ENVIRONMENTAL ASSESSMENT

MAMMAL DAMAGE MANAGEMENT IN THE STATE OF IOWA

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

PREPARED IN CONSULTATION WITH
THE UNITED STATES FISH AND WILDLIFE SERVICE
IOWA DEPARTMENT OF NATURAL RESOURCES
IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP

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ACRONYMS

APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CDC	Centers for Disease Control and Prevention
CO_2	Carbon Dioxide
CSA	Cooperative Service Agreement
DEA	Drug Enforcement Agency
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FMD	Foot and Mouth Disease
FONSI	Finding of No Significant Impact
FY	Fiscal Year
HPS	Hantavirus Pulmonary Syndrome
IDALS	Iowa Department of Agriculture and Land Stewardship
IDNR	Iowa Department of Natural Resources
IDPH	Iowa Department of Public Health
IWDM	Integrated Wildlife Damage Management
MDM	Mammal Damage Management
MOU	Memorandum of Understanding
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWRC	National Wildlife Research Center
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
TNR	Trap, Neuter, Release Program
USACE	U.S. Army Corps of Engineers
U.S.	United States
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WID	Work Initiation Document
WNV	West Nile Virus
WS	Wildlife Services

CHAPTER 1: NEED FOR ACTION AND SCOPE OF ANALYSIS

1.1 INTRODUCTION

Across the United States, 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 animals which increases the potential for conflicting human/animal interactions. This Environmental Assessment (EA) evaluates the potential environmental effects of alternatives for WS' involvement in mammal 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 (7 U.S.C. 8351-8352) as amended, and the Act of December 22, 1987 (7 U.S.C. 8353)). Human/animal conflict issues are complicated by the wide range of public responses to animals and animal damage. What may be unacceptable damage to one person may be a normal cost of living with nature to someone else. The relationship in American culture of values and 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.*

WS' activities are conducted to prevent or reduce animal damage to agricultural, industrial, and natural resources, and to 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 approach (WS Directive 2.105) in which a combination of methods may be used or recommended to reduce 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 is a cooperatively funded, service-oriented program that receives requests for assistance with damage caused by animals from private and public entities, including tribes and other governmental agencies. As requested, WS cooperates with land and animal management agencies to reduce damage effectively and efficiently in accordance with applicable federal, state, and local laws and Memoranda of Understanding (MOUs) between WS and other agencies.

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 direct, indirect, and cumulative impacts. In addition, this EA has been prepared to evaluate a range of alternatives to meet the need for action while addressing the issues associated with mammal damage management. Pursuant to the NEPA and the Council on Environmental Quality (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 significant effects. This EA will also serve as a decision-aiding mechanism to ensure that the policies and goals of the NEPA are infused into the actions of the agency[1].

[1]After the development of the EA by WS and consulting agencies and after public involvement in identifying new issues and alternatives, WS will issue a Decision. Based on the analyses in the EA after public involvement, a decision will be made to either publish a Notice of Intent to prepare an Environmental Impact Statement or a Finding of No Significant Impact (FONSI) will be noticed to the public in accordance to NEPA and the Council of Environmental Quality regulations.

The WS-Iowa program continues to receive requests for assistance or anticipates receiving requests for assistance to resolve or prevent damage or threats associated with the American badger (*Taxidea taxus*), American beaver (*Castor canadensis*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*) woodchuck (groundhog)/marmot (*Marmota monax*), muskrat (*Ondatra zibethicus*), Virginia opossum (*Didelphis virginiana*), Eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), Eastern gray squirrel (*Sciurus carolinensus*), fox squirrel (*Sciurus niger*), Eastern chipmunk (*Tamias striatus*), feral swine (*Sus scrofa*), river otter (*Lontra canadensis*), white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*) big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), Northern long-eared myotis (*Myotis septentrionalis*), Eastern red bat (*Lasiurus borealis*), Eastern pipistrelle (*Pipistrellus subflavus*), feral/free-ranging cat (*Felis domesticus*), feral/free-ranging dog (*Canis familiaris*) plains pocket gopher (*Geomys bursarius*), mink (*Mustela vison*), least weasel (*Mustela nivalis*), long-tailed weasel (*Mustela frenata*) and small mammals, such as insectivores (shrews and moles)(order *Insectivora*) and rodents (mice, rats, and voles) (order *Rodentia*).

1.2 NEED FOR ACTION

Some species of wildlife have adapted to thrive in human-altered habitats. Those species, in particular, are often responsible for the majority of conflicts between people and wildlife that lead to requests for assistance to reduce damage to resources and to reduce threats to the health and safety of people. Both sociological and biological carrying capacities must be addressed to resolve 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 (Hardin 1986). 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). These 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 may have a biological carrying capacity to support higher populations of wildlife, in many cases the wildlife acceptance capacity is lower or has been met (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. The need for action to manage damage and threats associated with mammals arises from requests for assistance[2] received by WS to reduce and prevent damage associated with mammals from occurring to four major categories: agricultural resources, natural resources, property, and threats to human safety. WS has identified those mammal species most likely to be responsible for causing damage to those four categories based on previous requests for assistance. Table 1.1 lists the number of WS' technical assistance and direct control projects involving mammal damage or threats of damage to those four major resource types in Iowa from the federal fiscal year[3] FY 2012 through FY 2016. Technical assistance is provided by WS to those persons requesting assistance

[2] WS only conducts mammal damage management after receiving a request for assistance. Before initiating mammal 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.

with resolving damage or the threat of damage by providing information and recommendations on mammal damage management activities 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 mammal species can cause damage to or pose threats to a variety of resources. Most requests for assistance received by WS are associated with those mammal species causing damage or threats of damage to property and human safety. For example, many of those mammal species listed in Table 1.1 are potential vectors for zoonotic diseases or can damage property through digging, burrowing or damaging lawns, houses and businesses. Many threats to human safety are addressed by WS at airports, where mammals on or near runways pose risks to aviation safety.

Table 1.1 – The resource types damaged by mammal species in Iowa from FY 2012 – FY 2016

	Resource[a]					Resource[a]			
Species	**A**	**N**	**P**	**H**	**Species**	**A**	**N**	**P**	**H**
American Badgers	0	0	16	39	**Marmots/Woodchucks**	0	0	5	11
American Beavers	0	25	30	11	**Muskrats**	0	0	40	1
Bobcats	0	0	0	1	**Opossums, Virginia**	51	0	46	42
Cats, Feral/Free Ranging	0	0	6	35	**Rabbits, Eastern Cottontail**	0	0	118	38
Coyotes	0	41	118	217	**Raccoons**	126	0	206	294
Deer, White-tailed (captive)	0	7	0	0	**Skunks, Striped**	65	0	182	120
Deer, White-tailed (wild)	0	2	46	141	**Squirrels, Fox**	0	0	1	0
Dogs, Feral	0	0	2	2	**Squirrels, Ground**	0	0	0	3
Foxes, Red	15	0	32	66	**Swine, Feral**	31	41	24	47

[a]A = Agriculture, N=Natural Resources, P=Property, H=Human Health and Safety

Need for Mammal Damage Management to Protect Human Health and Safety

Human health and safety concerns and problems associated with mammals include, but are not limited to, the potential for transmission of zoonotic diseases to humans, mammal hazards at airports, and risks and actual instances of mammals attacking and potentially injuring humans.

Zoonoses (*i.e.*, wildlife diseases transmissible to people) are a major concern of cooperators when requesting assistance with managing threats from mammals. Disease transmission can not only occur from direct interactions between humans and mammals but from interactions with pets and livestock that have direct contact with mammals. Pets and livestock often encounter and interact with mammals, which can increase the opportunity of transmission of disease to humans. Table 1.2 depicts common diseases affecting humans that can be transmitted by mammals in addition to diseases that affect other animals, including domestic species. These include viral, bacterial, mycotic (fungal), and protozoal diseases.

Table 1.2 - Wildlife Diseases in the Eastern United States that Pose Potential Health Risks through Transmission to Humans (Beran 1994, Davidson 2006)[†]

Disease	Causative Agent	Hosts[‡]	Human Exposure
Anthrax	*Bacillus antracis*	cats, dogs	inhalation, ingestion
Tetanus	*Clostridium tetani*	mammals	direct contact
Dermatophilosis	*Dermatophilus congolensis*	mammals	direct contact
Pasteurellaceae	*Haemophilus influenzae*	mammals	bite or scratch
Salmonellosis	*Salmonella* sp.	mammals	ingestion
Yersinosis	*Yersinia* sp.	cats	ingestion
Chlamydioses	*Chlamydophilia felis*	cats	inhalation, direct contact
Typhus	*Rickettsia prowazekii*	opossums	inhalation, ticks, fleas
Sarcoptic mange	*Sarcoptes scabiei*	red fox, coyotes, dogs	direct contact
Trichinosis	*Trichinella spiralis*	raccoons, fox	ingestion, direct contact
Rabies	Rhabdovirirdae family	mammals	direct contact
Visceral larval	*Baylisascaris procyonis*	raccoons, skunks	ingestion, direct contact
Leptospirosis	*Leptospira interrogans*	mammals	ingestion, direct contact
Echinococcus	*Echinococcus multilocularis*	fox, coyotes	ingestion, direct contact
Toxoplasmosis	*Toxoplasma gondii*	cats, mammals	ingestion, direct contact
Spirometra	*Spirometra mansonoides*	bobcats, raccoons, fox	ingestion, direct contact
Giardiasis	*Giardia lamblia, G. Duodenalis*	beaver, coyotes, cats, dogs	ingestion, direct contact
Lyme disease	*Borellia burgdorferi*	deer	tick bite (vectored by deer)
Ehrlichiosis	*Ehrlichia* sp.	deer	tick bite (vectored by deer)
Tularemia	*Francisella tularensis*	rodents, rabbits	direct contact, ingestion, inhalation
Hantavirus	*Bunyaviridae* family	rodents	direct contact, ingestion, inhalation

[†]Table 1.2 is not considered an exhaustive list of wildlife diseases that are considered infectious to humans that are carried by wildlife species. The zoonoses provided are the more common infectious diseases for the species addressed in this EA and are only a representation of the approximately 100 to 3,000 zoonoses known to exist.

[‡] The host species provided for each zoonosis includes only those mammalian species addressed in this EA unless the zoonoses listed potentially infects a broad range of mammalian wildlife.

Zoonoses infecting a broad range of mammals are denoted by the general term "*mammals*" as the host species. The diseases listed do not necessarily infect only those mammalian species covered under this EA, but likely infect several species of mammals or groups of mammals. For a complete discussion of the more prevalent diseases in free-ranging mammals, please refer to Beran (1994) and Davidson (2006).

Individuals or property owners that request assistance with mammals frequently are concerned about potential disease risks but are unaware of the types of diseases that can be transmitted by those animals. In those types of situations, assistance is requested because of a perceived risk to human health or safety associated with wild animals living in close association with humans, from animals acting out of character by roving in human-inhabited areas during daylight, or from animals showing no fear when humans are present.

In many circumstances when human health concerns are the primary reason for requesting WS' assistance, there may have been no actual cases of transmission of disease to humans by mammals. Thus, it is the risk of disease transmission that is the primary reason for requesting and conducting wildlife

management to lessen the threat of disease transmission. Situations where the threat of disease associated with wild or feral mammal populations may include:

- Exposure of residents to the threat of rabies due to the presence of bats in residential homes and publicly owned buildings, such as schools.
- Exposure of humans to threats of rabies posed by skunks denning and foraging in a residential community or from companion animals coming in contact with infected skunks.
- Concern about the threat of histoplasmosis from the disturbance of a large deposit of guano in an attic where a large colony of bats routinely roosts or raise young.
- Accumulated droppings from denning or foraging raccoons and subsequent exposure to raccoon roundworm in fecal deposits in a suburban community or at an industrial site where humans work or live in areas of accumulation.

Feral swine are known to carry numerous parasites and diseases, which may be transmitted to humans, including brucellosis, leptospirosis, salmonellosis, toxoplasmosis, tuberculosis, influenza and *Escherichia coli* (West et al 2009, Hutton et al. 2006). Infection may result from direct exposure to swine (e.g., hunters handling carcasses), through contamination of food crops (California Food Emergency Response Team 2007), or through secondary infection of a third host (West et al. 2009). When diseases are transmitted through a third host, feral swine transmit the diseases to other wild mammals, birds, or reptiles, which in turn may transmit them to domestic livestock or humans. Although incidence of disease transmission from feral swine to humans is relatively uncommon, some diseases like brucellosis, tuberculosis and tularemia can be fatal. In 2005, an Iowan farmer contracted brucellosis in which feral swine in the area were believed to be the source, first transmitting the disease to his domestic swine herd (IDALS 2006).

Beaver damming activity creates conditions favorable to certain types of mosquitoes and can hinder mosquito control efforts or result in population increases of these insects (Wade and Ramsey 1986). While the presence of these insects is largely a nuisance, mosquitoes can transmit diseases such as Eastern and Western equine encephalitis, St. Louis Encephalitis, LaCrosse Virus, and West Nile Virus (WNV) (Mallis 1982)(Lindsey et. al. 2014)(Center for Disease Control (CDC) 2000). The first human cases of WNV in Iowa were recorded in 2002. By the end of 2002, Iowa had 16 reported cases. From 2003 through 2016 there were 444 human cases and six deaths resulting from WNV (IDPH 2016a).

Beaver are carriers of the intestinal parasite *Giardia lamblia,* which can contaminate human water supplies and cause outbreaks of the disease Giardiasis in humans (Woodward 1983, Beach and McCulloch 1985, Wade and Ramsey 1986, Miller and Yarrow 1994). The CDC has recorded at least 41 outbreaks of waterborne Giardiasis, affecting more than 15,000 people. Beaver are also known carriers of tularemia, a bacterial disease that is transmittable to humans through bites by arthropod vectors or infected animals or by handling animals or carcasses that are infected (Wade and Ramsey 1986). Skinner et al. (1984) found that in cattle-ranching sections of Wyoming the fecal bacterial count was much higher in beaver ponds than in other ponds, something that can be a concern to ranchers and recreationists. On rare occasions, beaver may also contract the rabies virus and attack humans. In February 1999, a beaver attacked and wounded a dog and chased some children that were playing near a stream in Vienna, Virginia. Approximately a week later, a beaver was found dead at the site and tested positive for rabies (T. Menke, Virginia WS, pers. comm., 2003).

In addition to rabies, feral cats carry other zoonoses including cat scratch fever (*Bartonella henselae*), Salmonella (*Salmonella* spp.), murie typhus (*Rickettseia typhi*), plague (*Yersinia pestis*), tularemia (*Francisella tularensis*), toxoplasmosis (*Toxoplasma gondii*), hookworm (*Uncinaria sterocephala, Ancylostoma tubaeforme, Ancylostoma braziliense, Ancylostoma ceylanicum*), and raccoon roundworm

(*Baylisascaris procyonis*) (Gerhold 2011, Gerhold and Jessup 2012). Many zoonosis carried by cats are not life-threatening to humans if they are diagnosed and treated early. However, certain portions of the population are at higher risk including children under the age of five, pregnant women, adults over 65, and persons with weakened immune systems (e.g., cancer patients undergoing chemotherapy) (CDC 2016). For example, in 1994, five children in Florida were hospitalized with encephalitis associated with cat scratch fever (Patronek 1998). In 2002, fleas from a feral cat colony, which had grown from 100 to 1,000 cats despite a trap, neuter and release effort, caused a daycare center at the University of Hawaii in Manoa to close for two weeks because of concerns about the potential transmission of murie typhus and flea (*Ctenocephalides felis*) infestations afflicting 84 children and faculty (Jessup 2004). In another example, in 2010, cats using Miami-Dade County beaches as a litter box were responsible for at least seven confirmed and eight unconfirmed human hookworm infections (Gerhold and Jessup 2012). A similar incident occurred in Miami in 2006 when 22 people were diagnosed with hookworm at a children's camp where feral cats were observed (Gerold and Jessup 2012).

Feral dogs can also carry zoonoses. These include leptospirosis, salmonellosis, spirometra, and rabies and act as hosts for parasites that carry additional zoonoses. For example, the primary way that people in Arizona are infected with Rocky Mountain spotted fever is feral dogs. From 2002 to 2004, an outbreak resulted in the hospitalization of 15 people and the death of two people (Demma et al. 2005).

This section includes only some examples of zoonotic diseases for which WS could provide surveillance or management assistance. It is not intended to be an exhaustive discussion of all potential zoonoses for which WS could provide assistance.

Hantavirus Pulmonary Syndrome (HPS) is caused by infection with hantaviruses. HPS was first recognized in North America when a cluster of cases was diagnosed in the southwestern US. Infection in humans causes acute, severe respiratory disease with a mortality rate of 38%. Rodents are the primary reservoir hosts of hantaviruses and are asymptomatic carriers. Human infection occurs when virus particles aerosolized from rodent urine, feces, or saliva are inhaled or by handling rodents (Davidson and Nettles 1997).

Tularemia, also known as rabbit fever, is a disease caused by the bacterium Fracisella tularensis. Tularemia typically infects animals such as rodents, rabbits, and hares. Usually, people become infected through the bite of infected ticks or tabanid flies, by handling infected sick or dead animals, by eating or drinking contaminated food or water, or by inhaling airborne bacteria. About 200 human cases of tularemia are reported each year in the U.S, and nine cases have been confirmed in Iowa since 2010 (CDC 2016). Without treatment with appropriate antibiotics, tularemia can be fatal (Dennis et al. 2001). The causative agent of tularemia is one of the most infectious pathogenic bacteria known, requiring as few as 10 organisms to cause disease. The Working Group on Civilian Biodefense considers tularemia to be a dangerous potential biological weapon because of its extreme infectivity, ease of dissemination, and substantial capacity to cause illness and death (Dennis et al. 2001).

Rabies is an acute, fatal viral disease of mammals most often transmitted through the bite of a rabid animal. Rabies is preventable, but it is fatal without prior vaccination or post-exposure treatment. From 2010 through 2015, a total of 382 animals have tested positive for rabies in Iowa. Those positive animals included 185 bats, 107 skunks, 38 cats, 29 cows, 16 dogs, five horses, one fox, and one squirrel (IDPH 2016b).

Foreign Animal Diseases: International trade and travel and the popularity of exotic pets have resulted in an ongoing risk of foreign animal disease introduction. In some cases, these diseases may be transmissible to humans. For example, in 2003, 81 individuals in five Midwestern states were diagnosed as having contracted monkey pox from pet prairie dogs and/or other exotic rodents (APHIS 2003).

Symptoms of monkey pox in humans included fever, cough, rash and swollen lymph nodes. The prairie dogs were believed to have contracted the disease from African rodents imported for sale as pets.

Disease Surveillance and Monitoring

Public awareness and health risks associated with zoonoses have increased in recent years. Several zoonotic diseases associated with mammals are addressed in this EA. Those zoonotic diseases remain a concern and continue to pose threats to human safety where people encounter mammals. WS has received requests to assist with reducing damage and threats associated with several mammal species and could conduct or assist with disease monitoring or surveillance activities for any of the mammal species addressed in this EA. Most disease sampling occurs ancillary to other wildlife damage management activities (*i.e.*, disease sampling occurs after wildlife have been captured or lethally removed for other purposes). For example, WS may opportunistically collect blood samples from fox, coyote, feral swine and rabbits that were lethally removed to alleviate damage occurring to property to test for tularemia.

Need for Mammal Damage Management at Airports

Airports provide ideal conditions for many wildlife species due to the large grassy areas adjacent to brushy, forested habitat used as noise barriers. Access to most airport properties is restricted so wildlife living within airport boundaries are protected during hunting and trapping seasons and are insulated from many other human disturbances.

The civil and military aviation communities have acknowledged that the threat to human safety from aircraft collisions with wildlife is increasing (Dolbeer 2000, MacKinnon et al. 2001). Collisions between aircraft and wildlife are a concern throughout the world because wildlife strikes threaten passenger 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 transport industry as a whole (Conover et al. 1995).

Between 1990 and 2014 in the United States, 3,360 aircraft strikes were reported involving terrestrial mammals of which 1,264 involved bats (Dolbeer et al. 2015). The number of mammal strikes actually occurring is likely to be much greater, since an estimated 80% of civil wildlife strikes go unreported (Cleary et al. 2000) and terrestrial mammal species with body masses less than one kilogram (2.2 pounds) are excluded from the database (Dolbeer et al. 2015). Civil and military aircraft have collided with a reported 62 mammal species (41 terrestrial and 21 bat) and 11 mammal species groups (7 terrestrial and five bat) from 1990 through 2014 (Dolbeer et al. 2015).

In Iowa, there were 48 reported strikes with mammals from 1990 through 2015 (FAA 2016). Seventeen of the mammal strikes involved bats, while 31 were terrestrial mammals (Table 1.3). Preventing damage and reducing threats to human safety is the goal of those cooperators requesting assistance at airports given that a potential strike can lead to the loss of human life and considerable damage to property.

Table 1.3 – Mammal species reported struck by aircraft in Iowa from 1990-2015

Species	# Strikes
Coyote	8
Bats (all)	17
Striped Skunks	7
White-tailed Deer	16
Total	**48**

Wildlife populations near or found confined within perimeter fences at airports can be a threat to human safety and cause damage to property when struck by aircraft. Those wildlife confined inside the airport perimeter fence would not be considered distinct populations nor separate from those populations found outside the perimeter fence. Wildlife found within the boundaries of perimeter fences originate from populations outside the fence. Those populations inside the fence do not exhibit nor have unique characteristics from those outside the fence and do not warrant consideration as a unique population under this analysis.

Need for Mammal Damage Management to Protect Agricultural Resources

WS received requests for assistance from agricultural producers experiencing damage problems from mammals including, but not limited to: predation of livestock by coyotes, damage to crops and stored feed by feral swine, fox, opossums, raccoons, and skunks, and risk of disease transmission.

In the United States in 2010, the National Agriculture Statistics Service (NASS) (2011) reported that 219,900 cattle and calves were lost due to predation with an estimated monetary value of $98.5 million. In Iowa, predators killed a reported 200 cattle and 1,400 calves in 2010 for an estimated monetary value of over $723,000 (NASS 2011). Coyotes were attributed to 38% of the cattle losses and 66.9% of the calves lost in Iowa; dogs accounted for 26.1% of the cattle and 13.9% of the calves reported lost in the state; and 28.8% of reported cattle lost were due to unknown predators, compared to the 9.8% of the calves lost to unknown predators (NASS 2011). Cattle producers in Iowa reported using a number of non-lethal methods to reduce losses due to predators. The use of exclusion fencing was reported as being employed by 22.3% of Iowa cattle producers compared to 46.5% reporting the use of guard animals (NASS 2011).

Iowa is an agricultural and livestock production state with a large proportion of its landscape in crop and swine production. The species that can cause the most crop damage covered in this EA are feral swine, raccoons, deer, and woodchucks. This is not an uncommon problem; Conover (2002) estimated that wildlife-related losses of agricultural commodities exceeds $4.5 billion in revenue annually. Feral swine can impact crops directly by consumption and indirectly through behaviors such as rooting, trampling and wallowing. Feral swine could vector pathogenic diseases to domestic stock, thereby constituting a disease risk to swine productions across the state. Raccoons commonly damage field and sweet corn crops and have been shown to reduce their home ranges during the period when corn is most attractive to them (Beasley and Rhodes 2008). When surveying corn fields for damage, a study in northern Indiana found that 87% of damage events were attributed to raccoon (DeVault et al 2007). Also, Beasley and Rhodes (2008) found a significant positive relationship between corn damage and raccoon abundance.

Woodchucks (commonly referred to as groundhogs) are also reported to cause damage to agriculture, such as row and forage crops, orchards, nursery plants, and commercial gardens. DeVault et al (2007) found that woodchucks were responsible for an estimated 38% of damage to soybean fields in northern Indiana, second only to white-tailed deer. Cottontail rabbits and voles are reported to damage orchard trees by gnawing at the base of the tree. Trees are badly damaged or the bark is girdled and trees die when feeding by rabbits and voles is severe.
Similar damage occurs in nurseries that grow landscape ornamentals and shrubs.

Livestock and dairy production contribute substantially to the state's economy and milk production. There were an estimated 211,000 milk cows, 3,850,000 beef cows, 21,300,000 pigs, 175,000 sheep, and 51,910,000 chickens in Iowa during 2015 (NASS 2016).

Several diseases including pseudorabies, tuberculosis, and potentially foot-and-mouth disease, affect domestic animals and wildlife. Monitoring for and containment or eradication of these diseases to protect agricultural and natural resource interests could include wildlife damage management activities conducted by WS in cooperation with the USDA APHIS Veterinary Services program, Iowa Department of Natural Resources (IDNR), and Iowa Department of Agriculture and Land Stewardship (IDALS) or other governmental agencies.

As with the zoonoses section earlier, this section includes only some examples of diseases of concern to agricultural animal species for which WS could provide surveillance or management assistance. It is not intended to be an exhaustive discussion of all potential diseases for which WS could provide assistance.

Toxoplasmosis. Cats, both domestic and wild, have been found to transmit the protozoan parasite, *Toxoplasma gondii* to other domestic and wild mammals. Cats have been found to be important reservoirs and the only species known to allow for the completion of the life cycle for *T. gondii* (Dubey 1973; Teutsch et al. 1979). Both feral and domiciled cats may be infected by this protozoan, but this infection is more common in feral cats. Fitzgerald et al. (1984) documented that feral and free-ranging pet cats transmitted *T. gondii* to sheep in New Zealand, resulting in abortion in ewes. Dubey et al. (1986) found cats to be a major reservoir of seroprevalence of *T. gondii* on swine farms in Illinois. The main sources for infecting cats are thought to be birds and mice.

Foot and Mouth Disease (FMD) is a severe, highly contagious vesicular viral disease of cloven-hoofed animals, including, but not limited to, cattle, swine, sheep, goats, and deer. The disease is rarely fatal in adult animals, although mortality in young animals may be high. FMD is endemic in Africa, Asia, South America, and parts of Europe, but the United States has been free of FMD since 1929. Although it is often not fatal, FMD causes severe losses in the production of meat and milk and therefore has grave economic consequences. FMD does not infect humans or horses, however, both could potentially transmit the virus.

While FMD is primarily an economically devastating disease of livestock, experimental studies have clearly demonstrated that it also threatens wildlife. North American wildlife that are susceptible to FMD include white-tailed deer, feral swine, bison, moose, antelope, musk ox, caribou, sheep, and elk. Most free-living North American wildlife have not had previous viral exposure to FMD, and there is little information available about their vulnerability (USGS NWHC 2001). Feral swine are known to be able to amplify and transmit FMD and could be an important carrier/reservoir of the disease in the event of an outbreak in the U.S. (Mohamed et al. 2011). Each state in the U.S. is or has developed its own FMD emergency response plan.

Feral swine are potential reservoirs for 30 viral and bacterial diseases as well as 37 parasites that threaten the health of livestock and humans (Hutton et al 2006). Of greatest concern is infection of swine production facilities with diseases like swine brucellosis and pseudorabies. In 2005, a domestic swine herd became infected with brucellosis and feral swine in the area are believed to be the source of infection (IDALS 2006). A study conducted in Texas found that feral swine do represent a reservoir of diseases transmissible to livestock (Corn et al, 1986). Swine harvested in this study tested positive for pseudorabies, brucellosis, and leptospirosis. Other diseases carried by feral swine include hog cholera, tuberculosis, bubonic plague, and anthrax (Beach 1993). A recent study in Oklahoma (Saliki et al. 1998) found samples also positive for antibodies against porcine parvovirus, swine influenza and the recently emerged porcine reproductive and respiratory syndrome virus. Porcine reproductive and respiratory syndrome (PRRS) is a highly infectious virus, requiring only a few viral particles to initiate infection (Henry 2003). Feral swine in Iowa have tested positive for influenza virus, leptospirosis, toxoplasmosis, and PRRS (WS unpublished data).

Pseudorabies is a disease of swine that can also affect cattle, horses, dogs, cats, sheep, and goats. The disease is caused by the pseudorabies virus, an extremely contagious herpes virus that causes reproductive problems, including abortion, stillbirths, and even occasional death in breeding and finishing hogs. The United States is one of the world's largest producers of pork and is the second largest exporter of pork. U.S. pork production accounts for about 10 percent of the total world supply. The retail value of pork sold to consumers exceeds $30 billion annually. In addition, the pork industry supports more than 600,000 jobs. Iowa ranks #1 in commercial pork production in the United States and had an estimated inventory in Dec 2016 of 22.4 million hogs (NASS 2017). In 2004, domestic swine in all 50 states had attained Stage V pseudorabies free status. However, pseudorabies is still found in feral swine and these animals serve as a potential source of infection for domestic animals.

Need to Resolve Damage Occurring to Natural Resources

Natural resources may be described as those assets belonging to the public and often managed and held in trust by government agencies as representatives of the people. Such resources may be plants or animals, including threatened and endangered species (T&E) or habitats in general. Examples of natural resources in Iowa include: parks, nature preserves, wildlife management areas, recreation areas, natural areas, including unique habitats or topographic features, T&E plants or animals, and any plant or animal populations that have been identified by the public as a natural resource.

Mammals have been identified to cause damage to natural resources in certain situations. Mammals causing damage are often locally overabundant at the damage site and threaten the welfare of a species' population identified as a natural resource. Predation can be especially harmful towards species with low productivity and declining populations. The presence of even a single predator at a nest site can result in the direct mortality of adult birds, chicks and eggs, or cause birds to abandon active nests and the nesting site entirely (Erwin et al. 2011, Kress and Hall 2004).

Beaver can impact natural resource communities more indirectly. While beaver ponds and the habitat they create can be beneficial for some species of wildlife, beaver activities can also destroy other critical habitat types (e.g. free-flowing streams, riparian areas, bird roosting and nesting areas) that are important to sensitive wildlife species. For example, certain species of fish and mussels are dependent on clear, cool and/or fast moving water (Cedar Valley Resource & Development Inc. 2002). Where beaver are abundant, they may restrict water flow to downstream natural areas thereby impacting wildlife populations. Freshwater mussels are the most imperiled group of animals in the U.S. (Carey et al. 2015).

White-tailed deer selectively forage on vegetation (Strole and Anderson 1992), and thus overabundant deer populations can have substantial impacts on certain herbaceous and woody species and on overall plant communities (Waller and Alverson 1997). These changes can lead to adverse impacts on other wildlife species that depend on these plants for food and/or shelter. Numerous studies have shown that over-browsing by deer can decrease tree reproduction, vegetation understory, plant density, and plant diversity (Warren 1991). For example, in the Great Smokey Mountains National Park in Tennessee, an area heavily populated with deer had a reduced number of plant species, a loss of hardwood species and a predominance of conifers compared to similar control areas with fewer deer (Bratton 1979). This alteration and degradation of habitat from deer over-browsing can have a detrimental effect on deer herd health and may displace other wildlife communities (*e.g.*, neotropical migrant songbirds and small mammals) that depend upon the understory destroyed by deer browsing (VDGIF 1999). Similarly, DeCalesta (1997) reported that deer browsing affected vegetation that songbirds need for foraging, escape cover, and nesting. Species richness and abundance of intermediate canopy-nesting songbirds was reduced in areas with higher deer densities (DeCalesta 1997). Intermediate canopy-nesting birds declined 37% in abundance and 27% in species diversity at higher deer densities. Five species of birds were found to disappear at densities of 38.1 deer per square mile and another two disappeared at 63.7 deer per square

mile. Casey and Hein (1983) found that three species of birds were lost in a research preserve stocked with high densities of ungulates and the densities of several other species of birds were lower than adjacent areas with fewer deer.

Feral swine have a negative effect on "almost all aspects of ecosystem structure and function" (Jolley et al. 2010). The greatest damage occurs in areas that are environmentally sensitive or that provide critically important habitat for T&E species or are otherwise imperiled (Campbell and Long 2009). Much of this damage occurs through feral swine's rooting behavior (digging for food with their snout), which disturbs both the structure and properties of soil (Campbell and Long 2009). Rooting, in conjunction with trampling and compaction, leads to the leaching of important minerals, changes in decomposition rates and nutrient cycling, as well as increased rates of erosion (Campbell and Long 2009). This disturbance, along with the consumption of seeds and young plants by feral swine, also changes the composition of vegetation on the landscape, the rate of plant regeneration, and encourages exotic invasive plants (Singer et al. 1984, Campbell and Long 2009). Howe et al. (1981) found that feral swine rooting activities in the forest of Tennessee and North Carolina had occurred to the extent that recovery would take three or more years, while Bratton (1975) found that feral swine damage was so extensive that the forest understory was unlikely to ever recover. These changes in vegetation can be so extensive that they nearly wipe out local populations of native wildlife for which this vegetation provides critical habitat (Singer et al. 1984). This damage is most pronounced in areas that are more sensitive to disturbance, such as aquatic environments (Seward et al. 2004, Kaller and Kelso 2006, Engeman et al. 2007, Kaller et al. 2007). Feral swine cause erosion, increased turbidity, increased sedimentation, fecal contamination, nutrient mobilization, and surface water enrichment. As a result, they can have direct and indirect effects on aquatic biota and communities (Zengel and Conner 2008).

Scientists estimate that nationwide feral and free-ranging domestic cats kill hundreds of millions of birds and more than a billion small mammals, such as rabbits, squirrels, and chipmunks each year. Cats kill common species such as cardinals, blue jays, and house wrens, as well as rare and endangered species such as piping plovers (ABC 2011). Individual feral and free-ranging cats can kill more than 100 animals each year. One well-fed cat that roamed a wildlife experiment station was recorded to have killed more than 1,600 animals (mostly small mammals) over 18 months (ABC 2011). Researchers at the University of Wisconsin coupled their four-year cat predation study with the data from other studies, and estimated that rural feral and free-ranging cats kill at least 7.8 million and perhaps as many as 217 million birds a year in Wisconsin. In some parts of the state, feral and free ranging cat densities reached 114 cats per square mile, outnumbering all similar-sized native predators (Coleman et al. 1997). Churcher and Lawton (1989) observed 77 well fed free-ranging cats in a Britain village for one year. They estimated that 30% to 50% of the animals captured by cats were birds and that the cats had significantly affected house sparrow populations within the village. Based on information acquired in the study, they estimated that more than 20 million birds are killed by cats in Britain each year with more than 70 million animals overall being taken by cats annually. Most recently, Loss et al. (2013) estimated that free-ranging cats kill 1.4 to 3.7 billion birds and 6.9 to 20.7 billion mammals worldwide annually.

Need for Mammal Damage Management to Protect Property

Mammals cause damage to a variety of property types each year. From FY 2012 through FY 2016, WS received reports of damages or threats of damage caused by mammals to aircraft, runways/taxiways, roads and bridges, railroads and trestles, residential and non-residential buildings, machinery, equipment/machinery, and landscaping. The most frequently reported damage type is the threat of aircraft striking mammals. The direct threat of aircraft strikes with mammals can cause substantial damage requiring costly repairs and aircraft downtime. Indirect threats to aircraft may result from large populations of small mammals such as rabbits, insectivores, mice, and voles attracting larger mammalian and avian predators to the airfield and increasing the risk of a wildlife strike.

Burrowing activities of woodchucks and muskrats can severely damage levees, dikes, earthen dams, landfills, and other structures (FEMA 2005). Woodchucks burrowing under roadbeds and embankments could potentially weaken or cause the collapse of these structures. Woodchucks also cause damage by chewing underground utility cables, sometimes resulting in power outages. Additionally, woodchuck burrows may cause damage to property when tractors and other equipment drop into a burrow or roll over due to a burrow.

Rooting by feral swine can cause damage to roadbeds, dikes, and other earthen structures. Feral swine have broken through livestock and game fences to consume animal feed and mineral supplements. In some areas, foraging swine have damaged landscaping, golf courses, and other ornamental plantings.

Need for Non-Damage Related Activities by WS Involving Mammals

Not all WS' activities related to mammals may involve traditional damage management or threats to human health or human safety. WS may be requested to assist with or conduct research and monitoring activities, such as live-capturing mammals for marking or telemetry research or collecting road killed specimens to determine species distribution. WS' personnel may be involved in species population enhancement activities, such as live capturing mammals for reintroduction to historical habitat or habitat improvement. WS may also be requested to conduct or assist in rescuing and translocating mammals in dangerous situations or to euthanize severely injured or sick mammals that do not involve damage or threats to human health and safety.

1.3 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) AND WS DECISION-MAKING:

All federal actions are subject to the NEPA (Public Law 9-190, 42 USC 4321 et seq.). WS follows CEQ regulations implementing the NEPA (40 CFR 1500 et seq.). In addition, WS follows the USDA (7 CFR 1b), and APHIS Implementing Guidelines (7 CFR 372) as part of the decision-making process. Those laws, regulations, and guidelines generally outline five broad types of activities to be accomplished as part of any project: public involvement, analysis, documentation, implementation, and monitoring. The NEPA also sets forth the requirement that all major 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. Federal activities affecting the physical and biological environment are regulated in part by the CEQ through regulations in 40 CFR 1500-1508. In accordance with the CEQ and USDA regulations, APHIS guidelines concerning the implementation of the NEPA, as published in the Federal Register (44 CFR 50381-50384), provide guidance to WS regarding the NEPA process.

Pursuant to the NEPA and the CEQ regulations, this EA documents the analyses of potential federal actions, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing significant effects, and serves as a decision-aiding mechanism to ensure that the policies and goals of the NEPA are infused into federal agency actions. 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.

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. As the authority for the management of mammal populations in the state, the IDNR was involved in reviewing the EA and providing 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,

including those mammal species addressed in this EA, and establishes and enforces regulated hunting and trapping seasons. WS' activities to reduce and/or prevent mammal damage under the alternatives would be coordinated with the IDNR, which would ensure WS' actions are incorporated into population objectives established for mammal species.

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

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

1.5 AFFECTED ENVIRONMENT

Mammals can be found across Iowa throughout the year. Therefore, damage or threats of damage associated with mammals could occur wherever mammals occur as would requests for assistance to manage damage or threats of damage. Assistance would only be provided by WS when requested by a landowner or manager and WS would only provide direct operational assistance on properties where a MOU, Cooperative Service Agreement (CSA), Work Initiation Document (WID), or other comparable document had been signed between WS and the cooperating entity.

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, or municipal lands in Iowa to reduce damage and threats associated with mammals. The analyses in this EA are intended to apply to actions taken under the selected alternative that could occur in any locale and at any time within the state. This EA analyzes the potential impacts of mammal damage management (MDM) and addresses activities that are currently being conducted under a MOU, CSA, WID, or other comparable document with WS. This EA also addresses the potential impacts of MDM in Iowa where additional agreements may be signed in the future.

Federal, State, County, Municipal, and Private Lands

Under two of the alternatives, WS could continue to provide MDM 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 mammals, 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

At present there is one federally-recognized tribe in Iowa. The WS program would only conduct damage management activities when requested by the Native American Tribe and only after a MOU or CSA has been signed between WS and the Tribe requesting assistance. 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 mammals on federal, state, county, municipal, and private properties under the alternatives analyzed in this EA would also be available for use to alleviate damage on tribal properties when the use of those methods have been approved for use by the Tribe requesting WS' assistance. Therefore, the activities and methods addressed under the alternatives would

include those activities that could be employed on Native American lands, when requested and agreed upon.

Site Specificity

This EA analyzes the potential impacts of MDM based on previous activities conducted on private and public lands where WS and the appropriate entities have entered into a MOU, CSA, WID, or other comparable document. The EA also addresses the impacts of MDM 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 MDM efforts could occur. Thus, this EA anticipates the potential expansion and analyzes the impacts of such efforts as part of the alternatives.

Most of the mammal species addressed in this EA can be found statewide and throughout the year, therefore, damage or threats of damage can occur wherever those mammals occur. Planning for the management of mammal damage must be viewed as being conceptually similar to the actions of 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. Although some of the sites where mammal damage could occur can be predicted, all 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 mammals 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 relate to specific areas whenever possible, however, many issues apply wherever mammal damage and the resulting management actions could occur and are treated as such.

Chapter 2 of this EA identifies and discusses issues relating to MDM. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in the State (see Chapter 2 for a description of the Decision Model and its application). Decisions made using the model would be in accordance with WS' directives 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 its mission.

1.6 AUTHORITY OF FEDERAL AND STATE AGENCIES

The authorities of WS and other agencies as those authorities relate to conducting wildlife damage management activities are discussed by agency below:

WS' Legislative Authority

The primary statutory authority for the WS program is the Act of March 2, 1931 (7 U.S.C. 8351-8352) as amended, and the Act of December 22, 1987 (7 U.S.C. 8353). 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 in managing wildlife damage.

United States Environmental Protection Agency (EPA)

The U.S. 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 and pesticides available for use to manage damage associated with mammals. The EPA is also responsible for administering and enforcing Section 404 of the Clean Water Act (CWA) along with the U.S. Army Corps of Engineers.

United States Fish and Wildlife Service (USFWS)

The USFWS is the primary federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife resources and their habitat. The USFWS has specific responsibilities for the protection of migratory birds, threatened and endangered species, inter-jurisdictional fish, and certain marine mammals, as well as for lands and waters managed by the agency in the National Wildlife Refuge System. The USFWS has statutory authority for enforcing the Fish and Wildlife Improvement Act of 1978 (16 USC 7.12), the Fish and Wildlife Act of 1956 (16 USC 742 a-j), and the Migratory Bird Treaty Act (16 USC 703-711).

United States Food and Drug Administration (FDA):

The U.S. 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 is also responsible for advancing the public health by helping to speed innovations that make medicines and foods more effective, safer, and more affordable, and helping the public get the accurate, science-based information they need to use medicines and foods to improve their health.

United States Drug Enforcement Administration (DEA):

The U.S. DEA is responsible for enforcing the Controlled Substance Act (1970). The DEA prevents the abuse and illegal use of controlled substances by regulating their production, distribution and storage.

United States Army Corps of Engineers (USACE):

The USACE is responsible for regulating all waters of the U.S. under the Clean Water Act (CWA).

Iowa Department of Natural Resources (IDNR)

The IDNR is responsible for the management, restoration, protection, and conservation of Iowa's forests and prairies. The IDNR also promotes natural resources stewardship and carries out state and federal law regulations and policies, like implementing program compliance with the Clean Air Act, CWA, and Endangered Species Act (ESA). Through technical assistance, permitting, and compliance programs, the IDNR engages in educational outreach and encourages the enjoyment of recreational opportunities in Iowa's state parks. The IDNR adheres to the Iowa Wildlife Action Plan, and establishes goals in concurrence with their mission, "To conserve and enhance our natural resources in cooperation with individuals and organizations to improve the quality of life in Iowa and ensure a legacy for future generations."

Iowa Department of Public Health (IDPH)

The IDPH is a partnership of local public health, non-profit organizations, health care providers, policymakers, businesses, and other similar organizations cooperating together to protect and promote the health of Iowans. The IDPH strives to improve the quality of life for the people of Iowa and assures access to quality population-based health services related to preventing epidemics and the spread of disease, preventing injuries and violence, promote healthy living, and protect against environmental hazards. The role of the IDPH also includes strengthening the health infrastructure of the state and facilitates communication of health-related issues to public entities and the people of Iowa.

Iowa Department of Agriculture and Land Stewardship (IDALS)

The IDALS provides leadership for all aspects of agriculture, consumer protection, and responsible use of natural resources in Iowa. The IDALS oversees the Division of Soil Conservation, Consumer Protection and Industry Services Division, Food Safety and Animal Health Division, the state Climatologist, Entomologist, and Veterinarian, and incudes programs regulated within the scope of Iowa law, generate agricultural statistics and provide oversight of the Horse and Dog Breeding Program. The Land Stewardship aspect of the Department is focused on ensuring high quality of life that previous generations have experienced in the state.

1.7 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

Environmental Assessment – Reducing Mammal Damage in Iowa: WS-Iowa developed an EA that analyzed the environmental effects of WS' involvement in MDM in Iowa (USDA 2006). That EA identified the issues associated with managing mammal damage and analyzed alternative approaches to meet the specific need identified in the EA while addressing the identified issues. Since activities conducted under the previous EA will be re-evaluated under this EA to address the updated need for action and the associated affected environment, the previous EA will be superseded by this analysis and the outcome of the Decision issued based on the analyses in this EA.

Environmental Impact Statement – Feral Swine Damage Management: A National Approach: APHIS and cooperating agencies previously prepared an EIS that addressed feral swine damage management in the United States, American Samoa, Mariana Islands, United States Virgin Islands, Guam, and Puerto Rico (USDA 2015). The Record of Decision selected the preferred alternative in the EIS to implement a nationally coordinated program that integrates methods to address feral swine damage. In accordance with the Record of Decision, WS developed this EA to be consistent with the EIS and the Record of Decision.

Proposal to Permit Take as provided under the Final Programmatic Environmental Impact Statement for the Eagle Rule Revision:

Developed by the USFWS, this EIS 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 EIS evaluated the management on an eagle management unit level (similar to the migratory bird flyways) to establish limits on the amount of eagle take that the USFWS could authorize in order to maintain stable or increasing populations. This alternative further establishes a maximum duration for permits of 30 years with evaluations in five year increments (USFWS 2016*a*). A Record of Decision was made for the preferred alternative in the EIS. The selected alternative revised the permit regulations for the "*take*" of eagles (see 50 CFR 22.26 as amended) and a provision to authorize the removal of eagle nests (see 50 CFR 22.27 as amended). The USFWS published a Final Rule on December 16, 2016 (81 FR 91551-91553).

1.8 SUMMARY OF PUBLIC INVOLVEMENT

Issues related to mammal damage management were initially developed by WS and stakeholder feedback/consultations. 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 is being 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 mammals, and by posting the EA on the APHIS website at http://www.aphis.usda.gov/wildlifedamage/nepa.

WS 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 would be fully considered to determine whether the EA should be revisited and, if appropriate, revised prior to issuance of a final Decision or publication of a notice of intent to prepare an EIS.

1.9 RATIONALE FOR PREPARING AN *EA* RATHER THAN AN *EIS*

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. As most mammals are regulated by the IDNR, the best available data for analysis is often based on statewide population dynamics. For example, an EA on the county level may not have sufficient data for that area and would have to rely on statewide analysis anyway. If a determination is made through this EA that the proposed action or the other alternatives might have a significant impact on the quality of the human environment, then an EIS would be prepared.

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 action 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 could occur in the absence of the federal action by a non-federal entity. This concept is applicable to situations involving federal assistance to reduce damage associated with wildlife species.

Most non-native invasive species are not protected under state or federal law. Most resident wildlife species are managed under state authority or law without any federal oversight or protection. In some states, with the possible exception of restrictions on methods (*e.g.*, firearms restrictions, pesticide regulations), unprotected wildlife species and certain resident wildlife species are managed with little or no restrictions allowing them to be killed or taken by anyone at any time when they are committing damage. The IDNR has the authority to manage and authorize the taking of mammals for damage management purposes.

When a non-federal entity (*e.g.*, agricultural producers, municipalities, counties, private companies, individuals) takes a mammal damage management action, the action is not subject to compliance with the

NEPA due to the lack of federal involvement 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 mammals should occur and even the particular methods that would be used, WS' involvement in the action would not affect the environmental status quo. Given that non-federal entities can receive authorization to use lethal MDM methods from the IDNR (depending on the species state classification), and since most methods for resolving damage are available to both WS and to non-federal entities, WS' decision-making ability is restricted to one of three alternatives: 1) WS can either take the action using the specific methods discussed in this EA upon request; 2) WS can provide non-lethal assistance only; 3) or WS can take no action, at which point the non-federal entity could take action anyway, either without a permit, during the hunting or trapping season, or through the issuance of a permit by the IDNR. Under those circumstances, WS would have virtually no ability to affect the environmental status quo because the action would likely occur in the absence of WS' direct involvement.

1.10 COMPLIANCE WITH LAWS AND STATUTES

Several laws and regulations pertaining to wildlife damage management activities, including activities that could be conducted in the state are discussed below. Those laws and regulations relevant to mammal damage management activities are addressed below:

Bald and Golden Eagle Protection Act (16 USC 668-668c), as amended:

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 USFWS to issue permits for the take of bald eagles and golden eagles on a limited basis (see 81 FR 91551-91553, 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 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 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 MDM methods described in this EA that might be used operationally by WS 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 would be used by WS under the alternatives 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 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 such use would be to the benefit of the historic property. A built-in 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 the Section 106 of the NHPA would be conducted as necessary in those types of situations.

Environmental Justice in Minority and Low Income Populations (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. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies, and activities on minority and low-income persons or populations. All activities are evaluated for their impact on the human environment and compliance with Executive

Order 12898.

WS would use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. All chemicals that could be used by WS are regulated by the EPA, the IDALS, the DEA, MOUs with land managing agencies, and by WS' Directives. WS would properly dispose of any excess solid or hazardous waste. WS does not anticipate adverse or disproportionate environmental impacts from the proposed action or alternatives, to minority or low-income populations. In contrast, the alternatives may benefit minority or low-income populations by reducing threats to public health and safety and property damage.

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

Children may suffer disproportionately from environmental health and safety risks, including the development of their physical and mental status. 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. The proposed activities would occur by using only legally available and approved methods where it would be 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 the proposed action or the alternatives. Additionally, since the proposed mammal damage management program is directed at reducing human health and safety risks at locations where children are sometimes present, it is expected that health and safety risks to children posed by mammals would be reduced.

Invasive Species (Executive Order 13112)

Executive Order 13112 directs federal agencies to use their programs and authorities to prevent the spread or to control populations of invasive species that cause economic or environmental harm or harm to human health. 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 work until a reasonable effort has been made to protect the items and the proper authority has been notified.

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 mammals that may cause safety and health concerns at workplaces.

Federal Insecticide, Fungicide, and Rodenticide Act

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 that would be available for use by WS or could be recommended by WS under any of the alternatives would be registered with and regulated by the EPA and the IDALS, and would be used or recommended by WS in compliance with labeling procedures and requirements. There are several products registered for the control of mammals (fumigants, toxicants, repellents) in Iowa listed in Appendix B.

Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360)

This law places administration of pharmaceutical drugs, including those used in wildlife capture and handling, under the Food and Drug Administration.

Controlled Substances Act of 1970 (21 U.S.C. 821 et seq.)

This law requires an individual or agency to have a special registration number from the DEA to possess controlled substances, including those that are used in wildlife capture and handling.

Animal Medicinal Drug Use Clarification Act of 1994

The Animal Medicinal Drug Use Clarification Act and its implementing regulations (21 CFR 530) establish several requirements for the use of animal drugs, including those used to capture and handle wildlife in damage management programs. Those requirements are: (1) a valid "*veterinarian-client-patient*" relationship, (2) well defined record keeping, (3) a withdrawal period for animals that have been administered drugs, and (4) identification of animals. A veterinarian, either on staff or on an advisory basis, would be involved in the oversight of the use of animal capture and handling drugs under any alternative where WS could use those immobilizing and euthanasia drugs. Veterinary authorities in each state have the discretion under this law to establish withdrawal times (*i.e.*, a period of time after a drug is administered that must lapse before an animal may be used for food) for specific drugs. Animals that might be consumed by a human within the withdrawal period must be identified. WS would establish procedures for administering drugs used in wildlife capture and handling that would be approved by state veterinary authorities in order to comply with this law.

Clean Water Act (Section 404)

Section 404 (33 U.S.C. 1344) of the Clean Water Act prohibits the discharge of dredged or fill material into waters of the United States without a permit from the United States Army Corps of Engineers (USACE) unless the specific activity is exempted in 33 CFR 323 or covered by a nationwide permit in 33 CFR 330. The breaching of most beaver dams is covered by these regulations (33 CFR 323, 33 CFR 330).

Food Security Act

The Wetland Conservation provision (Swampbuster) of the 1985 (16 USC 3801-3862), 1990 (as amended by PL 101-624), and 1996 (as amended by PL 104-127) farm bills require all agricultural producers to protect wetlands on the farms they own. Wetlands converted to farmland prior to December 23, 1985 are not subject to wetland compliance provisions even if wetland conditions return as a result of lack of maintenance or management. If prior converted cropland is not planted to an agricultural commodity (crops, native and improved pastures, rangeland, tree farms, and livestock production) for more than 5 consecutive years and wetland characteristics return, the cropland is considered abandoned and then

becomes a wetland subject to regulations under Swampbuster and Section 404 of the Clean Water Act. The Natural Resource Conservation Service is responsible for certifying wetland determinations according to this Act.

Iowa Wildlife Laws

Several state laws and regulations pertain to WS wildlife damage management actions (Appendix E). WS complies with these laws and regulations, and consults/cooperates with the IDNR and other agencies to ensure compliance.

Iowa Pesticide Laws

The pesticide policies in Iowa are governed by the IDALS Pesticide Bureau. The Bureau administers the Pesticide Act of Iowa (C66, 71, 73, 75, 77, 79, 81, §206.1), which establishes requirements for licenses and provides the authority for enforcement and inspections. The Bureau also consists of the Pesticide Advisory Committee, which assists the secretary in obtaining scientific data and coordinating regulation, enforcement, research, and education for agricultural chemical functions, of the state (21-48.1(206) Function).

CHAPTER 2: DEVELOPMENT OF ALTERNATIVES

Chapter 2 contains a discussion of the issues that have driven the development of SOPs and alternatives to address mammal damage. This chapter also contains a description of the Integrated Wildlife Damage Management (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 ADDRESSED IN THE ANALYSIS OF THE 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 and other issues associated with mammals in Iowa were developed by WS through discussions with partnering agencies, cooperators, and stakeholders.

The issues as they relate to the possible implementation of the alternatives, including the proposed action, are discussed in detail in Chapter 3. The issues analyzed in detail are the following:

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

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on the populations of target species. Methods used to resolve damage or threats to human safety can involve altering the behavior of target species and may require the use of lethal methods when appropriate. Non-lethal methods 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 are employed. Lethal methods would be employed to remove a mammal or those mammals responsible for causing damage or posing threats to human safety. The use of lethal methods would therefore result in local population reductions in the area where damage or threats were occurring. The number of target species removed from the population using lethal methods under the alternatives would be dependent on the number of requests for assistance received, the

number of individuals involved with the associated damage or threat, and the efficacy of methods employed.

The analysis for magnitude of impact on populations from the use of lethal methods would be based on a measure of the number of animals killed in relation to their abundance and/or status (e.g. nuisance species, game species, etc.). Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population densities are high and usually only after they have caused damage. WS' removal is monitored by comparing numbers of animals killed with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause adverse impacts to the viability of native species populations. All lethal removal of mammals by WS would occur at the requests of a cooperator seeking assistance and only after authorization has been provided by the IDNR for the lethal take, when required.

In addition, many of the mammal species addressed in this EA can be harvested during annual hunting and/or trapping seasons and can be addressed using available methods by other entities when those species cause damage or pose threats of damage when permitted by the IDNR. Therefore, any mammal damage management activities conducted by WS under the alternatives addressed would be occurring along with other natural process and human-induced events such as natural mortality, human-induced mortality from private damage management activities, mortality from regulated harvest, and human-induced alterations of wildlife habitat.

Issue 2 - Effects of Damage Management Methods on Non-target Wildlife Species Populations, Including T&E Species

The issue of non-target species effects, including effects on T&E species, arises from the use of non-lethal and lethal methods identified in the alternatives. The use of non-lethal and lethal methods has the potential to inadvertently disperse, capture, or kill non-target wildlife. Concerns have also been raised about the potential for adverse effects to occur to non-target wildlife from the use of chemical methods. Chemical methods being considered for use to manage damage and threats associated with mammals are further discussed in Appendix B.

The 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 ESA requires that federal agencies conduct their activities in a way to conserve T&E species. It also requires that federal agencies consult with the USFWS prior to undertaking any action that may take listed T&E species or their critical habitat pursuant to Section 7(a)(2) of the ESA.
There may also be concerns that WS' activities could result in the disturbance of eagles that may be near or within the vicinity of WS' activities. Under 50 CFR 22.3, the term "disturb", as it relates to take under the Bald and Golden Eagle Act, has been defined as "to agitate or bother a bald and golden eagles 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 environmental consequences evaluation conducted in Chapter 3 of this EA will discusses the potential for WS' activities to disturb eagles as defined by the Act.

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

An additional issue often raised is the potential risks to human 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 health and safety. WS' employees use and recommend only those methods that are legally available, selective for target species, and are effective at resolving the damage associated with wildlife. Still, some concerns exist regarding the safety of WS' methods despite their legality. As a result, WS will analyze the potential for proposed methods that pose a risk to members of the public or employees of WS. In addition to the potential risks to the public associated with WS' methods, risks to WS employees are also an issue. WS' employees are potentially exposed to damage management methods as well as subject to workplace accidents. Selection of methods, as part of an integrated approach, includes consideration for public and employee safety.

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 indirect exposure to the chemical or from wildlife that have been exposed. Under the alternatives identified, the use of chemical methods would include immobilizing drugs, euthanasia drugs, reproductive inhibitors, fumigants, toxicants, and repellents. These methods are further discussed in Appendix B.

The issue of the potential for drugs used in animal capture, handling, and euthanasia to cause adverse health effects in humans that hunt and consume the species involved has been raised. This issue is expected to only be of concern for wildlife that are hunted and sometimes consumed by people as food. Chemicals proposed for use under the relevant alternatives are regulated by the EPA, state laws, the DEA, the FDA, and WS' Directives.

Safety of Non-Chemical Methods Employed

Non-chemical methods employed to reduce damage and threats to safety caused by mammals, if misused, could potentially be hazardous to human safety. Non-chemical methods may include but are not limited to firearms, live-traps, exclusion, body-gripping traps, pyrotechnics, and other scaring devices. A complete list of non-chemical methods available to alleviate damage associated with mammals is provided in Appendix B of this EA. The cooperator requesting assistance would be made aware through a MOU, CSA, WID, or a similar document that those devices 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.

Issue 4 - Humaneness and Animal Welfare Concerns of Methods

Humaneness, in part, is a person's perception of harm or pain inflicted on an animal; therefore 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 but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate 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."*

According to the American Veterinary Medical Association (AVMA), suffering is described as a *"…highly unpleasant emotional response usually associated with pain and distress*" (AVMA 1987).

However, suffering *"…can occur without pain…,"* and *"…pain can occur without suffering…"* Because suffering carries with it the implication of a time frame, a case could be made for *"…little or no suffering where death comes immediately…"* (California Department of Fish and Game 1991). Pain and physical restraint can cause stress in animals and the inability of animals to effectively deal with those stressors can lead to distress. Suffering occurs when action is not taken to alleviate conditions that cause pain or distress in animals.

Defining pain as a component in humaneness appears to be a greater challenge than that of suffering. Pain obviously occurs in animals, but assessing pain experienced by animals can be challenging (AVMA 2013, California Department of Fish and Game 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.

Stress has been defined as the effect of physical, physiologic, or emotional factors (stressors) that induce an alteration in an animal's base or adaptive state. Responses to stimuli vary among animals based on the animals' experiences, age, species, and current condition. Not all forms of stress result in adverse consequences for the animal and some forms of stress serve a positive, adaptive function for the animal. Eustress describes the response of animals to harmless stimuli, which initiate responses that are beneficial to the animal. Neutral stress is the term for response to stimuli that have neither harmful nor beneficial effects to the animal. Distress results when an animal's response to stimuli interferes with its well-being and comfort (AVMA 2013).

Analysis of this issue must consider not only the welfare of the animals captured, but also the welfare of humans, livestock, and some T&E species if damage management methods are not used. For example, some individuals may perceive techniques used to remove a predator that is killing or injuring pets or livestock as inhumane, while others may believe it is equally or more inhumane to permit pets and livestock that depend upon humans for protection to be injured or killed by predators.

2.2 DAMAGE MANAGEMENT STRATEGIES AVAILABLE FOR 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 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., feral swine) or any combination of these, depending on the circumstances of the specific damage problem.

The IWDM Strategies Employed by WS:

Direct Damage Management Assistance (Direct Control)

Direct damage management assistance includes damage management activities that are directly conducted or supervised by WS personnel. Direct control may be initiated when the problem cannot effectively be

resolved through technical assistance alone and when a WID or other comparable instruments provide for direct damage management by WS. 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 effectively resolve problems, especially if restricted-use pesticides are necessary or if the problems are complex.

Technical Assistance Recommendations

"Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods and approaches. The actual implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for use by non-WS entities. Technical assistance may be provided through a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems. These strategies are based on the level of risk, need, and the practicality of their application. 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.

Educational Efforts

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 static balance, but rather is in continual flux. WS routinely disseminates recommendations and information to individuals sustaining damage. Additionally WS provides lectures, courses, and demonstrations to producers, homeowners, state and county agents, colleges and universities, and other interested groups related to wildlife damage management and disease issues. WS frequently cooperates with other agencies in education and public information efforts including cooperative presentations or publications. Technical papers are presented at professional meetings and conferences so that WS personnel, 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

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. NWRC scientists work closely with wildlife managers, researchers, field specialists, and others to develop and evaluate wildlife damage management techniques. NWRC scientists have authored hundreds of scientific publications and reports, and are respected world-wide for their expertise in wildlife damage management.

Wildlife Services Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints, which is depicted by the WS Decision Model and described by Slate et al. (1992) (Figure 2.1). WS personnel are

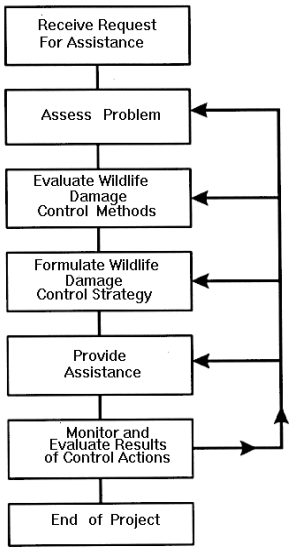
frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate to reduce damage. WS personnel assess the problem then evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic, and social considerations.Following this evaluation, methods deemed to be practical for the situation are incorporated into a management strategy. After this strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions.

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 mammals 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 depending on the alternative selected. WS and other state, tribal, and federal wildlife management agencies may facilitate discussions at local community meetings when resources are available.

Requests for assistance to manage damage caused by mammals often originate from the decision-maker(s) based on community feedback or from concerns about damage or threats to human safety. As representatives of the community, the decision-maker(s) are able to provide the information to local interests either through technical assistance provided by WS or through demonstrations and presentation by WS on mammal damage management activities. This process allows decisions on mammal damage management activities to be made based on local input. They may implement management recommendations provided by WS or others on their own, or may request management assistance from WS, other wildlife management agencies, local animal control agencies, or private businesses or organizations.

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.



2.3 STANDARD OPERATING PROCEDURES FOR MAMMAL DAMAGE MANAGEMENT

SOPs improve the safety, selectivity, and efficacy of wildlife damage management activities. The WS program uses many such SOPs. Those SOPs would be incorporated into activities conducted by WS when addressing mammal 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 mammal 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.

- All pesticides and repellants used would be registered by the IDALS.
- Immobilizing and euthanasia drugs would be used according to the DEA, FDA, and WS' directives and procedures.

- All controlled substances would be registered with the DEA or the FDA.

- WS' employees would follow approved procedures outlined in the WS' Field Manual for the Operational Use of Immobilizing and Euthanizing Drugs (Johnson et al. 2001).

- WS' employees that use controlled substances would be trained to use each material and are certified to use controlled substances.

- WS' employees who use pesticides and controlled substances would participate in state-approved continuing education to keep current of developments and maintain their certifications.

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

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

2.4 ADDITIONAL STANDARD OPERATING PROCEDURES SPECIFIC TO THE ISSUES

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

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

- Lethal take of mammals by WS would be reported and monitored by WS and the IDNR to evaluate population trends and the magnitude of WS' take of mammals and ensure activities do not adversely affect mammal populations in the state.

- The take of mammals under the alternatives would only occur when authorized by the IDNR, when applicable, and only at levels authorized.

- Management actions would be directed toward localized populations or groups of target species and/or an individual of those species. Generalized population suppression across Iowa, or even across major portions of Iowa, would not be conducted with the exception of exotic and/or invasive species.

- The use of non-lethal methods would be considered prior to the use of lethal methods when managing mammal damage.

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

- As appropriate, suppressed firearms would be used to minimize noise impacts.

- 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.

- Carcasses of mammals retrieved after damage management activities have been conducted would be disposed of in accordance with WS Directive 2.515.
- Non-target animals captured in traps would be released unless it is determined that the animal would not survive and/or that the animal cannot be released safely.

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

- Damage management activities would be conducted away from areas of high human activity. If this is not possible, then activities would be conducted during periods when human activity is low (*e.g.*, early morning), if possible.

- Shooting would be conducted during time periods when public activity and access to the control areas are restricted. Personnel involved in shooting operations would be fully trained in the proper and safe application of this method.

- All personnel employing chemical methods would be properly trained and certified in the use of those chemicals. All chemicals used by WS would be securely stored and properly monitored to ensure the safety of the public. WS' use of chemicals and training requirements to use those chemicals are outlined in WS Directive 2.401 and WS Directive 2.430.

- All chemical methods used by WS or recommended by WS would be registered with the EPA, DEA, FDA, and the IDPH, as appropriate.

- WS would adhere to all established withdrawal times for mammals when using immobilizing drugs for the capture of mammals that are agreed upon by WS, the INDR, and veterinarian authorities. Although unlikely, in the event that WS is requested to immobilize mammals either during a period of time when harvest of those mammal species is occurring or during a period of time where the withdrawal period could overlap with the start of a harvest season, WS would euthanize the animal or mark the animal with ear tags labeled with a "*do not eat*" warning and appropriate contact information.

- Pesticide and controlled substance use, storage, and disposal would conform to label instruction and other applicable laws and regulations, and Executive Order 12898.

Issue 4 - Humaneness and Animal Welfare Concerns of Methods

- Personnel would be well trained in the latest and most humane devices/methods for removing mammals causing damage.

- WS' use of euthanasia methods would follow those recommended by WS' directives (WS Directive 2.505, WS Directive 2.430).

- WS' use of all traps, snares (cable devices), and other capture devices would comply with WS Directive 2.450.

2.5 ALTERNATIVES

Alternatives were developed for consideration based on the need for action and issues using the WS Decision model (Slate et al. 1992). The alternatives will receive detailed environmental impacts analysis in Chapter 3 (Environmental Consequences). Chapter 2 also discusses alternatives considered but not analyzed in detail, with rationale. The following alternatives were developed to meet the need for action and address the identified issues associated with managing damage caused by mammals in Iowa:

Alternative 1 - Continue the Current Adaptive Integrated Mammal Damage Management Program (No Action/Proposed 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 mammals. WS, 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 mammals 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. 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 mammal damage in addressing those mammals responsible for causing damage as expeditiously as possible. To maximize effectiveness, damage management activities should begin as soon as mammal damage occurs. Mammal damage that has been ongoing can be difficult to resolve using available methods since mammals could be conditioned and familiar with a particular location. Subsequently, making that area unattractive through the use of available methods can be difficult to achieve once damage has been ongoing. WS would work closely with those entities requesting assistance to identify situations where damage could occur and begin to implement damage management activities under this alternative as early as possible to increase the likelihood of those methods achieving the level of damage reduction requested by the cooperating entity.

Under this alternative, WS would 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 mammals, or 3) provide technical assistance and direct operational assistance to a property owner or manager experiencing damage. The removal of mammal species native to Iowa or designated game species can only legally transpire through regulated hunting and trapping seasons, or through the issuance of a permit or license by the IDNR and only at levels specified in the permit.

Property owners or managers requesting assistance would be provided with information regarding the use of effective and practical non-lethal and lethal techniques under this alternative. 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), take the management action themselves without consulting another private or governmental agency, or take no action.

Euthanizing captured mammals could happen through the use of euthanasia drugs or carbon dioxide once a live-capture method is used. Euthanasia drugs are an acceptable form of euthanasia for free-ranging

wildlife while carbon dioxide is a conditionally acceptable[4] method of euthanasia (AVMA 2013). On occasion, mammals could be euthanized by gunshot once live-captured, which is a method of euthanasia considered appropriate by the AVMA for free-ranging wildlife, when administered appropriately (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 mammal damage would include limited habitat manipulations, exclusion, and/or changes in cultural practices, which are addressed further below and in Appendix B.

Non-lethal methods can disperse or otherwise make an area unattractive to mammals, thereby, reducing the presence of mammals 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 to resolve every request for assistance if deemed inappropriate by WS' personnel using the WS Decision Model, especially when the requesting entity has used non-lethal methods previously and found those methods to be inadequate in resolving the damage or threats of damage. 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 mammals from the area resulting in a reduction in the presence of those mammals at the site. For any management methods employed, the proper timing is essential in effectively dispersing those mammals causing damage. Employing methods soon after damage begins or soon after threats are identified increases the likelihood that those damage management activities would achieve success in addressing damage. Therefore, coordination and timing of methods is necessary to be effective in achieving expedient resolution of mammal damage.

Lethal methods would be employed to resolve damage associated with those mammals identified by WS as responsible for causing damage or threats to human safety only after receiving a request for the use of those methods. The use of lethal methods would result in local population reductions in the area where damage or threats were occurring since mammals would be removed from the population. Lethal methods are often employed to reinforce non-lethal methods and to remove mammals that have been identified as causing damage or posing a threat to human safety. The number of mammals removed from the population using lethal methods under the proposed action would be dependent on the number of requests for assistance received, the number of mammals involved with the associated damage or threat, and the efficacy of methods employed.

WS may recommend mammals be harvested during the regulated hunting and/or trapping season for those species in an attempt to reduce the number of mammals causing damage. Managing mammal populations over broad areas could lead to a decrease in the number of mammals causing damage. Establishing hunting or trapping seasons and the allowed take during those seasons is the responsibility of the IDNR.

Alternative 2- Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would be restricted to only using or recommending non-lethal methods to resolve damage caused by mammals (Appendix B). Lethal methods could continue to be used under this alternative by those persons experiencing damage by mammals 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 IDNR, local animal control agencies, or private businesses or organizations. Property owners or managers might choose to implement WS' non-lethal

[4]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."*

recommendations on their own or with the assistance of WS, implement lethal methods on their own, or request assistance (nonlethal or lethal) from a private or public entity other than WS.

Alternative 3 – No Mammal Damage Management Conducted by WS

This alternative would preclude any and all activities by WS to reduce threats to human health and safety, and to alleviate damage to agricultural resources, property, and natural resources. WS would not be involved with any aspect of mammal damage management. All requests for assistance received by WS to resolve damage caused by mammals would be referred to the IDNR and/or other private entities.

Despite no involvement by WS in resolving damage and threats associated with mammals, those persons experiencing damage caused by mammals could continue to resolve damage by employing those methods legally available; therefore the lethal removal of mammals to alleviate damage or threats could occur despite the lack of involvement by WS. The lethal removal of mammals could occur through the issuance of permits by the IDNR, when required, and during the hunting or trapping seasons. All methods described in Appendix B would be available for use by those persons experiencing damage or threats except for the use of immobilizing drugs and euthanasia chemicals. Immobilizing drugs and euthanasia chemicals can only be used by WS or appropriately licensed veterinarians.

2.6 ALTERNATIVES NOT CONSIDERED IN DETAIL

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

Non-lethal Methods Implemented 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 mammals. 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 mammal damage, but would only prevent the use of those methods by WS until all non-lethal methods had been employed.

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 the 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 mammals. Under WS Directive 2.101, WS must consider the use of non-lethal methods before lethal methods. Non-lethal methods have been effective in alleviating mammal damage. In those situations where damage could be alleviated using non-lethal methods deemed effective, those methods

would be employed or recommended as determined by the WS Decision Model. Therefore, this alternative was not considered in detail.

Live Capture and Translocate Mammals Only

Under this alternative, all requests for assistance would be addressed using live-capture methods or the recommendation of live-capture methods. Mammals would be live-captured using immobilizing drugs, live-traps, or nets (*e.g.*, cannon nets, rocket nets, or drop nets). All mammals live-captured through direct operational assistance by WS would be translocated.

Translocation sites would be identified and have to be pre-approved by the IDNR and the property owner where the translocated mammals would be placed prior to live-capture and translocation. Live-capture and translocation could be conducted as part of the alternatives analyzed in detail. When requested by the IDNR, WS could translocate mammals or recommend translocation 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 mammals unless permitted by the IDNR, this alternative was not considered in detail. In addition, the translocation of mammals by WS could occur under any of the alternatives analyzed in detail, except Alternative 3. However, translocation by other entities could occur under Alternative 3.

The translocation of mammals that have caused damage to other areas following live-capture generally would not be effective or cost-effective. Translocation is generally ineffective because problem mammal 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 mammal damage problems at the new location. Also, hundreds of mammals would need to be captured and translocated to solve some damage problems, 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). There is also a concern of spreading wildlife diseases by moving wildlife from one location to another.

Reducing Damage by Managing Mammal Populations through the Use of Reproductive Inhibitors

Under this alternative, the only method available to resolve requests for assistance would be the recommendation and the use of reproductive inhibitors to reduce or prevent reproduction in mammals responsible for causing damage. Reproductive inhibitors are often considered for use where wildlife populations are overabundant and where traditional hunting or lethal control programs are not publicly acceptable (Muller et al. 1997). Use and effectiveness of reproductive control as a wildlife population management tool is limited by population dynamic characteristics (*e.g.*, longevity, age at onset of reproduction, population size and biological/cultural carrying capacity), habitat and environmental factors (*e.g.*, isolation of target population, cover types, and access to target individuals), socioeconomic, and other factors.

Population modeling indicates that reproductive control is more efficient than lethal control only for some rodent and small bird species with high reproductive rates and low survival rates (Dolbeer 1998). Additionally, the need to treat a sufficiently large number of target animals, multiple treatments, and population dynamics of free-ranging populations place considerable logistic and economic constraints on the adoption of reproduction control technologies as a wildlife management tool for some species.

Given the costs associated with live-capturing and performing sterilization procedures on mammals and the lack of availability of chemical reproductive inhibitors for the management of most mammal

populations, this alternative was not evaluated in detail. Currently, the only reproductive inhibitor that is registered with the EPA for use on mammals is Gonacon™, which is only available for use on white-tailed deer.

Compensation for Mammal Damage

Reimbursement provides producers monetary compensation for losses; it does not remove the problem nor does it assist with reducing future losses. The compensation only alternative would require the establishment of a system to reimburse persons impacted by mammal damage. Under such an alternative, WS would not provide any technical assistance or direct damage management. Aside from lack of legal authority, analysis of this alternative indicates that the concept has many drawbacks (Wagner et al. 1997):

- It would require larger expenditures of money and labor to investigate and validate all damage claims to determine and administer appropriate compensation.

- Compensation would most likely be less than full market value.

- In the case of predation on livestock or pets, compensation may not be a satisfactory solution for individuals who feel responsible for the well-being of their livestock or in situations where there is an emotional attachment to the animal.

- Compensation would give little incentive to resource owners to limit damage through improved cultural, husbandry, or other practices and management strategies.

- Not all resource owners would rely completely on a compensation program and lethal control would most likely continue as permitted by state law.

- Compensation would not be practical for reducing threats to human health and safety.

This alternative was eliminated from further analysis because it is not financially feasible or practical to provide compensation for all mammal damage.

Bounties

Payment of funds (bounties) for killing mammals suspected of causing economic losses have not been supported by state agencies, such as the IDNR, as well as most wildlife professionals for many years (Latham 1960, Hoagland 1993). WS concurs with those agencies and wildlife professionals because of several inherent drawbacks and inadequacies in the payment of bounties. Bounties are often ineffective at controlling damage over a wide area, such as the entire state. The circumstances surrounding the lethal removal of animals are typically arbitrary and completely unregulated because it is difficult or impossible to assure animals claimed for bounty were not lethally removed from outside the area where damage was occurring. Also, effective MDM often targets problem individuals or groups of individuals and establishment of a bounty may not resolve conflicts created by those individuals. In addition, WS does not have the authority to establish a bounty program.

Trap-Neuter-Release Program for Feral and Free Ranging Cats

This topic has undergone considerable debate in animal welfare and scientific communities for a number of years. The debate focuses on whether controlling feral, free-ranging, or invasive animal populations

through Trap-Neuter-Release (TNR) programs, often including a vaccination component, are effective and alleviate problems (*i.e.*, diseases, predation, agricultural damage, and human safety).

Theoretically, TNR would work if all animals of one sex or both were sterilized. However, the probability of controlling invasive species in the wild with this technique is not currently reasonable, especially with the animals being self-sufficient and not relying on humans to survive. Additionally, some individuals within a population can be trap-shy. Capturing or removing trap shy individuals often requires implementing other methods.

In addition, the National Association of State Public Health Veterinarians and the AVMA oppose TNR programs based on health concerns and threats (AVMA 2016). One major concern is the potential for disease and parasite transmission to humans either from direct contact during sterilization or the risk of exposure after the animal is released. Once live-captured, performing sterilization procedures during field operations on anesthetized feral cats would be difficult. Sanitary conditions are difficult to maintain when performing surgical procedures in field conditions. To perform operations under appropriate conditions, live-captured animals would need to be transported from the capture site to an appropriate facility, which increases the stress on the animal and threatens human health from handling and transporting. A mobile facility could be used but would still require additional handling and transporting of the live-captured animals to the facility. Once the surgical procedure was completed, the animal would have to be held to ensure recovery and transported back to the area where capture occurred.

TNR programs are often not as successful as desired and needed to reduce immediate threats posed by wildlife, especially when human safety is a concern (Barrows 2004, Levy and Crawford 2004, Jessup 2004, Winter 2004, AVMA 2016). Animals subjected to TNR would continue to cause the same problems[5] they caused before the TNR program was initiated because of slow attrition. TNR programs can take a decade or longer to reduce target species populations (Barrows 2004, Winter 2004) and therefore are ineffective when acute issues need rapid solutions (Levy and Crawford 2004, Stoskopf and Nutter 2004). Several studies report that target species populations often remain stable or increase following TNR programs due to immigration and reproduction from other members of the groups (Castillo and Clarke 2003, Levy and Crawford 2004, Winter 2004) with little to no resolution of threats to human safety or damages (Barrows 2004, Slater 2004, Winter 2004).

Other concerns arise when considering the legality of TNR programs given the documented damage caused by target species, especially to native wildlife (Barrows 2004, Levy and Crawford 2004, Jessup 2004). Some people have questioned whether TNR programs are violating the Migratory Bird Treaty Act and the ESA because released animals may continue to kill migratory birds and/or endangered species (Barrows 2004, Levy and Crawford 2004, Jessup 2004). As a result of the continued threat to human safety created by TNR programs and the continued threat to T&E wildlife and native wildlife in general, this alternative will not be considered further.

CHAPTER 3: ENVIRONMENTAL CONSEQUENCES

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 in relation to the issues identified. Additionally, this chapter compares the environmental consequences of the proposed action / no action alternative to the environmental consequences of the other alternatives.

[5] Levy et al. (2003), Barrows (2004), and Jessup (2004) reported that sterilized cats that do not spend any time on courting and mating are left with more time to hunt than non-sterilized cats and therefore, continue to remain as potential reservoirs of animal and human disease, a social nuisance, and continue to hunt and kill protected species.

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 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

The proposed action/no action alternative (Alternative 1) 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.

Effects on Target Mammal Species Populations:

Alternative 1: Integrated Mammal Damage Management Program (Proposed Action/No Action)

A common issue is whether damage management actions would adversely affect the populations of target mammal species, especially when lethal methods are employed. Alternative 1 addresses requests for assistance received by WS through technical and operational assistance where an integrated approach to methods would be employed and/or recommended. Non-lethal methods can disperse or otherwise make an area unattractive to mammals causing damage, thereby reducing the presence of mammals at the site and potentially the immediate area around the site where non-lethal methods are employed.

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 mammals from the area resulting in a reduction in the presence of those mammals at the site where those methods were employed. However, mammals 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 mammal populations under any of the alternatives.

The use of IWDM approved lethal methods, listed in appendix B, could result in local population reductions in the area where damage or threats were occurring since mammals would be removed from the population. Lethal methods are often employed to reinforce non-lethal methods and to remove mammals 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 mammals in the area where damage or threats were

occurring. The number of mammals removed from the population using lethal methods would be dependent on the number of requests for assistance received, the number of mammals involved with the associated damage or threat, the number approved by the regulatory agency that manages the species in question, and the efficacy of methods employed.

WS may recommend mammals be harvested during the regulated hunting and/or trapping season for those species in an attempt to reduce the number of mammals causing damage. Managing mammal populations over broad areas could lead to a decrease in the number of mammals causing damage. Establishing hunting and trapping seasons and the allowed harvest 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 mammals with hunting and/or trapping seasons would be occurring in addition to any lethal removal 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. Table 3.1 identifies average annual lethal removal of animals by WS, proposed maximum annual WS removal, and estimated annual harvest by hunters and trappers within Iowa for 2012-2016. No indirect effects were identified for this issue.

Table 3.1 Quantitative impacts of lethal removal for selected species in Iowa.

Species	Average Annual WS Removal 2012-2016	Maximum proposed WS Annual Removal	IA Statewide Population Trend	IA Statewide Average Annual Estimated Season Harvest 2012-2016	% WS Proposed Annual Removal Compared to Average Annual Harvest and Control Permits
Badgers	3.4	50	Increasing	963	5.19%
Bats (all)	0	5	Unknown	n/a	n/a
Bears, Black	0	5	n/a	n/a	n/a
Beavers	5.8	100	Unknown	8,643	1.16%
Bobcats	0.2	25	Stable	629	3.97%
Cats (feral/free ranging)	0	0*	Unknown	n/a	n/a
Chipmunk, Eastern	0	5	Unknown	n/a	n/a
Cottontail, Eastern	31.8	1000	Increasing	102,860	0.97%
Coyotes	7.6	100	Increasing	12,688	0.78%
Deer, White-tailed (Captive)	26	1000	n/a	n/a	n/a
Deer, White-tailed (Wild)	5.6	1000	Stable	104,683	0.96%
Dogs (feral/free ranging and hybrids	0	0*	n/a	n/a	n/a
Elk (Captive)	0	200	n/a	n/a	n/a
Foxes, Gray	0	5	Decreasing	78	6.4%
Foxes, Red	6	100	Stable	3,278	3.05%
Goats, feral	0	10	Unknown	n/a	n/a
Gophers, Pocket	0	50	Unknown	n/a	n/a
Jackrabbits, Black-tailed	0	5	Decreasing	n/a	n/a
Lions, Mountain	0	5	n/a	n/a	n/a
Marmots/Woodchucks	0.8	100	Unknown	n/a	n/a
Mice (all)	0	1000	Unknown	n/a	n/a
Mink	0	10	Unknown	7,292	0.14%
Moles (all)	0	200	Unknown	n/a	n/a
Muskrats	4	200	Increasing	48,178	0.42%
Opossums, Virginia	7.6	500	Increasing	3,509	14.25%
Otters, River	0.2	25	Stable	887	2.81%
Raccoons	18.2	500	Increasing	245,492	0.20%
Rats, Norway	0	500	Unknown	n/a	n/a
Shrews (all)	0	100	Unknown	n/a	n/a
Skunk, Striped	9.6	100	Increasing	691	14.47%

Squirrels, Eastern Gray	0	200	Unknown	n/a	n/a
Squirrels, Fox	0	200	Unknown	n/a	n/a
Squirrels, Ground	1	300	Unknown	n/a	n/a
Swine, Feral	0.6	100	Unknown	n/a	n/a
Voles (all)	0	500	Unknown	n/a	n/a
Weasels	0	5	Unknown	19	26.32%

* Unlimited transfer of custody or relocation

Badger

Badgers can be found throughout Iowa but are more commonly observed in western Iowa (IDNR 2016). Badger harvest rates fluctuate, likely due to the value of their pelts, but the long-term population trend for the state is increasing (IDNR 2016). Badgers are classified as a furbearer species with regulated annual hunting and trapping seasons that run from November through January. There is no daily bag limit and possession limits for badgers. The number of badgers estimated at harvested annual by sport hunters and trappers from 2012 through 2016 is 963 (Table 3.1) (IDNR 2016). Reported harvest of badgers during the trapping seasons is based on the sale of fur/hides. There is no mandatory reporting of badgers harvested during the annual trapping season. From 2012 through 2016, WS removed an average of 3.4 badgers each year.

Direct, Indirect, and Cumulative Effects:

Based on previous requests for assistance received by WS and anticipated future requests, the removal of badgers by WS would not exceed 50 animals annually. WS lethal removal of 50 badger would represent 5.19% of the estimated hunter/trapper harvest (Table 3.1). Damages and threats of damages associated with badger most often occur in urban/suburban areas and at airports where hunting is restricted or not allowed. Therefore, WS' proposed lethal removal would not adversely affect the ability to harvest badger during the annual regulated hunting/trapping season. Based on the limited proposed removal by WS and the fact that the IDNR allows for unlimited harvest of badger, WS' activities will have no significant effects on statewide badger populations.

The unlimited harvest levels allowed by the IDNR during the trapping and hunting seasons provide an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the badger population would occur resulting in an undesired population decline. The IDNR's oversight of WS and hunting/trapping seasons would ensure that the cumulative removal would not have a negative impact on the overall badger population.

Beaver

Beaver are found throughout Iowa near wetlands and streams (IDNR 2016). Nelson and Nielson (2011) found in central and southern Illinois there are between 5.6 to 9.9 beavers in a colony and 0.8 to 3.27 colonies per square kilometer, in suitable habitat. Beaver harvest rates fluctuate, likely due to the value of their pelts, and the current population trend for beavers in Iowa is unknown (IDNR 2016).

Beavers are classified as a furbearer species with a regulated annual trapping season that runs from November through April. Beavers have no daily or season limit for trapping (IDNR 2016). The number of beavers estimated as harvested annually by sport trappers from 2012 through 2016 is 8,643 (Table 3.1) (IDNR 2016). Reported harvest of beavers during the trapping seasons is based on the sale of fur/hides. There is no mandatory reporting of beavers harvested during the annual trapping season.

In addition to trapping, beavers can be lethally removed as a nuisance species by land owners or their

representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed an average of 5.8 beavers each year.

Direct, Indirect, and Cumulative Effects:
Based on previous requests for assistance received by WS and anticipated future requests, up to 100 beavers could be lethally removed by WS annually to alleviate damage. WS' removal of 100 beavers would represent 1.16% of the estimated annual trapper harvest (Table 3.1). This level of removal is considered to be a low magnitude.

To address damage by beaver flooding and human health threats related to waterborne contaminants, WS may breach or remove beaver dams or install flow control devices during beaver damage management activities. Dam breaching and removal or installation of flow control devices are usually conducted in conjunction with local population reductions using trapping and/or shooting. As a result, changes in habitat generally have no long term effects on local beaver populations. Some animals that escape removal may lose or have limited access to stored food caches during winter months due to lower water levels and the presence of ice. This may limit winter survival of some individuals due to starvation or increased predation risk while feeding on land. However, reductions in local populations would result in lower interspecific competition for available food resources. Dam removal or flow manipulation would have no effect on neighboring populations and would not alter habitat in a way that does not allow for future use by beaver or re-colonization.

The unlimited trapper harvest allowed by the IDNR during the length of the trapping seasons provides an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the beaver population would occur resulting in an undesired population decline. The IDNR's oversight of WS and the trapping seasons would ensure that the cumulative removal would not have a negative impact on the overall beaver population.

Eastern Cottontail
The Eastern cottontail is abundant and widespread across Iowa, especially in southern counties. Cottontails do not distribute themselves evenly across the landscape, but tend to concentrate in favorable habitats such as brushy fence rows or field edges, gullies filled with debris, brush piles, areas of dense briars, or landscaped backyards where food and cover are suitable. Cottontails are rarely found in dense forest or open grasslands, but fallow crop fields may provide suitable habitat. Within these habitats, cottontails spend their entire lives in an area of 10 acres or less. Occasionally they may move a mile or so from a summer range to winter cover or to a new food supply. In suburban areas, cottontails are numerous and mobile enough to fill voids when cottontails are removed from an area. Population densities vary with habitat quality, but one cottontail per 0.4 hectares (1 acre) is a reasonable average (Craven 1994). Cottontails live only 12 to 15 months, yet make the most of time available reproductively. They can raise as many as six litters per year of one to nine young (usually four to six), having a gestation period of 28 to 32 days. If no young were lost, a single pair together with their offspring could produce 350,000 cottontails in five years (National Audubon Society 2000). Presently, the IDNR conducts roadside surveys and collects population trend information via annual harvest data.

Cottontails are classified as a small game species with a regulated annual hunting season that runs from September through February. Eastern cottontails have a daily bag limit of 10 and a possession limit of 20 for hunting (IDNR 2016). The number of cottontails estimated as harvested annually from 2012 through 2016 is 102,860 (Table 3.1) (IDNR 2016). Harvest numbers are reported from the Iowa Small Game Harvest Survey. The IDNR also conducts a biannual Roadside Survey to observe apparent populations of small game. There is no mandatory reporting of cottontails harvested during the annual hunting seasons.

In addition to hunting, cottontails can be lethally removed as a nuisance species by land owners or their

representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed and average of 31.8 cottontails each year (Table 3.1).

Direct, Indirect, and Cumulative Effects:
Based on previous requests for assistance received by WS and anticipated future requests, up to 1,000 cottontails could be lethally removed by WS annually to alleviate damage. WS' removal of 1,000 cottontails would represent 0.97% of the estimated annual hunter harvest (Table 3.1). Damages and threats of damages associated with cottontails most often occur in urban/suburban areas and at airports within Iowa where hunting is restricted or not allowed. Therefore, WS' proposed lethal removal would not adversely affect the ability to harvest cottontails during the annual regulated hunting season or result in adverse cumulative impacts to the statewide population.

Coyote
Coyotes are common and found throughout Iowa, mainly in open grasslands and near agriculture (IDNR 2016). Although coyote densities vary based on local habitat quality, Knowlton (1972) published that density estimates of 0.5 to 1.0 coyotes per square mile would likely be applicable to coyote densities across much of their range. Reports have indicated larger densities of coyotes in the southwestern part of Iowa (IDNR 2016). Coyote densities as high as two per square kilometer (five per square mile) have been reported in the southwestern and west-central United States, but are lower in other portions of the country. Few studies have accurately determined coyote densities (Voigt and Berg 1987), but the IDNR does monitor long-term trends in relative abundance through the sale of fur/hides (estimated fur harvest), sign station surveys, and archery deer hunter survey. The current population trend for coyotes in Iowa is increasing (IDNR 2016). Reported harvest of coyotes during the hunting/trapping seasons is based on the sale of fur/hides. There is no mandatory reporting of coyotes harvested during the annual hunting/trapping seasons.

In addition to hunting and trapping, coyotes can be lethally removed as a nuisance species by land owners or their representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed an average of 7.6 coyotes each year.

Direct, Indirect, and Cumulative Effects:
Based on previous requests for assistance received by WS and anticipated future requests, the removal of coyotes by WS would not exceed 100 coyotes annually. WS lethal removal of 100 coyotes would represent 0.78% of the estimated annual hunter/trapper (Table 3.1). This level of removal is insignificant and not expected to negatively impact coyote populations. Population modeling information suggests that a viable coyote population can withstand an annual removal of 70% of their population without causing a decline in the population (Connolly 1995). Therefore, no significant cumulative impacts are expected when WS' removal is added to the average annual sportsman harvest. Based on the limited proposed removal by WS and the IDNR's oversight, which allows for unlimited harvest of coyotes, WS' activities will have no significant effects on statewide coyote populations. The unlimited harvest levels allowed by the IDNR during the trapping and hunting seasons provide an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the coyote population would occur resulting in an undesired population decline. The IDNR's oversight of WS and hunting/trapping seasons would ensure that the cumulative removal would not have a negative impact on the overall coyote population.

White-tailed Deer
White-tailed deer are abundant and widespread across Iowa. When compared to other land mammals in North America, the white-tailed deer currently occupies the largest geographic range of any other mammal (Pagel et al. 1991). White-tailed deer range throughout most of the United States, except the far southwest, and inhabit the southern half of the southern tier of Canadian provinces. This species inhabits

farmlands, brushy areas, forests, suburbs, and gardens. Rural areas containing a matrix of forest and agricultural crops can contain the highest deer densities (Roseberry and Woolf 1998). Biologists and resource managers in Iowa have successful raised the population of white-tailed deer from around 400, in the 1930s, to over 500,000 by 2016; white-tailed deer inhabit parts of Iowa by a ratio of approximately 100 deer per square mile. As deer populations increase, there is an increasing occurrence of damage from white-tailed deer to agricultural crops (DeVault et al. 2007), a rise in deer-vehicle collisions (Conover et al. 1995), and a disruption in forest health, regeneration, and forest dependent species (Tilghman 1989). Additionally, white-tailed deer are ranked as one of the most hazardous species to aviation according to the percentage of strikes that caused damage from 1990 through 2012 (Dolbeer et al. 2013).

The authority for management of resident wildlife species, including deer, is the responsibility of the IDNR. The IDNR collects and compiles information on white-tailed deer population trends and harvest and uses this information to manage deer populations. The primary tool for the management of deer populations in Iowa is through adjusting the allowed lethal removal during the deer harvest season in the state (IDNR 2009). White-tailed deer are classified as a big-game species with annual hunting seasons. During the 2015-2016 hunting season, the IDNR reported that 101,595 deer were harvested (IDNR 2016). The number of deer allowed to be harvested by individual hunters during the length of the deer hunting season varies across the state.

Mortality can also occur from vehicle collisions, dogs, illegal removal, tangling in fences, disease, and other causes (Crum 2003). Recent trends show local populations decreasing in a few counties (Boone and Pottawattamie) as reported by hunters (Tyler Harms, IDNR, pers. comm. 2017). Epizootic Hemohorragic Disease (EHD) is thought to be the cause of this decline, and ongoing investigations by the IDNR are monitoring the impacts of this disease (Tyler Harms, IDNR, pers. comm. 2017). Annual deer mortality in Iowa from other sources (*e.g.*, illegal removal and predation) is currently unknown. Since 2012, more than 40,000 deer have been struck by motor vehicles (about 9,500 deer per year) with this trend declining since 1995 (IDNR 2016).

From FY 2012 through FY 2016, WS responded to 189 requests for assistance associated with white-tailed deer in the state (Table 1.1). Most requests for assistance were addressed by providing technical assistance. During the same period, WS removed an average of 5.6 free-ranging white-tailed deer and 26 captive white-tailed deer each year (Table 3.1). The removal of 130 captive deer in one year was in response to an outbreak of Chronic Wasting Disease in captive facilities.

Direct, Indirect, and Cumulative Effects:
After review of previous activities conducted by WS and in anticipation of addressing requests for lethal removal, WS' future lethal removal could reach 1,000 free-ranging deer annually. In addition, WS may be requested by the IDNR and/or the IDALS to assist with sampling and managing the spread of diseases found in free-ranging and/or captive deer populations. If a disease outbreak occurred, WS could be requested to lethally remove white-tailed deer for sampling and/or to prevent further spread of diseases. However, WS' total annual removal would not exceed 1,000 deer annually under the proposed action.

If requested, WS could again assist with sampling and removing deer from captive facilities where deer were confined inside a perimeter fence. The detection of a disease at a captive facility often raises concerns for the potential spread of diseases to free-ranging herds. The spread of diseases among deer inside those facilities is often increased due to their close contact with one another. Often, once a disease is detected in a confined deer herd, the entire herd is destroyed to ensure the containment of the disease. Any involvement with the depopulation of deer confined inside a perimeter fence by WS would be at the request of the IDNR and/or the IDALS. As proposed in this alternative, in those cases where WS was requested to assist with the removal of a captive deer herd in Iowa, the removal would not exceed 1,000 deer for purposes of disease monitoring or surveillance. Deer confined inside perimeter fences for the

purposes of non-traditional farming, including confined for hunting, are not included in statewide deer population estimates. However, since removal of deer by WS for disease surveillance or monitoring could occur in free-ranging or captive herds, the potential removal of up to 1,000 deer for disease surveillance and monitoring by WS would be considered as part of the impact analysis on the statewide free-ranging deer population.

From 2012 through 2016, 543,425 deer were harvested in Iowa during the annual hunting seasons, with the highest harvest level occurring in 2012 when 121,407 deer were harvested. The lowest harvest level of deer occurred in 2013 when 99,414 deer were harvested (IDNR 2016). If WS' removal reached 1,000 deer during the highest harvest of deer that occurred in 2012, WS' removal would have represented 0.82% of the harvest. If WS' removal reached 1,000 deer during the lowest harvest total of deer that occurred in 2013, WS' removal would have represented 1.01% of the total harvest.

With oversight of the IDNR, the magnitude of removal of deer by WS annually to resolve damage and threats would be low. White-tailed deer populations are increasing around the state with the annual harvest controlling a major proportion of the population. Since 2014, annual harvest numbers have decreased, inversely proportional to deer abundance. WS' management actions would not only minimally impact the white-tailed deer population, but have no significant impact on harvest quotas.

The magnitude of WS' activities to alleviate damage and threats associated with deer would be low with the oversight and permitting of WS' activities occurring by the IDNR. The authorizing of all WS' removal by the INDR would ensure WS' removal would meet the objectives of the statewide wildlife management plan.

Elk

Wild elk populations have been extirpated from Iowa since 1871, primarily from over-hunting. Captive herds are raised and managed throughout the state on private lands and refuges. WS has not previously been requested to provide assistance with elk damage. Iowa currently has 24 captive herds of elk, totaling 863 individuals (IDALS unpublished data). Captive elk could potentially escape from confinement and cause damage.

Direct, Indirect, and Cumulative Effects:

Captive elk persist in small herds around portions of the state but rarely cause damage or threats of damage. WS could respond to requests from the IDNR to aid in the translocation of escaped captive elk, or be called upon to lethally remove an escaped individual inflicting damage to public or private land, or threating human safety. Coordination and cooperation with the IDNR would be strictly adhered to regarding WS response to requests for assistance in dealing with escaped or captive elk to include disease surveillance. In the event lethal removal is implemented, WS could remove up to 200 individuals without causing adverse effects to the natural environment.

Red Fox

Red fox are found throughout Iowa, with populations in the north on the rise. Coyotes and red fox compete for food resources and habitat. In areas of high coyote populations, foxes can select more urban landscapes to avoid interactions with coyotes (Gosselink et al. 2003). Despite this competition, the red fox population appears to be increasing across the state (IDNR 2016).

Red fox are classified as both a game and a furbearer species in Iowa with a regulated annual hunting and trapping season that runs from November through January. Red fox have no daily or season limit for hunting or trapping (IDNR 2016). The number of red fox estimated as harvested annually from 2012 through 2016 is 3,278 (Table 3.1) (IDNR 2016). Reported harvest of red fox during the trapping seasons

is based on the sale of fur/hides. There is no mandatory reporting of red fox harvested during the annual hunting/trapping seasons.

In addition to hunting and trapping, red fox can be lethally removed as a nuisance species by land owners or their representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed an average of six red foxes each year.

Direct, Indirect, and Cumulative Effects:
Based on previous requests for assistance received by WS and anticipated future requests, the removal of red fox by WS would not exceed 100 animals annually. WS lethal removal of 100 red fox would represent 3.05% of the estimated hunter/trapper harvest (Table 3.1). Damages and threats of damages associated with red fox most often occur in urban/suburban areas and at airports where hunting is restricted or not allowed. Therefore, WS' proposed lethal removal would not adversely affect the ability to harvest red fox during the annual regulated hunting season. Based on the limited proposed removal by WS and the fact that the IDNR allows for unlimited harvest of red fox, WS' activities will have no significant effects on statewide red fox populations.

The unlimited harvest levels allowed by the IDNR during the trapping and hunting seasons provide an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the red fox population would occur resulting in an undesired population decline. The IDNR's oversight of WS and hunting/trapping seasons would ensure that the cumulative removal would not have a negative impact on the overall red fox population.

Woodchucks
The woodchuck (also known as groundhog, marmot, or whistle pig) is a large rodent, often seen along fencerows, in pastures, or along roads across the state (IDNR 2016). Woodchucks have one litter a year and average five kits (Merritt 1987, Armitage 2003). Woodchucks breed at age one and live four to five years, which translates to prolific population increases across Iowa. One pair of woodchucks, at a 1:1 sex ratio, could produce more than 600 offspring in their lifetime. Woodchuck populations in Iowa are not monitored by the IDNR and no population estimates are available.

Woodchucks are classified as a small game species with a regulated annual hunting season that runs from May through December. Woodchucks have no daily or season limit for hunting (IDNR 2016). Woodchucks have a continuous harvest season (IDNR 2016).

In addition to hunting, woodchucks can be lethally removed as a nuisance species by land owners or their representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed an average of 0.8 woodchucks each year.

Direct, Indirect, and Cumulative Effects:
Based on previous requests for assistance received by WS and anticipated future requests, up to 100 woodchucks could be lethally removed by WS annually to alleviate damage. No annual harvest data exists for woodchucks, but considering their abundance and prolific nature across the state, WS' impact on woodchuck the population is considered to be a low magnitude.

Woodchuck damage management activities would target single animals or local populations of the species at sites where their presence is causing unacceptable damage to agriculture, human health or safety, natural resources, or property (i.e., airports, private property, or industrial operations). Some local populations may be temporarily reduced as a result of damage management activities conducted under the proposed action alternative aimed at reducing damage at a local site. The unlimited harvest of

woodchucks, as regulated by the IDNR provides an indication that densities are sufficient that overharvest is unlikely to occur.

Muskrat

Muskrats are common in Iowa and distributed throughout a wide range of water ways (IDNR 2016). Muskrat populations can fluctuate greatly from year to year depending on weather condition, disease outbreaks, habitat loss, etc. However, muskrats are highly prolific and produce two to three litters per year that average four to seven young per litter, which makes them relatively immune to overharvest (Boutin and Birkenholz 1987). Loss of suitable habitat can suppress muskrat populations like the statewide drought from 2011-2012, but muskrat populations are presently prolific in Iowa. The current population trend for muskrats in Iowa is increasing (IDNR 2016).

Muskrats are classified as a furbearer species with a regulated annual trapping season from November through February. Muskrats have no daily or season limit for trapping (IDNR 2016). The number of muskrats estimated as harvested annually from 2012 through 2016 is 48,178 (Table 3.1) (IDNR 2016). Reported harvest of muskrats during the trapping seasons is based on the sale of fur/hides. There is no mandatory reporting of muskrats harvested during the annual trapping seasons.

In addition to trapping, muskrats can be lethally removed as a nuisance species by land owners or their representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed an average of four muskrats each year.

Direct, Indirect, and Cumulative Effects:

Based on previous requests for assistance received by WS and anticipated future requests, up to 200 muskrats could be lethally removed by WS annually to alleviate damage. Using the average annual trapper harvest data to assess WS' impacts to the muskrat population, WS' removal of 200 muskrats would represent 0.42% of the estimated annual trapper harvest (Table 3.1). This level of removal is considered to be a low magnitude.

Like many other mammal species in Iowa, muskrats maintain sufficient population densities to allow for an annual trapping season. Like other mammal species addressed in this EA, the unlimited harvest allowed by the IDNR during the trapping season and the permitting of lethal removal to alleviate damage by the IDNR provides an indication that the IDNR believes that muskrat populations maintain sufficient densities within the state to sustain unlimited harvest and that overharvest is unlikely.

Virginia Opossum

Virginia opossums are common and found throughout Iowa, with populations higher in the southern part of the state and high numbers also occurring in urban areas (IDNR 2016). Absolute opossum population densities are difficult to determine, but the IDNR does monitor long-term trends in relative abundance through the sale of fur/hides (estimated fur harvest), sign station surveys, and archery deer hunter survey. The current population trend for opossums in Iowa is increasing (IDNR 2016).

Opossums are classified as both a game and a furbearer species in Iowa with a regulated annual hunting and trapping season that runs from November through January. Opossums have no daily or season limit for hunting or trapping (IDNR 2016). The number of opossums estimated as harvested annually from 2012 through 2016 is 3,509 (Table 3.1) (IDNR 2016). Reported harvest of opossums during the hunting/trapping seasons is based on the sale of fur/hides. There is no mandatory reporting of opossums harvested during the annual hunting/trapping seasons.

In addition to hunting and trapping, opossums can be lethally removed as a nuisance species by land

owners or their representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed an average of 7.6 opossums each year.

Direct, Indirect, and Cumulative Effects:
Based on previous requests for assistance received by WS and anticipated future requests, up to 500 opossums could be lethally removed by WS annually to alleviate damage. Using the average annual harvest data to assess WS' impacts to the opossum population, WS' removal of 500 opossums would represent 14.25% of the estimated hunter/trapper harvest (Table 3.1). This level of removal is considered to be a low magnitude.

The unlimited hunter/trapper harvest allowed by the IDNR during the length of the hunting and trapping seasons provides an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the opossum population would occur resulting in an undesired population decline. The IDNR's oversight of WS and hunting/trapping seasons would ensure that the cumulative removal would not have a negative impact on the overall opossum population.

Raccoons
The raccoon is found throughout Iowa. Absolute raccoon population densities are difficult or impossible to determine over a large spatial scale (Gehrt, et al. 2002). However, the IDNR monitors long-term trends in relative abundance through the sale of fur/hides (estimated fur harvest), sign station surveys, and archery deer hunter survey. The current population trend for raccoons in Iowa is increasing (IDNR 2015).

Raccoons are classified as both a game and a furbearer species in Iowa with a regulated annual hunting and trapping season. The hunting/trapping season runs from November through January with no daily or season limit (IDNR 2016). The number of raccoons estimated as harvested from 2012 through 2016 is shown in Table 3.1 (IDNR 2016). Reported harvest of raccoons during the hunting/trapping seasons is based on estimated the sale of fur/hides. There is no mandatory reporting of raccoons harvested during the annual hunting/trapping seasons.

In addition to hunting and trapping, raccoons can be lethally removed as a nuisance species by land owners or their representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed an average of 18.2 raccoons each year.

Direct, Indirect, and Cumulative Effects:
Based on previous requests for assistance received by WS and anticipated future requests, up to 500 raccoons could be lethally removed annually by WS to alleviate damage. Using the average annual trapper/hunter harvest data to assess WS' impacts to the raccoon population, WS' removal of 500 raccoons would represent 0.20% of the estimated harvest (Table 3.1). This level of removal is insignificant and not expected to negatively impact raccoon populations.

The unlimited hunter/trapper harvest allowed by the IDNR during the length of the hunting and trapping seasons provides an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the raccoon population would occur resulting in an undesired population decline. The IDNR's oversight of WS and hunting/trapping seasons would ensure that the cumulative removal would not have a negative impact on the overall raccoon population.

Striped Skunk
Striped skunks are common and found throughout Iowa (IDNR 2016). Populations are the highest in the western and northern parts of the state, with relatively lower numbers in the south and eastern regions of Iowa (IDNR 2016). In some urban areas skunks are abundant, especially along railroads or high-tension power lines because these features provide travel ways and denning sites. Skunks are sensitive to

outbreaks of diseases like rabies and distemper. These outbreaks can cause a skunk population to decline sharply. This species may be less common now than it was 50 years ago because small farming operations have given way to larger, less diverse crop farms. Absolute skunk population densities are difficult to determine but the IDNR does monitor long-term trends in relative abundance through the sale of fur/hides (estimated fur harvest), sign station surveys, and archery deer hunter survey. The current population trend for skunks in Iowa is increasing, but harvest rates have remained low due to low price of furs (IDNR 2016).

Skunks are classified as both a game and a furbearer species in Iowa with a regulated annual hunting and trapping season that runs from November through January. Skunks have no daily or season limit for hunting or trapping (IDNR 2016). The number of skunks estimated as harvested annually from 2012 through 2016 is 691 (Table 3.1) (IDNR 2016). Reported harvest of skunks during the hunting/trapping seasons is based on the sale of fur/hides. There is no mandatory reporting of skunks harvested during the annual hunting/trapping seasons.

In addition to hunting and trapping, skunks can be lethally removed as a nuisance species by land owners or their representative when causing damage or posing a threat of damage. From 2012 through 2016, WS removed an average of 9.6 skunks each year.

Direct, Indirect, and Cumulative Effects:
Based on previous requests for assistance received by WS and anticipated future requests, up to 100 skunks could be lethally removed by WS annually to alleviate damage. Using the average annual harvest to assess WS' impacts to the skunk population, WS' removal of 100 skunks would represent 14.47% of the estimated total number of skunks removed by hunters/trappers (Table 3.1). Since skunks are often taken as a nuisance species and more skunks are trapped/hunted than sold, this level of removal is considered to be a low magnitude.

The unlimited hunter/trapper harvest allowed by the IDNR during the length of the hunting and trapping seasons provides an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the skunk population would occur resulting in an undesired population decline. The IDNR's oversight of WS and hunting/trapping seasons would ensure that the cumulative removal would not have a negative impact on the overall skunk population.

Feral Swine
Feral swine (also known as wild pigs, wild boars, Russian boars, or feral hogs), are medium to large sized hoofed mammals that look similar to domestic swine. These animals breed any time of year but peak breeding times usually occur in the fall. Litters sizes usually range from one to 12 piglets (Mayer and Brisbin 2009). Feral swine are the most prolific wild mammals in North America. Given adequate nutrition, a feral swine population can reportedly double in just four months (Barrett and Birmingham 1994). Feral swine may begin to breed as young as four months of age and sows can produce two litters per year (Mayer and Brisbin 2009). Feral swine are found in variable habitats in most of the United States, with the highest densities occurring in the southern United States. Populations are usually clustered around areas with ample food and water supplies.

In Iowa, feral swine are not considered a game mammal and are defined as any hog, including Russian and European wild boar, that is not conspicuously identified by ear tags or other identification and is roaming freely on public or private land without the land manager's or landowner's permission. The IDNR does not regulate feral swine and no season or bag limits exist. Feral swine may be killed at any time and by any method on private and public lands, except on lands owned and managed by the IDNR. Iowa currently has no recorded feral swine population, and most reported hog sightings have been domestic individuals either released or escaped from enclosures. Since the threat of feral swine encroachment is increasing due

to increasing populations in neighboring states (i.e., Missouri), increased vigilance is warranted by both WS and the INDR.

Feral swine damage may be addressed by WS in response to requests by federal agencies, state agencies, or the public in Iowa. Agricultural producers may request assistance with managing damage to standing crops or disease threats to domestic livestock. Natural resource managers may request assistance to protect natural areas, parks, recreation areas, or T&E species. Public health agencies may request assistance in reducing feral swine densities where disease threats to people may be present (see Table 1.3). WS may use any legal methods among those outlined by Barrett and Birmingham (1994) and West et al. (2009) as suitable for feral swine damage management, including the use of aircraft to shoot feral swine.

Between FY 2012 and FY 2016, WS responded to three requests for assistance associated with feral swine. Those persons requesting assistance reported escaped pot-belly pigs on agricultural land. Damages occur primarily from the rooting and wallowing behaviors of feral swine. Removal of a small number of feral swine or a single individual will sometimes reduce damage considerably where natural resources, agriculture, or property is affected (Barrett and Birmingham 1994). However, damage may increase dramatically in areas where feral swine have ample resources and opportunity to expand.

Direct, Indirect, and Cumulative Effects:
To address any future requests for assistance associated with feral swine, the WS-Iowa program may use any legal methods among those outlined by the APHIS National Feral Swine Damage Management Program as suitable for feral swine damage management to assist in reducing feral swine populations. WS anticipates that up to 100 swine could be lethally removed annually, unless heavy invasion from southern states establishes a population in Iowa. Feral swine would most likely be lethally removed by trapping and/or shooting. Feral swine captured using live-capture methods would be subsequently euthanized pursuant to WS Directive 2.505, or in cases where the animal is a pet or raised for the purpose of agricultural production, WS would transfer custody of the animal to Animal Control within the county of capture. 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. WS' lethal removal of feral swine would comply with this Executive Order.

Free-ranging/Feral Cats and Dogs
Free-ranging cats and dogs are socialized and can be strays, lost or abandoned pets, or pets with homes that are allowed to roam outside. Feral cat and dogs, in contrast, are not socialized to humans and are traditionally not kept as pets. The number of feral cats and dogs in Iowa is unknown. WS would coordinate with state and local authorities with jurisdiction over feral animal control in accordance with WS Directive 2.340.

Direct, Indirect, and Cumulative Effects:
Control efforts by WS would typically be limited to live-trapping, primarily using cage traps, with subsequent transport and transfer of custody to a local animal control officer or state licensed animal shelter. After relinquishing the feral cats/dogs to a local animal control officer or animal shelter, the care and the final disposition of the cat/dog would be the responsibility of the animal control officer and/or animal shelter. Feral cats/dogs would be removed in projects aimed at protecting human safety and alleviating damage or threats of damage to agricultural resources, property, and natural resources. It is possible that WS could live capture feral cats/dogs to alleviate damage and threats of damage. These animals would then be transferred to an appropriate animal care facility such as a local humane society or

animal control shelter. The transfer of custody would have no significant adverse effects on local or statewide populations of these species.

Miscellaneous Rodents

Rodents (mice, voles, ground squirrels, and rats) may be lethally removed by WS during wildlife hazard management, assessment, and monitoring at airports and airbases because these species serve as attractants to avian and mammalian predators and scavengers, which create direct hazards to aircraft. Additionally, these species may be lethally removed in or near rural parks and other structures to protect human health and safety or natural resources.

Large population fluctuations are characteristic of many small rodent populations and are highly prolific. For example, meadow voles may have up to 17 litters annually, typically with four to five young per litter, and deer mice have three to four litters with four to six young each (Burt and Grossenheider 1980, National Audubon Society 2000).

Direct, Indirect, and Cumulative Effects:

The primary method of lethal removal for these species by WS would be trapping or toxicants. Removal of these species by WS would be done at specific isolated sites (e.g., airports, parks, etc.). WS could lethally remove up to 2,000 small rodents, assorted by species (200 moles, 500 Norway rats, 100 shrews, 500 voles, 200 eastern gray squirrels, 200 fox squirrels, 300 ground squirrels). Impacts from the level of removal to rodent and insectivore populations would be minimal due to the species' relatively high reproductive rates and because rodent/insectivore damage management recommended and conducted by WS would be at a limited number of specific local sites within the range of these species. Based upon the above information, WS limited lethal removal of these small rodents may cause temporary reductions at the specific local sites, but would have no adverse direct or cumulative impacts on overall populations of the species.

Norway rats are not native to North America and were accidentally released into this country. In the wild, the impacts of these species are seen by many as entirely detrimental (Burt and Grossenheider 1980). 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. Although removal of these species up to and including extirpation could be seen as desirable, because of the productivity and distribution of the species and the limited nature of WS work, WS is unlikely to ever do more than limit populations at specific local sites. Based on the above information and WS limited lethal removal of Norway rats, WS should have minimal effects on rat populations.

Other Target Species

In addition to the mammals analyzed above, other target species could be lethally removed in small numbers by WS, or could be lethally removed when requested to resolve mammal damage or threats of mammal damage, on private or public lands. Under the proposed action, WS could lethally remove 50 plains pocket gophers, 25 bobcats, 25 river otters, 10 mink, and five individuals each of the following species, annually: bats that are not federally or state listed as threatened or endangered, black bears, mountain lions, weasels of any kind, eastern chipmunks, gray foxes, and black-tailed jackrabbits. The removal of each respective number of individuals would not significantly impact the populations, for any of these species as this level of removal is of considerably low magnitude. Damage management activities would target single animals or local populations at sites where their presence was causing unacceptable damage to agriculture, human health or safety, natural resources, or property. Some local populations may be temporarily reduced as a result of removal activities to reduce damage at a local site.

The estimated WS removal would be of low magnitude when compared to the number of those game species harvested each year, and would be of extremely low magnitude when compared to the statewide population of those species. Those species are not considered to be of low densities in the state. Other species, such as black bears and mountain lions, may travel from neighboring states and infrequently be found in Iowa. Iowa does not have self-sustaining populations of black bears or mountain lions (IDNR 2014a, IDNR 2014b). Both black bears and mountain lions have no legal status in the Iowa Code, and therefore are not protected by Iowa law (IDNR 2014a, IDNR 2014b). WS has not previously received requests for assistance for these species, but may be requested to assist in the live-capture and translocation, or limited lethal removal these mammals. Based upon increased black bear and mountain lion sightings in the recent past (IDNR 2014a, IDNR 2014b), it is possible that WS assistance will be requested to assist with black bear or mountain lion threats to human safety, pets, livestock, and/or other property. Also, WS may be asked to assist with research projects to better understand their presence and movements. The IDNR or other entity requesting WS assistance may request to have WS euthanize the animal, or have WS transport it to a location for permanent residence in a captive animal facility. Euthanasia is also authorized, if warranted, to maintain safety of personnel and/or if the animal becomes injured to a point of suffering. Should there be an immediate threat to human safety or confirmation of incidences of depredation (e.g., attacks on humans or depredations of livestock or pets), then black bears or mountain lions may be lethally removed before live capture and relocation is attempted. Any capture or lethal removal would be conducted in close coordination with IDNR. WS anticipates a maximum of five individual black bears or mountain lions could be taken each year.

Wildlife Disease Surveillance and Monitoring

The ability to efficiently conduct surveillance for diseases is dependent upon rapid detection of the pathogen if it is introduced. Effective implementation of a surveillance system will facilitate planning and execution at regional and state levels, and coordination of surveillance data for risk assessment. It will 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. Data collected by organizations/agencies conducting research and monitoring will provide a broad species and geographic surveillance effort.

To provide the most useful information and a uniform structure for surveillance, strategies for collecting samples could be employed. Those strategies include:

Investigation of Illness/Death in Mammals: A systematic investigation of illness and death in mammals may be conducted to determine the cause of the illness or death. This strategy offers the best and earliest probability of detection if a disease is introduced 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 mammals without additional mammals being handled or killed.

Surveillance in Live Wild Mammals: This strategy involves sampling live-captured, apparently healthy mammals, to detect the presence of a disease. Mammal species that represent the highest risk of being exposed to, or infected with, the disease because of their movement patterns, or mammals 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 mammal 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 mammal capture and handling.

Surveillance in Harvested Mammals: Check stations for harvestable mammal species provide an opportunity to sample dead mammals to determine the presence of a disease, and could supplement data

collected during surveillance of live mammals. Sampling of mammals harvested or lethally removed as part of damage management activities would focus on species that are most likely to be exposed to a disease.

Under the disease sampling strategies listed above that could be implemented to detect or monitor mammalian diseases, WS' implementation of those sampling strategies would not adversely affect mammal populations in the state. Sampling strategies that could be employed involve sampling live-captured mammals that could be released on site after sampling occurs. The sampling (*e.g.*, drawing blood, hair sample, fecal sample) and the subsequent release of live-captured mammals would not result in adverse effects since those mammals are released unharmed on site. In addition, sampling of sick, dying, or hunter harvested mammals would not result in the additive lethal take of mammals that would not have already occurred in the absence of a disease sampling program. Therefore, the sampling of mammals for diseases would not adversely affect the populations of any of the mammal species addressed in this EA and would not result in any take of mammals that would not have already occurred in the absence of disease sampling (*e.g.*, hunter harvest).

Summary

Evaluation of WS' activities relative to wildlife populations indicated that program activities will likely have no cumulative adverse effects on mammal populations. 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 taken 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.

Alternative 2 – Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would not intentionally remove any target mammal species because no lethal methods would be used. Although, the methods employed by WS would not be intended to result in the death of an animal, some methods, such as live-capture and anesthesia, can result in injury or death of target animals despite the training and best efforts of management personnel. This type of removal is likely to be limited to a few individuals and would not adversely impact populations of any species.

Direct, Indirect, and Cumulative Effects:

Although WS lethal removal of mammals would not occur, it is likely that without WS conducting some level of lethal MDM activities for these species, private MDM efforts would increase. Cumulative impacts on target species populations would be variable depending upon actions taken by affected landowners/resource managers and the level of training and experience of the individuals conducting the MDM. Some individuals experiencing damage may take illegal or unsafe action against the problem

species either unintentionally due to lack of training, or deliberately out of frustration of continued damage. In these instances, more target species may be lethally removed than with a professional MDM program (Alternative 1). Overall impacts on target species populations would be similar to or slightly more significant than Alternative 1 depending upon the extent to which resource managers use the assistance provided by WS. However, for the reasons presented in the population effects analysis in section 3.1, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

Alternative 3 – No Mammal Damage Management Conducted by WS

Under this alternative, WS would not conduct mammal damage management activities in the state. WS would have no direct involvement with any aspect of addressing damage caused by mammals and would provide no technical assistance. Mammals could continue to be lethally removed to resolve damage and/or threats occurring either through permits issued by the IDNR, during the regulated hunting or trapping seasons, or without a permit as allowed in certain situations by state laws and regulations. Management actions taken by non-federal entities would be considered the *environmental status quo*.

Direct, Indirect, and Cumulative Effects:
Local mammal populations could decline, stay the same, or increase depending on actions taken by those persons experiencing mammal damage. Some resource/property owners may take illegal, unsafe, or environmentally harmful action against local populations of mammals 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 impacts similar to the proposed action.

Since mammals would still be lethally removed under this alternative, the potential effects on the populations of those mammal species would be similar among all the alternatives for this issue. Any actions to resolve damage or reduce threats associated with mammals could occur by other entities despite WS' lack of involvement under this alternative. However, for the reasons presented in the population effects analysis in section 4.1.1, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

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 mammals. The potential effects on the populations of non-target wildlife species, including T&E species, are analyzed below.

Alternative 1 - Continue the Current Adaptive Integrated Mammal Damage Management Program (No Action/Proposed Action)

The potential for adverse effects to non-targets occurs from the employment of methods to address mammal damage. Under the proposed action, WS could provide both technical assistance and direct operational assistance to those 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. Management actions are directed towards specific animals or

groups of animals responsible for causing damage or posing threats. WS consults with the USFWS and the IDNR to determine the potential risks to federally and state listed T&E species in accordance with the ESA and state laws. Non-lethal methods are given priority when addressing requests for assistance (WS Directive 2.101). Non-target animals captured in traps are released unless it is determined that the animal would not survive and or that the animal cannot be safely released. WS would only employ methods in response to a request for assistance after the property owner or manager has signed a document agreeing to allow specific methods be used on property they own and/or manage. SOPs to prevent and reduce any potential adverse impacts on non-targets are discussed in Chapter 2. Despite the best efforts to minimize non-target lethal 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.

Non-Lethal Methods

Non-lethal methods have the potential to cause adverse effects to non-targets primarily though physical exclusion, frightening devices, or deterrents (see Appendix B). Any exclusionary device erected to prevent access to resources could also potentially exclude non-target species, therefore adversely impacting that species. The use of frightening devices or deterrents may also disperse non-target species from the immediate area where they are employed.

Other non-lethal methods available for use under any of the alternatives are live-capture traps (see Appendix B). WS would use and recommend the use of target-specific attractants and place them or recommend they be placed in areas where target species are active to reduce the risk of capturing non-targets. WS would monitor or recommend traps be monitored frequently so non-target species can be released unharmed.

Eagles may occur in or near areas where damage management activities are conducted. Routine activities conducted by WS' personnel under the proposed action / no action alternative could occur in areas where eagles are present, which could disrupt the current behavior of an eagle or eagles that are nearby during those activities. As discussed previously, "*take*" as defined by the Bald and Golden Eagle Protection Act, includes 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 / no 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 take of 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 2017). 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 (e.g. unintentional disturbance of an eagle). Activities, such as walking to a site, discharging a firearm, riding an ATV or driving a boat, generally represent short-term disturbances to sites where those activities take place. WS would conduct activities that are located near eagle nests using the National Bald Eagle Management Guidelines (USFWS 2017). The categories that 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. However, 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 eagles.

Lethal Methods

As previously mentioned, eagles may occur in or near areas where management activities are conducted under the proposed action / no action alternative. Non-purposeful lethal removal of a bald or golden eagle or their nests is considered a "*take*" as defined by the Bald and Golden Eagle Protection Act. WS has reviewed those methods available under the proposed action / no action alternative and the use patterns of those methods. WS determined that the SOPs that WS uses while conducting damage management activities reduces the likelihood that eagles would be lethally removed (e.g., prohibiting placement of a snare within 50 feet of a carcass which may attract eagles).

All of the lethal methods listed in Appendix B could be available under this alternative. Some of these methods include:

> *Shooting* - In cases where shooting was selected as an appropriate method, identification of an individual target would occur prior to application, eliminating risks to non-targets. Additionally, suppressed firearms would be used when appropriate to minimize noise impacts to non-targets.
>
> *Euthanasia* - Non-target species captured during the implementation of non-lethal capture methods can usually be released prior to euthanasia, which occurs subsequent to live-capture.
>
> *Snare (cable device)* - WS would use snares in compliance with applicable federal, state and local laws and regulations (WS Directive 2.210) as well as WS Directives to minimize risks to non-targets.
>
> *Bodygrip Trap (e.g., Conibear)* - WS would use bodygrip traps in compliance with applicable federal, state and local laws and regulations (WS Directive 2.210) as well as WS Directives to minimize risks to non-targets.
>
> *Rodenticides* - A common concern regarding the use of rodenticides is the potential risk to non-target animals, including threatened and endangered species. Rodenticides would be used by WS in accordance with their label and WS Directive 2.401 to minimize risks to non-targets.
>
> *Fumigants* - Only fumigants and toxicants registered with the EPA and the IDALS pursuant to the FIFRA would be recommended and used by WS under this alternative. Fumigants and toxicants, including restricted use toxicants, could be used by licensed non-WS' pesticide applicators; therefore, WS' use of fumigants and toxicants would provide no additional negative impacts on non-target species as these substances could be used in the absence of WS' involvement. WS personnel are trained and licensed in the safe and effective use of fumigants and toxicants as well as the behavior and biology of both target and non-target wildlife species.

Direct, Indirect, and Cumulative Effects:

The persistent use of non-lethal methods would likely result in the dispersal or abandonment of those areas where non-lethal methods are employed of both target and non-target species. Therefore, any use of non-lethal methods has similar results on both non-target and target species. However, the potential impacts to non-targets, like the impacts to target species, are expected to be temporary. WS would not employ or recommend these methods be employed over large geographic areas or at such intensity that essential resources would be unavailable and that long term adverse impacts to non-target populations

would occur. Non-lethal methods are generally regarded as having minimal impacts on populations because individuals are unharmed. Therefore, non-lethal methods would not have any significant adverse impacts on non-target populations of wildlife including threatened and endangered species under this alternative.
Only those repellents registered with the EPA and IDALS pursuant to the FIFRA would be recommended and used by WS under this alternative. Therefore, the use and recommendation of repellents would not have negative impacts on non-target species when used according to label requirements. Most repellents for mammals pose a very low risk to non-targets when exposed to or when ingested.

Mammals could still be lethally removed during the regulated harvest season, when causing damage, and through the issuance of permits by the IDNR under this alternative. WS would also employ and/or recommend lethal methods under the proposed action alternative to alleviate damage caused by target mammals. Lethal methods available for use to manage damage caused by mammals under this alternative would include shooting, body-gripping traps, snares, snap traps, euthanasia after live-capture, and registered fumigants and toxicants.

The use of firearms is essentially selective for target species since animals are identified prior to application; therefore, no adverse impacts are anticipated from use of this method.

WS personnel's pesticide training in combination with following label requirements presents a low risk of exposure of non-targets species to registered fumigants and toxicants. Additionally, WS personnel would follow all label directions during pesticide applications. As appropriate, WS would use signage and other means of notification to ensure the public is aware of fumigant or toxicant applications or applications sites, to ensure non-target domestic species such as dogs are not exposed.

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 mammals, the use of such methods can result in the incidental lethal removal of unintended species. Those occurrences are infrequent and should not affect the overall populations of any species under the proposed action. From 2012 – 2016, there was only one instance where a lethal removal occurred on a non-target species. In this instance, a river otter was taken by a body-gripping trap meant to catch a beaver. WS' lethal removal of non-target species during activities to reduce damage or threats to human safety associated with mammals is expected to be extremely low to non-existent. WS would monitor the lethal removal of non-target species to ensure program activities or methodologies used in mammal damage management do not adversely impact non-targets. Methods available to resolve and prevent mammal damage or threats when employed by trained, knowledgeable personnel are selective for target species. WS would annually report to the IDNR any non-target lethal removal to ensure lethal removal by WS is considered as part of management objectives established. The potential impacts to non-targets are similar to the other alternatives and are considered to be minimal to non-existent.

The proposed MDM could benefit many other wildlife species that are impacted by predation, habitat modification or competition for resources. For example, fox often feed on the eggs, nestlings, and fledglings of ground nesting bird species. This alternative has the greatest possibility of successfully reducing mammal 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 C contains the list of species currently listed in the state. Based on the species that are currently listed by the USFWS in Iowa and the actions and methods that WS intends to use to address MDM in the state, WS has made a "no effect" determination for all federally listed species except for piping plovers and freshwater mussels. Requests for predator management may occur in the same area as nesting piping plovers and may include minor disturbance; however minor disturbance is not likely to cause abandonment of nests or direct impacts on chicks. Removal of beaver dams could actually improve mussel habitat, thus conferring a "may affect, not likely to adversely affect" determination for federally listed mussels. After consultation on these analysis and determinations, USFWS concurs that implementation of MDM by WS in Iowa is not likely to adversely affect T&E species. If program activities change in scope or intensity, WS will consult with the USFWS as necessary to ensure the protection and sustainability of all T&E species.

State Listed Species – The current list of state listed species as determined by the IDNR was obtained and reviewed during the development of the EA (see Appendix D). WS has consulted with the IDNR to determine if the proposed activities would adversely affect those species currently listed by the state. After reviewing the proposed methods and alternatives relative to the potential impacts to state-listed species, the IDNR agreed with WS' determination that adverse impacts to the T&E species populations in Iowa are not likely.

Summary of non-target animal impact analysis

WS continually monitors, evaluates, and makes modifications as necessary to methods or strategies when providing direct operational assistance, to not only reduce damage but also to minimize potentially harmful effects to non-targets. Additionally, WS consults as required with the USFWS and the IDNR to determine the potential risks to eagles and federally and state listed T&E species in accordance with the Bald and Golden Eagle Protection Act, ESA and state laws. WS annually reports to these entities to ensure that any non-target lethal removal by WS is considered as part of management objectives. Potential direct and cumulative impacts to non-targets, including T&E species, from the recommendation of methods by WS under this alternative would be expected to be insignificant. No indirect effects were identified for this issue.

Alternative 2 – Mammal Damage Management by WS through Non-lethal Methods Only

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 non-target in a live-capture device as outlined under Alternative 1. Although the availability of WS assistance with non-lethal MDM methods could decrease incentives for non-WS entities to use lethal MDM methods, non-WS efforts to reduce or prevent damage could result in less experienced persons implementing lethal MDM methods and lead to a greater removal of non-target wildlife.

Direct, Indirect, and Cumulative Effects:
Under this alternative, WS' efforts to protect rare, T&E species would not be as effective as the preferred alternative because WS would be unable to access lethal techniques if non-lethal techniques are ineffective. Lethal efforts to protect these species would have to be conducted by other natural resource management entities. Capture and release (e.g., for disease monitoring) and capture and relocate would be allowed under this alternative. There is the remote chance that the capture devices could result in the death of a non-target animal. However, given that these devices would be applied with provisions to keep

the target animal alive, the risks to non-target species are very low and would not result in adverse impacts on non-target species populations.

If mammal damage problems were not effectively resolved by non-lethal control methods, members of the public may resort to other means of lethal control such as the use of shooting or the use of pesticides. This could result in less experienced persons implementing control methods and could lead to greater risks to non-target wildlife than the proposed action. For example, shooting by persons not proficient at mammal identification could lead to killing of non-target mammals. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants that could lead to unknown effects on local non-target species populations, including T&E species. Hazards to raptors, including bald eagles, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals. While cumulative impacts would be variable, WS does not anticipate any significant cumulative impacts from this alternative.

Effects on T&E species: WS' impacts on T&E species would be similar to the non-lethal methods used under Alternative 1. Risks to T&E species from increased private efforts to address damage management problems will vary depending upon the training and level of experience of the individual conducting the MDM. As stated above, frustrated individuals may resort to use of unsafe or illegal methods like poisons that may increase risks to T&E species. Risks to T&E species may be lower with this alternative than with Alternative 3 because people would have ready access to assistance with non-lethal MDM techniques. WS could advise individuals as to the potential presence of state and federally listed species in their area.

Alternative 3 – No Mammal Damage Management Conducted by WS

Under this alternative, WS would not be directly involved with mammal damage management activities. Therefore, no direct impacts to non-targets or T&E species would occur by WS under this alternative. Mammals would continue to be lethally removed under permits issued by the IDNR, harvest would continue to occur during the regulated season, and non-native mammal species could continue to be lethally removed without the need for a permit.

Direct, Indirect, and Cumulative Effects:
The ability to reduce damage and threats of damage caused by mammals to other wildlife species, including T&E species, and their habitats 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 mammal behavior, risks to non-target wildlife would be higher under this alternative. If frustration from the lack of available assistance causes those persons experiencing mammal 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.

Effects on T&E species: WS will not have any direct impact on T&E species. Risks to T&E species from increased private efforts to address damage management problems will vary depending upon the training and level of experience of the individual conducting the MDM. As stated above, frustrated

individuals may resort to use of unsafe or illegal methods like poisons that may increase risks to T&E species. Risks to T&E species may be higher with this alternative than with the other alternatives because WS would not have any opportunity to provide advice or assistance with the safe and effective use of MDM techniques or have the opportunity to advise individuals regarding the presence of T&E species.

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

A common concern is the potential adverse effects 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 - Continue the Current Adaptive Integrated Mammal Damage Management Program (No Action/Proposed Action)

WS would use the Decision Model to determine the appropriate method or methods that would effectively resolve requests for assistance. The methods chosen 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.

WS' employees who conduct MDM 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 mammals. 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. Activities would generally be conducted when human activity is minimal (e.g., early mornings, at night) and/or in areas where human activities are minimal (e.g., in areas closed to the public).

Lethal methods available under the proposed action would include the use of firearms, kill traps (*e.g.*, conibear traps, snap traps, glue traps), live-capture followed by euthanasia, registered fumigants and toxicants, and the recommendation that mammals be harvested during the regulated hunting or trapping season established for those species by the IDNR.

Other live-capture devices, such as cannon nets, pose minor safety hazards 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, which limits the exposure of the public to misuse of the method.

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 immobilizing drugs, euthanasia drugs, reproductive inhibitors, fumigants, toxicants, and repellents (Appendix B). The use of immobilizing drugs under the identified alternatives would only be administered to mammals that have been live-captured using other methods or administered through injection using a projectile (*e.g.*, dart gun). Immobilizing drugs used to sedate wildlife are used to temporary handle and transport animals to lessen the distress of the animal from the experience. Drug

delivery to immobilize mammals is likely to occur on site with close monitoring of the animal to ensure proper care of the animal. Most immobilizing drugs are fully reversible with a full recovery of sedated animals occurring.

Euthanizing drugs would be administered under similar circumstances to immobilizing drugs under the relevant proposed alternatives. Euthanized animals would be disposed of in accordance with WS Directives and in accordance with label directions, therefore, would not be available for harvest and consumption. If mammals were immobilized for sampling or translocation and released, risks could occur to human safety if harvest and consumption occurred. SOPs employed by WS to reduce risks are discussed in Chapter 2.

The cooperator requesting assistance is made aware through a MOU, CSA, 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.

Direct, Indirect, and Cumulative Effects:
To help ensure safe use and awareness, WS' employees who use firearms during official duties are required to attend an approved initial firearm safety training course and attend an annual safety training course in accordance with WS Directive 2.615 to remain certified for firearm use. As a condition of employment, WS' employees who carry and use firearms are subject to the Lautenberg Domestic Confiscation Law, which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence (18 USC § 922(g)(9)). A safety assessment based on site evaluations, coordination with cooperating and local agencies (if applicable), and consultation with cooperators would be conducted before firearms are deemed appropriate to alleviate or reduce damage and threats to human safety when conducting activities. WS and cooperating agencies would work closely with cooperators requesting assistance to ensure all safety issues are considered before firearms are deemed appropriate for use. The use of all methods, including firearms, must be agreed upon with the cooperator to ensure the safe use of those methods.

Restraining devices and body-gripping traps are typically set in situations where human activity is minimal to ensure public safety. Restraining devices and body-gripping traps rarely cause serious injury to humans and are triggered through direct activation of the device. Therefore, human safety concerns associated with restraining devices and body-gripping traps used to capture wildlife, including mammals, require direct contact to cause bodily harm. Again, restraining devices are not located in high-use areas to ensure the safety of the public and pets. Signs warning of the use of those tools in the area are posted for public view at access points to increase awareness that those devices are being used and to avoid the area, especially pet owners.

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. Mammals euthanized by WS or lethally removed using chemical methods would be disposed of in accordance with WS Directive 2.515. All euthanasia would occur in accordance with AVMA guidelines and in the absence of the public to further minimize risks, whenever possible. All WS' personnel who apply fumigants and toxicants registered with the EPA pursuant to the FIFRA are licensed as pesticide applicators by the IDALS. WS personnel are trained in the safe and effective use of fumigants and toxicants. Training and adherence to agency directives and label requirements would ensure the safety of both employees applying fumigants and toxicants and members of the public. To the extent possible, toxicants, treated baits, and/or mammals lethally removed with fumigants or toxicants by WS will be collected and/or disposed of in accordance with label requirements to reduce risk of secondary toxicity to people who may be exposed to them or attempt to consume them. WS would utilize locking

bait stations to restrict access of children to rodenticides such as anticoagulants. As appropriate, WS would use signage and other means of notification to ensure the public is aware of fumigant or toxicant applications or applications sites, to ensure people, including children, are not exposed.

The recommendation of repellents or the use of those repellents registered for use to disperse mammals could occur under the proposed action as part of an integrated approach to managing mammal 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.

The recommendation by WS that mammals be harvested during the regulated hunting and/or trapping seasons which are established by the IDNR would not increase risks to human safety above those risks already inherent with hunting or trapping those species. Recommendations of allowing hunting and/or trapping on property owned or managed by a cooperator to reduce mammal populations that could then reduce damage or threats would not increase risks to human safety. Safety requirements established by the IDNR for the regulated hunting and trapping seasons would further minimize risks associated with hunting and trapping. Although hunting and trapping accidents do occur, the recommendation of allowing hunting or trapping to reduce localized populations of mammals would not increase those risks.

No adverse direct or indirect effects to human safety have occurred from WS' use of methods to alleviate mammal damage from FY 2012 through FY 2016. The risks to human safety from the use of non-lethal and lethal methods, when used appropriately and by trained personnel, are considered low. 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. 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. Additionally, WS personnel are properly trained on the safe storage, transportation, and use of 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. WS does not anticipate any additional adverse cumulative impacts to human safety from the use of firearms when recommending that mammals be harvested during regulated hunting seasons to help alleviate damage.

Alternative 2 – Mammal Damage Management by WS through Non-lethal Methods Only

Under this alternative, WS would not use lethal MDM methods. Concerns about human health risks from WS' use of lethal mammal damage management methods would be alleviated because no such use would occur. However, most lethal methods would still be available to licensed pest control operators. Benefits to the public from WS' MDM activities will depend on the ability of WS to resolve problems using non-lethal methods and the effectiveness of non-WS MDM efforts. In situations where risks to human health and safety from mammals cannot be resolved using nonlethal methods, benefits to the public will depend on the efficacy of non-WS use of lethal MDM methods. If lethal MDM programs are implemented by

individuals with less experience than WS, they may not be able to safely and 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 mammal 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 that 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 that could lead to unknown direct, indirect, and/or cumulative impacts to humans and pets.

Alternative 3 – No Mammal Damage Management Conducted by WS

Under the no mammal damage management alternative, WS would not be involved with any aspect of managing damage associated with mammals, including technical assistance. Due to the lack of involvement in managing damage caused by mammals, no impacts to human safety would occur directly from WS. This alternative would not prevent those entities experiencing threats or damage from mammals from conducting damage management activities in the absence of WS' assistance. The direct burden of implementing permitted methods would be placed on those experiencing damage.

Direct, Indirect, and Cumulative Effects:
Similar to Alternative 2, reproductive inhibitors, immobilizing drugs, and euthanasia chemicals would not be available under this alternative to those persons experiencing damage or threats from mammals unless proper training and certifications were obtained. However, fumigants, toxicants, and repellents would continue to be available to those persons with the appropriate pesticide applicators license. Since most methods available to resolve or prevent mammal damage or threats are available to anyone, the threats to human safety from the use of those methods are similar between the alternatives. 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. However, methods employed by those not experienced in the use of methods or are not trained in their proper use, could increase threats to human safety. Overall, the methods available to the public, when applied correctly and appropriately, pose minimal risks to human safety.

Issue 4 - Humaneness and Animal Welfare Concerns of Methods

The issues of method humaneness relating to the alternatives are discussed below.

Alternative 1 - Continue the Current Adaptive Integrated Mammal Damage Management Program (No Action/Proposed Action)

Under the proposed action, WS would integrate methods using WS' Decision Model as part of technical assistance and direct operational assistance. Methods available under the proposed action could include non-lethal and lethal methods integrated into direct operational assistance. Under this alternative, non-lethal methods would be used by WS that are generally regarded as humane. Non-lethal methods would include resource management methods (*e.g.*, crop selection, habitat modification, modification of human behavior), exclusion devices, frightening devices, reproductive inhibitors, cage traps, nets, and repellents.

WS may use EPA registered and approved chemicals to manage damage caused by some mammals. Some individuals consider the use of such chemicals to be inhumane. WS personnel are experienced, professional and humane in their use of management methods and always follow label directions. Under this alternative, mammals would be killed by experienced WS personnel using the best and most appropriate method(s) available.

The AVMA states "... euthanasia is the act of inducing humane death in an animal" and "...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" (AVMA 2007).

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."

AVMA (2013) recognizes that there is "an inherent lack of control over free-ranging wildlife, accepting that firearms may be the most appropriate approach to their euthanasia, and acknowledging that the quickest and most humane means of terminating the life of free-ranging wildlife in a given situation may not always meet all criteria established for euthanasia (i.e., distinguishes between euthanasia and methods that are more accurately characterized as humane killing). Because of the variety of situations that may be encountered, it is difficult to strictly classify methods for termination of free-ranging wildlife as acceptable, acceptable with conditions, or unacceptable. Furthermore, classification of a given method as a means of euthanasia or humane killing may vary by circumstances. These acknowledgments are not intended to condone a lower standard for the humane termination of wildlife. The best methods possible under the circumstances must be applied, and new technology and methods demonstrated to be superior to previously used methods must be embraced."

Direct, Indirect, and Cumulative Effects:

The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology. MDM methods viewed by some persons as inhumane would be employed by WS under this alternative. These methods would include shooting, trapping, toxicants/chemicals, and snares. Despite SOPs and state trapping regulations designed to maximize humaneness, the perceived stress and trauma associated with being held in a trap or snare until the WS

employee arrives at the capture site to dispatch or release the animal, is unacceptable to some persons. Other MDM methods used to remove target animals including shooting and use of body-gripping traps (i.e., Conibear) result in a relatively humane death because the animals die instantly or within seconds to a few minutes. These methods however, are also considered inhumane by some individuals.

WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some MDM methods are used in situations where non-lethal damage management methods are not practical or effective. No indirect or cumulative adverse impacts were identified for this issue.

Alternative 2 – Mammal Damage Management by WS through Non-lethal Methods Only

The issues of humaneness of methods under this alternative are likely to be perceived to be similar to humaneness issues discussed under the proposed action. This perceived similarity is derived from WS' recommendation of methods that some consider inhumane. WS would not directly be involved with damage management activities under this alternative. However, the recommendation of the use of methods would likely result in the requester employing those methods. Therefore, by recommending methods and thus a requester employing those methods, the issue of humaneness would be similar to the proposed action.

Direct, Indirect, and Cumulative Effects:
WS would instruct and demonstrate the proper use and placement of methodologies to increase effectiveness in capturing target mammal species and to ensure methods are used in such a way as to minimize pain and suffering. However, the efficacy of methods employed by a cooperator would be based on the skill and knowledge of the requestor in resolving the threat to safety or damage situation despite WS' demonstration. Therefore, a lack of understanding of the behavior of mammals or improperly identifying the damage caused by mammals along with inadequate knowledge and skill in using methodologies to resolve the damage or threat could lead to incidents with a greater probability of being perceived as inhumane. In those situations, the pain and suffering are likely to be regarded as greater than those discussed in the proposed action.

Alternative 3 – No Mammal Damage Management Conducted by WS

Under this alternative, WS would have no involvement in any aspect of MDM in Iowa. Those persons experiencing damage or threats associated with mammals could continue to use those methods legally available. Those methods would likely be considered inhumane by those persons who would consider methods proposed under any alternative as inhumane. The issue of humaneness would likely be directly linked to the methods legally available to the general public since methods are often labeled as inhumane by segments of society no matter the entity employing those methods.

Direct, Indirect, and Cumulative Effects:
The humaneness of methods would be based on the skill and knowledge of the person employing those methods. A lack of understanding of the target species or methods used could lead to an increase in situations perceived as being inhumane to wildlife despite the method used. Despite the lack of involvement by WS under this alternative, those methods perceived as inhumane by certain individuals and groups would still be available to the general public to use to resolve damage and threats caused by mammals.

3.2 ISSUES NOT CONSIDERD FOR COMPARATIVE ANALYSIS

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, critical habitats (areas listed in T&E species recovery plans), visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. Therefore, these resources were not analyzed.

Additional issues were identified by WS during the scoping process of this EA that were considered but will not receive detailed analyses for the reasons provided. The following issues were considered but will not be analyzed in detail:

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

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 FONSI. This EA addresses impacts for managing damage and threats to human safety associated with mammals in Iowa, analyzes individual and cumulative impacts, provides a thorough analysis of other issues relevant to MDM, and provides the public an opportunity to review and comment on the analysis and alternatives.

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. As most mammals are regulated by the IDNR, the best available data for analysis is often based on statewide population dynamics. For example, an EA on county level may not have sufficient data for that area and have to rely on statewide analysis anyway. If a determination is made through this EA that the proposed action or the other alternatives might have a significant impact on the quality of the human environment, then an EIS would be prepared.

WS' Impact on Biodiversity

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

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. Therefore the threshold of damage or economic loss that can be tolerated is also

unique to the individual. In addition, establishing a threshold would be difficult or inappropriate to apply to human health and safety situations.

Mammal Damage Management Should Not Occur at Taxpayer Expense

Some individuals may believe that wildlife damage management should not be provided at the expense of the taxpayer or that activities should be fee-based. Funding for MDM activities is derived from federal appropriations and through cooperative funding. Activities conducted for the management of damage and threats to human safety from mammals would be funded through CSAs with individual property owners or associations. A minimal federal appropriation is allotted for the maintenance of the WS program in Iowa. The remainder of the WS program is mostly fee-based. Technical assistance is provided to requesters as part of the federally-funded activities, but the majority of direct assistance in which WS' employees perform damage management activities is funded through CSAs 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 mammals 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 circumstance where mammals 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.

Mammal Damage Should Be Managed By Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce mammal damage for property owners or property managers 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, airports, and cities and towns may prefer to use WS because of security and safety issues. The relationship between WS and private industry is addressed in WS directive 3.101.

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 mammals. As described in Appendix B, the lethal removal of mammals with firearms by WS to alleviate damage or threats would occur using a rifle, air rifle, pistol, 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).

The lethal removal of mammals by WS using firearms occurs primarily from the use of rifles. However, the use of shotguns could be employed to lethally remove some species. Mammals that are removed using rifles would occur within areas where retrieval of all mammal carcasses for proper disposal is highly likely (*e.g.*, at an airport). With risks of lead exposure occurring primarily from ingestion of bullet

fragments, the retrieval and proper disposal of mammal 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 mammal, if misses occur, or if the mammal 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 exist that lead from bullets deposited in soil from shooting activities could lead to contamination of water, 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 2005). 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 where it was believed the lead contamination was due to runoff from the parking 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 lethal removal of mammals can occur during regulated hunting seasons or through the issuance of permits by the IDNR, WS' assistance with removing mammals would not be additive to the environmental status quo since those mammals 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 MDM activities. The proficiency training received by WS' employees in firearm use and accuracy increases the likelihood that mammals 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 mammal carcasses lethally removed using firearms would be retrieved and disposed of properly to limit the availability of lead in the environment and ensures mammal carcass are 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 are deposited into the environment from WS' activities due to misses, the bullet passing through the carcass, or from mammal carcasses that may be irretrievable would be below any level that would pose any risk from exposure or significant contamination of water.

Effects of Mammal Damage Management Activities on the Regulated Harvest of Mammals

Another issue commonly identified is a concern that mammal damage management activities conducted by WS would affect the opportunity for persons to harvest those species during the regulated hunting and

trapping seasons, either by reducing local populations through the lethal removal of mammals or by reducing the number of mammals present in an area through dispersal techniques. Those species that are addressed in this EA that also can be hunted or trapped during regulated seasons in Iowa include: Eastern cottontails, woodchucks, red fox, gray squirrel, fox squirrel, thirteen-lined ground squirrel, raccoon, coyote, mink, muskrat, striped skunk, Virginia opossum, white-tailed deer, and beaver.

Potential impacts could arise from the use of non-lethal or lethal damage management methods. Non-lethal methods used to reduce or alleviate damage reduce mammal densities by dispersing animals from areas where damage or the threat of damage is occurring. Similarly, lethal methods used to reduce damage could locally lower target species densities in areas where damage is occurring, resulting in a reduction in the availability of those species during the regulated harvest season. WS' MDM activities would primarily be conducted in areas where hunting access is restricted (e.g., airports, urban areas) or hunting has been ineffective. The use of non-lethal or lethal methods often disperses mammals from areas where damage is occurring to areas outside the damage area, which could serve to move those mammal species from those less accessible areas to places more accessible to hunters and trappers. In addition, in appropriate situations, WS commonly recommends recreational hunting and trapping as a damage management alternative for many of the species listed in this EA.

Effects of Beaver Dam Removal on the Status of Wetlands

The issue of WS' potential impacts to wetlands stems from beaver damage management, primarily from the removal of beaver dams. Beaver dam removal during activities to manage damage caused by beaver sometimes occurs in areas inundated by water resulting from flooding. Beavers build dams primarily in smaller riverine systems (intermittent and perennial streams and creeks). Dam material usually consists of mud, sticks, and other vegetative material. Their dams obstruct the normal flow of water and can change the preexisting hydrology from flowing or circulating waters to slower, deeper, more expansive waters that accumulate bottom sediment. The depth of the bottom sediment depends on the length of time an area is covered by water and the amount of suspended sediment in the water.

Beaver dams, over time, can establish new wetlands. The regulatory definition of a wetland stated by the USACE and the EPA (40 CFR 232.2) is: "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

If a beaver dam is not removed and water is allowed to stand, hydric soils and hydrophytic vegetation eventually form. This process can take anywhere from several months to many years depending on preexisting conditions. Hydric soils are those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions. In general, hydric soils form much easier where wetlands have preexisted. Hydrophytic vegetation includes plants that grow in water or on a substrate that is at least periodically deficient in oxygen because of excessive water content. If those conditions are met, then a wetland has developed that would have different wildlife habitat values than an area that has been more recently impounded by beaver dam activity.

The intent of most dam removal operations is not to drain established wetlands. With few exceptions, requests received by WS to remove beaver dams have involved the removal of the dam to return an area to the condition that existed before the dam had been built, or before it had been affecting the area for more than a few years. WS' beaver damage management activities are primarily conducted to address damage to agricultural crops, timber resources, public property such as roads and bridges, and water management structures. Beaver dam removal activities would primarily be conducted on small watershed

streams, tributary drainages, and ditches. Those activities could be described as small, exclusive projects conducted to restore water flow through previously existing channels.

In the majority of instances, beaver dam removal would be accomplished by manual methods (i.e., hand tools). WS' personnel do not utilize heavy equipment, such as trackhoes or backhoes, for beaver dam removal. Only the portion of the dam blocking the stream or ditch channel would be breached. In some instances, WS' activities involve the installation of structures to manage water levels at the site of a breached beaver dam.

If the area does not have hydric soils, it usually takes many years for them to develop and a wetland to become established; this often takes greater than five years as indicated by the Swampbuster provision of the Food Security Act. Most beaver dam removal by WS would be allowed under exemptions stated in 33 CFR parts 323 and 330 of Section 404 of the Clean Water Act or parts 3821 and 3822 of the Food Security Act. However, the removal of some beaver dams could trigger certain portions of Section 404 that require landowners to obtain permits from the USACE prior to removing a blockage. WS' personnel determine the proper course of action upon inspecting a beaver dam impoundment.

3.3 SUMMARY

No significant cumulative environmental impacts are expected from any of the three Alternatives. Under the Proposed Action, the lethal removal of mammals by WS would not have significant impacts on overall native mammal populations, but some short-term local reductions may occur. Some efforts to reduce damage caused by non-native species could result in elimination of the species from local areas or the state (e.g. feral swine). No risk to public safety is expected when WS' programs are provided and accepted by requesting individuals in Alternative 1 since only trained and experienced wildlife biologists/specialists would conduct and recommend MDM activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations in Alternatives 1 and 2 conduct their own MDM activities, and when no WS assistance is provided in Alternative 3. In all three Alternatives, however, the increase in risk would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS's participation in MDM activities on public and private lands, the analysis in this EA indicates that WS Integrated MDM program will not result in significant cumulative adverse impacts on the quality of the human environment.

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APPENDIX B

METHODS AVAILABLE FOR RESOLVING OR PREVENTING MAMMAL DAMAGE IN THE STATE OF IOWA

The most effective approach to resolving wildlife damage problems is to integrate the use of several methods, either simultaneously or sequentially. An Integrated Wildlife Damage Management (IWDM) plan would integrate and apply practical methods of prevention and reduce damage by wildlife while minimizing harmful effects of damage reduction measures on humans, other species, and the environment. IWDM may incorporate resource management, physical exclusion and deterrents, and population management, or any combination of these, depending on the characteristics of specific damage problems.

In selecting damage management techniques for specific damage situations, consideration is given to the responsible species and the magnitude, geographic extent, duration and frequency, and likelihood of wildlife damage. Consideration is also given to the status of target and potential non-target species, local environmental conditions and impacts, social and legal aspects, and relative costs of damage reduction options. The cost of damage reduction may sometimes be a secondary concern because of the overriding environmental, legal, and animal welfare considerations. These factors are evaluated in formulating damage management strategies that incorporate the application of one or more techniques.

A variety of methods are potentially available to the WS program relative to the management or reduction of damage from mammals. Various federal, state, and local statutes and regulations and WS directives govern WS' use of damage management tools and substances. WS develops and recommends or implements IWDM strategies based on resource management, physical exclusion, and wildlife management approaches. Within each approach there may be available a number of specific methods or tactics. The following methods and materials may be recommended or used in technical assistance and direct damage management efforts of the WS program.

Non-Chemical Mammal Damage Management Methods

Non-chemical management methods consist primarily of tools or devices used to repel, capture or kill a particular animal or local population of wildlife to alleviate damage and conflicts. Methods may be non-lethal (e.g., fencing, frightening devices, etc.) or lethal (e.g., firearms, body gripping traps, snares, etc.). If WS personnel apply these methods on private lands, a Work Initiation Document or similar document must be signed by the landowner or administrator authorizing the use of each damage management method. Non-chemical methods used or recommended by WS include:

Exclusion pertains to preventing access to resources through fencing or other barriers. Fencing of small critical areas can sometimes prevent animals that cannot climb from entering areas of protected resources. Fencing, especially if it is installed with an underground skirt, can prevent access to areas for many mammal species that dig, including fox, coyote, and striped skunks. Areas such as airports, yards or hay meadows may be fenced. Hardware cloth or other metal barriers can sometimes be used to prevent girdling and gnawing of valuable trees and to prevent the entry of mammals into buildings through existing holes or gaps. Exclusion and one-way devices, such as netting or nylon window screening, can be used to exclude bats from a building or an enclosed structure (Greenhall and Frantz 1994). Electric fences of various constructions have been used effectively to reduce damage to various crops by deer, raccoons, and other species (Craven and Hygnstrom 1994, Boggess 1994).

Cultural methods and habitat management includes the application of practices that seek to minimize exposure of the protected resource to damaging animals through processes other than

exclusion. They may include changing animal husbandry practices such as employing guard dogs, herders, shed lambing, carcass removal, or pasture selection. Strategies may also include minimizing cover where damaging mammals might hide, manipulating the surrounding environment through barriers or fences to deter animals from entering a protected area, or planting lure crops on fringes of protected crops. For example, removal of trees from around buildings can sometimes reduce damage associated with raccoons.

Some mammals that cause damage in urban environments are attracted to homes by the presence of garbage or pet food left outside and unprotected. Removal or sealing of garbage in tight trash receptacles and elimination of all pet foods from outside areas can reduce the presence of unwanted mammals. If raccoons are a problem, making trash and garbage unavailable and removing all pet food from outside during nighttime hours can greatly reduce their presence.

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

Animal behavior modification refers to tactics that deter or repel damaging mammals and thus, reduce damage to the protected resource. These techniques are usually aimed at causing target animals to respond by fleeing from the site or remaining at a distance. They usually employ extreme noise or visual stimuli. Unfortunately, many of these techniques are only effective for a short time before wildlife habituate to them (Conover 1982). Devices used to modify behavior in mammals include:

- electronic guards (siren strobe-light devices)
- propane exploders
- pyrotechnics
- laser lights
- human effigies
- harassment / shooting into air

Beaver dam removal may be recommended or executed by WS. Removing beaver dams not only restores natural hydrology, but it also often alleviates the damage associated with flooding, which may impact roads and private property. The specific tools to remove beaver dams may include hand tools, heavy machinery, or binary explosives.

Live capture and relocation can be accomplished through the use of cage traps, species specific traps, live snares, nets, foothold traps, and other methods to capture some species of mammals for the purpose of translocating them for release to wild sites. Relocation of damaging mammals might be the best viable solution, such as when the mammals are considered to have high value like with T&E species. Under the right conditions, relocating wildlife can be a viable and effective wildlife management technique (Craven et al. 1998). WS-Iowa would only relocate wildlife at the direction of and only after consulting with the USFWS and/or the IDNR to coordinate capture, transportation, and selection of suitable relocation sites, as well as compliance with all proper guidelines.

Trapping can utilize a number of devices, including footholds, species specific traps, cage-type traps, body gripping (conibear) traps, snaps traps, and glue traps. These techniques are implemented by WS personnel because they can be an effective tool for managing mammals.

Foothold traps can be effectively used to capture a variety of mammals. Foothold traps are either placed beside, or in travel ways being actively used by the target species. Placement of traps is contingent upon the habits of the respective target species, habitat conditions, and

presence of non-target animals. Effective trap placement and the use of appropriate baits and lures by trained WS personnel also contribute to the foothold trap's selectivity. An additional advantage is that foothold traps can allow for the on-site release of non-target animals.

Species specific traps (e.g. "Dog-proof traps) can be effectively used specifically to capture raccoons. These species specific traps are either placed beside travel ways or foraging areas being actively used by raccoons. These are specific to raccoons because they bait is placed inside the trap and the raccoon is required to reach in with its paw in an attempt to access the bait resulting in capture.

Cage traps are live capture traps used to trap a variety of small to medium sized mammals. Cage traps come in a variety of sizes and are made of galvanized wire mesh, and consist of a treadle in the middle of the cage that triggers the door to close behind the animal after it enters the trap.

Corral Trap may be constructed from steel or wood supports with wire fencing and are typically circular in shape. . These traps are used to capture animals alive. Traps are baited with foods or other items attractive to the target animal (see **ATTRACTANTS** below). Animals enter through door(s) that are triggered by an observer, a trigger mechanism, or root stick. Alternatively, doors may be of a one way design, exploiting an animal's natural tendencies. For example, feral swine exhibit rooting behavior, which makes them susceptible to being trapped in traps with doors that are hinged at the top and tilted inward at the bottom, and allow the animal to root underneath the door and enter the trap, but not exit.

Body-grip (e.g., Conibear-type) traps are designed to cause the quick death of the animal that activates the trap. Placement is at travel corridors or burrow entrances created or used by the target species. The animal is captured as it travels through the trap and activates the triggering mechanism. Safety hazards and risks to humans are usually related to setting, placing, checking, or removing the traps.

Hancock (e.g., suitcase/basket-type) traps are designed to live-capture beaver. This type of trap is constructed of a metal frame covered in chain-link fence that is hinged with springs. Trap appearance is similar to a large suitcase when closed. When set, the trap is opened to allow an animal to enter and when tripped, the sides close around the animal.

Colony traps are multi-catch traps used to either live-capture or drown muskrats. There are various types of colony traps. One common type of colony trap consists of a cylindrical tube of wire mesh with a one-way door on each end (Novak 1987). Colony traps are set at entrances to muskrat burrows or placed in muskrat travel lanes.

Sherman box traps are small live traps used to capture small mammals, such as rodents. These traps are often made of galvanized steel or aluminum and fold up for easy transport. Sherman box traps also consist of a treadle towards the back of the trap that triggers the door to close behind the animal being trapped.

Snares (cable restraints) are traps made of light cable with a locking device, and are used to catch small and medium sized mammals. The cable is placed in the path of an animal in the form of a loop. When the target species walks into the snare, the loop becomes smaller in size, holding the animal as if it were on a leash. When used as a live capture device, snares are equipped with integrated stops that permit snaring, but do not choke the animal.

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

Hand nets are used to catch small mammals in confined areas such as homes and businesses. These nets resemble fishing dip nets with the exception that they are larger and have long handles

Catch poles are devices that allow animals to be restrained while keeping them a safe distance away. The device consists of a noose that is usually plastic coated cable at the end of a long pole. The operator of the pole can place the noose over the head and around the neck of an animal and tighten the noose to prevent the animal's escape.

Net guns are devices that project a net over a target animal using a specialized gun.

Snap traps are similar to body-grip traps in that they are designed to cause the quick death of the animal that activates the trap. Placement is along travel corridors and they may be baited. The animal is captured as it crosses over the triggering mechanism or while it feeds on the bait. Snap traps are small, designed for mice and rats, and safety hazards and risks to humans are usually low and are related to setting, placing, checking, or removing the traps.

Glue traps, also called glue boards or sticky traps, are designed to capture mice and rats that cross over them in an extremely sticky glue. They do not cause a quick death of the animal trapped, which generally die from dehydration and may be considered inhumane if they are not checked regularly and trapped animals humanely euthanized or released (the glue can be deactivated with vegetable oil). Placement is along travel corridors used by the target species. Safety hazards and risks to humans are very low.

Attractants including, baits, scents or lures, are used to increase the efficacy of other methods by enticing an animal to investigate a particular location where capture methods (e.g., cage traps, corral traps, live-restraint traps) are deployed. These attractants can be either natural or synthetically based. Scents or lures are usually blends of volatile natural substances including urine, musk, organs (glands) and essential oils. An example of a synthetically based lure would be fatty acid scent that is a synthetic mixture of several volatile fatty acids found in fermented egg. Baits include any foods or combination of foods attractive to the target animal. Visual attractants (e.g., feathers) can also be used to entice an animal to investigate a particular location. These are non-restricted substances available for use by the public.

Shooting is selective for target species and may involve the use of either a pistol, shotgun, rifle, or air rifle. Shooting is an effective method to remove a small number of mammals in damage situations, especially where other methods are not feasible. Removal of specific animals in the problem area can sometimes provide immediate relief from a problem. Shooting is sometimes utilized as one of the first lethal damage management options because it offers the potential of resolving a problem more quickly and selectively than some other methods, but it is not always effective. Shooting may sometimes be one of the only damage management options available if other factors preclude setting of damage management equipment. WS personnel receive firearms safety training to use firearms that are necessary for performing their duties. Shooting may also require the use of artificial light, night vision equipment and Forward Looking Infrared equipment when conducted at night.

Judas Pigs involves attaching a radio and / or GPS transmitter to a feral swine that has been captured and then releasing it at the site of capture. The animal would be monitored using signals emitted from

the transmitter. Once this animal or "Judas pig" has joined other feral swine, those feral swine are either lethally removed or become additional Judas pigs. The original animal with the transmitter may be lethally removed or released to join additional feral swine and the process repeated. If Judas pigs sustain injuries and it is determined that they would not survive during application of this method by WS, they will be euthanized in accordance with WS Directive 5.505. WS would handle Judas pigs in compliance with all WS SOPs and WS Directives.

Aerial Shooting (*i.e.*, shooting from an aircraft) consists of visually sighting target animals in the problem area and shooting them from an aircraft. Aerial shooting is species-selective and can be used for immediate control of feral swine, deer, or coyotes to reduce damage if weather, terrain, and cover conditions are favorable. WS has used aerial hunting for disease surveillance in other states (*e.g.*, taking deer samples for chronic wasting disease and searching for carcasses in areas where an anthrax outbreak has occurred). In deciduous cover, aerial hunting is more effective in winter when snow cover improves visibility and leaves have fallen. The WS program aircraft-use policy helps ensure that aerial hunting is conducted in a safe and environmentally sound manner, in accordance with federal and state laws. Pilots and aircraft must be certified under established WS program procedures and only properly trained WS employees are approved to shoot from aircraft. Ground crews are often used with aerial operations for safety reasons. Ground crews can also assist with locating and recovering target animals, as necessary. The use of firearms from aircraft would occur in remote areas where tree cover and vegetation allows for visibility of target animals from the air.

Cervical dislocation is sometimes used to euthanize small rodents that are captured in live traps and when relocation is not a feasible option. The animal is stretched and the neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. When done properly, the AVMA approves this technique as humane method of euthanasia and states that cervical dislocation is a humane technique for euthanasia of small rodents (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).

Hunting/Trapping: WS sometimes recommends that resource owners consider legal hunting and trapping as an option for reducing mammal damage. Although legal hunting/trapping is impractical and/or prohibited in many urban-suburban areas, it can be used to reduce some populations of mammals.

Chemical Mammal Damage Management Methods

All chemicals used by WS are registered by the EPA (under FIFRA) and IDALS. WS personnel that use restricted-use chemical methods are certified as pesticide applicators by IDALS and are required to adhere to all certification requirements set forth in FIFRA and Iowa pesticide control laws and regulations and have specific training by WS for MDM pesticide application. Chemicals are only used on private, public, or tribal property sites with authorization from the property owner/manager. Pharmaceutical drugs, including those used in wildlife capture and handling, are administrated by FDA and/or DEA.

No chemicals are used by WS on public or private lands without authorization from the land management agency or property owner or manager. The following chemical methods have been proven to be selective and effective in reducing damage by mammals.

Ketamine (Ketamine HCl) is a dissociative anesthetic that is used to capture wildlife, primarily mammals, birds, and reptiles. It is used to eliminate pain, calms fear, and allay anxiety. Ketamine is possibly the most versatile drug for chemical capture, and it has a wide safety margin (Fowler and Miller 1999). When used alone, this drug may produce muscle tension, resulting in shaking, staring,

increased body heat, and occasionally seizures. Usually, ketamine is combined with sedatives such as xylazine. The combination of such drugs is used to control an animal, maximize the reduction of stress and pain, and increase human and animal safety.

Xylazine is a sedative (analgesic) that calms nervousness, irritability, and excitement, usually by depressing the central nervous system. Xylazine is commonly used with ketamine to produce a relaxed anesthesia. It can also be used alone to facilitate physical restraint. Because xylazine is not an anesthetic, sedated animals are usually responsive to stimuli. Therefore, personnel should be even more attentive to minimizing sight, sound, and touch. When using ketamine/xylazine combinations, xylazine will usually overcome the tension produced by ketamine, resulting in a relaxed, anesthetized animal (Fowler and Miller 1999). This reduces heat production from muscle tension, but can lead to lower body temperatures when working in cold conditions.

BAM is a combination of Butorphanol tartrate, Azaperone tartrate, and Medetomidine hydrochloride used for a broad range of species. BAM provides smooth induction times, as well as quick reversal times. BAM is potent in small volume quantities, which make it effective for immobilizing wildlife remotely by a dart. Animals that are administered BAM have superior muscle relaxation and a good anesthetic plane, which facilitates handling and data collection.

Medetomidine (Medetomidine HCI) is an alpha-2 adrenergic agonist with sedative and analgesic properties. Medetomidine calms the animal and provides pain relief. Medetomidine is routinely used in combination with ketamine or tiletamine-zolazepam, and when the combinations are administered produce an animal that is very manageable and in a good state of analgesia. Medetomidine sedative effects can be reversed by yohimbine, tolazoline, or atipamezole.

Tiletamine-zolazepam (Telazol) is a dissociative anesthetic. It is two-and-a-half to five times more potent than ketamine; therefore, it generally works faster and lasts longer. Currently, tiletamine can only be purchased as Telazol, which is a mixture of two drugs: tiletamine and zolazepam (a tranquilizer). Muscle tension varies with species. Telezol produces extensive muscle tension in dogs, but produces a more relaxed anesthesia in coyotes, wolves, and bears. It is often the drug of choice for these wild species (Fowler and Miller 1999).

Atipamezole (Atipamezole HCL) is an alpha-2 antagonist used to reverse the sedative effects of medetomidine and xylazine. Absorption of atipamezole is rapid, producing quick recovery times. Atipamezole typically reverses the sedative effect of medetomidine in 5-10 minutes. Atipamezole is highly selective, which minimizes undesirable effects.

Naltrexone (Naltrexone HCI) is an antagonism of any opiate sedation in any species. High doses of naltrexone are an effective tool in reducing or preventing renarcotization. Naltrexone is a pure opioid antagonists, therefore it has a high therapeutic indices.

Tolazoline (Tolazoline HCL) is a combination alpha-1 and alpha-2 antagonist used to reverse the sedative effects of xylazine. Tolazoline works well on white-tailed deer, black-tailed deer, mule deer, moose, and blackbuck antelope. Reversal is quick, typically within two minutes.

Yohimbine (Yohimbine HCL) is an alpha-2 antagonist used to reverse the sedative effects of xylazine. Yohimbine quickly reverses the sedative effects of xylazine, typically 2-10 minutes. Additionally, cardiac side effects such as arrhythmia and bradycardia are reverse with yohimbine. Yohimbine is effective on a variety of carnivores and hoofstock, but not cervids.

Sodium pentobarbital with local anesthetic additives combines pentobarbital with another substance to hasten cardiac arrest. Specific drugs in this category include Beuthanasia –D Special® and Euthasol®. Sodium pentobarbital is a barbituric acid derivitave, which are generally the preferred method to euthanize animals, and work on almost all species and size of animals (Kreeger and Arnemo 2012). Intravenous and intracardiac are the only acceptable routes of injection. As with pure sodium pentobarbital, intracardiac injections are only acceptable for animals that are unconscious or deeply anesthetized. With other injection routes, there are concerns that the cardiotoxic properties may cause cardiac arrest before the animal is fully unconscious.

Gas cartridges are incendiary devices composed of carbon and sodium nitrate. When ignited and placed in the target animal's burrow, the resultant carbon monoxide and other gases cause asphyxiation. The only risks to non-target species are risks to rodents and other species found in burrows with the target species. WS will not use gas cartridges in areas where state and federally listed species may be in burrows with the target animal.

Zinc Phosphide is a toxicant used to kill rodents and lagomorphs.. It is 2- 15 times more toxic to rodents than to carnivores (Hill and Carpenter 1982). Secondary risks appear to be minimal to predators and scavengers that scavenge carcasses of animals killed with zinc phosphide (Hill and Carpenter 1982, Tietjen 1976, Hegdal and Gatz 1977, Hegdal et al. 1980, and Johnson and Fagerstone 1994). This is because: 1) 90% of the zinc phosphide ingested by rodents is detoxified in the digestive tract (Matschke unpubl. as cited in Hegdal et al. 1980), 2) 99% of the zinc phosphide residues occur in the digestive tracts, with none occurring in the muscle, and 3) the amount of zinc phosphide required to kill target rodents is not enough to kill most other predatory animals (Johnson and Fagerstone 1994).

In addition, zinc phosphide has a strong emetic action (i.e., causes vomiting) and most non-target animals in research tests regurgitated bait or tissues contaminated with zinc phosphide without succumbing to the toxicant (Hegdal and Gatz 1977, Hegdal et al. 1980, Johnson and Fagerstone 1994). Furthermore, predators tend to eviscerate zinc phosphide-poisoned rodents before eating them or otherwise avoid the digestive tract and generally do not eat the stomach and intestines (Hegdal et al. 1980, Johnson and Fagerstone 1994). Although zinc phosphide baits have a strong, pungent, phosphorous-like odor (garlic like), this characteristic seems to attract rodents, particularly rats, and apparently makes the bait unattractive to some other animals. Many birds appear capable of distinguishing treated from untreated baits and they prefer untreated grain when given a choice (Siegfried 1968, Johnson and Fagerstone 1994). Birds appear particularly susceptible to the emetic effects of zinc phosphide, which would tend to offer an extra degree of protection against bird species dying from zinc phosphide grain bait consumption or, for scavenging bird species, from eating poisoned rodents. Use of rolled oats instead of whole grain also appears to reduce bird acceptance of bait. Uresk et al. (1988) reported on the effects of zinc phosphide on six non-target rodent populations. They determined that no differences were observed from pretreatment until after treatment in populations of eastern cottontail rabbits (*Sylvilagus floridanus*) and white-tailed jackrabbits (*Lepus townsendii*). However, primary consumption of bait by non-target wildlife can occur and potentially cause mortality. Uresk et al. (1988) reported a 79% reduction in deer mouse (Peromyscus maniculatus) populations in areas treated with zinc phosphide, however the effect was not statistically significant because of high variability in densities and the reduction was not long-term (Deisch et al. 1990).

Ramey et al. (2000) reported that five weeks after treatment, no ring-necked pheasants (*Phasianus colchicus*) had been killed as a result of zinc phosphide baiting. In addition, Hegdal and Gatz (1977) determined that zinc phosphide did not affect non-target populations and more radio-tracked animals

were killed by predators than died from zinc phosphide intoxication (Hegdal and Gatz 1977, Ramey et al. 2000). Tietjen (1976) observed horned larks (*Eremophila alpestris*) and mourning doves (*Zenaida macroura*) on zinc phosphide-treated prairie dog colonies, but observations after treatment did not locate any sick or dead birds, a finding similar to Apa et al. (1991). Uresk et al. (1988) reported that ground feeding birds showed no difference in numbers between control and treated sites. Apa et al. (1991) further states that zinc phosphide was not consumed by horned larks because: 1) poison grain remaining for their consumption was low (i.e., bait was accepted by prairie dogs before larks could consume it), 2) birds have an aversion to black-colored foods, and 3) birds have a negative sensory response to zinc phosphide. Reduced impacts on birds have also been reported by Tietjen and Matschke (1982). Deisch et al. (1989) reported on the effect zinc phosphide has on invertebrates. They determined that zinc phosphide bait reduced ant densities, however, spider mites, crickets, wolf spiders, ground beetles, darkling beetles and dung beetles were not affected. Wolf spiders and ground beetles showed increases after one year on zinc phosphide treated areas (Deisch 1986). Generally, direct long-term impacts from rodenticide treatments were minimal for the insect populations sampled (Deisch et al. 1989). Long-term effects were not directly related to rodenticides, but more to habitat changes (Deisch 1986) as vegetative cover and prey diversity increased without prairie dogs grazing and clipping the vegetation (Deisch et al. 1989).

Use of zinc phosphide on various types of fruit, vegetable, or cereal baits (e.g., apples, carrots, sweet potatoes, oats, barley) has proven to be effective at suppressing rodent and lagomorph populations. All chemicals used by WS are registered under FIFRA and administered by EPA and IDALS. Zinc phosphide is federally registered for use by APHIS/WS. Specific bait applications are designed to minimize non-target hazards (Evans 1970). WS personnel that use chemical methods are certified as pesticide applicators by IDALS and are required to adhere to all certification requirements set forth in FIFRA and the Iowa pesticide control laws and regulations. No chemicals are used on federal or private lands without authorization from the land management agency or property owner/manager.

Carbon Dioxide (CO_2) is sometimes used to euthanize mammals that are captured in live traps and when relocation is not a feasible option. Live mammals are placed in a sealed chamber. CO_2 gas is released into the chamber and the animal quickly dies after inhaling the gas. This method is approved as a euthanizing agent by the AVMA. 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.

Repellents are usually naturally occurring substances or chemicals formulated to be distasteful or to elicit pain or discomfort for target animals when they are smelled, tasted, or contacted. Only a few repellents are commercially available for mammals, and are registered for use on only a few species. Repellents are not available for many species that may present damage problems, such as some predators or furbearing species. Repellents are variably effective and depend to a great extent on resource to be protected, time and length of application, and sensitivity of the species causing damage. Acceptable levels of damage control are usually not realized unless repellents are used in conjunction with other techniques.

Explosives are defined as any chemical mixture or device that serves as a blasting agent or detonator. Explosives are generally used to breach beaver dams that are too large to remove using other methods. WS would only use binary explosives to remove beaver dams. Binary explosives consist of two components (ammonium nitrate and nitromethane) that are separately contained. These two components are not classified as “explosives” until they are mixed. Once mixed, binary explosives are considered “high explosives” and subject to a wide range of federal and state regulations.

Detonating cord and detonators are also considered explosives. WS employees who are authorized to use explosives as a method are required to attend extensive explosive safety training and spend time with a certified explosive specialist in the field prior to obtaining certification. WS employees must comply with all policies, procedures, and training requirements described in the WS Explosives Safety Manual and WS Directives 2.625 and 2.435. Risks associated with explosives are minimal when used appropriately and with consideration of human safety. When recommending that explosives be used, WS would caution against their improper use.

APPENDIX C

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES IN THE STATE OF IOWA*

Animals – 14 listings		
Status	**Type**	**Species/Listing Name**
E	Mammal	Indiana bat (*Myotis sodalis*)
T	Mammal	Northern long-eared bat (*Myotis septentrionalis*)
E	Insect	Rusty patched bumble bee (*Bombus affinis*)
E	Mussel	Higgins eye (pearlymussel) (*Lampsilis higginsii*)
T	Reptile	Eastern massasauga (rattlesnake), (*Sistrurus catenatus*)
E	Mussel	Sheepnose mussel (*Plethobasus cyphyus*)
T	Bird	Piping plover (*Charadrius melodus*) (except Great Lakes watershed)
E	Fish	Topeka shiner (*Notropis topeka (tristis)* (except where listed as an experimental population)
T	Insect	Dakota skipper (*Hesperia dacotae*)
E	Insect	Poweshiek skipperling (*Oarisma poweshiek*)
E	Mollusk	Iowa Pleistocene snail (*Discus macclintocki*)
E	Mussel	Spectaclecase (*Cumberlandia monodonta*)
E	Fish	Pallid sturgeon (*Scaphirhynchus albus*)
E	Bird	Least tern (*Sterna antillarum*) (interior pop.)

Plants – 5 listings		
Status	**Type**	**Species/Listing Name**

T	Herbaceous	Prairie bush-clover (*Lespedeza leptostachya*)
T	Herbaceous	Mead's milkweed (*Asclepias meadii*)
T	Herbaceous	Northern wild monkshood (*Aconitum noveboracense*)
T	Herbaceous	Eastern prairie fringed orchid (*Platanthera leucophaea*)
T	Herbaceous	Western prairie fringed orchid (*Platanthera praeclara*)

* Obtained from the USFWS website at **http://ecos.fws.gov/ecp0/reports/species-listed-by-state-report?state=IA&status=listed** on February 9, 2017.

APPENDIX D

IDNR LISTED THREATENEND AND ENDANGERED ANIMAL AND PLANT SPECIES*

SCIENTIFIC NAME	COMMON NAME	STATE[1] STATUS	FEDERAL[2] STATUS
PLANTS			
Aconitum noveboracense	Northern Wild Monkshood	Threatened	Threatened
Agalinus gattingerii	Round-stemmed False Foxglove	Threatened	
Agalinus skinneriana	Pale False Foxglove	Endangered	
Agastache foeniculum	Blue Giant-hyssop	Endangered	
Allium cernuum	Nodding Wild Onion	Threatened	
Amorpha nana	Fragrant False Indigo	Threatened	
Arctostaphylos uva-ursi	Bearberry	Endangered	
Aristolochia serpentaria	Virginia Snakeroot	Threatened	
Aronia melanocarpa	Black chokeberry	Endangered	
Ascelpias stenophylla	Narrow-leaved Milkweed	Endangered	
Asclepias engelmanniana	Eared Milkweed	Endangered	
Asclepias lanuginosa	Woolly Milkweed	Threatened	
A*sclepias meadii*	Mead's Milkweed	Endangered	Threatened
Asclepias speciosa	Showy Milkweed	Threatened	
Aster dumosus	Ricebutton Aster	Endangered	
Aster furcatus	Forked Aster	Threatened	
Aster junciformis	Rush Aster	Threatened	
Aster linariifolius	Flax-leaved Aster	Threatened	
Aster macrophyllus	Large-leaved Aster	Endangered	
Aster schreberi	Schreber's Aster	Endangered	
Aureolaria pedicularia	Fern-leaved False Foxglove	Endangered	
Berula erecta	Water Parsnip	Threatened	
Besseya bullii	Kittentails	Threatened	
Betula pumila	Bog Birch	Threatened	
Blephilia ciliate	Pagoda Plant	Threatened	
Botrychium matricariifolium	Matricary Grape Fern	Endangered	
Botrychium multifidum	Leathery Grapefern	Threatened	
Botrychium simplex	Little Grapefern	Threatened	
Cacalia suaveolens	Sweet Indian-plantain	Threatened	
Callirhoe alcaeoides	Poppy Mallow	Threatened	
Callirhoe triangulata	Poppy Mallow	Endangered	
Carex chordorrhiza	Cordroot Sedge	Endangered	
Chimaphila umbellate	Pipsissewa	Threatened	
Chrysoplenium iowense	Golden Saxifrage	Threatened	
Commelina erecta	Dayflower	Threatened	
Corallorhiza maculate	Spotted coralroot	Threatened	
Cornus canadensis	Bunchberry	Threatened	
Corydalis aurea	Golden Corydalis	Threatened	
Corydalis curvisiliqua	Large-bracted Corydalis	Endangered	
Corydalis sempervirens	Pink Cordydalis	Threatened	
Cypripedium reginae	Showy Lady's-slipper	Threatened	
Dalea villosa	Silky Prairie-clover	Endangered	
Decodon verticillatus	Swamp-loosestrife	Endangered	
Dichanthelium boreale	Northern Panic-grass	Endangered	
Dichanthelium linearifolium	Slim-leaved Panic-grass	Threatened	
Dodecatheon amethystinum	Jeweled Shooting Star	Threatened	
Drosera rotundifolia	Roundleaved Sundew	Endangered	
Dryopteris intermedia	Glandular Wood Fern	Threatened	
Dryopteris marginalis	Marginal Shield Fern	Threatened	

Equisetum sylvaticum	Woodland Horsetail	Threatened	
Eriophorum gracile	Slender Cottongrass	Threatened	
Faxinus quadrangulata	Blue Ash	Threatened	
Filipendula rubra	Queen of the Prairie	Threatened	
Floerkea proserpinacoides	False Mermaid	Endangered	
Galium labradoricum	Bog Bedstraw	Endangered	
Gaylussacia baccata	Black Huckleberry	Threatened	
Hudsonia tomentosa	Povertygrass	Endangered	
Hybanthus concolor	Green Violet	Threatened	
Hypericum boreale	Northern St. Johnswort	Endangered	
Hypericum gentianoides	Pineweed	Endangered	
Ilex verticillata	Winterberry	Endangered	
Isoetes melanospora	Black-based Quillwort	Endangered	Endangered
Jeffersonia diphylla	Twinleaf	Threatened	
Juniperus horizontalis	Creeping Juniper	Threatened	
Justicia americana	Water-willow	Endangered	
Krigia virginica	Dwarf Dandelion	Endangered	
Lechea intermedia	Intermediate Pinweed	Threatened	
Lechea villosa	Hairy Pinweed	Threatened	
Lespedeza leptostachya	Prairie Bush-clover	Threatened	Threatened
Leucospora multifidi	Cleft Conobea	Endangered	
Linnaea borealis	Twinflower	Threatened	
Lomatium foeniculaceum	Whiskbroom Parsley	Endangered	
Lomatium orientale	Western Parsley	Threatened	
Lupinus perennis	Wild Lupine	Threatened	
Lycopodium clavatum	Running Clubmoss	Endangered	
Lycopodium dendroideum	Tree Clubmoss	Threatened	
Lycopodium inundatum	Bog Clubmoss	Endangered	
Lycopodium porophilum	Rock Clubmoss	Threatened	
Lygodesmia rostrate	Annual Skeletonweed	Endangered	
Marsilea vestita	Hairy Waterclover	Threatened	
Megalodonta beckii	Water Marigold	Endangered	
Menyanthes trifoliate	Bog Buckbean	Threatened	
Mertensia paniculata	Northern Lungwort	Endangered	
Mimulus alatus	Winged Monkeyflower	Threatened	
Mimulus glabratus	Yellow Monkeyflower	Threatened	
Mitchella repens	Partridge Berry	Threatened	
Monotropa hypopithys	Pinesap	Threatened	
Oenothera perennis	Small Sundrops	Threatened	
Opuntia fragilis	Little Prickypear	Threatened	
Opuntia macrorhiza	Bigroot Prickypear	Endangered	
Orobanche fasciculate	Clustered Brooomrape	Endangered	
Osmunda cinnamomea	Cinnamon Fern	Endangered	
Panicum philadelphicum	Philadelphia Panic-grass	Threatened	
Pellaea atropurpurea	Purple Cliffbrake	Endangered	
Peltandra virginica	Arrow Arum	Endangered	
Penstemon gracilis	Slender Beardtongue	Threatened	
Platanthera flava	Pale Green Orchid	Endangered	
Platanthera hookeri	Hooker's Orchid	Threatened	
Platanthera hyperborea	Northern Bog Orchid	Threatened	
Platanthera leucophaea	Eastern Prairie Fringed Orchid	Endangered	Threatened
Platanthera praeclara	Western Prairie Fringed Orchid	Endangered	Threatened
Platanthera psycodes	Purple Fringed Orchid	Threatened	
Polansia jamesii	Clammyweed	Endangered	
Polygala cruciata	Crossleaf Milkwort	Endangered	
Polygala incarnate	Pink Milkwort	Threatened	
Polygala polygama	Purple Milkwort	Endangered	
Polygonum douglasii	Douglas' Knotweed	Endangered	

Potentilla anserine	Silverweed	Threatened	
Potentilla fruticosa	Shrubby Cinquefoil	Threatened	
Potentilla pensylvanica	Pennsylvania Cinquefoil	Threatened	
Potentilla tridentata	Three-toothed Cinquefoil	Endangered	
Prunus nigra	Canada Plum	Endangered	
Psoralea onobrychis	Frenchgrass	Endangered	
Pyrola asarifolia	Pink Shinleaf	Endangered	
Pyrola secunda	One-sided Shinleaf	Threatened	
Rhexia virginica	Meadow Beauty	Threatened	
Rhynchospora capillacea	Beaked Rush	Threatened	
Ribes hudsonianum	Northern Currant	Threatened	
Rosa acicularis	Prickly Rose	Endangered	
Salix lucida	Shining Willow	Threatened	
Salix pedicellaris	Bog Willow	Threatened	
Scleria verticillata	Low Nutrush	Threatened	
Selaginella eclipes	Meadow Spikemoss	Endangered	
Sheperdia argentea	Buffaloberry	Threatened	
Solidago patula	Rough-leaved Goldenrod	Endangered	
Solidago uliginosa	Bog Goldenrod	Endangered	
Sphaeralcea coccinea	Scarlet Globemallow	Threatened	
Spiranthes lacera	Slender Ladies-tresses	Threatened	
Spiranthes lucida	Yellow-lipped Ladies-tresses	Endangered	
Spiranthes ovalis	Oval Ladies-tresses	Threatened	
Spiranthes romanzoffiana	Hooded Ladies-tresses	Threatened	
Spiranthes vernalis	Spring Ladies-tresses	Threatened	
Streptopus roseus	Rosy Twisted-stalk	Threatened	
Stylisma pickeringii	Pickering Morning-glory	Endangered	
Talinum parviflorum	Fameflower	Threatened	
Talinum rugospermum	Rough-seeded Fameflower	Endangered	
Thalictrum revolutum	Waxy Meadowrue	Endangered	
Thelypteris phegopteris	Long Beechfern	Endangered	
Triglochin maritimum	Large Arrowgrass	Threatened	
Triglochin palustre	Small Arrowgrass	Threatened	
Vaccinium angustifolium	Low Sweet Berry	Threatened	
Vaccinium myrtilloides	Velvetleaf blueberry	Threatened	
Veratrum woodii	False Hellebore	Threatened	
Viola incognita	Large-leaved Violet	Endangered	
Viola renifolia	Kidney-leaved Violet	Threatened	
Woodsia ilvensis	Rusty Woodsia	Endangered	
Woodsia oregana	Oregon Woodsia	Threatened	
Xyris torta	Yellow-eyed Grass	Endangered	

MAMMALS

Clethrionomys gapperi	Red-backed Vole	Endangered	
Cryptotis parva	Least Shrew	Threatened	
Myotis sodalis	Indiana Bat	Endangered	Threatened
Perognathus flavescens	Plains Pocket Mouse	Endangered	
Spilogale putorius	Spotted Skunk	Endangered	
Synaptomys cooperi	Southern Bog Lemming	Threatened	

INSECTS

Coenonympha tullia	Ringlet	Endangered	
Euphydryas phaeton	Baltimore	Threatened	
Glaucopsyche lygdamus	Silvery Blue	Threatened	
Hesperia dacotae	Dakota Skipper	Endangered	Threatened
Oarisma powesheik	Powesheik Skipperling	Threatened	

Poanes massasoit	Mulberry Wing	Threatened	
Problema byssus	Byssus Skipper	Threatened	

FISH

Acipenser fulvescens	Lake Sturgeon	Endangered	
Ammocrypta clara	Western Sand Darter	Threatened	
Esox americanus	Grass Pickerel	Threatened	
Etheostoma chlorosomum	Bluntnose Darter	Endangered	
Etheostoma microperca	Least Darter	Endangered	
Etheostoma spectabile	Orangethroat Darter	Threatened	
Icthyomyzon castaneus	Chestnut Lamprey	Threatened	
Lampetra appendix	American Brook Lamprey	Threatened	
Lota lota	Burbot	Threatened	
Moxostoma duquesnei	Black Redhorse	Threatened	
Notropis anogenus	Pugnose Shiner	Endangered	
Notropis heteroepis	Blacknose Shiner	Threatened	
Notropis nocturnus	Freckled Madtom	Endangered	
Notropis texanus	Weed Shiner	Endangered	
Notropis topeka	Topeka Shiner	Endangered	
Noturus eleutherus	Mountain Madtom	Endangered	
Scaphirhynchus albus	Pallid Sturgeon	Endangered	Endangered
Semotilus margarita	Pearl Dace	Endangered	

AMPHIBIANS

Ambystoma laterale	Blue-spotted Salamander	Endangered	
Lithobates areolatus	Crawfish Frog	Endangered	Threatened
Necturus Maculosus	Mudpuppy	Threatened	
Notophtalmus viridescens	Central Newt	Threatened	

REPTILES

Agkistrodon contortrix	Copperhead	Endangered	
Carphopis amoenus vermis	Western Worm Snake	Threatened	
Glyptemys inscultpa	Wood Turtle	Endangered	Endangered
Crotalus viridis	Prairie Rattlesnake	Endangered	
Emydoidea blandingii	Blanding's Turtle	Endangered	Endangered
Kinosternon flavescens	Yellow Mud Turtle	Endangered	
Lampropeltis holbrooki	Speckled Kingsnake	Threatened	
Nerodia erythrogaster neglecta	Copperbelly Water Snake	Endangered	
Nerodia rhombifera	Diamondback Water Snake	Threatened	
Ophisaurus attenuatus	Slender Glass Lizard	Threatened	
Plestiodon obsoletus	Great Plains Skink	Endangered	
Sistrurus catenatus	Eastern Massasauga[3]	Endangered	Endangered
Sternotherus odoratus	Common Musk Turtle	Threatened	
Terrapene ornata	Ornate Box Turtle	Threatened	Threatened

BIRDS

Ammodramus henslowii	Henslow's Sparrow	Threatened	Threatened
Asio flammeus	Short-eared Owl	Endangered	
Asio otus	Long-eared Owl	Threatened	
Buteo lineatus	Red-shouldered Hawk	Endangered	
Charadrius melodus	Piping Plover	Endangered	Threatened
Circus cyaneus	Northern Harrier	Endangered	
Rallus elegans	King Rail	Endangered	Threatened
Sterna antillarum	Least Tern	Endangered	

Tyto alba	Common Barn Owl	Endangered	
Mollusks			
Alasmidonta viridis	Slippershell	Endangered	
Anodontoides ferussacianus	Cylinder Mussel	Threatened	
Catinella gelida	Frigid Ambersnail	Endangered	
Cumberlandia monodonta	Spectacle Case	Endangered	Endangered
Cyclonaias tuberculata	Purple Pimpleback	Threatened	Threatened
Discus macclintocki	Iowa Pleistocene Snail	Endangered	
Ellipsaria lineolata	Butterfly Mussel	Threatened	Threatened
Fusconaia ozarkensis	Ozark Pigtoe	Endangered	
Lampsilis higginsii	Higgin's-eye Pearly Mussel	Endangered	Endangered
Lampsilis teres anodontoides	Yellow Sandshell	Endangered	
Lampsilis teres teres	Slough Sandshell	Endangered	
Lasmigona compressa	Creek Heelsplitter	Threatened	
Novisuccinea spp.	Iowa Pleistocene Ambersnail	Endangered	
Novisuccinea spp.	Minnesota Pleistocene Ambersnail	Endangered	
Plethobasus cyphyus	Bullhead	Endangered	Endangered
Pleurobema sintoxia	Ohio River Pigtoe	Endangered	
Strophitus undulatus	Strange Floater	Threatened	
Tritogonia verrucosa	Buckhorn	Endangered	
Venustaconcha ellipsiformis	Ellipse	Threatened	
Vertigo briarensis	Briarton Pleistocene Vertigo	Endangered	
Vertigo hubrichti	Midwest Pleistocene Vertigo	Threatened	
Vertigo meramecensis	Bluff Vertigo	Endangered	
Vertigo spp.	Vertigo New Species	Endangered	
Vertigo occulta	Occult Vertigo	Threatened	Threatened

[1] Listed in the Wildlife Code of Iowa, Chapter 481B – 571: 77.2, 77.3 Endangered, threatened, and special concern species.
[2]Federally Listed Species under the Endangered Species Act (ESA) of 1973 as Amended:
Endangered = Any species that is in danger of extinction throughout all or a significant portion of its range.
Threatened = Any species that is likely to become endangered within the foreseeable future.
Candidate = Plants or animals that the U.S. Fish & Wildlife Service is reviewing for possible addition to the list of Endangered and Threatened species.
Proposed = Any species proposed for listing as Threatened or Endangered by the U.S. Fish & Wildlife Service.
Threatened/SA = Any species listed Threatened due to Similarity of Appearance by the U.S. Fish & Wildlife Service.
[3]Considered extirpated, historical or accidental occurrence in Iowa.

* Obtained from the INDR website at **http://www.iowadnr.gov/Conservation/Threatened-Endangered** on April 7, 2017.

APPENDIX E

THREATENED AND ENDANGERED SPECIES IMPACT ANALYSIS

Species	Counties	Habitat Characteristics	Relevant Information	Determination
Indiana Bat (E) (*Myotis sodalist*)	Boone, Story, Marshall, Tama, Guthrie, Dallas, Polk, Jasper, Poweshiek, Iowa, Johnson, Cedar, Clinton, Scott, Adair, Madison, Warren, Marion, Mahaska, Keokuk, Washington, Louisa, Muscatine, Union, Clarke, Lucas, Monroe, Wapella, Jefferson, Henry, Des Moines, Lee, Van Burren, Davis, Appanoose, Wayne, Decatur, Ringgold, Taylor	• During winter, caves located in karst areas of the east-central United States or man-made excavated mines. • In summer, roost sites under the bark of dead or dying trees that retain large, thick slabs of peeling bark.	• Management activities are not expected to result in the removal of trees or occur in any mines or caves.	No effect
Northern Long-earred Bat (T) (*Myotis septentrionalis*)	All counties	• During winter, caves located in karst areas of the east-central United States or man-made excavated mines. • In summer, roost sites under bark of dead or dying trees. May also be found in barns or sheds.	• Management activities are not expected to result in the removal of tree or occur in any mines or caves. • Mammal damage activities may occur near barns or sheds, but only on the ground level and with minimal disturbance.	No effect
Rusty Patched Bumble Bee (E) (*Bombus affinis*)	Allamakee, Black Hawk, Clayton, Johnson, Winneshiek	• Prefers grasslands or prairies, or areas that contain flowering plants, to acquire nectar and pollen. Underground rodent cavities in or clumps of grasses provide nesting sites. • Overwintering hibernation sites, used by queens, require undisturbed soil.	• Management actions are not expected to disturb soil or further degrade grassland habitat. • Any management activities around overwintering areas will be rare, with minimal disturbance.	No effect
Higgin's Eye Pearlymussel (E) (*Lampsilis higginsii*)	Allamakee, Clayton, Clinton, Des Moines, Dubuque, Jackson, Johnson, Jones, Linn,	• Dependent on large rivers and prefers deep water with moderate currents, where the mussel buries itself beneath the substrate.	• Management of mammal damage may occur near or in streams, sloughs, or rivers, for beaver dam removal. • Alleviation of dams restores hydrology, thereby improving mussel habitat, if any effect occurs at all.	May affect, but not likely to adversely affect.

	Louisa, Muscatine, Scott		WS personnel will consult with USFWS and IDNR prior to implementing beaver dam removal.	
Eastern Massasauga (T) (*Sistrurus catenatus*)	Bremer, Chickasaw, Clinton, Delaware, Lee, Muscatine, Scott	• Lowland prairie or grassland habitat is typically preferred by eastern massasaugas, usually near crayfish burrows	• Management actions are not expected to interfere with crayfish burrows or lowland habitat quality. • Any disturbance will be rare and insignificant, as management actions in such areas do not damage the substrate or crayfish burrows.	No effect
Sheepnose Mussel (E) (*Plethobasus cyphyus*)	Allamakee, Clayton, Des Moines, Jackson, Lee, Louisa, Muscatine, Scott	• Prefers river shallows with slower current. • Sheepnose have been found in deep runs within larger rivers, or under cobble and boulders. • Individuals tend to burrow in mud along the river bed.	• Management of mammal damage may occur near or in streams, sloughs, or rivers, for beaver dam removal. • Alleviation of dams restores hydrology, thereby improving mussel habitat, if any effect occurs at all. • WS personnel will consult with USFWS and IDNR prior to implementing beaver dam removal.	May affect, but not likely to adversely affect
Piping Plover (T)(*Charadrius melodus*)	Pottawattamie, Woodbury	• Prefers sandy beaches or wide, flat areas for congregations. • Nesting sites are typically located in shoreline wetland habitats • Roosts on shores of lakes and rivers	• Management actions for mammal damage has no direct effect on the piping plover or the shores of lakes and rivers. • Management activities nearby roosting habitats may cause minimal disturbance, but no significant impact is expected. • Mammal damage management in and around roosting locations, on shore of lakes and rivers, is rare.	May affect, but not likely to adversely affect
Topeka Shiner (E) (*Notropis topeka*)	Lyon, Emmec, Palo Alto, Pocahontas, Humboldt, Calhoun, Webster, Sac, Ida, Carroll, Greene, Dallas	• Typically found in slow-moving prairie rivers and streams that are naturally winding and have a sand, gravel, or rubble silt bottom.	• Management activities may restore hydrology and river flow to rivers and streams affected by beaver damming. • Mammal damage action may alleviate beaver damage, thereby augmenting Topeka shiner habitat.	May affect, not likely to adversely affect.
Dakota Skipper (T) (*Hesperia dacotae*)	Dickinson	• Inhabits tallgrass and mixed grass prairies of high quality. • Flourishes in areas with a rich diversity of flowering plants.	• Management actions for mammal damage are not expected to alter or remove prairie habitat.	No effect
Poweshiek Skipperling (E) (*Oarisma poweshiek*)	Cerro Gordo, Dickinson, Emmet, Hancock, Howard, Kossuth, Osceola	• Dependent on locality, but can be found in dry, upland prairies with high-quality tallgrass composition. • Also found in lowland, prairie fens, or wet prairies.	• Management activities are not expected to alter or disturb prairie habitat in both tallgrass or mixed grass communities.	No effect

Iowa Pleistocene Snail (E) (*Discus macclinktocki*)	Clinton, Jackson, Dubuque, Clayton, Delaware	• Specifically live on cool, moist algific talus slopes where cool air and water maintain cooler temperatures (below 50 degrees in summer; above 14 degrees in winter). • Areas where underground ice can cool air, which flows out of cracks in the hillside.	• Management of mammal damage is not expected to take place on algific talus slopes.	No effect
Spectaclecase (E) (*Cumberlandia monodonta*)	Clayton, Des Moines, Dubuque, Lee, Louisa, Muscatine, Scott	• Prefer large rivers with muddy bottoms covered in rocks and tree roots. • Typically adheres to firm mud beneath rock slabs, boulders, or tree roots, in sheltered portions of the river.	• Management actions may involve beaver dam removal for hydrological restoration. • Alleviation of beaver dams usually increase river flow to replenish benefits to aquatic and semi-aquatic species. • WS personnel will consult with USFW and IDNR prior to implementing beaver dam removal.	May affect, not likely to adversely affect
Pallid Sturgeon (E) (*Scaphirhynchus albus*)	Fremont, Harrison, Mills, Monona, Pottawattamie, Woodbury	• In winter and spring, prefers mixture of sand, gravel, and rock substrate bottoms in large, flowing rivers. • In summer, primarily sand substrate is preferred by the sturgeon. • Typically found in moderate to fast moving rivers with wide channels.	• Management activities are not expected to occur in rivers, or river shores. • Alleviation of beaver dams in large river tributaries would increase river flow, which may positively affect pallid sturgeon. • WS personnel do not walk across river bottoms, streams, or creeks in a substantial way	No effect
Least Tern (E) (*Sterna antillarum*)	Pottawattamie, Woodbury	• Nest on sparsely vegetated shorelines, sandbars, and gravel pits. • Forage in flowing water by hovering and diving.	• Mammal damage management is not expected to occur on shorelines or sandbars. • Management actions taken nearby shorelines are rare, but may cause minimal disturbance. • Any disturbance would be insignificant.	No effect
Prairire Bush-clover (T) (*Lespedeza leptostachya*)	All counties	• Endemic to tallgrass prairies in the upper Mississippi River Valley. • Prefers grasslands rich in diversity.	• Management actions in prairie habitats will be coordinated with USFWS and/or IDNR for potential impacts. • Wildlife Services does not anticipate working extensively in areas where Prairie Bush-Clover exists.	No effect
Mead's Milkweed (T) (*Asclepias meadii*)	Adair, Clarke, Decatur, Ringgold, Warren	• Requires mesic to dry mesic (moderately wet to moderately dry) soil, in upland prairie habitat, especially late-successional prairie. • Grows in tallgrass prairies or glade habitat alongside	• Management actions in prairie habitats will be coordinated with USFWS and/or IDNR for potential impacts. • WS does not anticipate working extensively in areas where Mead's Milkweed exists.	No effect

		vegetation adapted to drought and fire.		
Northern Wild Monkshood (T) (*Aconitum noveboracense*)	Allamakee, Clayton, Delaware, Dubuque, Hardin, Jackson	• Typically grows in shaded hillsides and cliffs, where underground ice cools air flowing from cracks to maintain lower temperatures.	• WS does not anticipate working in areas where northern wild monkshood exists.	No effect
Eastern Prairie Fringed Orchid (T) (*Platanthera leucophaea*)	Decatur, Jackson, Johnson, Jones	• Grows in a wide range of habitats, from prairies to wetlands. Sedge meadows and marsh edges can have communities of fringed orchids, or even bogs. • Requires full sun to optimally grow, and grassy habitat with little to no woody encroachment. • Symbiotic fungus (mycorrhizae) required for seedlings to become established.	• Management actions for mammal damage are not expected to disturb prairie or wetland habitat. • WS personnel will consult with USFWS and IDNR before implementing management actions in wetland or threatened habitat.	No effect
Western Prairie Fringed Orchid (T) (*Platanthera praeclara*)	All counties	• Grows in a wide range of habitats, from prairies to wetlands. Sedge meadows and marsh edges can have communities of fringed orchids, or even bogs. • Requires full sun to optimally grow, and grassy habitat with little to no woody encroachment. • Symbiotic fungus (mycorrhizae) required for seedlings to become established.	• Management actions for mammal damage are not expected to disturb prairie or wetland habitat. • WS personnel will consult with USFWS and IDNR before implementing management actions in wetland or threatened habitat.	No effect