's gull population is estimated at 85,000 – 175,000 pairs (Burger and Gochfeld 2002). However, based on observations of flocks with more than 100,000 individuals on Lake Erie, the population is likely larger (Burger and Gochfeld 2002). Bonaparte's gulls are migrants and winter visitors throughout much of the United States during the nonbreeding season, including the UMVGL region (Burger and Gochfeld 2002, Wires et al. 2010). According to the UMVGL Waterbird Conservation Plan, Bonaparte's gulls are considered a species of moderate concern in North America (Wires et al. 2010). Bonaparte's gulls have not been observed on a yearly basis during the CBC in Iowa since 1966; however, since the 1990's, the number of years with observations has increased (NAS 2010).

The number of Bonaparte's gulls addressed in Iowa by all entities to alleviate damage is shown in Table 3.22. The highest combined authorized removal by non-WS entities (230 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.22 – Number of Bonaparte's gulls addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	0	20 + 10 nests	0	15	0
2012	0	*	0	15	0
2013	121	20 + 10 nests	7	230	109
2014	0	20 + 10 nests	0	130	88
2015	16	50 + 10 nests	4	110	4
Average	**27**	**28 + 10 nests**	**2**	**100**	**40**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
The best available data estimates the population of Bonaparte's gulls to be at least 85,000 breeding pairs (Burger and Gochfeld 2002). Based on this estimate, the annual removal of up to 100 Bonaparte's gulls by WS under the proposed action alternative would represent 0.06% of the population. Based on the best scientific data and since the population of Bonaparte's gulls is likely larger, WS proposed removal level will not have significant adverse direct or indirect effects on Bonaparte's gull populations. The removal of Bonaparte's gulls by WS to alleviate damage will only occur under depredation permits. The potential authorized removal from all non-WS entities combined with WS' proposed removal would only represent 0.19% of the Bonaparte's gull population. In addition, WS would only remove Bonaparte's gulls at levels permitted by the USFWS through the issuance of a depredation permit. The permitting of lethal removal by USFWS pursuant to the MBTA would ensure the cumulative take of Bonaparte's gulls occurs within the allowable levels to achieve the desired population objectives for the species. Therefore, WS proposed removal is not expected to have adverse cumulative impacts on Bonaparte's gull populations. Since

Bonaparte's gulls typically do not nest in Iowa, the probability that WS would remove a nest is likely to be very low, and therefore not proposed.

Horned Lark Biology and Population Impacts

IA population estimate: 300,000 WS proposed removal: 50
BBS IA, 1966-2013: -3.66% BBS IA, 2003-2013: -2.20%
BBS Eastern Tallgrass Prairie, 1966-2013: -2.11% BBS Eastern Tallgrass Prairie, 2003-2013: -2.41%
BBS Prairie Potholes, 1966-2013: -3.71% BBS Prairie Potholes, 2003-2013: -3.24%
BBS Prairie Hardwood Transition, 1966-2013: -0.64%
BBS Prairie Hardwood Transition, 2003-2013: 0.21%
WS removal as % of state population: 0.01% Cumulative removal as % of state population: 0.06%

Horned larks are present year-round throughout much of the United States, including Iowa (Beason 1995). Horned lark habitat consists of open country including short grass prairie, deserts, agricultural land, alpine habitat, and other areas with low vegetation (Beason 1995). Horned larks are a social species and therefore form flocks during the non-breeding season of up to several hundred birds (Beason 1995). These flocks may even join with other flocks of tree sparrows, dark-eyed juncos, Lapland longspurs, and snow buntings (Beason 1995). The number of horned larks observed in Iowa during the CBC has shown a variable, but stable trend since 1966 (NAS 2010).

The number of horned larks addressed in Iowa by all entities to alleviate damage is shown in Table 3.23. The highest combined authorized removal by non-WS entities (150 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.23 – Number of horned larks addressed in Iowa from FY 2011 - FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	0	0	0	150	0
2012	0	*	0	0	0
2013	45	0	11	150	13
2014	1,087	0	27	150	45
2015	476	350	20	0	0
Average	**322**	**88**	**12**	**90**	**12**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
WS' proposed removal is only a fraction of a percentage of the state population of horned larks. Therefore, WS proposed removal level is expected to have no adverse direct or indirect effects on horned lark populations. The cumulative removal by all entities in Iowa, including WS, was also only a fraction of a percentage of the state population. Additionally, all removal of horned larks would occur within the levels permitted by the USFWS and IDNR pursuant to the MBTA. Therefore, the potential authorized removal from all non-WS entities combined with WS proposed removal is not expected to create adverse cumulative impacts to horned lark populations. The permitting of the removal of horned larks by the USFWS and the

IDNR pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for horned larks in Iowa.

House Sparrow Biology and Population Impacts

IA population estimate: 5,000,000
BBS IA, 1966-2013: -2.79%
BBS Eastern Tallgrass Prairie, 1966-2013: -4.03%
BBS Prairie Potholes, 1966-2013: -3.60%
BBS Prairie Hardwood Transition, 1966-2013: -3.07%
BBS Prairie Hardwood Transition, 2003-2013: -3.69%
WS removal as % of state population: 0.08%

WS proposed removal: 4,000 + 20 nests (and eggs)
BBS IA, 2003-2013: -2.61%
BBS Eastern Tallgrass Prairie, 2003-2013: -4.21%
BBS Prairie Potholes, 2003-2013: -5.04%

House sparrows were introduced to North America from England in 1850 and have spread throughout the continent (Fitzwater 1994). House sparrows are found year-round throughout Iowa (Burnett et al. 1998*a*). Nesting locations often occur in areas of human activities and are considered "*...fairly gregarious at all times of year*" with nesting occurring in small colonies or clumped distribution (Lowther and Cink 2006). Large flocks of sparrows can also be found in the winter as birds forage and roost together. The number of house sparrows observed during the CBC had shown a general decreasing trend in Iowa since 1966 (NAS 2010).

Like European starlings, because of their negative effects on and competition with native bird species, house sparrows are considered by many wildlife biologists, ornithologists, and naturalists to be an undesirable component of North American ecosystems. Since house sparrows are an introduced, rather than native species, they are not protected by the MBTA, and removal of house sparrows does not require depredation permits issued by either the USFWS or the IDNR. Executive Order 13112 states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law; 1) reduce invasion of exotic species and associated damages, 2) monitor invasive species populations, provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education on invasive species. The number of sparrows lethally removed by non-WS entities to alleviate damage or threats in Iowa is unknown since the reporting of sparrow removal is not required. The number of house sparrows dispersed and lethally removed by WS from FY 2011 through FY 2015 can be seen in Table 3.24.

Table 3.24 – Number of house sparrows addressed by WS in Iowa from FY 2011 through FY 2015

Year	Dispersed by WS[1]	WS' Removal[1]
2011	1,310	141
2012	200	278
2013	1,540	477 + 3 nests
2014	979	559
2015	3,613	843
Average	**1,528**	**460 + 1 nest**

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:
Although the house sparrow population trend has been slightly declining since 1966, WS' removal of house sparrows to reduce damage and threats would be in compliance with Executive Order 13112. Additionally, WS' proposed removal is only a fraction of a percent of the statewide population. Therefore, WS does not expect the proposed removal to have any adverse direct or indirect effects on house sparrow populations.

Although non-WS removal is unknown, house sparrows have historically expanded their range throughout North America. Therefore, WS does not anticipate any significant cumulative impacts to sparrow populations.

Killdeer Biology and Population Impacts

WS proposed removal: 350
BBS IA, 1966-2013: 3.94%
BBS Eastern Tallgrass Prairie, 1966-2013: 2.10%
BBS Prairie Potholes, 1966-2013: -0.20%
BBS Prairie Hardwood Transition, 1966-2013: -0.57%
BBS IA, 2003-2013: 4.00%
BBS Eastern Tallgrass Prairie, 2003-2013: 1.64%
BBS Prairie Potholes, 2003-2013: 0.63%
BBS Prairie Hardwood Transition, 2003-2013: 0.05%

The killdeer is by far the most wide-spread and familiar of North American plovers because of its habitat, its tolerance of humans, its easily observed parental care, and its distinct vocalizations. The killdeer is probably more common today than at any time in its history as a result of habitat changes brought on by humans. Killdeer are statewide summer residents of Iowa and are considered the most abundant nesting shorebird in the state (IDNR 2001). Survey data from the CBC indicates the number of killdeer within the state has shown a stable trend in Iowa since 1966 (NAS 2010). The population of killdeer in the United States is estimated to be approximately 1,000,000 birds according to the IUCN (Birdlife International 2012).

The number of killdeer addressed in Iowa by all entities to alleviate damage is shown in Table 3.25. The highest combined authorized removal by non-WS entities (475 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.25 – Number of killdeer addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	337	0	25	465	5
2012	165	*	10	295	8
2013	731	0	58	475	58
2014	603	0	69	475	82
2015	1,179	350	85	395	78
Average	**603**	**88**	**49**	**421**	**46**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Requests for assistance associated with killdeer occur primarily at airports. WS would continue to assist airport personnel in identifying habitat and other attractants to killdeer on airport property. Killdeer would continue to be addressed using primarily non-lethal harassment and dispersal methods. The removal of 350 killdeer would represent 0.04% of the national population. Based on the best scientific data, WS proposed removal level will have no adverse direct effects on killdeer populations. If habitat modification and non-lethal harassment methods occur within airport property to minimize the attraction of killdeer on the property, then there could be an indirect impact on the nesting and/or breeding success of individuals that originally

nested on the airport property; this localized indirect impact would be minimal and therefore would not cause significant effects on the state killdeer populations. The cumulative removal of killdeer by all entities in Iowa, including WS, would represent 0.08% of the national population estimate. Since this is a fraction of a percent, the potential authorized removal from all non-WS entities combined with WS proposed removal is also not expected to create adverse cumulative impacts. All removal of killdeer would occur within the levels permitted by the USFWS and IDNR pursuant to the MBTA.

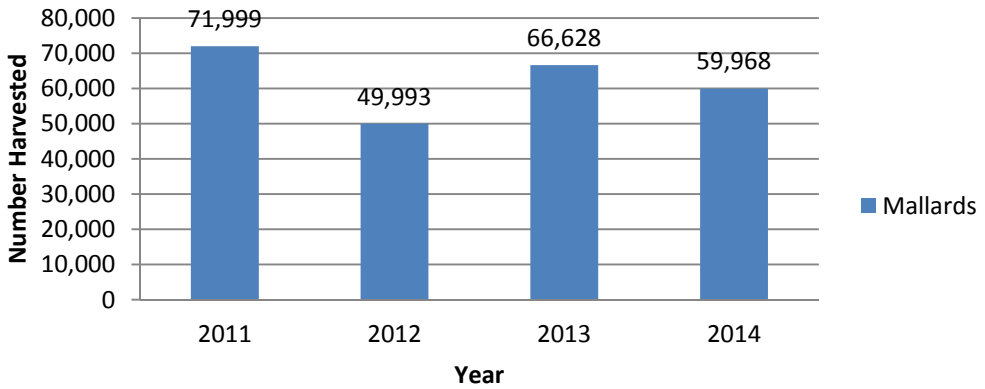
Mallard Biology and Population Impacts

WS proposed removal: 250 + 10 nests (and eggs)
WS proposed number translocated: 50
BBS IA, 1966-2013: 5.43%
BBS Eastern Tallgrass Prairie, 1966-2013: 2.53%
BBS Prairie Potholes, 1966-2013: 1.00%
BBS Prairie Hardwood Transition, 1966-2013: 0.83%
BBS Prairie Hardwood Transition, 2003-2013: 0.78%
BBS IA, 2003-2013: 5.05%
BBS Eastern Tallgrass Prairie, 2003-2013: 1.33%
BBS Prairie Potholes, 2003-2013: 2.40%

Mallards are one of the most recognizable waterfowl species and are considered the most abundant waterfowl species with the widest breeding range (Drilling et al. 2002). Mallards can be found wintering as far north as weather conditions allow. In Iowa, mallards can be found throughout the year (Drilling et al. 2002). The fall migration period begins in early August and continues through early-December with the peak occurring from early September through the end of November. The spring migration begins in early February and continues through early April with the peak occurring from mid-February through the end of May (Drilling et al. 2002).

The number of mallards observed in the state during the CBC has shown a relatively stable trend since 1966 (NAS 2010). The number of mallards observed in the state during the Mid-winter Waterfowl Survey conducted in 2015 was estimated at 36,901 (Fronczak 2015). In 2014, the number of mallards observed during the Mid-winter Waterfowl Survey in Iowa was 64,720 (Fronczak 2015). The estimated population for mallards was 11.6 ± 0.4 million in 2015, which is 51% above the long-term average (USFWS 2015*b*). Like other waterfowl species, mallards can be harvested during a regulated hunting season. Mallards can be harvested in Iowa during a split season that occurs from October through December. The estimated number of mallards harvested from 2011 to 2014 during the annual hunting season is shown in Figure 3.3 (Raftovich et al. 2012, Raftovich and Wilkins 2013, Raftovich et al. 2015).

Figure 3.3 - Mallards harvested annually in Iowa, 2011-2014



The number of mallards addressed in Iowa by WS and other entities to alleviate damage is shown in Table 3.26. The annual harvest of mallards in Iowa ranged from 49,993 to 71,999 since 2011; WS' proposed removal of 250 would only account for a range of 0.3% and 0.5% of the annual harvest. WS is also authorized to live-trap and translocate up to 50 mallards annually; however, WS has not translocated any mallards in Iowa from FY 2011 through FY 2015. The highest authorized removal for non-WS entities (205 birds) in addition to the WS proposed removal and the highest number of mallards harvested since 2011 was used to assess the cumulative removal.

Table 3.26 – Number of mallards addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	5	20 + 10 nests	2	60	2
2012	0	*	0	35	0
2013	5	20 + 10 nests	1	205	3
2014	289	20 + 10 nests	4	195	5
2015	124	250 + 10 nests	7 + 10 eggs	180	2
Average	**85**	**78 + 10 nests**	**3 + 2 eggs**	**135**	**2**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed removal level is expected to have no adverse direct or indirect effects on mallard populations within the state. The removal of 250 mallards would only represent 0.7% of the mallards observed in Iowa in the Mid-winter Waterfowl Survey conducted in 2015. The mallard population has also remained stable enough to accommodate an annual hunting season and WS's proposed removal is only a fraction of a percentage of the hunter harvest for the last five years. The removal of mallards by WS to alleviate damage will only occur when permitted by the USFWS and the IDNR pursuant to the MBTA through issuance of depredation permits. The potential authorized removal from all non-WS entities (including the annual harvest) and WS proposed removal is not expected to create adverse cumulative impacts. The removal of mallards by WS would only occur at levels authorized by USFWS and IDNR to ensure that WS' removal and the removal by all other entities, including annual hunter harvest, would be considered to maintain the desired population management levels of mallards within Iowa. WS' proposed removal is of low magnitude when compared to the annual harvest numbers and therefore is not expected to hinder the ability of those interested persons in harvesting mallards during the hunting season.

Additionally, WS could be requested to live-capture and translocate up to 50 mallards. WS' proposed translocation of up to 50 mallards is expected to have no adverse direct effects on the mallard population in Iowa. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, mallards could be translocated during their nesting season which could lower their nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of mallards in Iowa. Mallards captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". The translocation of mallards can only occur when permitted by the USFWS. Therefore, all removal, including live-capture and

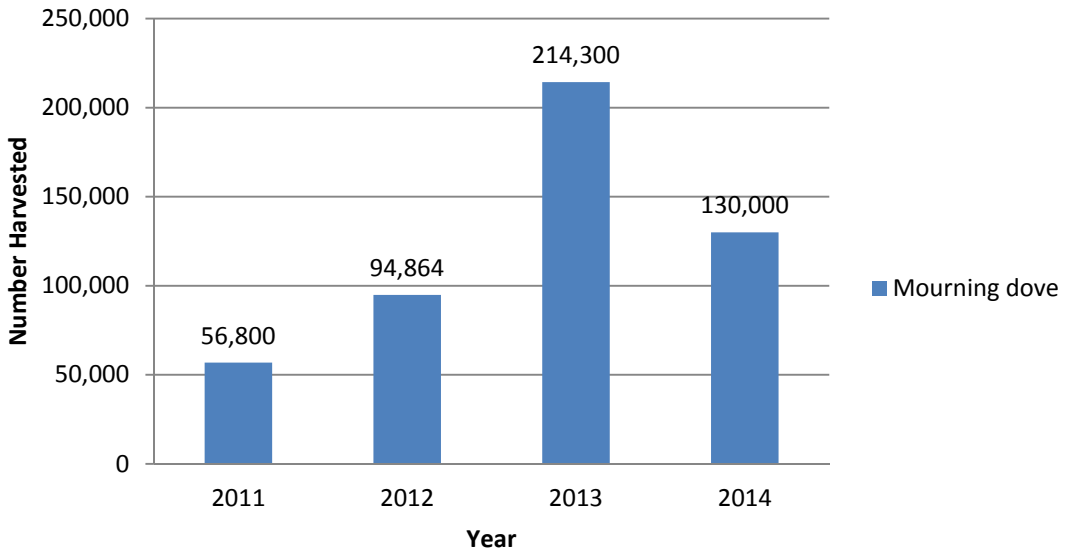
translocation by WS, is authorized and occurs at the discretion of the USFWS, which ensures cumulative take is considered as part of population management objectives for mallards.

Mourning Dove Biology and Population Impacts

IA population estimate: 2,100,000 WS proposed removal: 2,000 + 10 nests (and eggs)
WS proposed number translocated: 500
BBS IA, 1966-2013: 0.44% BBS IA, 2003-2013: -0.01%
BBS Eastern Tallgrass Prairie, 1966-2013: -0.32% BBS Eastern Tallgrass Prairie, 2003-2013: -0.83%
BBS Prairie Potholes, 1966-2013: -0.23% BBS Prairie Potholes, 2003-2013: -0.14%
BBS Prairie Hardwood Transition, 1966-2013: -0.11%
BBS Prairie Hardwood Transition, 2003-2013: -0.84%
WS removal as % of state population: 0.1% Cumulative removal as % of state population: 10.3%

Mourning doves are migratory birds with substantial populations throughout much of North America (Otis et al. 2008). Doves are common summer residents of Iowa, migrating into the state beginning in March and leaving by October (IDNR 2011). Only about 2% of the dove population stays in Iowa year-round (IDNR 2011). In Iowa, mourning doves are most commonly found in the Loess Hills in western Iowa and in the southern portion of Iowa along the Missouri border (IDNR 2011). Mourning doves prefer open habitat and can be found in rural, suburban and urban environments (Otis et al. 2008). Mourning doves are considered migratory game birds and many states have regulated hunting seasons for doves. Iowa did not have a regulated hunting season for doves until 2011 (Ver Heul 2011). Doves can be harvested within Iowa from the beginning of September to the beginning of November. The annual preliminary harvest numbers for mourning doves in Iowa from 2011 through 2014 is shown in Figure 3.4 (Raftovich et al. 2012, Raftovich and Wilkins 2013, Raftovich et al. 2015). The number of mourning doves observed during the CBC had shown a general increasing trend in Iowa since 1966 although winter observations have experienced slight declines in the past seven years (NAS 2010).

Figure 3.4 - Mourning doves harvested annually in Iowa, 2011-2014



The number of mourning doves addressed in Iowa by WS and other entities to alleviate damage is shown in Table 3.27. The annual harvest of mourning doves in Iowa ranged from 56,800 to 214,300 since 2011; WS' proposed removal of 2,000 would only account for a range of 0.9% and 3.5% of the annual harvest. The highest authorized removal for non-WS entities (440 birds) in addition to the WS proposed removal and the highest number of doves harvested since 2011 was used to assess the cumulative removal. WS is also authorized to trap and translocate up to 500 mourning doves annually, but WS did not trap and translocate any mourning doves during FY 2011 through FY 2015.

Table 3.27 – Number of mourning doves addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	2,865	50 + 10 nests	69	410	72
2012	6,637	*	51	260	16
2013	3,538	50 + 10 nests	104	430	104
2014	5,669	50 + 10 nests	108	440	59
2015	4,986	2,000 + 10 nests	118	370	115
Average	**4,739**	**538 + 10 nests**	**90**	**382**	**73**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on mourning dove populations. Local populations of mourning doves in Iowa are likely augmented by migrating birds during the winter months. Like other native bird species, the removal of mourning doves by WS to alleviate damage will only occur when permitted by the USFWS and the IDNR pursuant to the MBTA through the issuance of depredation permits. Additionally, the potential authorized removal from all non-WS entities combined with WS proposed removal and the annual harvest is not expected to create adverse cumulative impacts. The removal of mourning doves by WS would only occur at levels authorized by the USFWS and the IDNR, which ensures WS' removal and removal by all entities, including hunter harvest, would be considered to achieve the desired population management levels of mourning doves in Iowa. WS' proposed removal is only a small percentage of the annual harvest, and therefore is not expected to hinder the ability of those interested persons in harvesting mourning doves during the hunting season.

Additionally, WS could live-capture and translocate up to 500 mourning doves. WS' proposed translocation of up to 500 mourning doves is expected to have no adverse direct effects on the mourning dove population in Iowa. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, mourning doves could be translocated during their nesting season which could lower nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of mourning doves in Iowa. Mourning doves captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". The translocation of mourning doves can only occur when permitted by the USFWS. Therefore, all removal,

including live-capture and translocation by WS, is authorized and occurs at the discretion of the USFWS, which ensures cumulative take is considered as part of population management objectives for mourning doves.

Red-tailed Hawk Biology and Population Impacts

IA population estimate: 26,000
WS proposed number translocated: 200
BBS IA, 1966-2013: 3.98%
BBS Eastern Tallgrass Prairie, 1966-2013: 2.01%
BBS Prairie Potholes, 1966-2013: 2.43%
BBS Prairie Hardwood Transition, 1966-2013: 2.08%
BBS Prairie Hardwood Transition, 2003-2013: 1.78%
WS removal as % of state population: 0.38%

WS proposed removal: 100 + 10 nests (and eggs)
BBS IA, 2003-2013: 2.75%
BBS Eastern Tallgrass Prairie, 2003-2013: 0.70%
BBS Prairie Potholes, 2003-2013: 1.21%
Cumulative removal as % of state population: 0.70%

Red-tailed hawks are one of the most widespread and recognizable raptors in North America (Preston and Beane 2009). Red-tailed hawks are generally found in open areas that are interspersed with patches of trees or other perching structures (Preston and Beane 2009). These raptors can be observed year-round across Iowa, especially around fields and woodland edges (Burnett et al. 1998*a*). The number of red-tailed hawks observed in Iowa during the CBC has shown a general increasing trend since 1966 (NAS 2010). The open habitat and availability of perches makes airports attractive locations for red-tailed hawks and where most requests for assistance to alleviate threats occurs. However, red-tailed hawks can also occasionally cause economic losses to agricultural producers when they feed on domestic fowl.

As part of an integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/translocate) to disperse or move red-tailed hawks when appropriate and safe. The number of red-tailed hawks live captured and translocated from FY 2011 to FY 2015 is shown in Table 3.28. While translocation of raptors can be effective, trapping and translocation is not always possible when birds persist on the airfield or when birds return to the airport after being translocated. The number of red-tailed hawks addressed by WS and other entities in Iowa to alleviate damage is shown in Table 3.29. The highest authorized removal for non-WS entities (83 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.28 – Number of red-tailed hawks live captured and translocated in Iowa from FY 2011 to FY 2015

Year	WS Authorized Translocation[2]	WS' Translocation[1]
2011	50	0
2012	*	1
2013	50	0
2014	50	12
2015	200	45
Average	**88**	**12**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal occurs under a depredation permit issued to WS in Iowa and Missouri
* Data not available

Table 3.29 – Number of red-tailed hawks addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	146	10 + 10 nests	12	48	19
2012	157	*	12	48	7
2013	109	0 + 10 nests	2	66	2
2014	152	0 + 10 nests	8	83	20
2015	523	75 + 10 nests	45	79	45
Average	**217**	**21 + 10 nests**	**16**	**65**	**19**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
WS' proposed removal is only a fraction of a percent of the statewide population and the red-tailed hawk population continues to increase. Therefore, WS' proposed removal will have no adverse direct or indirect effects on red-tailed hawk populations. Red-tailed hawks are afforded protection under the MBTA and removal is only allowed through the issuance of a depredation permit and only at those levels stipulated in the permit. The potential authorized removal from all non-WS entities combined with WS proposed removal is also not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and IDNR pursuant to the MBTA ensures removal by WS and all other entities occurs within allowable removal levels to achieve the desired population objectives for red-tailed hawks in Iowa.

Additionally, WS could live-capture and translocate up to 200 red-tailed hawks. WS' proposed translocation of up to 200 red-tailed hawks is expected to have no adverse direct effects on the red-tailed hawk population. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, red-tailed hawks could be translocated during their nesting season which could lower nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of red-tailed hawks in Iowa. Red-tailed hawks captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". The translocation of red-tailed hawks can only occur when permitted by the USFWS. Therefore, all removal, including live-capture and translocation by WS, is authorized and occurs at the discretion of the USFWS, which ensures cumulative take is considered as part of population management objectives for red-tailed hawks.

Red-winged Blackbird Biology and Population Impacts

IA population estimate: 6,200,000
BBS IA, 1966-2013: -0.12%
BBS Eastern Tallgrass Prairie, 1966-2013: -0.83%
BBS Prairie Potholes, 1966-2013: -0.13%
BBS Prairie Hardwood Transition, 1966-2013: -1.41%
BBS Prairie Hardwood Transition, 2003-2013: -1.67%
WS removal as % of state population: 0.02%

WS proposed removal: 1,000
BBS IA, 2003-2013: -0.24%
BBS Eastern Tallgrass Prairie, 2003-2013: -2.02%
BBS Prairie Potholes, 2003-2013: 1.38%

The red-winged blackbird is one of the most abundant bird species in North America and is a commonly recognized bird that can be found in a variety of habitats (Yasukawa and Searcy 1995). The breeding habitat of red-winged blackbirds includes marshes and upland habitats from southern Alaska and Canada southward to Costa Rica extending from the Pacific to the Atlantic Coast along with the Caribbean Islands (Yasukawa and Searcy 1995). Northern breeding populations of red-winged blackbirds migrate southward during the migration periods but red-winged blackbirds are common throughout the year in states along the Gulf Coast and parts of the western United States (Yasukawa and Searcy 1995). During the migration periods, red-winged blackbirds often form mixed species flocks with other blackbird species. In Iowa, red-winged blackbirds can be found throughout the year (Yasukawa and Searcy 1995). The number of red-winged blackbirds observed during the CBC in the state has shown a stable trend since 1966 with the numbers increasing within the last five years (NAS 2010).

Since the removal of blackbird species, including red-winged blackbirds can occur without the need for a depredation permit when committing or about to commit damage, the number of red-winged blackbirds lethally removed by non-WS entities in the state is currently unknown. The number of red-winged blackbirds dispersed and lethally removed by WS from FY 2011 through FY 2015 can be seen in Table 3.30. Since red-winged blackbirds often form mixed species flocks with other blackbird species, determining the number of birds of each species present in the mixed species flocks can be difficult. Therefore, when dispersing mixed species flocks, the number of red-wing blackbirds present in the flocks was unknown. From FY 2011 to FY 2015, an annual average of 207,405 mixed species blackbirds were dispersed by WS (see Table 3.9).

Table 3.30 – Number of red-winged blackbirds addressed in Iowa by WS, FY 2011 - FY 2015

Year	Dispersed by WS[1]	WS' Removal[1]
2011	26,300	54
2012	6,470	32
2013	362,616	133
2014	18,537	45
2015	22,680	245
Average	**87,321**	**102**

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:

Based on the best scientific data, WS' proposed annual removal level will have no adverse direct or indirect effects on red-winged blackbird populations. While non-WS removal is unknown, red-winged blackbird populations have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to red-wing blackbird populations in Iowa.

Feral Pigeon Biology and Population Impacts

IA population estimate: 400,000
BBS IA, 1966-2013: -2.66%
BBS Eastern Tallgrass Prairie, 1966-2013: -3.14%
BBS Prairie Potholes, 1966-2013: -0.67%
BBS Prairie Hardwood Transition, 1966-2013: -0.27%
BBS Prairie Hardwood Transition, 2003-2013: -0.54%
WS removal as % of state population: 12.5%

WS proposed removal: 50,000 + 100 nests (and eggs)
BBS IA, 2003-2013: -2.09%
BBS Eastern Tallgrass Prairie, 2003-2013: -2.63%
BBS Prairie Potholes, 2003-2013: 0.68%

Pigeons are an introduced rather than native species and, therefore they are not protected by federal law. Pigeons are closely associated with humans as human structures and activities provide them with food and sites for roosting, loafing, and nesting (Williams and Corrigan 1994). Thus, they are commonly found around city buildings, bridges, parks, farm yards, grain elevators, feed mills, and other man-made structures (Williams and Corrigan 1994). Additionally, although pigeons are primarily grain and seed eaters, they will readily feed on garbage, livestock manure, spilled grains, insects, and any other available bits of food (Williams and Corrigan 1994). Pigeons are found throughout Iowa, especially in cities and town or at farms with livestock (Lowther and Johnston 2014). Iowa CBC data from 1966 through 2014 shows a slightly increasing population trend for wintering populations of pigeons (NAS 2010).

Since pigeons are a non-native species and are, therefore, afforded no protection under the MBTA, the removal of pigeons to alleviate damage or to reduce threats can occur without the need for a depredation permit from the USFWS or IDNR. The number of pigeons lethally removed to alleviate damage or threats in Iowa is unknown since the reporting of pigeon removal is not required. The number of feral pigeons dispersed and lethally removed by WS in Iowa from FY 2011 through FY 2015 can be seen in Table 3.31.

Table 3.31 – Number of feral pigeons addressed by WS in Iowa from FY 2011 through FY 2015

Year	Dispersed by WS[1]	WS' Removal[1]
2011	152	381
2012	493	391
2013	751	602
2014	690	3,584
2015	6,809	6,826 + 1 nest
Average	**1,779**	**2,357 + 0 nests**

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:

WS' proposed removal is of a low magnitude when compared with the statewide population and therefore will have no adverse direct or indirect effects on feral pigeon populations in Iowa. Additionally, WS' proposed pigeon damage management activities would be conducted pursuant to Executive Order 13112. The Executive Order states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law; 1) reduce invasion of exotic species and associated damages, 2) monitor invasive species populations, provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education on invasive species. Although non-WS removal is unknown, WS does not anticipate any significant adverse cumulative impacts on feral pigeon populations in Iowa.

Snow Goose Biology and Population Impacts

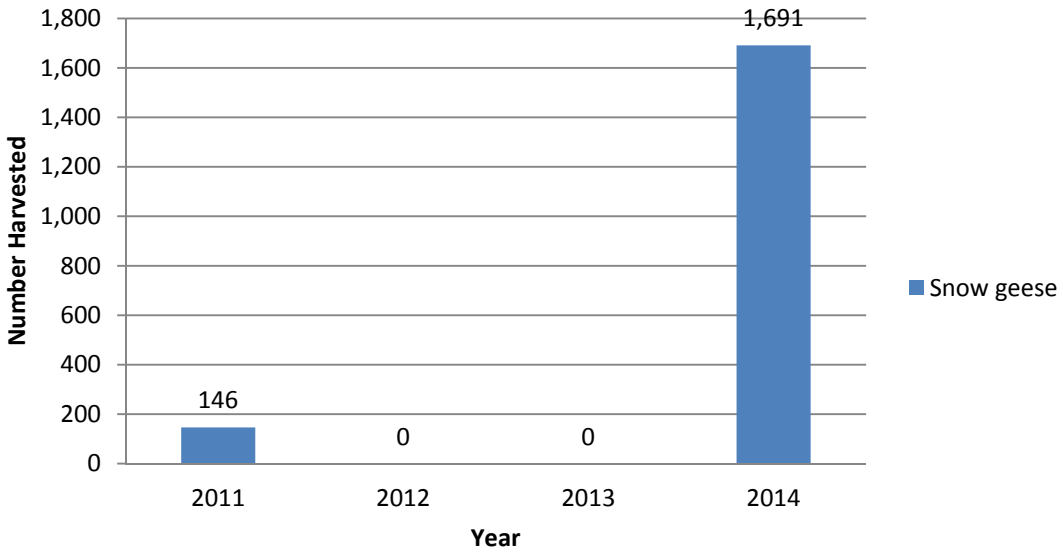
WS proposed removal: 50 + 10 nests (and eggs) WS proposed number translocated: 50

Snow geese breed across the extreme northern portions of Canada and along the Arctic coast (Mowbray et al. 2000). No breeding populations of snow geese occur in Iowa. However, snow geese are migrants through Iowa with some snow geese overwintering in the state (Mowbray et al. 2000). The fall migration period occurs from September through November with the spring migration occurring from late February through the first part of June (Mowbray et al. 2000). The number of snow geese observed during the CBC has shown a fluctuating trend since 1966 (NAS 2010). The average number of light geese, which includes snow, blue and Ross's geese, observed in Iowa during the Midwinter Waterfowl Survey from 2011 through 2015 has

been 57 geese (Fronczak 2015). Snow goose populations have increased dramatically since the mid-1970s and have reached historic highs across their breeding and wintering range (Mowbray et al. 2000).

Like many other waterfowl species, snow geese can be harvested during regulated hunting seasons, including those in Iowa. Snow geese can be harvested from October through mid-January. Snow geese can also be harvested from mid-January through mid-April with no daily bag or possession limit as part of the Light Goose Conservation Order. Figure 3.5 depicts the total number of hunter harvested snow geese between 2011 and 2014 (Raftovich et al. 2012, Raftovich and Wilkins 2013, Raftovich et al. 2015).

Figure 3.5 - Snow geese harvested annually in Iowa, 2011-2014[1]



[1]No snow geese were reported by hunters as being harvested in 2012 and 2013

The number of snow geese addressed in Iowa by WS to alleviate damage from FY 2011 to FY 2015 is shown in Table 3.32.

Table 3.32 – Number of snow geese addressed from FY 2011 through FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[1]	Authorized Removal for Other Entities[3]	Removal by Other Entities[3]
2011	0	20 + 10 nests	0	0	0
2012	0	*	0	0	0
2013	95	20 + 10 nests	0	0	0
2014	79	20 + 10 nests	0	0	0
2015	4	20 + 10 nests	0	0	0
Average	**36**	**20 + 10 nests**	**0**	**0**	**0**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:

All removal of snow geese by WS would occur only after a depredation permit had been issued by the USFWS either to WS or to the entities experiencing damage or threats of damage. If a permit was issued to an entity other than WS, WS' participation in damage management activities requiring lethal removal would occur as an agent of the cooperating entity under the depredation permit. Due to the rapidly increasing population, WS proposed removal is expected to have no adverse direct or indirect effects on snow geese populations. Additionally, WS proposed removal combined with the potential removal by non-WS entities, including annual harvest, is not expected to create adverse cumulative impacts on snow goose populations since all removal would occur at the discretion of the USFWS. WS' limited proposed removal would not hinder the ability of those interested persons to harvest snow geese during the hunting seasons.

Additionally, WS' proposed translocation of up to 50 snow geese is expected to have no adverse direct effects on the snow geese population in Iowa. Although the live-capture and translocation of this species would be a non-lethal method of reducing damage or threats of damage, geese could be translocated during their nesting season, which could lower nesting success. Reduced nesting success could occur by removing one of the adult pairs. Provided most of WS' translocations will occur outside of the nesting season, significant adverse indirect effects from translocation are not expected to occur to the population of snow geese in Iowa. Snow geese captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". The translocation of snow geese can only occur when permitted by the USFWS. Therefore, all removal, including live-capture and translocation by WS, is authorized and occurs at the discretion of the USFWS, which ensures cumulative take is considered as part of population management objectives for snow geese.

Turkey Vulture Biology and Population Impacts

IA population estimate: 40,000
BBS IA, 1966-2013: 10.03%
BBS Eastern Tallgrass Prairie, 1966-2013: 7.11%
BBS Prairie Potholes, 1966-2013: 14.84%
BBS Prairie Hardwood Transition, 1966-2013: 6.26%
BBS Prairie Hardwood Transition, 2003-2013: 7.87%
WS removal as % of state population: 0.5%

WS proposed removal: 200
BBS IA, 2003-2013: 14.86%
BBS Eastern Tallgrass Prairie, 2003-2013: 9.23%
BBS Prairie Potholes, 2003-2013: 17.77%
Cumulative removal as % of state population: 1.02%

Turkey vultures can be found throughout Mexico, across most of the United States, and along the southern tier of Canada (Kirk and Mossman 1998). Turkey vultures can be found throughout Iowa and have become increasingly common in recent years (Washburn 2008). Turkey vultures can be found in virtually all habitats but they are most abundant where forest is interrupted by open land (Kirk and Mossman 1998). Turkey vultures are social and often roost in large groups in trees, on cliffs, power lines, or on homes or other buildings (Kirk and Mossman 1998). Turkey vultures can live at least 20 years of age (Venable 1996). The number of turkey vultures observed during the CBC since 1966 shows a variable trend within Iowa (NAS 2010).

The number of turkey vultures addressed in Iowa by all entities to alleviate damage is shown in Table 3.33. The highest combined authorized removal by non-WS entities (209 birds) in addition to the WS proposed removal was used to assess the cumulative removal.

Table 3.33 – Number of turkey vultures addressed in Iowa from FY 2011 to FY 2015

Year	Dispersed by WS[1]	Removal under Depredation Permits			
		WS Authorized Removal[2]	WS' Removal[3]	Authorized Removal for Other Entities[4]	Removal by Other Entities[4]
2011	53	10	2	209	35
2012	34	*	2	204	34
2013	98	10	3	149	51
2014	70	10	13	203	103
2015	372	200	16	126	24
Average	**125**	**58**	**7**	**178**	**49**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year, WS' authorized removal under a depredation permit issued to WS in Iowa and Missouri, additional removals are allowed under permits held by cooperators and are not included in table
[3]Data reported by federal fiscal year, some of WS removal occurred under other entities' permits within the state
[4]Data reported by calendar year
* Data not available

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS proposed removal level will have no adverse direct effects on vulture populations. Direct operational assistance conducted by WS on turkey vultures could occur anytime of the year in Iowa; however, if assistance occurs in the spring, there could be an impact on the nesting and/or breeding success of individuals that are in close proximity to that area; this localized impact would be minimal and therefore would also not cause adverse indirect effects on the state turkey vulture populations. Additionally, the potential authorized removal from all non-WS entities combined with WS proposed removal is not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the IDNR pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for turkey vultures in Iowa.

Western Meadowlark Biology and Population Impacts

IA population estimate: 900,000
BBS IA, 1966-2013: -4.11%
BBS Eastern Tallgrass Prairie, 1966-2013: -5.22%
BBS Prairie Potholes, 1966-2013: -2.02%
BBS Prairie Hardwood Transition, 1966-2013: -11.42%
BBS Prairie Hardwood Transition, 2003-2013: -7.58%
WS removal as % of state population: 0.005%

WS proposed removal: 50
BBS IA, 2003-2013: -6.82%
BBS Eastern Tallgrass Prairie, 2003-2013: -7.04%
BBS Prairie Potholes, 2003-2013: -1.55%
Cumulative removal as % of state population: 0.005%

The Western meadowlark is an abundant grassland bird found throughout the western portion of North America as far east as western Tennessee and Alabama during its wintering range (Davis and Lanyon 2008). In Iowa, Western meadowlarks can be found year round throughout most of the state wherever there is adequate habitat (Davis and Lanyon 2008). Western meadowlarks prefer a wide range of open grassland habitats, but are also found in orchards, desert grassland, and along roadsides (Davis and Lanyon 2008). During fall and winter, Western meadowlarks may form flocks of up to 200 individuals, sometimes with Eastern meadowlarks (Davis and Lanyon 2008). The number of Western meadowlarks observed in Iowa during the CBC has shown a slightly declining trend since 1966 (NAS 2010). No Western meadowlarks have been lethally removed in Iowa in the past five years by any entity.

Direct, Indirect, and Cumulative Effects:

Although the Western meadowlark population trend has been slightly declining since 1966, WS proposed removal is only a fraction of a percent of the state population. Also, the removal of Western meadowlarks can only occur when permitted by the USFWS through the issuance of depredation permits. Therefore, WS proposed removal level will have no adverse direct or indirect effects on Western meadowlark populations. The potential authorized removal from all non-WS entities combined with WS proposed removal is also not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the IDNR pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for Western meadowlarks in Iowa.

Yellow-headed Blackbird Biology and Population Impacts

IA population estimate: 11,000
BBS IA, 1966-2013: 2.04%
BBS Eastern Tallgrass Prairie, 1966-2013: -4.32%
BBS Prairie Potholes, 1966-2013: 0.62%
BBS Prairie Hardwood Transition, 1966-2013: -3.29%
BBS Prairie Hardwood Transition, 2003-2013: -5.03%
WS removal as % of state population: 0.9%

WS proposed removal: 100
BBS IA, 2003-2013: 4.81%
BBS Eastern Tallgrass Prairie, 2003-2013: -2.45%
BBS Prairie Potholes, 2003-2013: 0.66%

The breeding habitat of yellow-headed blackbirds includes deep-water, emergent wetlands within prairie and mountain meadows in the Western and Central United States and Canada (Twedt and Crawford 1995). Wintering populations of yellow-headed blackbirds range from the southern portion of Arizona, New Mexico, and Texas south through Mexico (Twedt and Crawford 1995). Breeding populations of yellow-headed blackbirds migrate southward during the migration period during late August and early September and return north in spring during April and May (Twedt and Crawford 1995). During the migration periods, small flocks of yellow-headed blackbirds form mixed species flocks with red-winged blackbirds and other blackbird species, congregating in staging areas (Twedt and Crawford 1995). The number of yellow-headed blackbirds observed during the CBC in the state has shown a variable, but slightly decreasing trend since 1966 (NAS 2010).

Since the removal of blackbird species, including yellow-headed blackbirds can occur without the need for a depredation permit when committing or about to commit damage, the number of yellow-headed blackbirds lethally removed by non-WS entities in the state is currently unknown. The number of yellow-headed blackbirds dispersed and lethally removed by WS from FY 2011 through FY 2015 can be seen in Table 3.35. Since yellow-headed blackbirds often form mixed species flocks with other blackbird species, determining the number of birds of each species present in the mixed species flocks can be difficult. Therefore, when dispersing mixed species flocks, the number of yellow-headed blackbirds present in the flocks was unknown. From FY 2011 to FY 2015, an annual average of 207,405 mixed species blackbirds were dispersed by WS (see Table 3.9).

Table 3.34 – Number of yellow-headed blackbirds addressed in Iowa by WS, FY 2011 - FY 2015

Year	Dispersed by WS[1]	WS' Removal[1]
2011	0	0
2012	0	0
2013	0	1
2014	0	0
2015	48	2
Average	**10**	**1**

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed annual removal level will have no adverse direct or indirect effects on yellow-headed blackbird populations. While non-WS removal is unknown, yellow-headed blackbird populations have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to yellow-headed blackbird populations in Iowa.

Primarily Live-capture and Translocation Species (Limited Lethal Removal)

Several species within Iowa, including sharp-shinned hawks, Cooper's hawks, rough-legged hawks, ferruginous hawks, Northern harriers, merlins, nighthawks, great horned owls, bank swallows, tree swallows, and rough-winged swallows, have the potential to pose threats to aviation safety, and most requests WS would receive for these species would be to alleviate the threats these species pose to aircraft. WS would address those requests for assistance primarily with non-lethal dispersal methods and through live-capture and translocation of individuals. Based on the requests for assistance received previously and in anticipation of receiving additional requests for assistance, WS proposes up to 50 each of sharp-shinned hawks, Cooper's hawks, Northern harriers, bank swallows, tree swallows, and rough-winged swallows and up to 25 each of rough-legged hawks, ferruginous hawks, nighthawks, great horned owls, and merlins could be live-captured and translocated annually under the proposed action. From FY 2011 to FY 2015, WS captured and translocated five Cooper's hawks in FY 2015, one rough-legged hawk in FY 2014, and 11 great horned owls (one in FY 2012, four in FY 2014, and six in FY 2015).

Lethal removal would only be conducted on these species when immediate threats to human safety occur, such as when banded individuals have returned to the same airport twice after translocation or when habituation to non-lethal methods occurs. In addition, WS could also be requested to employ lethal methods under the proposed action alternative to address damage or threats of damage associated with those species, including damage to property, agricultural resources, and livestock. The number of each species dispersed by WS in Iowa from FY 2011 to FY 2015 can be seen in Table 3.35. WS has not lethally removed any of these species from FY 2011 through FY 2015 with the exception of two rough-legged hawks in FY 2015. Based on previous requests for assistance received by WS, as well as anticipated requests, no more than 20 individuals and 10 nests (and eggs) each of Cooper's hawks, great horned owls, tree swallows, and rough-winged swallows and no more than 10 individuals and 10 nests with eggs of rough-legged hawks could be removed annually by WS. Additionally, WS anticipates that no more than 20 bank swallows and 10 sharp-shinned hawks could be removed annually by WS.

Table 3.35 – Number of individuals dispersed by WS in Iowa from FY 2011 to FY 2015

Species	Fiscal Year[1]					Average
	2011	2012	2013	2014	2015	
Cooper's hawk	0	0	0	0	1	0
Sharp-shinned hawk	0	0	0	1	1	0
Rough-legged hawk	0	0	0	38	20	12
Ferruginous hawk	0	0	0	0	0	0
Northern harrier	0	0	3	15	4	4
Merlin	0	0	0	0	0	0
Great horned owl	0	0	0	0	0	0
Bank swallow	0	0	0	10	100	22
Tree swallow	0	0	0	0	26	5
Rough-winged swallow	0	0	0	0	0	0

[1]Data reported by federal fiscal year

Direct, Indirect, and Cumulative Effects:

Cooper's hawks, sharp-shinned hawks, rough-legged hawks, great horned owls, bank swallows, tree swallows, and rough-winged swallows are not expected to be removed by WS at any level that would cause adverse direct effects on the population of those species. These species listed are afforded protection under the MBTA and removal is only allowed through the issuance of a depredation permit and only at those levels stipulated in the permit. Therefore, those birds would be removed in accordance with applicable state and federal laws and regulations authorizing removal of migratory birds and their nests and eggs, including the USFWS and the IDNR permitting processes.

Although the live-capture and translocation of these species would be a non-lethal method of reducing damage or threats of damage, these species could be translocated during their nesting season which could lower nesting success. Reduced nesting success could occur by removing one of the adult pairs of any of these species. Provided most of WS' translocation will occur outside of the nesting season, significant adverse indirect effects are not expected to occur to the nesting success of Cooper's hawks, sharp-shinned hawks, Northern harriers, great horned owls, bank swallows, tree swallows, and rough-winged swallows in Iowa. Individuals captured and translocated could be banded for identification purposes using United States Geological Survey approved metal leg-bands appropriate for the species. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*".

The USFWS, as the agency with management responsibility for migratory birds, could impose restrictions on depredation removal as needed to assure cumulative removal does not adversely affect the continued viability of populations. Since removal of these species, including live-capture and translocation, can only occur when permitted by the USFWS and IDNR pursuant to the MBTA through the issuance of depredation permits, all removal, including removal by WS, would only occur at levels authorized by the USFWS and the IDNR which ensures there are no adverse cumulative impacts on the population of these species in Iowa. This would assure that cumulative impacts on these bird populations would have no significant adverse impact on the quality of the human environment.

Additional Target Species

Some target species have been lethally removed in small numbers by WS and have included no more than 20 individuals and/or no more than 20 nests annually. Based on previous requests for assistance, anticipation of future requests for assistance, and the removal levels necessary to alleviate those requests for assistance, no more than 20 individuals and 20 nests (and eggs) each of cattle egrets, wood ducks, Northern shovelers, redheads, ring-necked ducks, free ranging or feral domestic waterfowl, mute swans, greater white-fronted

geese, lesser scaups, Lapland longspurs, green herons, wild turkeys, ring-necked pheasants, double-crested cormorants, purple finches, house finches, Northern mockingbirds, barred owls, bobolinks, chipping sparrows, dark-eyed juncos, dickcissels, Eastern kingbirds, Western kingbirds, Northern flickers, red-bellied woodpeckers, downy woodpeckers, and hairy woodpeckers, and no more than 10 individuals and 10 nests (and eggs) of pileated woodpeckers could be removed annually by WS. It is also anticipated that 20 red-headed woodpeckers could be removed annually by WS.

In addition, WS could conduct only non-lethal harassment methods to disperse the following species: barn owls, black terns, burrowing owls, Forster's terns, great egrets, greater yellowlegs, marbled godwits, ospreys, short-billed dowitchers, short-eared owls, snow buntings, Swainson's hawks, trumpeter swans, and upland sandpipers. However, WS does not anticipate lethally removing any of these species to alleviate damage or threats of damage. It is unlikely that significant adverse direct or indirect effects will occur to these species populations by implementation of only non-lethal methods by WS.

Wild turkeys, ring-necked pheasants, greater white-fronted geese, wood ducks, lesser scaups, Northern shovelers, redheads, and ring-necked ducks maintain sufficient population densities to allow for annual harvest seasons. The proposed removal of up to 20 individuals and up to 20 nests under the proposed action would be a minor component of the annual removal of these species during the regulated hunting seasons.

WS analyzed the removal of pileated woodpeckers as an indicator of no significant direct or cumulative adverse impacts to these additional species. Pileated woodpeckers represent the most sensitive species included in this group that WS may lethally remove based on abundance and available habitat. Therefore, if pileated woodpeckers are not adversely impacted by WS' removal, then no other species in this group should suffer negative impacts to their statewide populations.

Pileated Woodpecker Biology and Population Impacts

IA population estimate: 300
BBS IA, 1966-2013: 10.39%
BBS Eastern Tallgrass Prairie, 1966-2013: 4.69%
BBS Prairie Potholes, 1966-2013: 4.56%
BBS Prairie Hardwood Transition, 1966-2013: 3.08%
BBS Prairie Hardwood Transition, 2003-2013: 3.11%
WS removal as % of state population: 3.3 %

WS proposed removal: 10 + 10 nests (and eggs)
BBS IA, 2003-2013: 9.28%
BBS Eastern Tallgrass Prairie, 2003-2013: 6.60%
BBS Prairie Potholes, 2003-2013: 5.34%

Pileated woodpeckers occur across much of North America in suitable deciduous, coniferous, and mixed forest habitats (Bull and Jackson 2011). Pileated woodpecker populations are thought to be limited most by the availability of late-successional forests with trees large enough to support adequately sized nesting cavities (Bull and Jackson 2011). Pileated woodpeckers are occasionally known to excavate on human dwellings (Bull and Jackson 2011).

Direct, Indirect, and Cumulative Effects:
WS' proposed removal is only a small percent of the statewide population and therefore will have no adverse direct or indirect effects on pileated woodpecker populations. The USFWS has not issued any depredation permits to non-WS entities for pileated woodpeckers from FY 2011 through FY 2015. The removal of pileated woodpeckers can only occur when permitted by the USFWS pursuant to the MBTA. Therefore, WS does not anticipate any significant cumulative impacts to pileated woodpecker populations in Iowa.

Summary
Evaluation of WS' activities relative to wildlife populations indicated that program activities will likely have no cumulative adverse effects on populations in Iowa. WS' actions would be occurring simultaneously, over

time, with other natural processes and human-generated changes that are currently taking place. Those activities include, but are not limited to:

- Natural mortality of wildlife
- Human-induced mortality through private damage management activities
- Human and naturally induced alterations of wildlife habitat
- Annual and perennial cycles in population densities

All those factors play a role in the dynamics of wildlife populations. In many circumstances, requests for assistance arise when some or all of those elements have contrived to elevate target species populations or place target species at a juncture to cause damage to resources. WS' actions to minimize or eliminate damage are constrained as to scope, duration and intensity, for the purpose of minimizing or avoiding impacts to the environment. WS evaluates damage occurring, including other affected elements and the dynamics of the damaging species, determines appropriate strategies to minimize effects on environmental elements, applies damage management actions, and subsequently monitors and adjusts/ceases damage management actions (Slate et al. 1992). This process allows WS to take into consideration other influences in the environment, such as those listed above, in order to avoid cumulative adverse impacts on target species.

Wildlife Disease Surveillance and Monitoring

The ability to efficiently conduct surveillance for and detect diseases is dependent upon rapid detection of the pathogen if it is introduced. Effective implementation of a surveillance system would facilitate planning and execution at regional and state levels, and coordination of surveillance data for risk assessment. It would also facilitate partnerships between public and private interests, including efforts by federal, state, and local governments as well as non-governmental organizations, universities, and other interest groups.[8] Current information on disease distribution and knowledge of the mixing of birds in migratory flyways has been used to develop a prioritized sampling approach based on the major North American flyways. Surveillance data from all of those areas are incorporated into national risk assessments, preparedness and response planning to reduce the adverse impacts of a disease outbreak in wild birds, poultry, or humans.

To provide the most useful information and a uniform structure for surveillance, five strategies for collecting samples in birds have been proposed (USDA 2005*b*). Those strategies include:

Investigation of Illness/Death in Birds: A systematic investigation of illness and death in wild birds may be conducted to determine the cause of the illness or the cause of death in birds. This strategy offers the best and earliest probability of detection if a disease is introduced by migratory birds into the United States. Illness and death involving wildlife are often detected by, or reported to natural resource agencies and entities. This strategy capitalizes on existing situations of birds without additional birds being handled or killed.

Surveillance in Live Wild Birds: This strategy involves sampling live-captured, apparently healthy birds to detect the presence of a disease. Bird species that represent the highest risk of being exposed to, or infected with the disease because of their migratory movement patterns (USDA 2005*b*), or birds that may be in contact with species from areas with reported outbreaks would be targeted. Where possible, this sampling effort would be coordinated with local projects that already plan on capturing and handling the desired bird species. Coordinating sampling with ongoing projects currently being conducted by state and federal agencies, universities, and others maximizes use of resources and minimizes the need for additional bird capture and handling.

[8]Data collected by organizations/agencies conducting research and monitoring will provide a broad species and geographic surveillance effort.

Surveillance in Hunter-harvested Birds: Check stations for waterfowl hunting or other harvestable bird species provide an opportunity to sample birds to determine the presence of a disease, and supplement data collected during surveillance of live wild birds. Sampling of hunter-killed birds would focus on hunted species that are most likely to be exposed to a disease, have relatively direct migratory pathways from those areas to the United States, and commingle in staging areas with species that could bring the virus from other parts of the world.

Sentinel Species: Waterfowl, gamefowl, and poultry flocks reared in backyard facilities may prove to be valuable for early detection and used for surveillance of diseases. Sentinel duck flocks may also be placed in wetland environments where they are potentially exposed to and infected with disease agents as they commingle with wild birds.

Environmental Sampling: Many avian diseases are released by waterfowl through the intestinal tract and can be detected in both feces and the water in which the birds swim, defecate, and feed. This is the principal means of disease spread to new birds and potentially to poultry, livestock, and humans. Analysis of water and fecal material from certain habitats can provide evidence of diseases circulating in wild bird populations, the specific types of diseases, and pathogenicity. Monitoring of water and/or fecal samples gathered from habitat is a reasonably cost effective, technologically achievable means to assess risks to humans, livestock, and other wildlife.

Direct, Indirect, and Cumulative Effects:
Under the disease sampling strategies listed above that could be implemented to detect or monitor avian diseases in the United States, WS' implementation of those sampling strategies would not create adverse direct or indirect effects on avian populations in the state. Sampling strategies that could be employed involve sampling live-captured birds that could be released on site after sampling occurs. The sampling (e.g., drawing blooding, feather sample, fecal sample) and the subsequent release of live-captured birds would not result in adverse direct or indirect effects since those birds are released unharmed on site. In addition, sampling of sick, dying, or hunter harvested birds would not result in the additive lethal removal of birds that would not have already occurred in the absence of a disease sampling program. Therefore, the sampling of birds for diseases would not create adverse cumulative impacts on the populations of any of the birds addressed in this EA nor would result in any removal of birds that would not have already occurred in the absence of disease sampling (e.g., hunter harvest).

Alternative 2 - Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, WS would not use lethal methods to resolve bird damage problems. Although some unintentional mortality might result from the use of bird capture devices like mist nets, these incidents are likely to be rare and would have negligible impacts on target species populations. Individuals, agencies and organizations would still be able to obtain permits for lethal bird removal from the USFWS and IDNR. Efforts to reduce or prevent damage and risks to livestock and/or human health and safety risks would likely be higher than with Alternative 1. If BDM is conducted by individuals with limited training or experience, it is possible that additional birds may be removed in the course of attempts to resolve damage problems.

Direct, Indirect, and Cumulative Effects:
Depending upon the experience, training, and methods available to the individuals conducting the BDM, potential adverse direct and indirect impacts on target bird populations would likely be the same or increase than with Alternative 1. However, for the same reasons shown under Alternative 1, it is unlikely that significant adverse direct or indirect effects would occur to target species' by implementation of this alternative. Direct and indirect impacts and potential risks of illegal toxicant use would be greater under this alternative than Alternative 1. DRC-1339 and Alpha-chloralose are currently only available for use by WS employees and would not be available under this alternative, although Starlicide, a product similar to DRC-

1339 would be available for use by licensed pesticide applicators. It is possible that frustration caused by the inability to reduce damage by the public would lead to illegal use of toxicants, which could increase adverse direct, indirect, or cumulative effects, however to an unknown degree. Because WS would be able to provide assistance with non-lethal BDM, risks of adverse cumulative impacts from actions by non-WS entities are lower than with Alternative 3.

Alternative 3 – No Bird Damage Management Conducted by WS

Under this alternative, WS would not conduct bird damage management activities. WS would have no direct involvement with any aspect of addressing damage caused by birds and would provide no technical assistance. No removal of birds by WS would occur. Birds could continue to be lethally removed to resolve damage and/or threats occurring either through depredation permits issued by the USFWS, under the blackbird depredation order, under the control order for Muscovy ducks, during the regulated hunting seasons, or in the case of non-native species, removal could occur anytime using legally available methods. Management actions taken by non-federal entities would be considered the *environmental status quo*.

Direct, Indirect, and Cumulative Effects:
Local bird populations could decline, stay the same, or increase depending on actions taken by those persons experiencing bird damage. The direct and indirect effects on bird populations would be variable and unknown. Some resource/property owners may take illegal, unsafe, or environmentally harmful actions against local populations of birds out of frustration or ignorance. While WS would provide no assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in direct or indirect impacts similar to the proposed action.

Since birds would still be removed under this alternative, the potential direct, indirect, and cumulative effects on the populations of those bird species would be similar among all the alternatives for this issue. WS' involvement would not be additive to removal that could occur since the cooperator requesting WS' assistance could conduct bird damage management activities without WS' direct involvement. Therefore, any actions to resolve damage or reduce threats associated with birds could occur by other entities despite WS' lack of involvement under this alternative, and therefore the cumulative impact on those bird species could be similar to Alternative 1.

Issue 2 - Effects on Non-target Wildlife Species Populations, Including T&E Species

A concern is often raised about the potential impacts to non-target species, including T&E species, from the use of methods to resolve damage caused by birds. The potential effects on the populations of non-target wildlife species, including T&E species, are analyzed below.

Alternative 1 - Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)

The potential adverse effects to non-targets occur from the employment of methods to address bird damage. Under the proposed action, WS could provide both technical assistance and direct operational assistance to those persons requesting assistance. The use of non-lethal methods as part of an integrated direct operational assistance program would be similar to those risks to non-targets discussed in the other alternatives.

WS personnel are experienced and trained in wildlife identification and to select the most appropriate methods for taking targeted animals and excluding non-target species. To reduce the likelihood of capturing non-target wildlife, WS would employ the most selective methods for the target species, would employ the use of attractants that are as specific to target species as possible, and determine placement of methods to avoid exposure to non-targets. SOPs to prevent and reduce any potential adverse impacts on non-targets are

discussed in Chapter 2 of this EA. Despite the best efforts to minimize non-target removal during program activities, the potential for adverse impacts to non-targets exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety. WS would monitor the removal of non-target species to ensure program activities or methodologies used in bird damage management do not create direct effects on non-target populations. Methods available to resolve and prevent bird damage or threats when employed by trained and knowledgeable personnel are selective for target species. WS would annually report to the USFWS and/or the IDNR any non-target removal to ensure removal by WS is considered as part of management objectives established.

Direct, Indirect, and Cumulative Effects:
While every precaution is taken to safeguard against taking non-targets during operational use of methods and techniques for resolving damage and reducing threats caused by birds, the use of such methods can result in the incidental removal of unintended species. Those occurrences are rare and should not affect the overall populations of any species under the proposed action. WS' removal of non-target species during activities to reduce damage or threats to human safety associated with birds is expected to be extremely low to non-existent. From FY 2011 through FY 2015, the WS program in Iowa was responsible for the unintentional removal of one wild turkey in FY 2015; otherwise, WS has not unintentionally removed any other birds during this time. The potential impacts to non-targets are similar to the other alternatives and are considered to be minimal to non-existent.

Non-lethal methods have the potential to cause adverse direct effects to non-targets primarily through exclusion, harassment, and dispersal. The use of auditory and visual dispersal methods used to reduce damage or threats caused by birds are also likely to disperse non-targets in the immediate area the methods are employed. Therefore, non-targets may be dispersed from an area while employing non-lethal dispersal techniques. However, like target species, the potential direct impacts on non-target species are expected to be temporary with target and non-target species often returning after the cessation of dispersal methods. Non-lethal methods would not be employed over large geographical areas or applied at such intensity that essential resources (e.g., food sources and habitat) would be unavailable for extended durations or over a wide geographical scope that long-term adverse effects would occur to a species' population. Non-lethal methods are generally regarded as having minimal direct impacts on overall populations of wildlife since individuals of those species are unharmed. Any exclusionary device erected to prevent access of target species also potentially excludes species that are not the primary reason the exclusion was erected; therefore, if the area is large enough, adverse indirect effects on non-target species may occur, but these are expected to be minimal. The use of non-lethal methods would not have significant adverse impacts on non-target populations under any of the alternatives.

Other non-lethal methods available for use under this alternative include live traps, nets, nest/egg destruction, translocation, and repellents. Live traps (e.g., cage traps, walk-in traps, decoy traps) and nets restrain wildlife once captured and are considered live-capture methods. Live traps have the potential to capture non-target species. Trap and net placement in areas where target species are active and the use of target-specific attractants would likely minimize the capture of non-targets. If traps and nets are attended to appropriately, most non-targets captured can be released on site unharmed. Therefore, no direct effects are expected on non-targets.

Only those repellents registered with the EPA pursuant to the FIFRA and registered for use in the state would be recommended and used by WS under this alternative. Therefore, the use and recommendation of repellents would not have negative direct or indirect effects on non-target species when used according to label requirements. Most repellents for birds are derived from natural ingredients that pose a very low risk to non-targets when exposed to or when ingested. Two chemicals commonly registered with the EPA as bird repellents are methyl anthranilate and anthraquinone. Methyl anthranilate naturally occurs in grapes. Methyl anthranilate has been used to flavor food, candy, and soft drinks. Anthraquinone naturally occurs in plants

like aloe. Anthraquinone can be used to make dye. Both products claim to be unpalatable to many bird species. Several products are registered for use to reduce bird damage containing either methyl anthranilate or anthraquinone. Formulations containing those chemicals are liquids that are applied directly to susceptible resources. Similarly, when used in accordance with the label requirements, the use of Avitrol would also not create adverse direct effects on non-targets when used according to label instructions.

Immobilizing drugs are applied through hand-baiting that targets specific individuals or groups of target species. Therefore, immobilizing drugs are only applied after identification of the target occurs prior to application. Pre-baiting and acclimation of the target waterfowl occurs prior to the application of alpha chloralose, which allows for the identification of non-targets that may visit the site prior to application of the bait. All unconsumed bait is retrieved after the application session has been completed. Since sedation occurs after consumption of the bait, personnel are present on site at all times to retrieve waterfowl. This constant presence by WS' personnel would allow for continual monitoring of the bait to ensure non-targets are not present. Based on the use pattern of alpha chloralose by WS, no adverse direct effects to non-targets would be expected from the use of alpha chloralose.

WS would also employ and/or recommend lethal methods under the proposed action alternative to alleviate damage. Lethal methods available for use to manage damage caused by birds under this alternative would include shooting and DRC-1339. In addition, birds could be euthanized after being live-captured or immobilized using drugs. Available methods and the application of those methods to resolve bird damage is further discussed in Appendix B. The use of firearms is essentially selective for target species since animals are identified prior to application; therefore, no adverse direct or indirect effects to non-targets would be anticipated from use of this method. The euthanasia of birds by WS' personnel would be conducted in accordance with WS Directive 2.505. Euthanasia would be limited to AVMA recommended techniques described in Chapter 2 after birds have been live-captured or chemically immobilized. Since live-capture and chemical immobilization of birds occurs prior to the administering of euthanasia techniques, no adverse direct or indirect effects to non-targets would occur under this alternative. WS' recommendation that birds be harvested during the regulated season by private entities to alleviate damage would not increase risks to non-targets.

During the migration period, eagles occur throughout the United States and parts of Mexico (Buehler 2000). Under the Bald and Golden Eagle Act, activities that could result in the "take" of eagles cannot occur unless the USFWS allow those activities to occur through the issuance of a permit. Take could occur through purposeful take (e.g., harassing an eagle from an airport using pyrotechnics to alleviate aircraft strike hazards) or non-purposeful take (e.g., unintentionally capturing an eagle in a trap). Both purposeful take and non-purposeful take require a permit from the United States Fish and Wildlife Service (see 50 CFR 22.26, 50 CFR 22.27). In those cases where purposeful take could occur or where there is a high likelihood of non-purposeful take occurring, WS would apply for a permit for those activities.

However, routine activities conducted by WS' personnel under the proposed action alternative could occur in areas where bald eagles were present, which could disrupt the current behavior of an eagle or eagles that were nearby during those activities. As discussed previously, "take" as defined by the Bald and Golden Eagle Protection Act, include those actions that "disturb" eagles. Disturb has been defined under 50 CFR 22.3 as those actions that cause or are likely to cause injury to an eagle, a decrease in productivity, or nest abandonment by substantially interfering with their normal breeding, feeding, or sheltering behavior.

WS has reviewed those methods available under the proposed action alternative and the use patterns of those methods. The routine measures that WS conducts would not meet the definition of disturb requiring a permit for the non-purposeful take of bald eagles. The USFWS states, "Eagles are unlikely to be disturbed by routine use of roads, homes, or other facilities where such use was present before an eagle pair nesting in a given area. For instance, if eagles build a nest near your existing home, cabin, or place of business you do not

need a permit" (USFWS 2009*b*). Therefore, activities that are species specific and are not of a duration and intensity that would result in disturbance as defined by the Act would not result in non-purposeful take. Activities, such as walking to a site, discharging a firearm, or riding an ATV along a trail, generally represent short-term disturbances to sites where those activities take place. WS would conduct activities that were located near eagle nests using the National Bald Eagle Management Guidelines (USFWS 2007*b*). The categories that would encompass most of these activities are Category D (Off-road vehicle use), Category F (Non-motorized recreation and human entry), and Category H (Blasting and other loud, intermittent noises). These categories generally call for a buffer of 330 to 660 feet for category D and F, and a ½-mile buffer for category H. WS would take active measures to avoid disturbance of bald eagle nests by following the National Bald Eagle Management Guidelines. Other routine activities conducted by WS do not meet the definition of "disturb" as defined under 50 CFR 22.3. Those methods and activities would not cause injuries to eagles and would not substantially interfere with the normal breeding, feeding, or sheltering behavior of bald eagles.

A common concern regarding the use of DRC-1339 is the potential non-target risks. All label requirements of DRC-1339 would be followed to minimize non-target hazards. As required by the label, all potential bait sites are pre-baited and monitored for non-target use as outlined in the pre-treatment observations section of the label. If non-targets are observed feeding on the pre-bait, the plots are abandoned and no treatment baiting would occur at those locations. Treated bait is mixed with untreated bait per label requirements when applied to bait sites to minimize the likelihood of non-targets finding and consuming bait that has been treated. The bait type selected can also limit the likelihood that non-target species would consume treated bait since some bait types are not preferred by non-target species.

By acclimating target bird species to a feeding schedule, baiting can occur at specific times to ensure bait placed is quickly consumed by target bird species, especially when large flocks of target species are present. The acclimation period allows treated bait to be present only when birds are conditioned to be present at the site and provides a higher likelihood that treated bait would be consumed by the target species, which makes it unavailable to non-targets. In addition, many bird species when present in large numbers tend to exclude non-targets from a feeding area due to their aggressive behavior and by the large number of conspecifics present at the location. Therefore, risks to non-target species from consuming treated bait only occurs when treated bait is present at a bait location. Any treated bait remaining at the location after target birds had finished feeding would be removed to avoid attracting non-targets. WS would retrieve all dead birds to the extent possible following treatment with DRC-1339.

DRC-1339 Primary Hazard Profile - DRC-1339 was selected for reducing bird damage because of its high toxicity to blackbirds (DeCino et al. 1966, West et al. 1967, Schafer, Jr. 1972) and low toxicity to most mammals, sparrows, and finches (Schafer, Jr. and Cunningham 1966, Apostolou 1969, Schafer, Jr. 1972, Schafer, Jr. et al. 1977, Matteson 1978, Cunningham et al. 1979, Cummings et al. 1992, Sterner et al. 1992). The likelihood of a non-target bird obtaining a lethal dose is dependent on: (1) frequency of encountering the bait, (2) length of feeding bout, (3) the bait dilution rate, (4) the bird's propensity to select against the treated bait, and (5) the susceptibility of the non-target species to the toxicant. Birds that ingest DRC-1339 die because of irreversible necrosis of the kidney and subsequent inability to excrete uric acid (*i.e.*, uremic poisoning) (DeCino et al. 1966, Felsenstein et al. 1974, Knittle et al. 1990). Birds ingesting a lethal dose of DRC-1339 usually die in one to three days.

The median acute lethal dose (LD_{50})[9] values for starlings, blackbirds, magpies, and corvids range from one to five mg/kg (Eisemann et al. 2003). The acute oral toxicity (LD_{50}) of DRC-1339 has been estimated for over 55 species of birds (Eisemann et al. 2003). For American crows, the median acute lethal dose has been estimated at 1.33 mg/kg (DeCino et al. 1966). DRC-1339 is toxic to mourning doves, pigeons, quail

[9]An LD_{50} is the dosage in milligrams of material per kilogram of body weight required to cause death in 50% of a test population of a species.

(*Coturnix coturnix*), chickens and ducks (*Anas* spp.) at ≥5.6 mg/kg (DeCino et al. 1966). In cage trials, Cummings et al. (1992) found that 2% DRC-1339-treated rice did not kill savannah sparrows (*Passerculus sandwichensis*). Gallinaceous birds and waterfowl may be more resistant to DRC-1339 than blackbirds, and their large size may reduce the chances of ingesting a lethal dose (DeCino et al. 1966). Avian reproduction does not appear to be affected from ingestion of DRC-1339 treated baits until levels are ingested where toxicity is expressed (USDA 2001).

There have been concerns expressed about the study designs used to derive acute lethal doses of DRC-1339 for some bird species (Gamble et al. 2003). The appropriateness of study designs used to determine acute toxicity to pesticides has many views (Lipnick et al. 1995). The use of small sample sizes was the preferred method of screening for toxicity beginning as early as 1948 to minimize the number of animals involved (Dixon and Mood 1948). In 1982, the EPA established standardized methods for testing for acute toxicity that favored larger sample sizes (EPA 1982). More recently, regulatory agencies have again begun to debate the appropriate level of sample sizes in determining acute toxicity based on a growing public concern for the number of animals used for scientific purposes.

Based on those concerns, the Ecological Committee on FIFRA Risk Assessment (ECOFRAM) was established by the EPA to provide guidance on ecological risk assessment methods (EPA 1999). The committee report recommended to the EPA that only one definitive LD_{50} be used in toxicity screening either on the mallard or northern bobwhite and recommended further testing be conducted using the up-and-down method (EPA 1999). Many of the screening methods used for DRC-1339 prior to the establishment of EPA guidelines in 1982 used the up-and-down method of screening (Eisemann et al. 2003).

A review of the literature shows that LD_{50} research using smaller sample sizes conducted prior to EPA established guidelines are good indicators of LD_{50} derived from more rigorous designs (Bruce 1985, Bruce 1987, Lipnick et al. 1995). Therefore, acute and chronic toxicity data gathered prior to EPA guidance remain valid and to ignore the data would be inappropriate and wasteful of animal life (Eisemann et al. 2003).

DRC-1339 Secondary Hazards - Secondary poisoning has not been observed with DRC-1339 treated baits. During research studies, carcasses of birds that died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1979). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds 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.

DRC-1339 is rapidly metabolized and excreted and does not bioaccumulate, which probably accounts for its low secondary hazard profile (Schafer, Jr. 1991). For example, cats, owls, and magpies would be at risk only after exclusively eating DRC-1339-poisoned starlings for 30 continuous days (Cunningham et al. 1979). No probable risk is expected to American kestrels based on the low hazard quotient value for marsh hawks used as a surrogate species (Schafer, Jr. 1970). The risk to mammalian predators from feeding on birds killed with DRC-1339 also appears to be low (Johnston et al. 1999).

The risks associated with non-target animal exposure to DRC-1339 baits have been evaluated in rice fields in Louisiana (Glahn et al. 1990, Cummings et al. 1992, Glahn and Wilson 1992), poultry and cattle feedlots in several western states (Besser 1964, Ford 1967, Royall et al. 1967), ripening sunflower fields in North Dakota (Linz et al. 2000), and around blackbird staging areas in east-central South Dakota (Knutsen 1998, Linz et al. 1995, Smith 1999). Smith (1999) used field personnel and dogs to search for dead non-target animals and found no non-target carcasses that exhibited histological signs consistent with DRC-1339 poisoning. The other studies also failed to detect any non-target birds that had succumbed to DRC-1339. However, DRC-1339 is a slow-acting avicide and thus, some birds could move to areas not searched by the study participants before dying.

DRC-1339 Environmental Degradation - DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultra violet radiation and has a half-life of less than two days. DRC-1339 is highly soluble in water but does not hydrolyze and degradation occurs rapidly in water. The chemical 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 (EPA 1995). Therefore, WS does not expect any adverse indirect effects on non-target species through chemical contamination from soil or water supplies.

Additional concerns have been raised regarding the risks to non-target wildlife associated with crows caching bait treated with DRC-1339. Crows are known to cache surplus food usually by making a small hole in the soil using the bill, by pushing the food item under the substrate, or covering items with debris (Verbeek and Caffrey 2002). Distances traveled from where the food items were gathered to where the item is cached varies, but some studies suggests crows travel up to 100 meters (Kilham 1989) and up to 2 kilometers (Cristol 2001, Cristol 2005). Caching activities appear to occur throughout the year, but may increase when food supplies are low. Therefore, the potential for treated baits to be carried from a bait site to surrounding areas exists as part of the food cache behavior exhibited by crows.

Several mitigating factors must be overcome for non-target risks to occur from bait cached by a crow. Those factors being: (1) the non-target wildlife species would have to locate the cached bait, (2) the bait-type used to target crows would have to be palatable or selected for by the non-target wildlife, (3) the non-target wildlife species consuming the treated bait would have to consume a lethal dose from a single bait, and (4) if a lethal dose is not achieved by eating a single treated cached bait, the non-target wildlife would have to ingest several treated baits (either from cached bait or from the bait site) to obtain a lethal dose which could vary by the species.

Summary

WS does not anticipate any adverse cumulative impacts on non-target species from the implementation of the proposed bird damage management methods. Based on the methods available to resolve bird damage and/or threats, WS does not anticipate the number of non-targets removed to reach a magnitude where declines in those species' populations would occur. Therefore, removal under the proposed action of non-targets will not create adverse cumulative effects on non-target species. DRC-1339 and alpha chloralose are currently only available for use by WS employees; therefore, no adverse cumulative impacts are expected from the use of these chemicals due to no additional contribution of these chemicals into the environment from non-WS entities. Starlicide, a product similar to DRC-1339, would be available for use by licensed pesticide applicators. However, no adverse cumulative impacts are expected because Starlicide has a similar hazard profile to DRC-1339.

The proposed bird damage management could benefit many other wildlife species that are impacted by predation or competition for resources. For example, crows are generally very aggressive nesting area colonizers and will force other species from prime nesting areas. American crows often feed on the eggs, nestlings, and fledglings of other bird species. This alternative has the greatest possibility of successfully reducing bird damage and conflicts to wildlife species since all available methods could possibly be implemented or recommended by WS.

T&E Species Effects

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or minimization measures. SOPs to avoid T&E effects are described in Chapter 2 of this EA.

Federally Listed Species –The current list of species designated as threatened and endangered in Iowa as determined by the USFWS was obtained and reviewed during the development of this EA. Appendix D contains the list of species currently listed in the state along with common and scientific names. Based on a review of those T&E species, WS has determined that activities conducted pursuant to the proposed action would have "No Effect" on those species listed or their critical habitats.

State Listed Species – The current list of state listed species designated as endangered or threatened as determined by the IDNR (see Appendix E) was reviewed during the development of the EA. Based on the review of species listed in the state, WS has determined that the proposed activities would not adversely affect those species currently listed.

Alternative 2 - Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, risks to non-target species from WS actions would likely be limited to the use of frightening devices, exclusionary devices, and the risks of unintentional capture of a bird in a live-capture device as outlined under Alternative 1. Although the availability of WS assistance with non-lethal BDM methods could decrease incentives for non-WS entities to use lethal BDM methods, non-WS efforts to reduce or prevent damage could result in less experienced persons implementing bird damage management methods and lead to a greater removal of non-target wildlife.

Direct, Indirect, and Cumulative Effects:
Similar to Alternative 3, it is possible that frustration from the resource owner due to the inability to reduce losses could lead to illegal use of toxicants, or other non-specific damage management methods by others could lead to unknown direct or indirect effects to non-target species populations, including T&E species. Hazards to T&E species could be more variable under this alternative than Alternative 1. Potential direct or indirect effects to non-target species could therefore be greater under this alternative if methods that are less selective or toxicants that cause secondary poisoning are used by non-WS entities. Direct effects on non-targets from non-lethal methods of bird damage management conducted by WS would be similar to Alternative 1. Since WS would be able to employ non-lethal methods under this alternative, indirect effects on non-target species could occur when implementing exclusionary devices if the area is large enough, but these indirect effects are expected to be minimal. The ability to reduce negative effects caused by birds to wildlife species and their habitats, including T&E species, would be variable based upon the skills and abilities of the person implementing BDM programs. It is possible that frustration caused by the inability to reduce losses would lead to non-specific damage management methods or illegal use of toxicants by others, which could increase adverse cumulative impacts, however to an unknown degree. While cumulative impacts would be variable, WS does not anticipate any significant cumulative impacts from this alternative.

Alternative 3 – No Bird Damage Management Conducted by WS

Under this alternative, birds could continue to be removed under depredation permits issued by the USFWS and the IDNR, removal would continue to occur during the regulated harvest season, non-native bird species could continue to be removed without the need for a permit, blackbirds could still be removed under the depredation order, and Muscovy ducks could be lethally removed under the control order. Risks to non-targets and T&E species would continue to occur from those who implement bird damage management activities on their own or through recommendations by the other federal, state, and private entities. Although some risks occur from those people that implement bird damage management in the absence of any involvement by WS, those risks are likely low and are similar to those under the other alternatives.

Direct, Indirect, and Cumulative Effects:
Under this alternative, WS would not be directly involved with damage management activities. Therefore, no direct or indirect impacts to non-targets or T&E species would occur by WS under this alternative. The

ability to reduce damage and threats of damage caused by birds to other wildlife species and their habitats, including T&E species, would be variable based upon the skills and abilities of the person implementing damage management actions under this alternative. The risks to non-targets and T&E species would be similar across the alternatives since most of those methods described in Appendix B would be available across the alternatives. If those methods available were applied as intended, direct, indirect, and cumulative effects to non-targets would be minimal to non-existent. If methods available were applied incorrectly or applied without knowledge of bird behavior, risks to non-target wildlife would be higher under this alternative. If frustration from the lack of available assistance causes those persons experiencing bird damage to use methods that were not legally available for use, direct, indirect, and cumulative effects on non-targets would be higher under this alternative. People have resorted to the use of illegal methods to resolve wildlife damage that have resulted in the lethal removal of non-target wildlife (e.g., White et al. 1989, USFWS 2001, FDA 2003). Therefore, adverse direct, indirect, or cumulative impacts to non-targets, including T&E species, could occur under this alternative; however WS does not anticipate any significant cumulative impacts.

Issue 3 - Effects of Damage Management Methods on Human Health and Safety

A common concern is the potential adverse effects that available methods could have on human health and safety. The threats to human safety of methods available under the alternatives are evaluated below by each of the alternatives.

Alternative 1 - Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)

The cooperator requesting assistance is made aware through a MOU, cooperative service agreement, inter-agency agreement, or a similar document that those methods agreed upon could potentially be used on property owned or managed by the cooperator; thereby, making the cooperator aware of the use of those methods on property they own or manage to identify any risks to human safety associated with the use of those methods.

WS would use the Decision Model to determine the appropriate method or methods that would effectively resolve the request for assistance. Those methods would be continually evaluated for effectiveness and if necessary, additional methods could be employed. Risks to human safety from technical assistance conducted by WS would be similar to those risks addressed under the other alternatives. The use of non-lethal methods as part of an integrated approach to managing damage that would be employed as part of direct operational assistance by WS would be similar to those risks addressed by the other alternatives.

Lethal methods available under the proposed action would include the use of firearms, DRC-1339, live-capture followed by euthanasia, and the recommendation that birds be harvested during the regulated hunting season established for those species by the USFWS and the IDNR. Although some formulations of the avicide DRC-1339 are restricted to use by WS only, a similar product containing the same active ingredient as DRC-1339 could be available for use as a restricted use pesticide by other entities.

WS' employees who conduct activities would be knowledgeable in the use of methods, wildlife species responsible for causing damage or threats, and WS' Directives. That knowledge would be incorporated into the decision-making process inherent with the WS' Decision Model that would be applied when addressing threats and damage caused by birds. Prior to and during the utilization of lethal methods, WS' employees would consider risks to human safety based on location and method. Risks to human safety from the use of methods would likely be greater in urban areas when compared to rural areas that are less densely populated. Consideration would also be given to the location where damage management activities would be conducted based on property ownership. If locations where methods would be employed occur on private property in rural areas where access to the property is controlled and monitored, the risks to human safety from the use of

methods would likely be less. If damage management activities occur at parks or near other public use areas, then risks of the public encountering damage management methods and the corresponding risk to human safety increases. Activities would generally be conducted when human activity is minimal (e.g., early mornings, at night) or in areas where human activities are minimal (e.g., in areas closed to the public).

Safety issues can arise related to misusing firearms and the potential human hazards associated with firearm use when employed to reduce damage and threats. To help ensure safe use and awareness, WS' employees who use firearms to conduct official duties are required to attend an approved firearm safety training course and to remain certified for firearm use; WS' employees must attend a re-certification safety training course in accordance with WS Directive 2.615. WS' employees who carry and use firearms as a condition of employment are required to attest that they have not been convicted of a misdemeanor crime of domestic violence. A thorough safety assessment would be conducted before firearms were deemed appropriate to alleviate or reduce damage and threats to human safety when conducting activities. WS would work closely with cooperators requesting assistance to ensure all safety issues were considered before the use of firearms was deemed appropriate. All methods, including firearms, must be agreed upon with the cooperator to ensure the safe use of methods.

All WS' personnel who handle and administer chemical methods would be properly trained in the use of those methods. Training and adherence to agency directives would ensure the safety of employees applying chemical methods. Birds euthanized by WS or removed using chemical methods would be disposed of in accordance with WS Directive 2.515 and applicable federal and state permits. All euthanasia would occur in the absence of the public to further minimize risks. SOPs are further described in Chapter 2 of this EA.

Direct, Indirect, and Cumulative Effects:
No adverse direct or indirect effects to human safety have occurred from WS' use of methods to alleviate bird damage from FY 2011 through FY 2015. The risks to human safety from the use of non-lethal and lethal methods, when used appropriately and by trained personnel, is considered low. Since WS personnel are required to complete and maintain firearms safety training, no adverse direct effects to human health and safety are expected as a result of the misuse of firearms by WS personnel.

Live-capture traps are typically set in situations where human activity is minimal to ensure public safety. Traps rarely cause serious injury and are triggered through direct activation of the device. Live-capture traps available for birds are typically walk-in style traps where birds enter, but are unable to exit. Therefore, human safety concerns associated with live traps used to capture birds require direct contact to cause bodily harm. No adverse direct effects to human health and safety are expected through the use of live-capture traps and devices or other non-lethal methods. Other live-capture devices, such as cannon nets, pose minor safety hazards to the public since activation of the device occurs by trained personnel after target species are observed in the capture area of the net. Lasers also pose minimal risks to the public since application occurs directly to target species by trained personnel; thereby, limiting exposure of the public to misuse of the method.

The recommendation of repellents or the use of those repellents registered for use to disperse birds could occur under the proposed action as part of an integrated approach to managing bird damage. Those chemical repellents that would be available to recommend for use or be directly used by WS under this alternative would also be available under any of the alternatives. Therefore, risks to human safety from the recommendation of repellents or the direct use of repellents would be similar across all the alternatives. Risks to human safety associated with the use or recommendation of repellents would be similar across all the alternatives. WS' involvement, either through recommending the use of repellents or the direct use of repellents, would ensure that label requirements of those repellents are discussed with those persons requesting assistance when recommended through technical assistance or would be specifically adhered to by

WS' personnel when using those chemical methods. Therefore, the risks to human safety associated with the recommendation of or direct use of repellents could be lessened through WS' participation.

Risks to human safety from the use of avicides could occur either through direct exposure of the chemical or exposure to the chemical from birds that have been lethally removed. DRC-1339 (3-chloro-p-toluidine hydrochloride) is currently registered for use only by WS to be used for bird damage management in Iowa. The mixing, drying, and storage of DRC-1339 treated bait occurs in controlled areas that are not accessible by the public. Therefore, risks to public safety from the preparation of DRC-1339 are minimal. Some risks do occur to the handlers during the mixing process from inhalation and direct exposure on the skin and eyes. Adherence to label requirements during the mixing and handling of DRC-1339 treated bait for use of personal protective equipment ensures the safety of WS' personnel handling and mixing treated bait. Therefore, risks to handlers and mixers that adhere to the personal protective equipment requirements of the label are low.

Locations where treated bait may be placed are determined based on product label requirements (e.g., distance from water, specific location restrictions), the target bird species use of the site (determined through prebaiting and an acclimation period), on non-target use of the area (areas with non-target activity are not used or abandoned), and based on human safety (e.g., in areas restricted or inaccessible by the public or where warning signs have been placed). Once appropriate locations were determined, treated baits would be placed in feeding stations or would be broadcast using mechanical methods (ground-based equipment or hand spreaders) and by manual broadcast (distributed by hand) per label requirements. Once baited using the diluted mixture (treated bait and untreated bait) when required by the label, locations would be monitored for non-target activity and to ensure the safety of the public. After each baiting session, all uneaten bait would be retrieved. The prebaiting period allows treated bait to be placed at a location only when target birds were conditioned to be present at the site and provides a higher likelihood that treated bait would be consumed by the target species, which makes it unavailable for potential exposure to humans. To be exposed to the bait, someone would have to approach a bait site and handle treated bait. If the bait had been consumed by target species or was removed by WS, then treated bait would no longer be available and human exposure to the bait could not occur. Therefore, direct exposure to treated bait during the baiting process would only occur if someone approached a bait site that contained bait and if treated bait was present, would have to handle treated bait.

Factors that minimize any risk of public health problems from the use of DRC-1339 are: 1) its use is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops (contrary to some misconceptions, DRC-1339 is not applied to feed materials that livestock can feed upon), 2) DRC-1339 is highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation. The half-life is about 25 hours; in general, DRC-1339 on treated bait material is almost completely broken down within a week if not consumed or retrieved, 3) the chemical 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, 4) application rates are extremely low (EPA 1995), 5) a human would need to ingest the internal organs of birds found dead from DRC-1339 to be exposed, and 6) 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).

Of additional concern is the potential exposure of people to crows harvested during the regulated hunting season that have ingested DRC-1339 treated bait. The hunting season for crows occurs from mid-October to November and mid-January through March with no daily harvest (bag) limit or possession limit. Under the proposed action, baiting using DRC-1339 to reduce crow damage could occur during the period of time when crows can be harvested. Although baiting could occur in rural areas during those periods, most requests for assistance to manage crow damage during the period of time when crows can be harvested occur in urban areas associated with urban crow roosts. Crows using urban communal roost locations often travel long distances to forage before returning to the roost location during the evening.

For a crow that ingested DRC-1339 treated bait to pose a potential risk to human safety to someone harvesting crows during the hunting season, a hunter would have to harvest a crow that ingested DRC-1339 treated bait and subsequently consume certain portions of the crow. The mode of action of DRC-1339 requires ingestion by crows so handling a crow harvested or found dead would not pose any primary risks to human safety. Although not specifically known for crows, in other sensitive species, DRC-1339 is metabolized and/or excreted quickly once ingested. In starlings, nearly 90% of the DRC-1339 administered dosages well above the LD50 for starlings was metabolized or excreted within 30 minutes of dosage (Cunningham et al. 1979). In one study, more than 98% of a DRC-1339 dose delivered to starlings could be detected in the feces within 2.5 hours (Peoples and Apostolou 1967) with similar results found for other bird species (Eisemann et al. 2003). Once death occurs, DRC-1339 concentrations appear to be highest in the gastrointestinal tract of birds, but some residue could be found in other tissue of carcasses examined (Giri et al. 1976, Cunningham et al. 1979, Johnston et al. 1999) with residues diminishing more slowly in the kidneys (Eisemann et al. 2003). However, most residue tests to detect DRC-1339 in tissues of birds have been completed using DRC-1339 dosages that far exceeded the known acute lethal oral dose for those species tested and far exceeds the level of DRC-1339 that would be ingested from treated bait. Johnston et al. (1999) found DRC-1339 residues in breast tissue of boat-tailed grackles (Quiscalus major) using acute doses ranging from 40 to 863 mg/kg. The acute lethal oral dose of DRC-1339 for boat-tailed grackles has been estimated to be ≤ 1 mg/kg, which is similar to the LD50 for crows (Eisemann et al. 2003). In those boat-tailed grackles consuming a trace of DRC-1339 up to 22 mg/kg, no DRC-1339 residues were found in the gastrointestinal track nor found in breast tissue (Johnston et al. 1999).

In summary, nearly all of the DRC-1339 ingested by sensitive species is metabolized or excreted quickly, normally within a few hours. Residues of DRC-1339 have been found in the tissues of birds consuming DRC-1339 at very high dosage rates that exceed current acute lethal dosages achieved under the label requirements of DRC-1339. Residues of DRC-1339 ingested by birds appear to be primarily located in the gastrointestinal tract of birds.

Under the proposed action, the controlled and limited circumstances in which DRC-1339 would be used would prevent any exposure of the public to this chemical. Based on current information, the human health risks from the use of DRC-1339 would be virtually nonexistent under this alternative.

Alpha-chloralose is an immobilizing agent available only for use by WS. The FDA has approved the use of alpha chloralose as an INAD (INAD #6602) to be used for the immobilization and capture of certain species of birds by trained WS' personnel. Alpha-chloralose is administered to target individuals, either as a tablet or liquid solution contained within a bread ball or as a powder formulated on whole kernel corn. All unconsumed baits are retrieved. Since applicators are present at all times during application of alpha chloralose, the risks to human safety are low. All WS' employees using alpha chloralose are required to successfully complete a training course on the proper use and handling of alpha chloralose. All WS' employees who use alpha chloralose would wear the appropriate personal protective equipment required to ensure the safety of employees.

Of additional concern with the use of immobilizing drugs is the potential for human consumption of meat from waterfowl that have been immobilized using alpha chloralose. Since waterfowl are harvested during a regulated harvest season and consumed, the use of immobilizing drugs is of concern. The intended use of immobilizing drugs is to live-capture waterfowl. Waterfowl are conditioned to feed during a period in the day when consumption of treated bait ensures waterfowl do not disperse from the immediate area where the bait is applied. The use of immobilizing drugs targets waterfowl in urban environments where hunting and the harvest of waterfowl does not occur or is unlikely to occur (e.g., due to city ordinances preventing the discharge of a firearm within city limits). However, it could be possible for target waterfowl to leave the immediate area where baiting is occurring after consuming bait and enter areas where hunting could occur.

To mitigate this risk, withdrawal times are often established. A withdrawal time is the period established between when the animal consumed treated bait to when it is safe to consume the meat of the animal by humans. In compliance with FDA use restrictions, the use of alpha chloralose is prohibited for 30 days prior to and during the hunting season on waterfowl and other game birds that could be hunted. In the event that WS was requested to immobilize waterfowl during a period of time when harvest of waterfowl was occurring or during a period of time where a withdrawal period could overlap with the start of a harvest season, WS would not use the immobilizing drugs. In those cases, other methods would be employed.

All WS personnel are properly trained on all chemicals handled and administered in the field, ensuring their safety as well as the safety of the public. Therefore, adverse direct effects to human health and safety from chemicals used by WS are anticipated to be very low. The amount of chemicals used or stored by WS and cooperating agencies would be minimal to ensure human safety. No adverse indirect effects are anticipated from the application of any of the chemicals available for WS.

The recommendation by WS that birds be harvested during the regulated hunting season, which is established by the IDNR under frameworks determined by the USFWS, would not increase risks to human safety above those risks already inherent with hunting those species. Recommendations of allowing hunting on property owned or managed by a cooperator to reduce bird populations, which could then reduce damage or threats would not increase risks to human safety. Safety requirements established by the IDNR for the regulated hunting season would further minimize risks associated with hunting. Although hunting accidents do occur, the recommendation of allowing hunting to reduce localized populations of birds would not increase those risks. Since the IDNR requires hunter and trapper safety training for all sportsmen, WS does not expect any additional adverse cumulative impacts to human safety from the use of firearms when recommending that birds be harvested during regulated hunting seasons to help alleviate damage.

Alternative 2 - Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, WS would not use lethal BDM methods. Concerns about human health risks from WS' use of lethal bird damage management methods would be alleviated because no such use would occur. However, Avitrol and the toxicant "Starlicide" which has the same active ingredient as DRC-1339 would be available to licensed pesticide applicators. Benefits to the public from WS BDM activities will depend on the ability of WS to resolve problems using nonlethal methods and the effectiveness of non-WS BDM efforts. In situations where risks to human health and safety from birds cannot be resolved using nonlethal methods, benefits to the public will depend on the efficacy of non-WS use of lethal BDM methods. If lethal BDM programs are implemented by individuals with less experience than WS, they may not be able to effectively resolve the problem or it may take longer to resolve the problem than with a WS program.

Direct, Indirect, and Cumulative Effects:
Since most methods available to resolve or prevent bird damage or threats are available to anyone, the direct, indirect, and cumulative effects to human safety from the use of those methods are similar between the alternatives. Private efforts to reduce or prevent damage would be expected to increase, and would likely result in less experienced persons implementing chemical or other damage management methods which may have variable adverse direct, indirect, and/or cumulative effects to human and pet health and safety than under Alternative 1. Ignorance and/or frustration caused by the inability to reduce losses could lead to illegal use of toxicants by others which could lead to unknown direct, indirect, and/or cumulative impacts to humans and pets. DRC-1339 and alpha chloralose would not be available under this alternative to non-WS entities experiencing damage or threats from birds and WS would not use DRC-1339 under this alternative since it is lethal, therefore no cumulative impacts to human health and safety should occur from these chemicals.

Alternative 3 – No Bird Damage Management Conducted by WS

Under the no bird damage management alternative, WS would not be involved with any aspect of managing damage associated with birds, including technical assistance. Due to the lack of involvement in managing damage caused by birds, no impacts to human safety would occur directly from WS. This alternative would not prevent those entities experiencing threats or damage from birds from conducting damage management activities in the absence of WS' assistance. Many of the methods discussed in Appendix B would be available to those persons experiencing damage or threats and could be used to remove birds if permitted by the USFWS and/or the IDNR. The direct burden of implementing permitted methods would be placed on those experiencing damage.

Direct, Indirect, and Cumulative Effects:
Since most methods available to resolve or prevent bird damage or threats are available to anyone, the adverse direct, indirect, and cumulative effects to human safety from the use of those methods are similar between the alternatives. Non-chemical methods available to alleviate or prevent damage associated with birds generally do not pose risks to human safety. Since most non-chemical methods available for bird damage management involve the live-capture or harassment of birds, those methods are generally regarded as posing minimal adverse direct and indirect effects to human safety. Habitat modification and harassment methods are also generally regarded as posing minimal adverse direct and indirect effects to human safety. Although some risks to safety are likely to occur with the use of pyrotechnics, propane cannons, and exclusion devices, those risks are minimal when those methods are used appropriately and in consideration of human safety. DRC-1339 and alpha chloralose would not be available under this alternative to those experiencing damage or threats from birds, therefore no adverse direct, indirect, or cumulative impacts to human health and safety should occur from these chemicals. The only methods that would be available under this alternative that would involve the direct lethal taking of birds are shooting, publicly available pesticides and repellents, and nest destruction. Under this alternative, shooting and nest destruction would be available to those persons experiencing damage or threats of damage when permitted by the USFWS and the IDNR. Firearms, when handled appropriately and with consideration for safety, pose minimal risks to human safety. However, methods employed by those persons not experienced in the use of methods or are not trained in their proper use, could increase the adverse direct, indirect, and/or cumulative impacts to human safety. Overall, the methods available to the public, when applied correctly and appropriately, pose minimal risks to human safety.

Issue 4 - Effects on the Aesthetic Values of Birds

People often enjoy viewing, watching, and knowing birds exist as part of the natural environment and gain aesthetic enjoyment in such activities. Those methods available to alleviate damage are intended to disperse and/or remove birds. Non-lethal methods are intended to exclude or make an area less attractive, which disperses birds to other areas. Similarly, lethal methods are intended to remove those birds identified as causing damage or posing a threat of damage. The effects on the aesthetic value of birds as it relates to the alternatives are discussed below.

Alternative 1 - Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)

Under the proposed action, methods would be employed that would result in the dispersal, exclusion, or removal of individuals or small groups of birds to resolve damage and threats. In some instances where birds are dispersed or removed, the ability of interested persons to observe and enjoy those birds would likely temporarily decline. Even the use of exclusionary devices can lead to the dispersal of wildlife if the resource being damaged was acting as an attractant. Thus, once the attractant has been removed or made unavailable, the wildlife would likely disperse to other areas where resources are more available.

The use of lethal methods would result in temporary declines in local populations resulting from the removal of birds to address or prevent damage and threats. The goal under the proposed action is to respond to requests for assistance and to manage those birds responsible for the resulting damage. Therefore, the ability to view and enjoy birds would remain if a reasonable effort is made to locate birds outside the area in which damage management activities occurred. Those birds removed by WS are those that could be removed by the person experiencing damage. All activities are conducted where a request for assistance has been received and only after agreement for such services have been agreed upon by the cooperator.

Direct, Indirect, and Cumulative Effects:
Since those birds removed by WS under this alternative could be removed with a depredation permit issued by the USFWS, under depredation orders, under control orders, without the need for a permit (non-native species), or during the regulated hunting seasons, WS' involvement in taking those birds would not likely be additive to the number of birds that could be removed in the absence of WS' involvement. WS' removal of birds from FY 2011 through FY 2015 has been of low magnitude compared to the total mortality and populations of those species. WS' activities are not likely additive to the birds that would be removed in the absence of WS' involvement. Given the limited removal proposed by WS under this alternative when compared to the known sources of mortality of birds, WS' bird damage management activities conducted pursuant to the proposed action is not expected to cause adverse direct or indirect effects on the aesthetic value of birds. However, WS involvement could lead to positive indirect effects resulting in the return of additional native bird species that otherwise would not be there, which would increase the enjoyment of viewing the birds. Some aesthetic value would be gained by the removal of birds and the return of a more natural environment, including the return of native wildlife and plant species that may be suppressed or displaced by high bird densities. The impact on the aesthetic value of birds and the ability of the public to view and enjoy birds under the proposed action would be similar to the other alternatives and is likely insignificant.

When damage caused by birds has occurred, any removal of birds by the property or resource owner would likely occur whether WS was involved with taking the birds or not. Therefore, the activities of WS are not expected to have any adverse cumulative impacts on this element of the human environment if occurring at the request of a property owner and/or manager. No significant cumulative impact is expected because the bird populations are a renewable resource and therefore will be replaced with new birds in the following years. The purpose of WS involvement is to alleviate the damage caused by the bird, not to eradicate the species.

Alternative 2 - Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, WS would not conduct any lethal BDM, but may conduct harassment of birds that are causing damage. Other non-lethal methods may be conducted as well under this alternative to help alleviate damage caused by birds.

Direct, Indirect, and Cumulative Effects:
Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the direct and indirect effects would then be similar to the Proposed Action Alternative. Cumulative impacts are expected to be similar to Alternative 1 as well.

Assuming property owners would choose to allow and pay for the implementation of non-lethal methods by WS, this alternative could result in birds relocating to other sites where they would likely cause or aggravate similar problems for other property owners. Thus, this alternative would likely result in more property owners experiencing adverse direct and/or indirect effects on the aesthetic values of their properties than the

Proposed Action Alternative. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities may be conducted to assure they do not re-establish in other undesirable locations.

Alternative 3 – No Bird Damage Management Conducted by WS

Under the no bird damage management by WS alternative, the actions of WS would have no impact on the aesthetic value of birds. Those persons experiencing damage or threats from birds would be responsible for researching, obtaining, and using all methods as permitted by federal, state, and local laws and regulations. The degree to which damage management activities would occur in the absence of assistance by any agency is unknown but likely lower compared to damage management activities that would occur where some level of assistance was provided. Birds could still be dispersed or removed under this alternative by those persons experiencing damage or threats of damage. Removal could also occur during the regulated harvest season, pursuant to the blackbird depredation order, pursuant to the Muscovy duck control order, and in the case of non-native species, removal could occur any time without the need for a depredation permit.

Direct, Indirect, and Cumulative Effects:
The potential direct and indirect effects on the aesthetic values of birds could be similar to the proposed action if similar levels of damage management activities are conducted by those persons experiencing damage or threats or is provided by other entities. If no action is taken or if activities are not permitted by the USFWS and the IDNR, then no direct or indirect effect on the aesthetic value of birds would occur under this alternative.

Since birds could continue to be removed under this alternative, despite WS' lack of involvement, the ability to view and enjoy birds would likely be similar to the other alternatives. The lack of WS' involvement would not lead to a reduction in the number of birds dispersed or removed since WS' has no authority to regulate removal or the harassment of birds. The USFWS and the IDNR with management authority over birds would continue to adjust all removal levels based on population objectives for those bird species. Therefore, the number of birds lethally removed annually through hunting, under the depredation/control orders, and pursuant to depredation permits are regulated and adjusted by the USFWS and the IDNR. Therefore, the cumulative impacts to the aesthetic value of birds would be similar to the other alternatives.

3.2 ISSUES NOT CONSIDERED FOR COMPARATIVE ANALYSIS

Additional issues were identified by WS and the USFWS during the scoping process of this EA. Those issues were considered by WS and the USFWS; however, those issues will not be analyzed in detail for the reasons provided. The following resource values are not expected to be significantly impacted by any of the alternatives analyzed as none of the alternatives cause any significant ground disturbance: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. Those resources will not be analyzed further.

WS' Impact on Biodiversity

The WS program does not attempt to eradicate any species of native wildlife. WS operates in accordance with applicable federal and state laws and regulations enacted to ensure species viability. Methods available are employed to target individual birds or groups of birds identified as causing damage or posing a threat of damage. Any reduction of a local population or group would frequently be temporary because immigration from adjacent areas or reproduction would replace the animals removed. WS operates on a small percentage of the land area of Iowa and would only target those birds identified as causing damage or posing a threat. Therefore, damage management activities conducted pursuant to any of the alternatives would not adversely affect biodiversity.

Humaneness of Methods to be Employed

Humaneness, in part, is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife, is an important and very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns, if " ... the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process." Suffering is described as a " . . . highly unpleasant emotional response usually associated with pain and distress." However, suffering " . . . can occur without pain . . . ," and "... pain can occur without suffering . . ." (AVMA 2013). Because suffering carries with it the implication of a time frame, a case could be made for " . . . little or no suffering where death comes immediately . . ." (CDFG 1991), such as shooting.

Pain obviously occurs in animals, but assessing pain experienced by animals can be challenging (AVMA 2013, CDFG 1991). The AVMA defines pain as being, "that sensation (perception) that results from nerve impulses reaching the cerebral cortex via ascending neural pathways" (AVMA 2013). The key component of this definition is the perception of pain. The AVMA (2013) notes that "pain" should not be used for stimuli, receptors, reflexes, or pathways because these factors may be active without pain perception. For pain to be experienced, the cerebral cortex and subcortical structures must be functional. If the cerebral cortex is nonfunctional because of hypoxia, depression by drugs, electric shock, or concussion, pain is not experienced.

The AVMA states "... euthanasia is the act of inducing humane death in an animal" and that "...that if an animal's life is to be taken, it is done with the highest degree of respect, and with an emphasis on making the death as painless and distress free as possible" (AVMA 2013). Additionally, euthanasia methods should minimize any stress and anxiety experienced by the animal prior to unconsciousness." Although use of euthanasia methods to end an animal's life is desirable, as noted by the AVMA, "For wild and feral animals, many of the recommended means of euthanasia for captive animals are not feasible. In field circumstances, wildlife biologists generally do not use the term euthanasia, but terms such as killing, collecting, or harvesting, recognizing that a distress- free death may not be possible" (Beaver et al. 2001).

AVMA (2013) notes, "While recommendations are made, it is important for those utilizing these recommendations to understand that, in some instances, agents and methods of euthanasia identified as appropriate for a particular species may not be available or may become less than an ideal choice due to differences in circumstances. Conversely, when settings are atypical, methods normally not considered appropriate may become the method of choice. Under such conditions, the humaneness (or perceived lack thereof) of the method used to bring about the death of an animal may be distinguished from the intent or outcome associated with an act of killing.

Following this reasoning, it may still be an act of euthanasia to kill an animal in a manner that is not perfectly humane or that would not be considered appropriate in other contexts. For example, due to lack of control over free-ranging wildlife and the stress associated with close human contact, use of a firearm may be the most appropriate means of euthanasia. Also, shooting a suffering animal that is in extremis, instead of catching and transporting it to a clinic to euthanize it using a method normally considered to be appropriate (e.g., barbiturates), is consistent with one interpretation of a good death. The former method promotes the animal's overall interests by ending its misery quickly, even though the latter technique may be considered to be more acceptable under normal conditions (Yeates 2010). Neither of these examples, however, absolves the individual from her or his responsibility to ensure that recommended methods and agents of euthanasia are preferentially used."

WS-Iowa personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology and funding. SOPs (Section 2.3) used to maximize humaneness are listed in this EA. As appropriate, WS euthanizes live animals by methods recommended by the AVMA (2013) or the recommendations of a veterinarian, even though the AVMA euthanasia methods were developed principally for companion animals and slaughter of food animals, and not for free-ranging wildlife. Due to the status quo definition, animals will be removed from the environment even with the absence of WS operations. Therefore, WS' professional involvement would ensure that most humane methods are utilized.

WS and the National Wildlife Research Center (NWRC) are striving to bring additional non-lethal damage management alternatives into practical use and to improve the selectivity and humaneness of management devices. Until new findings and products are found practical, a certain amount of animal suffering could occur when some methods are used in situations when non-lethal damage management methods are not practical or effective. WS supports the most safe, humane, selective, and effective damage management techniques, and would continue to incorporate advances into program activities.

A Loss Threshold should be Established before Allowing Lethal Methods

One issue identified through WS' implementation of the NEPA processes is a concern that a threshold of loss should be established before employing lethal methods to resolve damage and that wildlife damage should be a cost of doing business. Some damage and economic loss can be tolerated by cooperators until the damage reaches a threshold where damage becomes an economic burden. The appropriate level of allowed tolerance or threshold before employing lethal methods would differ among cooperators and damage situations. In addition, establishing a threshold would be difficult or inappropriate to apply to human health and safety situations.

Bird Damage Management should not occur at Taxpayer Expense

Another issue previously identified is the concern that wildlife damage management should not be provided at the expense of the taxpayer or that activities should be fee-based. The WS-Iowa program's funding for damage management activities is derived from federal appropriations and through cooperative funding. Activities conducted for the management of damage and threats to human safety from birds would be funded through cooperative service agreements with individual property owners or managers. A minimal federal appropriation is allotted for the maintenance of a WS program in Iowa. The remainder of the WS program is entirely 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 service agreements between the requester and WS.

Cost Effectiveness of Management Methods

The CEQ does not require a formal, monetized cost benefit analysis to comply with the NEPA. Consideration of this issue is not essential to making a reasoned choice among the alternatives being considered. However, the methods determined to be most effective to reduce damage and threats to human safety caused by birds and that prove to be the most cost effective would receive the greatest application. As part of an integrated approach, evaluation of methods would continually occur to allow for those methods that are most effective at resolving damage or threats to be employed under similar circumstances where birds are causing damage or pose a threat. Additionally, management operations may be constrained by cooperator funding and/or objectives and needs. The cost effectiveness of methods and the effectiveness of methods are linked.

Bird Damage should be Managed by Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce bird damage for property owners when deemed appropriate by the resource owner. Some property owners would prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity and thus could provide the service at less expense, or because they prefer to use a private business rather than a government agency. However, some property owners would prefer to enter into an agreement with a government agency. In particular, large industrial businesses, and cities and towns may prefer to use WS because of security and safety issues.

Effects from the Use of Lead Ammunition in Firearms

Questions have arisen about the deposition of lead into the environment from ammunition used in firearms to lethally remove birds. As described in Appendix B, the lethal removal of birds with firearms by WS to alleviate damage or threats would occur using a rifle or shotgun. In an ecological risk assessment of lead shot exposure in non-waterfowl birds, ingestion of lead shot was identified as the concern rather than just contact with lead shot or lead leaching from shot in the environment (Kendall et al. 1996). To address lead exposure from the use of shotguns, the standard conditions of depredation permits issued by the USFWS pursuant to the MBTA for the lethal removal of birds requires the use of non-toxic shot. To alleviate concerns associated with lead exposure in wildlife, WS would only use non-toxic shot as defined in 50 CFR 20.21(j) when using shotguns to remove all birds.

The removal of birds by WS would occur primarily from the use of shotguns. However, the use of rifles could be employed to lethally remove some species. Birds that were removed using rifles would occur within areas where retrieval of all bird carcasses for proper disposal would be highly likely (e.g., at roost sites). With risks of lead exposure occurring primarily from ingestion of lead shot and bullet fragments, the retrieval and proper disposal of bird carcasses would greatly reduce the risk of scavengers ingesting or being exposed to lead that may be contained within the carcass.

However, deposition of lead into soil could occur if, during the use of a rifle, the projectile passes through a bird, if misses occur, or if the bird carcass is not retrieved. Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil is generally retained within the top 20 cm (about 8 inches). In addition, concerns occur that lead from bullets deposited in soil from shooting activities could lead to contamination of either ground water or surface water from runoff. The amount of lead that becomes soluble in soil is usually very small (0.1-2.0%) (USEPA 2013). Stansley et al. (1992) studied lead levels in water that was subjected directly to high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Although Stansley et al. (1992) detected elevated lead levels in water in a stream and a marsh that were in the shot "*fall zones*" at a shooting range, the study did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot. Stansley et al. (1992) believed the lead contamination near the parking lot was due to runoff from the lot, and not from the shooting range areas. The study also indicated that even when lead shot is highly accumulated in areas with permanent water bodies present, the lead does not necessarily cause elevated lead contamination of water further downstream (Stansley et al. 1992). Ingestion of lead shot, bullets or associated fragments is not considered a significant risk to fish and amphibians (The Wildlife Society 2008).

Craig et al. (1999) reported that lead levels in water draining away from a shooting range with high accumulations of lead bullets in the soil around the impact areas were far below the "*action level*" of 15 parts per billion as defined by the EPA (i.e., requiring action to treat the water to remove lead). These studies suggest that the very low amounts of lead that could be deposited from damage management activities would have minimal effects on lead levels in soil and water.

Lead ammunition is only one of many sources of lead in the environment, including use of firearms for hunting and target shooting, lost fishing sinkers (an approximated 3,977 metric tons of lead fishing sinkers are sold in the United States annually; The Wildlife Society 2008), and airborne emissions from metals industries (such as lead smelters and iron and steel production), manufacturing industries, and waste incineration that can settle into soil and water (USEPA 2013). Since the harvest of birds can occur during regulated hunting seasons, through the issuance of depredation permits, under depredation orders without the need to obtain a depredation permit, or are considered non-native with no depredation permit required for removal, WS' assistance with removing birds would not be additive to the environmental status quo. WS' assistance would not be additive to the environmental status quo since those birds removed by WS using firearms could be lethally removed by the entities experiencing damage using the same method in the absence of WS' involvement. The amount of lead deposited into the environment may be lowered by WS' involvement in damage management activities due to efforts by WS to ensure projectiles do no pass through, but are contained within, the bird carcass, which limits the amount of lead potentially deposited into soil from projectiles passing through the carcass. The proficiency training received by WS' employees in firearm use and accuracy increases the likelihood that birds are lethally removed humanely in situations that ensure accuracy and that misses occur infrequently, which further reduces the potential for lead to be deposited in the soil from misses or from projectiles passing through carcasses. In addition, WS' involvement ensures bird carcasses lethally removed using firearms would be retrieved and disposed of properly to limit the availability of lead in the environment and ensures bird carcass would be removed from the environment to prevent the ingestion of lead in carcasses by scavengers. Based on current information, the risks associated with lead bullets that could be deposited into the environment from WS' activities due to misses, the bullet passing through the carcass, or from bird carcasses that may be irretrievable would be below any level that would pose any risk from exposure or significant contamination of water.

Global Climate Change/Greenhouse Gas Emissions

The WS program activities that may result from the alternatives would have a negligible effect on atmospheric conditions including the global climate. Meaningful direct or indirect emissions of greenhouse gases would not occur as a result of the proposed action. The proposed action would meet requirements of applicable federal laws, regulations, and Executive Orders including the Clean Air Act and Executive Order 13514.

3.3 SUMMARY OF IMPACTS

No significant cumulative environmental impacts are expected from any of the proposed actions analyzed in this supplement. Under the Current/Proposed Action, the lethal removal of birds by WS has not and would not have a significant impact on overall bird populations in Iowa or nationwide, but some local reductions may occur. No risk to public safety is expected when WS' services are provided and accepted by continuing the BDM program with the included supplemental actions since only trained and experienced wildlife biologists/specialists would conduct and recommend bird damage management activities. Although some persons will likely be opposed to WS' participation in bird damage management activities on public and private lands, the analysis in this EA indicates that WS integrated bird damage management program would not result in significant adverse cumulative impacts on the quality of the human environment.

CHAPTER 4 - LIST OF PREPARERS AND PERSONS/AGENCIES CONSULTED

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APPENDIX A

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APPENDIX B

BIRD DAMAGE MANAGEMENT METHODS AVAILABLE FOR USE

NON-LETHAL METHODS - NONCHEMICAL

Agricultural producer and property owner practices consist primarily of non-lethal 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 judgment on their effectiveness and practicality.

Cultural methods 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. 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).

Environmental/Habitat modification can be an integral part of bird damage management. Wildlife production and/or presence are directly related to the type, quality, and quantity of suitable habitat. Therefore, habitat can be managed to reduce or eliminate the production or attraction of certain bird species or to repel certain birds. In most cases, the resource or property owner is responsible for implementing habitat modifications, and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect. Habitat management is most often a primary component of bird damage management 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 crows and blackbirds that form large roosts during late autumn and winter. Bird activity can be greatly reduced at roost sites by removing all the trees or selectively thinning the stand.

Animal behavior modification 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 by this category are bird-proof barriers, electronic guards, propane exploders, pyrotechnics, distress calls and sound producing devices, chemical frightening agents, repellents, scarecrows, mylar tape, lasers, and eye-spot balloons.

These techniques are generally only practical for small areas. Scaring devices such as distress calls, helium-filled eyespot 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, Schmidt and Johnson 1984, Mott 1985, Graves and Andelt 1987, Bomford 1990). Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, Tobin et al. 1988).

Paintball guns are used as a non-lethal harassment method to disperse birds from areas using physical harassment. Paintballs are most often used to harass waterfowl. Paintballs can be used to produce physically and visually negative-reinforcing stimuli that can aid in the dispersal of birds from areas where damages or threats of damages are occurring.

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). Netting can be used to exclude birds from a specific area by the placement of bird proof netting over and around the specific resource to be protected. Exclusion may be impractical in most settings (e.g., commercial agriculture), however it can be practical in small areas (e.g., personal gardens) or for high-value crops (e.g., grapes) (Johnson 1994). Although this alternative would provide short-term relief from damage, it may not completely deter birds from feeding, loafing, staging, or roosting at that site. A few people would find exclusionary devices such as netting unsightly, trashy, and cause a decreased aesthetic value of the neighborhood when used over personal gardens.

Overhead wire grids can deter bird use of specific areas where they are causing a nuisance (Johnson 1994). The birds apparently fear colliding with the wires and thus avoid flying into areas where the method has been employed. Overhead wire grids are more practical and cost effective than netting for large areas; for example, they can be used to keep waterfowl out of retention ponds on airfields.

Auditory scaring devices such as propane exploders, pyrotechnics, electronic guards, and audio distress/predator vocalizations are effective in many situations for dispersing damage-causing bird species. However, these devices are usually only effective for a short period of time before birds become accustomed and learn to ignore them (Arhart 1972, Rossbach 1975, Schmidt and Johnson 1984, Mott 1985, 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). Birds quickly learn to ignore visual and other scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Lasers are a non-lethal technique evaluated by the NWRC (Glahn et al. 2000, Blackwell et al. 2002). For best results and to disperse numerous birds from a roost, the laser is most effectively used in periods of low light, such as after sunset and before sunrise. In the daytime, the laser can also be used during overcast conditions or in shaded areas to move individual and small numbers of birds, although the effective range of the laser is much diminished. Blackwell et al. (2002) tested lasers on several bird species and observed varied results among species. Lasers were ineffective at dispersing mallards with birds habituating in approximately 5 minutes and 20 minutes, respectively (Blackwell et al. 2002). As with other bird damage management tools lasers are most effective when used as part of an integrated management program.

Live traps are any trap that captures an animal without killing it. The animal can then be released or euthanized. In most situations, live trapped birds are subsequently euthanized. Translocation 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 translocation 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.

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

Nest box traps may be used by WS for corrective damage management and are effective in capturing cavity nesting birds (DeHaven and Guarino 1969, Knittle and Guarino 1976).

Mist nets are more commonly used for capturing small-sized birds, but can be used to capture larger birds such as ducks and ring-neck pheasants or even smaller nuisance hawks and owls. It was introduced into the United States in the 1950s 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 and use mortar projectiles to propel a net up and over birds, which have been baited to a particular site.

Raptor traps are varied in form and function and include but are not limited to Bal-chatri, Dho Gaza traps, Phai hoop traps, and Swedish goshawk traps. These traps could be used specifically to live-trap raptors.

Corral traps could be used to live-capture birds, primarily geese and other waterfowl. Corral traps can be effectively used to live capture Canada geese during the annual molt when birds are unable to fly. Each year for a few weeks in the summer, geese are flightless as they are growing new flight feathers. Therefore, geese can be slowly guided into corral-traps.

Funnel traps could be used to live-capture waterfowl. Traps are set up in shallow water and baited. Funnel traps allow waterfowl to enter the trap but prevent the ducks from exiting. Traps would be checked regularly to address live-captured waterfowl. Captured ducks can be relocated or euthanized.

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 or safety issues for home and business owners. Removal of nests is intended to deter birds from nesting in the same area again. Birds generally attempt to re-nest, so the method may need to be conducted repeatedly throughout the nesting season, and over several years. Heusmann and Bellville (1978) reported that nest removal was an effective, but time-consuming, method because problem bird species are highly mobile and can easily return to damage sites from long distances, or because of high populations. This method poses no imminent danger to pets or the public.

Egg Treatment (addling/shaking, puncturing, or oiling) is a method of suppressing reproduction in local nuisance bird populations by destroying egg embryos to arrest their development and eliminate hatching. Treated eggs are returned to the nest and the adult bird remains attached to the nest site. Treatment of eggs is typically done where the current number of birds is tolerable, but additional birds would not be. Treatment of eggs will not reduce the overall problem bird population, but may slow its growth and make adult birds more responsive to harassment (also see *Egg oiling* below).

Lure crops/alternate foods. When damage cannot be avoided by careful crop selection or modified planting schedules, lure crops can sometimes be used to mitigate the loss potential. Lure crops are planted or left for consumption by wildlife as an alternative food source. This approach provides relief for critical crops by sacrificing less important or specifically planted fields. Establishing lure crops is sometimes expensive, requires considerable time and planning to implement, and may attract other unwanted species to the area.

Resource Management includes a variety of practices that may be used by resource owners to reduce the potential for wildlife damage. Implementation of these practices is appropriate when the potential for damage can be reduced without significantly increasing a resource owner's costs or diminishing his/her ability to manage resources pursuant to goals. Resource management recommendations are made through WS technical assistance efforts.

NON-LETHAL METHODS - CHEMICAL

Avitrol is a chemical frightening agent (repellent) that is effective in a single dose when mixed with untreated baits, normally in a 1:9 ratio. Avitrol, however, is not completely non-lethal in that a small portion of the birds are generally killed (Johnson and Glahn 1994). Prebaiting is usually necessary to achieve effective bait acceptance by the target species. This chemical is registered for use on pigeons, crows, blackbirds, starlings, and house sparrows in various situations. Avitrol treated bait is placed in an area where the targeted birds are feeding. When a treated particle is consumed, affected birds begin to 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 non-accumulative in tissues and rapidly metabolized by many species (Schafer, Jr. 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, Jr. 1991). However, a laboratory study by Schafer, Jr. et al. (1974) showed that magpies exposed to two to 3.2 times the published 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. Some hazards may occur to predatory species consuming unabsorbed chemical in the GI tract of affected or dead birds (Schafer, Jr. 1981, Holler and Shafer 1982).

Methyl anthranilate (artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. Methyl anthranilate (MA) has been shown to be a promising repellent for many bird species, including waterfowl (Dolbeer et al. 1993). Cummings et al. (1995) found effectiveness of MA declined significantly after 7 days. Belant et al. (1996) found MA ineffective as a bird grazing repellent, even when applied at triple the recommended label rate. MA is also under investigation as a potential bird taste repellent and may become available for use as a livestock feed additive (Mason et al. 1984, Mason et al. 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[10]), nontoxic to rats in an inhalation study (LC_{50} > 2.8 mg/L[11]), and of relatively low toxicity to fish and other invertebrates. Methyl anthranilate is naturally occurring in concord grapes and in the blossoms of several species of flowers and is used as a food additive and perfume ingredient (Dolbeer et al. 1992). It has been listed as "*Generally Recognized as Safe*" by the U.S. Food and Drug Administration (Dolbeer et al. 1992).

Water surface and turf applications of MA are generally considered expensive. For example, the least intensive application rate required by label directions is 20 lbs. of product (8 lbs. active ingredient) per acre of surface water at a cost of about $64/lb. with retreating required every 3-4 weeks. Cost of treating turf areas would be similar on a per acre basis. In addition, 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 non-irritating to any humans that might be exposed. Fogging applications must generally be repeated 3-5 times after the initial treatment before the birds abandon a treatment site. Applied at a rate of about 0.25 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 EPA or the FDA.

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).

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

Alpha-chloralose is a central nervous system depressant used as an immobilizing agent to capture and remove pigeons, waterfowl and other birds. It is labor intensive and in some cases, may not be cost effective (Wright 1973). Alpha-chloralose is typically delivered in a well contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds. WS' personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Alpha-chloralose was eliminated from more detailed analysis 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. Alpha-chloralose is used in other countries as an avian and mammalian toxicant. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer, Jr. 1991). The dose

[10]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.
[11]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.

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, non-target species and the public, and the low toxicity of the active ingredient. Other supporting rationale for this determination included relatively low total annual use and a limited number of potential exposure pathways. The agent is currently approved for use by WS as an Investigative New Animal Drug by the FDA rather than a pesticide.

Egg oiling is a method for suppressing reproduction of nuisance birds by spraying a small quantity of food grade vegetable oil or corn oil on eggs in nests. The oil prevents exchange of gases and causes asphyxiation of developing embryos and has been found to be 96-100% effective in reducing hatchability (Pochop 1998, Pochop et al. 1998). The method has an advantage over nest or egg destruction in that the incubating birds generally continue incubation and do not re-nest. The EPA has ruled that use of corn oil for this purpose is exempt from registration requirements under FIFRA. To be most effective, the oil should be applied anytime between the fifth day after the laying of the last egg in a nest and at least five days before anticipated hatching. This method is extremely target specific and is less labor intensive than egg addling.

LETHAL METHODS - MECHANICAL

Shooting is more effective as a dispersal technique than as a way to reduce bird densities when large numbers of birds are present. Normally shooting is conducted with shotguns, rifles or air rifles. Shooting is a very individual specific method and is normally used to remove a single offending bird. However, at times, a few birds could be shot from a flock to make the remainder of the birds more wary and to help reinforce non-lethal methods. It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Shooting with shotguns, air rifles, or rim and center fire 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 bird damage management 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 year 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 the 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 crow damage management around crops or other resources.

Cervical dislocation is sometimes used to euthanize birds which are captured in live traps. The bird is stretched and the neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. The AVMA approves this technique as a humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of poultry and other small birds

(Beaver et al. 2001). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Beaver et al. 2001).

Snap traps are modified rat snap traps used to remove individual woodpeckers 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 FIFRA (administered by the EPA). WS' personnel that use restricted-use chemical methods are certified as pesticide applicators by the State of Iowa and are required to adhere to all certification requirements set forth in FIFRA and Iowa 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. 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 AVMA (Beaver et al. 2001). 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 and is also the gas released by 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 society.

DRC-1339 has proven to be an effective method of starling, blackbird, gull, and pigeon control at feedlots, dairies, airports, and in urban areas (DeCino et al. 1966, Besser et al. 1967, West et al. 1967). Studies continue to document the effectiveness of DRC-1339 in resolving blackbird/starling problems at feedlots (West and Besser 1976, Glahn 1981, Glahn et al. 1987), and dispersing crow roosts in urban/suburban areas (Boyd and Hall 1987). Glahn and Wilson (1992) noted that baiting with DRC-1339 is a cost-effective method of reducing damage by blackbirds to sprouting rice.

DRC-1339 is a slow acting avicide that is registered with the EPA for reducing damage from several species of birds, including blackbirds, starlings, pigeons, crows, ravens, magpies, and gulls. DRC-1339 was developed as an avicide because of its differential toxicity to mammals. DRC-1339 is highly toxic to sensitive species but only slightly toxic to non-sensitive birds, predatory birds, and mammals (Schafer, Jr. 1981, Schafer, Jr. 1991, Johnston et al. 1999). For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/bird to cause death (Royall et al. 1967). Most bird species that are responsible for damage, including starlings, blackbirds, pigeons, crows, magpies, and ravens are highly sensitive to DRC-1339. Many other bird species such as raptors (Schafer, Jr. 1981), sparrows, and eagles are classified as non-sensitive. Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to non-target and T&E species (EPA 1995). Secondary poisoning has not been observed with DRC-1339 treated baits, except crows eating gut contents of pigeons (Kreps 1974). During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1979). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds and starlings killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers. Secondary hazards of DRC-1339 are almost nonexistent (Schafer, Jr. 1984, Schafer, Jr. 1991, Johnston et al. 1999). 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 ultra violet radiation. DRC-1339 is highly soluble in water but does not hydrolyze and degradation occurs rapidly in water. DRC-1339 tightly binds to soil and has low mobility. The half-life is about 25 hours, which means it is nearly 100% broken down within a week, and identified metabolites (*i.e.*, degradation chemicals) have low toxicity. Although DRC-1339 is highly toxic to aquatic invertebrates (EPA 1995), following labeling requirements eliminates the risks to non-target mussel species. These label requirements include application more than 50 feet from a body of water, observation, and pre-baiting to ensure the rapid uptake of treated bait by the target bird species.

APPENDIX C

Bird Species Evaluated in the Environmental Assessment for Iowa

Species		Species	
American crow	*Corvus brachyrhynchos*	House sparrow (English)	*Passer domesticus*
American kestrel	*Falco sparverius*	Killdeer	*Charadrius vociferous*
American robin	*Turdus migratorius*	Lapland longspur	*Calcarius lapponicus*
American white pelican	*Pelecanus erythrorhynchos*	Laughing gull	*Leucophaeus atricilla*
Bald eagle	*Haliaeetus leucocephalus*	Lesser scaup	*Aythya affinis*
Bank swallow	*Riparia riparia*	Mallard (domestic/wild)	*Anas platyrhynchos*
Barn owl	*Tyto alba*	Marbled godwit	*Limosa fedoa*
Barn swallow	*Hirundo rustica*	Merlin	*Falco columbarius*
Barred owl	*Strix varia*	Mourning dove	*Zenaida macroura*
Black tern	*Chlidonias niger*	Mute swan	*Cygnus olor*
		Nighthawk (all)	*Chordeiles sp.*
Blue-winged teal	*Anas discors*	Northern flicker	*Colaptes auratus*
Bobolink	*Dolichonyx oryzivorus*	Northern harrier	*Circus cyaneus*
Bonaparte's gull	*Chroicocephalus philadelphia*	Northern mockingbird	*Mimus polyglottos*
Brown-headed cowbird	*Molothrus ater*	Northern shoveler	*Anas clypeata*
Burring owl	*Athene cunicularia*	Osprey	*Pandion haliaetus*
Canada goose	*Branta canadensis*	Pileated woodpecker	*Dryocopus pileatus*
Cattle egret	*Bubulcus ibis*	Purple finch	*Haemorhous purpureus*
Chipping sparrow	*Spizella passerina*	Red-bellied woodpecker	*Melanerpes carolinus*
Cliff swallow	*Petrochelidon pyrrhonota*	Redhead	*Aythya americana*
Common grackle	*Quiscalus quiscula*	Red-headed woodpecker	*Melanerpes erythrocephalus*
Cooper's hawk	*Accipiter cooperii*	Red-tailed hawk	*Buteo jamaicensis*
Dark-eyed junco	*Junco hyemalis*	Red-winged blackbird	*Agelaius phoeniceus*
Dickcissel	*Spiza americana*	Ring-billed gull	*Larus delawarensis*
Double-crested cormorant	*Phalacrocorax auritus*	Ring-necked duck	*Aythya collaris*
Downy woodpecker	*Picoides pubescens*	Ring-necked pheasant	*Phasianus colchicus*
Eastern kingbird	*Tyrannus tyrannus*	Feral pigeon (rock dove)	*Columba livia*
Eastern meadowlark	*Sturnella magna*	Rough-legged hawk	*Buteo lagopus*
Eurasian-collared dove	*Streptopelia decaocto*	Rough-winged swallow	*Stelgidopteryx serripennis*
European starling	*Sturnus vulgaris*	Sharp-shinned hawk	*Accipter striatus*
Ferruginous hawk	*Buteo regalis*	Short-billed dowitcher	*Limnodromus griseus*
Forster's tern	*Sterna forsteri*	Short-eared owl	*Asio flammeus*
Franklin's gull	*Leucophaeus pipixcan*	Snow bunting	*Plectrophenax nivalis*
Free-ranging or feral domestic waterfowl[12]		Snow goose	*Chen caerulescens*
Great black-backed gull	*Larus marinus*	Swainson's hawk	*Buteo swainsoni*
Great blue heron	*Ardea herodias*	Tree swallow	*Tachycineta bicolor*
Great egret	*Ardea alba*	Trumpeter swan	*Cygnus buccinator*
Great-horned owl	*Bubo virginianus*	Turkey vulture	*Cathartes aura*
Greater white-fronted goose	*Anser albifrons*	Upland sandpiper	*Bartramia longicauda*
Greater yellowlegs	*Tringa melanoleuca*	Western kingbird	*Tyrannus verticalis*
Green heron	*Butorides virescens*	Western meadowlark	*Sturnella neglecta*
Hairy woodpecker	*Picoides villosus*	Wild turkey	*Meleagris gallopavo*
Herring gull	*Larus argentatus*	Wood duck	*Aix sponsa*
Horned lark	*Eremophila alpestris*	Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
House finch	*Haemorhous mexicanus*		

[12] Free-ranging or feral domestic waterfowl refers to captive-reared, domestic, of some domestic genetic stock, or domesticated breeds of ducks, geese, and swans. Examples of domestic waterfowl include, but are not limited to, mute swans, Muscovy ducks, Pekin ducks, Rouen ducks, Cayuga ducks, Swedish ducks, Chinese geese, Toulouse geese, Khaki Campbell ducks, Embden geese, and pilgrim geese. Feral ducks may include a combination of mallards, Muscovy duck, and mallard-Muscovy hybrids.

APPENDIX D

USFWS Listing of Threatened and Endangered Species in Iowa

Summary of Animals listings

Status	Species/Listing Name
E	Bat, Indiana Entire (*Myotis sodalis*)
T	Bat, Northern long-eared (*Myotis septentrionalis*)
E	Higgins eye (pearlymussel) Entire (*Lampsilis higginsii*)
E	Mussel, sheepnose (*Plethobasus cyphyus*)
T	Plover, piping except Great Lakes watershed (*Charadrius melodus*)
E	Shiner, Topeka Entire (*Notropis topeka (=tristis)*)
T	Skipper, Dakota (*Hesperia dacotae*)
E	skipperling, Poweshiek Entire (*Oarisma poweshiek*)
E	Snail, Iowa Pleistocene Entire (*Discus macclintocki*)
E	Spectaclecase (mussel) (*Cumberlandia monodonta*)
E	Sturgeon, pallid Entire (*Scaphirhynchus albus*)
E	Tern, least interior pop. (*Sterna antillarum*)

Summary of Plant listings

Status	Species/Listing Name
T	Bush-clover, prairie (*Lespedeza leptostachya*)
T	Milkweed, Mead's (*Asclepias meadii*)
T	Monkshood, northern wild (*Aconitum noveboracense*)
T	Orchid, eastern prairie fringed (*Platanthera leucophaea*)
T	Orchid, western prairie fringed (*Platanthera praeclara*)

Obtained from the USFWS website at
http://ecos.fws.gov/tess_public/reports/species-listed-by-state-report?state=IA&status=listed on 05/06/16.

APPENDIX E

IDNR Listing of Endangered, Threatened, and Special Concern Species in Iowa

571—77.2 (481B) Endangered, threatened, and special concern animals. The natural resource commission, in consultation with scientists with specialized knowledge and experience, has determined the following animal species to be endangered, threatened or of special concern in Iowa:

77.2(1) *Endangered animal species:*

Mammals

Indiana Bat	Myotis sodalis
Plains Pocket Mouse	Perognathus flavescens
Red-backed Vole	Clethrionomys gapperi
Spotted Skunk	Spilogale putorius

Birds

Red-shouldered Hawk	Buteo lineatus
Northern Harrier	Circus cyaneus
Piping Plover	Charadrius melodus
Common Barn Owl	Tyto alba
Least Tern	Sterna antillarum
King Rail	Rallus elegans
Short-eared Owl	Asio flammeus

Fish

Lake Sturgeon	Acipenser fulvescens
Pallid Sturgeon	Scaphirhynchus albus
Pugnose Shiner	Notropis anogenus
Weed Shiner	Notropis texanus
Pearl Dace	Semotilus margarita

Freckled Madtom	Noturus nocturnus
Bluntnose Darter	Etheostoma chlorosomum
Least Darter	Etheostoma microperca

Reptiles

Yellow Mud Turtle	Kinosternon flavescens
Wood Turtle	Clemmys insculpta
Great Plains Skink	Eumeces obsoletus
Copperbelly Water Snake	Nerodia erythrogaster neglecta
Western Hognose Snake	Heterodon nasicus
Copperhead	Agkistrodon contortrix
Prairie Rattlesnake	Crotalus viridis
Massasauga Rattlesnake	Sistrurus catenatus

Amphibians

Blue-spotted Salamander	Ambystoma laterale
Crawfish Frog	Rana areolata

Butterflies

Dakota Skipper	Hesperia dacotae
Ringlet	Coenonympha tullia

Land Snails

Iowa Pleistocene Snail	Discus macclintocki
Minnesota Pleistocene Ambersnail	Novisuccinea new species A
Iowa Pleistocene Ambersnail	Novisuccinea new species B
Frigid Ambersnail	Catinella gelida
Briarton Pleistocene Vertigo	Vertigo briarensis
Bluff Vertigo	Vertigo meramecensis
Iowa Pleistocene Vertigo	Vertigo new species

Fresh Water Mussels

Spectacle Case	Cumberlandia monodonta
Slippershell	Alasmidonta viridis
Buckhorn	Tritogonia verrucosa
Ozark Pigtoe	Fusconaia ozarkensis
Bullhead	Plethobasus cyphyus
Ohio River Pigtoe	Pleurobema sintoxia
Slough Sandshell	Lampsilis teres teres
Yellow Sandshell	Lampsilis teres anodontoides
Higgin's-eye Pearly Mussel	Lampsilis higginsi

77.2(2) *Threatened animal species:*

Mammals

Least Shrew	Cryptotis parva
Southern Bog Lemming	Synaptomys cooperi

Birds

Long-eared Owl	Asio otus
Henslow's Sparrow	Ammodramus henslowii

Fish

Chestnut Lamprey	Ichthyomyzon castaneus
American Brook Lamprey	Lampetra appendix
Grass Pickerel	Esox americanus
Blacknose Shiner	Notropis heterolepis
Topeka Shiner	Notropis topeka
Western Sand Darter	Ammocrypta clara
Black Redhorse	Moxostoma duquesnei
Burbot	Lota lota
Orangethroat Darter	Etheostoma spectabile

Reptiles

Slender Glass Lizard	Ophisaurus attenuatus
Common Musk Turtle	Sternotherus odoratus
Blanding's Turtle	Emydoidea blandingii
Ornate Box Turtle	Terrapene ornata
Diamondback Water Snake	Nerodia rhombifera
Western Worm Snake	Carphophis amoenus vermis
Speckled Kingsnake	Lampropeltis getulus

Amphibians

Mudpuppy	Necturus maculosus
Central Newt	Notophthalmus viridescens

Butterflies

Powesheik Skipperling	Oarisma powesheik
Byssus Skipper	Problema byssus
Mulberry Wing	Poanes massasoit
Silvery Blue	Glaucopsyche lygdamus
Baltimore	Euphydryas phaeton

Snails

Midwest Pleistocene Vertigo	Vertigo hubrichti
Occult Vertigo	Vertigo occulta

Fresh Water Mussels

Cylinder	Anodontoides ferussacianus
Strange Floater	Strophitus undulatus
Creek Heelsplitter	Lasmigona compressa
Purple Pimpleback	Cyclonaias tuberculata
Butterfly	Ellipsaria lineolata
Ellipse	Venustaconcha ellipsiformis

77.2(3) *Special concern animal species:*

Mammals

Southern Flying Squirrel	Glaucomys volans

Birds

Forster's Tern	Sterna forsteri
Black Tern	Chlidonias niger
Peregrine Falcon	Falco peregrinus
Bald Eagle	Haliaeetus leucocephalus

Fish

Pugnose Minnow	Notropis emiliae
Pirate Perch	Aphredoderus sayanus

Reptiles

Smooth Green Snake	Opheodrys vernalis
Bullsnake	Pituophis catenifer sayi

Butterflies

Dreamy Duskywing	Erynnis icelus
Sleepy Duskywing	Erynnis brizo
Columbine Duskywing	Erynnis lucilius
Wild Indigo Duskywing	Erynnis baptisiae
Ottoe Skipper	Hesperia ottoe
Leonardus Skipper	Hesperia l. leonardus

Pawnee Skipper	Hesperia leonardus pawnee
Beardgrass Skipper	Atrytone arogos
Zabulon Skipper	Poanes zabulon
Broad-winged Skipper	Poanes viator
Sedge Skipper	Euphyes dion
Two-spotted Skipper	Euphyes bimacula
Dusted Skipper	Atrytonopsis hianna
Salt-and-pepper Skipper	Amblyscirtes hegon
Pipevine Swallowtail	Battus philenor
Zebra Swallowtail	Eurytides marcellus
Olympia White	Euchloe olympia
Purplish Copper	Lycaena helloides
Acadian Hairstreak	Satyrium acadicum
Edward's Hairstreak	Satyrium edwardsii
Hickory Hairstreak	Satyrium caryaevorum
Striped Hairstreak	Satyrium liparops
Swamp Metalmark	Calephelis mutica
Regal Fritillary	Speyeria idalia
Baltimore	Euphydryas phaeton ozarkae

[ARC 8105B, IAB 9/9/09, effective 10/14/09]

571—77.3(481B) Endangered, threatened, and special concern plants. The natural resource commission, in consultation with scientists with special knowledge and experience, determined the following plant species to be endangered, threatened, or of special concern in Iowa.

77.3(1) *Endangered plant species:*

COMMON NAME	SCIENTIFIC NAME
Pale false foxglove	Agalinus skinneriana
Blue giant-hyssop	Agastache foeniculum
Bearberry	Arctostaphylos uva-ursi
Black chokeberry	Aronia melanocarpa
Eared milkweed	Asclepias engelmanniana
Mead's milkweed	Asclepias meadii
Narrow-leaved milkweed	Asclepias stenophylla
Ricebutton aster	Aster dumosus
Large-leaved aster	Aster macrophyllus
Schreber's aster	Aster schreberi
Fern-leaved false foxglove	Aureolaria pedicularia
Matricary grape fern	Botrychium matricariifolium
Poppy mallow	Callirhoe triangulata
Cordroot sedge	Carex chordorrhiza
Large-bracted corydalis	Corydalis curvisiliqua
Silky prairie-clover	Dalea villosa
Swamp-loosestrife	Decodon verticillatus
Northern panic-grass	Dichanthelium boreale
Roundleaved sundew	Drosera rotundifolia
False mermaid	Floerkea proserpinacoides
Bog bedstraw	Galium labradoricum
Povertygrass	Hudsonia tomentosa
Northern St. Johnswort	Hypericum boreale
Pineweed	Hypericum gentianoides
Winterberry	Ilex verticillata
Black-based quillwort	Isoetes melanopoda
Water-willow	Justicia americana
Dwarf dandelion	Krigia virginica
Cleft conobea	Leucospora multifida
Whiskbroom parsley	Lomatium foeniculaceum
Running clubmoss	Lycopodium clavatum
Bog clubmoss	Lycopodium inundatum
Annual skeletonweed	Lygodesmia rostrata
Water marigold	Megalodonta beckii
Northern lungwort	Mertensia paniculata
Bigroot pricklypear	Opuntia macrorhiza
Clustered broomrape	Orobanche fasciculata
Ricegrass	Oryzopsis pungens
Cinnamon fern	Osmunda cinnamomea
Purple cliffbrake	Pellaea atropurpurea

Arrow arum	Peltandra virginica
Pale green orchid	Platanthera flava
Eastern prairie fringed orchid	Platanthera leucophaea
Clammyweed	Polansia jamesii
Crossleaf milkwort	Polygala cruciata
Purple milkwort	Polygala polygama
Jointweed	Polygonella articulata
Douglas' knotweed	Polygonum douglasii
Three-toothed cinquefoil	Potentilla tridentata
Canada plum	Prunus nigra
Frenchgrass	Psoralea onobrychis
Pink shinleaf	Pyrola asarifolia
Prickly rose	Rosa acicularis
Meadow spikemoss	Selaginella eclipes
Rough-leaved goldenrod	Solidago patula
Bog goldenrod	Solidago uliginosa
Yellow-lipped ladies-tresses	Spiranthes lucida
Pickering morning-glory	Stylisma pickeringii
Rough-seeded fameflower	Talinum rugospermum
Waxy meadowrue	Thalictrum revolutum
Long beechfern	Thelypteris phegopteris
Large-leaved violet	Viola incognita
Rusty woodsia	Woodsia ilvensis
Yellow-eyed grass	Xyris torta

77.3(2) *Threatened plant species:*

Northern wild monkshood	Aconitum noveboracense
Round-stemmed false foxglove	Agalinus gattingerii
Nodding wild onion	Allium cernuum
Fragrant false indigo	Amorpha nana
Virginia snakeroot	Aristolochia serpentaria
Woolly milkweed	Asclepias lanuginosa
Showy milkweed	Asclepias speciosa
Forked aster	Aster furcatus
Rush aster	Aster junciformis
Flax-leaved aster	Aster linariifolius
Water parsnip	Berula erecta
Kittentails	Besseya bullii
Bog birch	Betula pumila
Pagoda plant	Blephilia ciliata
Leathery grapefern	Botrychium multifidum
Little grapefern	Botrychium simplex
Sweet Indian-plantain	Cacalia suaveolens
Poppy mallow	Callirhoe alcaeoides
Pipsissewa	Chimaphila umbellata

Golden saxifrage	Chrysosplenium iowense
Dayflower	Commelina erecta
Spotted coralroot	Corallorhiza maculata
Bunchberry	Cornus canadensis
Golden corydalis	Corydalis aurea
Pink corydalis	Corydalis sempervirens
Showy lady's-slipper	Cypripedium reginae
Slim-leaved panic-grass	Dichanthelium linearifolium
Jeweled shooting star	Dodecatheon amethystinum
Glandular wood fern	Dryopteris intermedia
Marginal shield fern	Dryopteris marginalis
Woodland horsetail	Equisetum sylvaticum
Slender cottongrass	Eriophorum gracile
Yellow trout lily	Erythronium americanum
Queen of the prairie	Filipendula rubra
Blue ash	Fraxinus quadrangulata
Black huckleberry	Gaylussacia baccata
Oak fern	Gymnocarpium dryopteris
Green violet	Hybanthus concolor
Twinleaf	Jeffersonia diphylla
Creeping juniper	Juniperus horizontalis
Intermediate pinweed	Lechea intermedia
Hairy pinweed	Lechea villosa
Prairie bush clover	Lespedeza leptostachya
Twinflower	Linnaea borealis
Western parsley	Lomatium orientale
Wild lupine	Lupinus perennis
Tree clubmoss	Lycopodium dendroideum
Rock clubmoss	Lycopodium porophilum
Hairy waterclover	Marsilea vestita
Bog buckbean	Menyanthes trifoliata
Winged monkeyflower	Mimulus alatus
Yellow monkeyflower	Mimulus glabratus
Partridge berry	Mitchella repens
Pinesap	Monotropa hypopithys
Small sundrops	Oenothera perennis
Little pricklypear	Opuntia fragilis
Royal fern	Osmunda regalis
Philadelphia panic-grass	Panicum philadelphicum
Slender beardtongue	Penstemon gracilis
Hooker's orchid	Platanthera hookeri
Northern bog orchid	Platanthera hyperborea
Western prairie fringed orchid	Platanthera praeclara
Purple fringed orchid	Platanthera psycodes
Pink milkwort	Polygala incarnata

Silverweed	Potentilla anserina
Shrubby cinquefoil	Potentilla fruticosa
Pennsylvania cinquefoil	Potentilla pensylvanica
One-sided shinleaf	Pyrola secunda
Meadow beauty	Rhexia virginica
Beaked rush	Rhynchospora capillacea
Northern currant	Ribes hudsonianum
Shining willow	Salix lucida
Bog willow	Salix pedicellaris
Low nutrush	Scleria verticillata
Buffaloberry	Sheperdia argentea
Scarlet globemallow	Sphaeralcea coccinea
Slender ladies-tresses	Spiranthes lacera
Oval ladies-tresses	Spiranthes ovalis
Hooded ladies-tresses	Spiranthes romanzoffiana
Spring ladies-tresses	Spiranthes vernalis
Rosy twisted-stalk	Streptopus roseus
Fameflower	Talinum parviflorum
Large arrowgrass	Triglochin maritimum
Small arrowgrass	Triglochin palustre
Low sweet blueberry	Vaccinium angustifolium
Velvetleaf blueberry	Vaccinium myrtilloides
False hellebore	Veratrum woodii
Kidney-leaved violet	Viola renifolia
Oregon woodsia	Woodsia oregana

77.3(3) *Special concern plant species:*

Balsam fir	Abies balsamea
Three-seeded mercury	Acalypha gracilens
Three-seeded mercury	Acalypha ostryifolia
Mountain maple	Acer spicatum
Moschatel	Adoxa moschatellina
Water plantain	Alisma gramineum
Wild onion	Allium mutabile
Amaranth	Amaranthus arenicola
Lanceleaf ragweed	Ambrosia bidentata
Saskatoon serviceberry	Amelanchier alnifolia
Low serviceberry	Amelanchier sanguinea
Raccoon grape	Ampelopsis cordata
Pearly everlasting	Anaphalis margaritacea
Sand bluestem	Andropogon hallii
Broomsedge	Andropogon virginicus
Purple angelica	Angelica atropurpurea
Purple rockcress	Arabis divaricarpa
Green rockcress	Arabis missouriensis

Lakecress	Armoracia lacustris
Fringed sagewort	Artemisia frigida
Common mugwort	Artemisia vulgaris
Pawpaw	Asimina triloba
Curved aster	Aster falcatus
Hairy aster	Aster pubentior
Prairie aster	Aster turbinellus
Standing milkvetch	Astragalus adsurgens
Bent milkvetch	Astragalus distortus
Missouri milkvetch	Astragalus missouriensis
Blue wild indigo	Baptisia australis
Yellow wild indigo	Baptisia tinctoria
Prairie moonwort	Botrychium campestre
Watershield	Brasenia schreberi
Buffalograss	Buchloe dactyloides
Poppy mallow	Callirhoe papaver
Water-starwort	Callitriche heterophylla
Grass pink	Calopogon tuberosus
Low bindweed	Calystegia spithamaea
Clustered sedge	Carex aggregata
Back's sedge	Carex backii
Bush's sedge	Carex bushii
Carey's sedge	Carex careyana
Flowerhead sedge	Carex cephalantha
Field sedge	Carex conoidea
Crawe's sedge	Carex crawei
Fringed sedge	Carex crinita
Double sedge	Carex diandra
Douglas' sedge	Carex douglasii
Dry sedge	Carex foena
Thin sedge	Carex gracilescens
Delicate sedge	Carex leptalea
Mud sedge	Carex limosa
Hoplike sedge	Carex lupuliformis
Yellow sedge	Carex lurida
Intermediate sedge	Carex media
Backward sedge	Carex retroflexa
Richardson's sedge	Carex richardsonii
Rocky Mountain sedge	Carex saximontana
Sterile sedge	Carex sterilis
Soft sedge	Carex tenera
Deep green sedge	Carex tonsa
Tuckerman's sedge	Carex tuckermanii
Umbrella sedge	Carex umbellata
Wild oats	Chasmanthium latifolium

Pink turtlehead	Chelone obliqua
Fogg's goosefoot	Chenopodium foggii
Missouri goosefoot	Chenopodium missouriensis
Coast blite	Chenopodium rubrum
Bugbane	Cimicifuga racemosa
Hill's thistle	Cirsium hillii
Swamp thistle	Cirsium muticum
Wavy-leaved thistle	Cirsium undulatum
Western clematis	Clematis occidentalis
Blue-eyed Mary	Collinsia verna
Cancer-root	Conopholis americana
Fireberry hawthorn	Crataegus chrysocarpa
Red hawthorn	Crataegus coccinea
Two-fruited hawthorn	Crataegus disperma
Hawthorn	Crataegus pruinosa
Hawksbeard	Crepis runcinata
Prairie tea	Croton monanthogynus
Crotonopsis	Crotonopsis elliptica
Waxweed	Cuphea viscosissima
Dodder	Cuscuta indecora
Small white lady's-slipper	Cypripedium candidum
Carolina larkspur	Delphinium carolinianum
Sessile-leaved tick trefoil	Desmodium sessilifolium
Fingergrass	Digitaria filiformis
Buttonweed	Diodia teres
Purple coneflower	Echinacea purpurea
Waterwort	Elatine triandra
Purple spikerush	Eleocharis atropurpurea
Green spikerush	Eleocharis olivacea
Oval spikerush	Eleocharis ovata
Dwarf spikerush	Eleocharis parvula
Few-flowered spikerush	Eleocharis pauciflora
Wolf's spikerush	Eleocharis wolfii
Interrupted wildrye	Elymus interruptus
Dwarf scouring rush	Equisetum scirpoides
Ponygrass	Eragrostis reptans
Tall cottongrass	Eriophorum angustifolium
Tawny cottongrass	Eriophorum virginicum
Upland boneset	Eupatorium sessilifolium
Spurge	Euphorbia commutata
Missouri spurge	Euphorbia missurica
Slender fimbristylis	Fimbristylis autumnalis
Umbrella grass	Fuirena simplex
Rough bedstraw	Galium asprellum
Small fringed gentian	Gentianopsis procera

Northern cranesbill	Geranium bicknellii
Spring avens	Geum vernum
Early cudweed	Gnaphalium purpureum
Limestone oak fern	Gymnocarpium robertianum
Bitterweed	Helenium amarum
Mud plantain	Heteranthera limosa
Water stargrass	Heteranthera reniformis
Hairy goldenaster	Heterotheca villosa
Common mare's-tail	Hippuris vulgaris
Canadian St. Johnswort	Hypericum canadense
Drummond St. Johnswort	Hypericum drummondii
White morning glory	Ipomoea lacunosa
Sumpweed	Iva annua
Alpine rush	Juncus alpinus
Toad rush	Juncus bufonius
Soft rush	Juncus effusus
Green rush	Juncus greenii
Edged rush	Juncus marginatus
Vasey's rush	Juncus vaseyi
Potato dandelion	Krigia dandelion
Pinweed	Lechea racemulosa
Duckweed	Lemna perpusilla
Creeping bush clover	Lespedeza repens
Silvery bladder-pod	Lesquerella ludoviciana
Wild flax	Linum medium
Brook lobelia	Lobelia kalmii
False loosestrife	Ludwigia peploides
Crowfoot clubmoss	Lycopodium digitatum
Adder's-mouth orchid	Malaxis unifolia
Globe mallow	Malvastrum hispidum
Two-flowered melic-grass	Melica mutica
Ten-petaled blazingstar	Mentzelia decapetala
Millet grass	Milium effusum
Rock sandwort	Minuartia michauxii
Naked mitrewort	Mitella nuda
Scratchgrass	Muhlenbergia asperifolia
Water milfoil	Myriophyllum heterophyllum
Rough water milfoil	Myriophyllum pinnatum
Water milfoil	Myriophyllum verticillatum
Glade mallow	Napaea dioica
Showy evening primrose	Oenothera speciosa
Northern adders-tongue fern	Ophioglossum vulgatum
Louisiana broomrape	Orobanche ludoviciana
Mountain ricegrass	Oryzopsis asperifolia
Gattinger's panic-grass	Panicum gattingeri

White beardtongue	Penstemon albidus
Cobaea penstemon	Penstemon cobaea
Tube penstemon	Penstemon tubiflorus
Cleft phlox	Phlox bifida
Annual ground cherry	Physalis pubescens
Heart-leaved plantain	Plantago cordata
Wood orchid	Platanthera clavellata
Green fringed orchid	Platanthera lacera
Plains bluegrass	Poa arida
Chapman's bluegrass	Poa chapmaniana
Weak bluegrass	Poa languida
Bog bluegrass	Poa paludigena
Meadow bluegrass	Poa wolfii
Hairy Solomon's-seal	Polygonatum pubescens
Large-leaved pondweed	Potamogeton amplifolius
Ribbonleaf pondweed	Potamogeton epihydrus
White-stemmed pondweed	Potamogeton praelongus
Spiralled pondweed	Potamogeton spirillus
Tussock pondweed	Potamogeton strictifolius
Vasey's pondweed	Potamogeton vaseyi
Bird's-eye primrose	Primula mistassinica
Prionopsis	Prionopsis ciliata
Mermaid weed	Proserpinaca palustris
Dwarf cherry	Prunus besseyi
Hortulan plum	Prunus hortulana
Sand cherry	Prunus pumila
Lemon scurfpea	Psoralea lanceolata
Crowfoot	Ranunculus circinatus
Gmelin's crowfoot	Ranunculus gmelinii
Buckthorn	Rhamnus alnifolia
Dwarf sumac	Rhus copallina
Northern gooseberry	Ribes hirtellum
Yellow cress	Rorippa sinuata
Swamp rose	Rosa palustris
Tooth-cup	Rotala ramosior
Dewberry	Rubus hispidus
Western dock	Rumex occidentalis
Widgeon grass	Ruppia maritima
Prairie rose gentian	Sabatia campestris
Sage willow	Salix candida
Sassafras	Sassafras albidum
Tumblegrass	Schedonnardus paniculatus
Scheuchzeria	Scheuchzeria palustris
Sensitive briar	Schrankia nuttallii
Hall's bulrush	Scirpus hallii

Prairie bulrush	Scirpus maritimus
Pedicelled bulrush	Scirpus pedicellatus
Smith's bulrush	Scirpus smithii
Torrey's bulrush	Scirpus torreyi
Veiny skullcap	Scutellaria nervosa
Wild stonecrop	Sedum ternatum
Rock spikemoss	Selaginella rupestris
Butterweed	Senecio glabellus
False golden ragwort	Senecio pseudaureus
Knotweed bristlegrass	Setaria geniculata
Virginia rockcress	Sibara virginica
Prairie dock	Silphium terebinthinaceum
Burreed	Sparganium androcladum
Great plains ladies-tresses	Spiranthes magnicamporum
Clandestine dropseed	Sporobolus clandestinus
Rough hedge-nettle	Stachys aspera
Needle-and-thread	Stipa comata
White coralberry	Symphoriocarpos albus
Eared false foxglove	Tomanthera auriculata
Spiderwort	Tradescantia virginiana
Humped bladderwort	Utricularia gibba
Flat-leaved bladderwort	Utricularia intermedia
Small bladderwort	Utricularia minor
Valerian	Valeriana edulis
American brookline	Veronica americana
Marsh speedwell	Veronica scutellata
Maple-leaved arrowwood	Viburnum acerifolium
Black arrowwood	Viburnum molle
Black haw	Viburnum prunifolium
Spurred violet	Viola adunca
Lance-leaved violet	Viola lanceolata
Macloskey's violet	Viola macloskeyi
Pale violet	Viola striata
Summer grape	Vitis aestivalis
Frost grape	Vitis vulpina