ENVIRONMENTAL ASSESSMENT

REDUCING MAMMAL DAMAGE
IN THE
STATE OF IOWA

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SUMMARY OF PROPOSED ACTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) proposes to continue the current damage management program that responds to mammal damage in the State of Iowa. An adaptive Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce mammal damage to property, agricultural and natural resources, to reduce adverse mammal impacts on human and livestock health and safety, and to obtain samples for wildlife diseases surveillance. Damage management would be conducted on public and private property in Iowa when the resource owner (property owner) or manager requests assistance or, in the case of animal disease management and surveillance, when assistance is requested by an appropriate State, federal or local government agency. The adaptive IWDM strategy would encompass the use of practical and effective methods to prevent or reduce damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods after applying the WS Decision Model (Slate et al. 1992). When appropriate, non-lethal methods, like physical exclusion, habitat modification or harassment, would be recommended and utilized to reduce damage. In other situations, mammals would be removed as humanely as possible using shooting, trapping, and registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods or could include instances where application of lethal methods alone would be the most appropriate strategy. All mammal damage management in Iowa is conducted in compliance with applicable Federal, State, Tribal, and local laws, regulations, policies, orders and procedures and closely coordinated with the Iowa Department of Natural Resources (IDNR).

ACRONYMS

ADC[1]	Animal Damage Control
AMDUCA	Animal Medicinal Drug Use Clarification Act
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWD	Chronic Wasting Disease
DSM	Des Moines International Airport
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
FY	Fiscal Year
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
MIS	Management Information System
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NOA	Notice of Availability
NWP	Nationwide Permit
NWRC	National Wildlife Research Center
PRRS	Porcine Reproductive and Respiratory Syndrome
PRV	Pseudorabies Virus
PZP	Porcine Zona Pellucida
SOP	Standard Operating Procedure
TB	Tuberculosis
T&E	Threatened and Endangered
TSE	Transmissible Spongiform Encephalopathy
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
WHA	Wildlife Hazard Assessment
WHMP	Wildlife Hazard Management Plan
WS	Wildlife Services

[1] On August 1, 1997, the Animal Damage Control program was officially renamed to Wildlife Services. The phrases Animal Damage Control, ADC, Wildlife Services, and WS are used synonymously throughout this EA.

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

Federal agencies which fund, support, permit, or implement programs and activities are required to take into consideration the environmental consequences of proposed actions in their decision making process under the National Environmental Policy Act (NEPA) of 1969. The intent of NEPA is to require federal decision-makers to consider the environmental impacts of proposed projects prior to implementing a decision.

This environmental analysis (EA) provides the basis for a determination of the degree of environmental impacts of the proposed and alternative actions. The EA identifies, describes, and evaluates the potential environmental impacts which could result from implementing the proposed adaptive mammal damage management program or alternatives, and analyzes possible impacts. As appropriate, the affected environment and environmental consequences may be described in terms of a regional overview or site-specific descriptions. This EA will focus on potential impacts to the following resources identified: concerns about mammal population declines from WS' management, concerns about non-target species, including threatened and endangered (T&E) species and Species of Special Concern, and concerns about the efficacy and cost-effectiveness of WS' mammal damage management.

1.2 BACKGROUND

Across the United States, wildlife habitat has been altered as human populations expanded and land was transformed to meet varying human needs. These changes have inherently caused increases in potential conflicts between people and wildlife. Some species of wildlife have adapted and thrived in the presence of people while others have not. This, in combination with today's economic pressures and heightened awareness of environmental issues, has increased the complexity of wildlife management. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program has expertise for resolving conflicts between people and wildlife. The USDA Animal Damage Control Final Environmental Impact Statement (USDA 1997) summarizes the relationship in American culture of wildlife values and wildlife damage in this way:

> "*Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife is generally regarded as providing economic, recreational and aesthetic benefits . . . and the mere knowledge that wildlife exists is a positive benefit to many people. However . . . the activities of some wildlife 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 wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural and economic considerations as well*."

With this said, the wildlife acceptance capacity and biological carrying capacity must be considered when resolving wildlife damage management problems. The wildlife acceptance capacity, or cultural carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations. Biological carrying capacity is the land or habitat's ability for supporting healthy populations without degradation to the species' health or their environment over an extended period of time (Decker and Purdy 1988). These phenomena are especially important because they define the sensitivity of a community to a wildlife species. For any given damage situation, there are varying thresholds by those directly and indirectly affected by the species and any associated damage. This damage threshold is a factor in determining the wildlife acceptance capacity. While Iowa may have a biological carrying capacity to support more mammals, in many cases the wildlife acceptance capacity has been exceeded. This often occurs when species occupy areas inhabited by people but also occurs when these species occur on croplands, roadways, school property, cemeteries, or recreational areas. Once the wildlife acceptance capacity is met or exceeded, people begin to implement population or damage reduction methods, including lethal methods, to alleviate damage and public health and/or safety threats.

Wildlife damage management is the science of reducing damage or other problems associated with wildlife and recognized as an integral part of wildlife management (The Wildlife Society 1990). Wildlife damage management is often misunderstood and many individuals consider management options as only lethal. Wildlife damage management is a specialized field within the wildlife management profession and decisions are not predicated solely on biological rationale. [2]Responsible wildlife management requires adherence to professional standards as exemplified by The Wildlife Society, a professional, nonprofit organization dedicated to the wise management and conservation of the wildlife resources of the world. These objectives are to: 1) develop and promote sound stewardship of wildlife resources and the environments upon which wildlife and humans depend, 2) undertake an active role in preventing human-induced environmental degradation, 3) increase awareness and appreciation of wildlife values, and 4) seek the highest standards in all activities of the wildlife profession (The Wildlife Society 1990). The mission of the Wildlife Damage Management Working Group of The Wildlife Society is *to promote better understanding of the challenges of managing human-wildlife conflicts and to provide a forum for TWS members to advance their skills and knowledge of wildlife damage management practices* (http://wildlifedamagegroup.unl.edu). During the last 130 years, with settlers migrating west, the introduction of domestic livestock, water development, urbanization, and other modern agricultural and cultural practices, wildlife management has also changed. It is generally recognized that responsible management not passive preservation is necessary when managing agricultural and natural resource, or protecting property and human health and safety.

Table 1-1. Species Analyzed in the EA.

Common Name	Scientific Name
Badger	*Taxidea taxus*
Beaver	*Castor canadensis*
Black-tailed jackrabbit	*Lepus californicus*
Bobcat	*Lynx rufus*
Coyote	*Canis latrans*
Eastern cotton-tail	*Sylvilagus floridanus*
Eastern mole	*Scalopus aquaticus*
Franklin's ground squirrel	*Spermophilus franklinii*
Ground hog	*Marmota monax*
Mink	*Mustela vison*
Muskrat	*Ondatra zibethica*
Opossums	*Didelphis virginianus*
Plains pocket gopher	*Geomys bursarius*
Raccoon	*Procyon lotor*
Red fox	*Vulpes fulva*
River otter	*Lutra canadesis*
Striped skunk	*Mephitis mephitis*
White-tailed deer	*Odocoileus virginianus*
Feral pigs	*Sus scrofa*
Feral cats	*Felix spp.*
Feral dog	*Canis familiaris*

1.3 PURPOSE OF THIS EA

The purpose of this EA is to address and evaluate the potential impacts on the human environment from alternatives for WS involvement in the protection of agricultural and natural resources, property, and public health and safety from damage and risks associated with mammals in Iowa. Several mammal species have potential to be the subject of WS mammal damage management activities in Iowa and are analyzed in this EA (Table 1-1). Damage problems can occur throughout the State. Under the Proposed Action, mammal damage management could be conducted on private and public lands in Iowa upon request.

1.4 WILDLIFE SERVICES PROGRAM

The USDA Secretary is authorized by Congress to protect American agricultural and other resources and

[2] Varying human needs place continually changing demands on the environment, wildlife resources, and consequently on wildlife management professionals. Special interest groups with conflicting social and economic goals exert political pressures that affect wildlife management decisions (Wolfe and Chapman 1987).

interests from damage associated with wildlife. That authority includes, if requested, protection of threatened and endangered (T&E) wildlife and to resolve conflicts between wildlife and human health and safety pursuant to the Act of March 2, 1931, as amended, 7 U.S.C. 426-426b[3] and the Act of December 22, 1987, 7 U.S.C. 426c.

The authorities imparted to the USDA Secretary by the Act of March 2, 1931, as amended, and the Act of December 22, 1987, have been delegated to APHIS, a USDA agency. Within APHIS, these authorities have been delegated to the WS program. Accordingly, WS' authorities support and authorize its mission of providing federal leadership and expertise to reduce problems caused by injurious and/or nuisance wildlife to agricultural and other natural resources, including other wildlife, and minimizing potential wildlife harm or threats to human health and safety[4].

The WS' "wildlife services" authorities cited above plus other statutory authorities[5] likewise authorize WS to enter into cooperative agreements with federal agencies, states, local jurisdictions, individuals, and public and private agencies, organizations, and institutions to reduce the risks of injurious animal species and/or nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonotic diseases. Therefore, wildlife damage management is not based on punishing animals but as one means of reducing damage[6], with actions being implemented using the WS Decision Model[7] (Slate et al. 1992). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated. The need for action is derived from the specific threats to resources or the public. WS' vision is to improve the coexistence of people and wildlife by providing federal leadership to reduce problems.

WS is a cooperatively-funded, service-oriented program that provides assistance to requesting public and private entities (WS Directives 3.101 and 3.110[8]). WS responds to requests for assistance when valued resources are lost, damaged, or threatened by wildlife. Responses can be in the form of technical assistance or operational damage management. The degree of WS involvement varies, depending on the complexity of the wildlife problem[9]. WS activities are conducted in accordance with applicable federal, state, and local laws, cooperative agreements, agreements for control, Memorandum of Understating (MOU), and other applicable documents. These documents establish the need for the requested work, legal authorities allowing the requested work, and the responsibilities of WS and its cooperators. WS' mission, developed through a strategic planning process, is: 1) *"To provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety"* (WS Directive 1.201). This is accomplished through:

- close cooperation with other federal and state agencies;
- training of wildlife damage management professionals;
- development and improvement of strategies to reduce wildlife losses and threats to the public;
- collection, evaluation and distribution of wildlife damage management information;

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[3] Section 426 as amended on October 28, 2000, authorizes the Secretary of Agriculture to "... conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before October 28, 2000."

[4] See www.aphis.usda.gov/ws/mission.html. Examples of APHIS-WS activities include: training of wildlife damage management professionals; development and improvement of strategies to reduce losses and threats to humans from wildlife; collection, evaluation, and dissemination of management information; cooperative wildlife damage management programs; informing and educating the public on how to reduce wildlife damage; and providing data and a source for limited-use management materials and equipment, including pesticides.

[5] Section 713 of the Agriculture, and Related Agencies Appropriations Act of 2003.

[6] Actions are not based solely on economics. Rather, other environmental considerations of wildlife damage management actions, to include biological, physical, social, and legal factors, are weighed along with economic considerations to identify practical approaches to each particular problem.

[7] The WS decision making process is a cognitive procedure for evaluating and responding to damage complaints.

[8] WS Policy Manual provides guidance for WS personnel to conduct wildlife damage management through Program Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

[9] WS' actions could be conducted when requested under emergency authorizations to protect human health and safety or other resources.

- cooperative wildlife damage management programs;
- inform and educate the public on how to reduce wildlife damage;
- provide data and a source for limited-use management materials and equipment, including Federal and state registered pesticides (USDA 1999).

WS uses an adaptive Integrated Wildlife Damage Management (IWDM) approach, sometimes called Integrated Pest Management (WS Directive 2.105), in which a combination of methods are considered and may be used or recommended to reduce wildlife damage (USDA 1997). These methods may include alteration of cultural practices and habitat and behavioral modification to prevent or reduce damage. The reduction of wildlife damage may also require that a local population of offending animal(s) be reduced through lethal means. However, killing the offending animal(s) is only one strategy considered by WS in developing management approaches. The alleviation of wildlife damage is the main focus of WS, whether addressed by WS professionals or other individuals, and consists of one or a combination of three basic strategies:

- Manage the resource being damaged so it is more difficult for the wildlife species to cause the damage.
- Manage the wildlife species responsible for, or associated with the damage so they cannot cause damage, or
- Physical separation of the two so that the damage is minimized.

Normally, according to the APHIS procedures implementing the NEPA, individual wildlife damage management actions may be categorically excluded (7 CFR 372.5(c), 60 Fed. Reg. 6,000-6,003, (1995). WS has decided, in this case, to prepare this EA to facilitate planning, interagency coordination, and the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. In addition, this EA has been prepared to evaluate and determine if there are any potentially significant or cumulative impacts from the proposed and planned damage management program. All wildlife damage management that would take place in Iowa would be undertaken according to relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act (ESA)

1.5 NEED FOR ACTION

By its very nature, wildlife is a highly dynamic and mobile resource that can damage agricultural and natural resources, property, and pose risks to human health and safety. The WS program carries out its federal wildlife damage management responsibility (Act of March 2, 1931, as amended, 7 U.S.C. 426-426b[10] and the Act of December 22, 1987, 7 U.S.C. 426c) to solve problems that occur when human activity and wildlife are in conflict while recognizing that wildlife is an important public resource greatly valued by the American people.

Conflicts between humans and wildlife are common in Iowa. The need for action is based on the requests for assistance for the protection of agricultural and natural resources, property, and human health and safety from mammal damage. Comprehensive surveys of mammal damage in Iowa have not been conducted. The data and information reported is based on requests for assistance from the public to WS

[10] Section 426 as amended on October 28, 2000, authorizes the Secretary of Agriculture to "... conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before October 28, 2000."

in Iowa[11], and as such, represent only a portion of the total damage caused by mammals because not all people who experience damage request assistance from WS (Section 1.6). In Iowa, the IDNR has management responsibility for resident wildlife, and conducts mammal management programs for furbearers, game species, and nongame mammals. WS' potential involvement in the area of mammal damage management in Iowa would be to provide basic recommendations and referral of callers to the IDNR, and to provide direct management assistance with the implementation of mammal damage management programs upon request and as permitted or otherwise authorized by the IDNR. To date, direct management programs regarding mammals conducted by WS in Iowa have included deer, beaver, ground hog, raccoon, and skunk damage management on private property for flood control and mammal hazard management at Iowa airports. Additionally, Iowa WS cooperates with State agencies to assess wildlife disease issues involving mammals.

1.5.1 Need for Mammal Damage Management to Protect Human Health and Safety

In Iowa human health and safety concerns and problems associated with mammals include, but are not limited to, the potential for mammal/aircraft strikes, transmission of zoonotic diseases to humans and pets, and other problems.

Mammal Hazards to Public Safety at Airports[12]. An MOU was developed in 1998 and revised in 2005 between the FAA and WS, which established a cooperative relationship between the two agencies to resolve wildlife hazards to aviation. The FAA is responsible for setting and enforcing federal regulations and policies to enhance public aviation and safety. The threat to human safety from aircraft collisions with wildlife (wildlife strikes) is increasing (MacKinnon et al. 2001). Although a greater number of wildlife strikes with aircraft involve birds, the most hazardous wildlife species in terms of damage to aircraft, cost of collisions, and effects on flight, is white-tailed deer (Dolbeer et al. 2003). Other mammals which pose hazards to aircraft and public safety are coyotes, feral dogs, fox, woodchucks, and others. WS receives requests for assistance regarding mammal damage management at civil airports and military airfields in Iowa.

To ensure compliance with 14 CFR 139.337, the FAA requires certified airports to conduct an ecological study/wildlife hazard assessment (WHA), and if necessary, establish a wildlife hazard management plan (WHMP) when any of the following events occur on or near an airport:

- An air carrier aircraft experiences multiple bird strike or engine ingestion.
- An air carrier aircraft experiences a damaging collision with wildlife other than birds.
- Wildlife of a size or in numbers capable of causing an event described in 1 or 2 above is observed to have access to any flight pattern or movement area.

WS completed 6 full WHA's in Iowa at the following airports:

Des Moines International	Eastern Iowa Cedar Rapids
Waterloo Regional	Pella Municipal
Dubuque Regional	Keokuk

[11] This damage included $200,000 for human health and safety, $100,000 for property, and $50,000 for agriculture (MIS 2005) .

[12] WS' involvement in deer damage management and disease surveillance covered under this EA could include property protection, natural resources protection, public health and safety projects, in high security areas and in municipalities. Based upon an anticipated increase in requests for, WS' actions may result in the desired localized deer density reduction. However, given the reproductive capacity of deer, the relatively high density of deer and the State, and the high mobility of deer, these reductions would only be short-term.

WS conducted one to five-day formal site visits resulting in formalized recommendation at the following 17 non-certificated airports:

Belle Plaine Municipal	Muscatine Municipal Airport
Ankeny Regional	Pella Municipal
Burlington Regional	Keokuk Municipal
Eastern Iowa Airport	Mason City Municipal
Dubuque Regional	Mount Pleasant Municipal
Fort Madison Municipal	Ottumwa Industrial
Johnson Aviation	Sioux Gateway
Forest City Municipal	Waterloo Municipal
Marion Airport	

Other Mammal Hazards to Public Health and Safety. Beaver activity in certain situations can become a threat to public health and safety (*e.g.*, burrowing into or flooding roadways and railroad beds can result in serious accidents) (Miller 1983, Woodward 1983). Increased water levels in urban areas resulting from beaver activity can lead to unsanitary conditions and potential health problems by flooding septic systems and sewage treatment facilities (DeAlmeida 1987, Loeb 1994). WS may also be requested to provide assistance to reduce the risk of bites and injuries from animals that appear to have lost their fear of humans and/or are behaving aggressively toward people.

Zoonotic Diseases. Zoonotic diseases are diseases of animals which are communicable to humans. Some mammals in Iowa may carry disease organisms or parasites including viral, bacterial, mycotic (fungal), protozoan and rickettsial diseases which pose a risk to humans (Table 1-2).

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 associated with them. Usually, mammal damage management is requested because of a perceived risk to human health or safety associated with wild animals living near humans, from animals acting out of character in human-inhabited areas during the day, or showing no fear when humans are present. In many cases, in which human health concerns are a reason for requesting mammal damage management, there may have been no actual cases of transmission of disease to humans by mammals to prompt the request. Thus, it is the risk of disease transmission that prompted the request to conduct mammal damage management. In most cases, the disease risk to humans is low and there may not have been a confirmed case of the disease. However, it is the goal of agricultural and human health programs is to prevent disease/illness from occurring. WS works with individuals and agencies on a case-by-case basis to assess the nature and magnitude of the wildlife conflict including providing information on the limitations about what we know regarding health risks associated with wild mammals. It is the choice of the individual or agency to tolerate the potential health risks or to seek to reduce those risks.

Iowa WS' primary involvement in the management of these types of diseases would be to aid other federal, State, and local government and research entities to monitor for the presence of diseases. This data can be used to predict potential risks to human health and safety and aid agencies direct management efforts. In the unlikely event of a disease outbreak, WS could also be asked to conduct localized population reduction to prevent the spread of the disease to other areas.

Disease	Causative Agent	Hosts
Sarcoptic mange	mite *(Sarcoptes scabiei)*	red fox, coyotes, domestic dogs
Swine brucellosis	bacterium (*Brucella suis)*	swine
Trichinosis	nematode *(Trichinella spiralis)*	swine, bears, raccoons, foxes, rats
Rabies	virus (Rhabidovirus)	all mammals (high risk wildlife: raccoons, foxes, skunks, bats)
Visceral larval migrans	nematode (*Baylisascaris procyonis)*	raccoons, skunks
Leptospirosis	bacteria (*Leptospira interrogans*) over 180 different serovars	All mammals
Echinococcus infection	tapeworm (*Echinococcus multilocularis)*	foxes, coyotes
Toxoplasmosis	protozoan parasite (*Toxoplasma ondii)*	Cats, such as bobcats, are definitive hosts, mammals and birds are intermediate hosts
Spirometra infection	tapeworm, (*Spirometra mansonoides)*	bobcats, raccoons, foxes, dogs, cats
Giardiasis	protozoan parasite (*Giardia lamblia, G. Duodenalis*, and other Giardia sp.-taxonomy controversial)	beavers, coyotes, dogs, cats
Histoplasmosis	Histoplasma capsulatum	Fungus occurs in bat guano and bird droppings
Lyme Disease	*Borelia burgdorferi* (spirocheate)	Rodents
Tuberculosis	*Mycobacterium bovis*	Cervids

Table 1-2. Wildlife Diseases That Pose Potential Human Health Risks in the United States (modified from Davidson and Nettles 1997).

Some situations in Iowa where the threat of disease associated with wild or feral mammal populations might occur include, but are not limited to:

- 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 must work or live in contaminated areas.
- Exposure of humans to threats of rabies posed by wildlife denning and foraging in a residential community[13].
- Threats of parasitic infections to humans from *Giardia* spp. resulting from high beaver populations in a park or recreation area where swimming is allowed.

Beaver damming activity creates conditions favorable to 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 equine encephalitis (Mallis 1982) and West Nile Virus (CDC 2000). In addition, beaver are carriers of the intestinal parasite *Giardia lamblia,* which can contaminate human water supplies and cause outbreaks of Giardiasis in humans (Woodward 1983, Beach and McCulloch 1985, Wade and Ramsey 1986, Miller and Yarrow 1994). Beaver are also known carriers of tularemia, a bacterial disease that is transmittable to humans through bites by arthropod vectors or

[13] Impacts of WS rabies research and management activities are addressed in USDA 2004 and, except as they relate to cumulative impacts on the environment, are not addressed in this EA.

infected animals or by handling animals or carcasses which are infected (Wade and Ramsey 1986). Skinner et al. (1984) found that 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 contract rabies 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. Meinke, WS, pers. comm. 2003).

Tularemia, also know as "rabbit fever" is a disease caused by a bacterium. Tularemia typically infects animals such as rodents, rabbits, and hares. Typically, 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. Most cases occur in the south-central and western states; however cases have been reported in every state except Hawaii. Without treatment with appropriate antibiotics, tularemia can be fatal (CDC 2003). 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).

Tuberculosis (TB) in humans is caused by bacteria called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs, but TB can attack any part of the body such as the kidney, spine, and brain. If not treated properly, TB disease can be fatal and was once the leading cause of death in the U.S. TB is spread through the air from one animal to another. The bacteria are put into the air when an animal with active TB of the lungs or throat coughs or sneezes. Animal, including people, nearby may breathe in these bacteria and become infected. In rare instances, TB can also be caused by a species of the *M. tuberculosis* complex called *M. bovis* which primarily infects cattle. Humans most commonly become infected with this strain of TB through consumption of unpasteurized milk products from infected cows. For example, from 2001-2005, 35 *M. bovis* cases were identified in New York City. TB was also found in wild white-tailed deer and in dairy herds in the Northern Lower Peninsula of Michigan (see section on Impacts on Agriculture below) and the state lost it's TB free status in 2000 (Michigan Department of Agriculture 2004). In January 2005, the first-known case of transmission of TB from deer to humans was reported in Michigan. The hunter was infected when he cut his hand while gutting an infected deer. The hunter was treated with antibiotics and recovered.

Rabies. Rabies is an acute, fatal viral disease of mammals most often transmitted through the bite of a rabid animal. Rabies mortality is preventable, but it is fatal without prior vaccination or post-exposure treatment. In Iowa, as of 2006, a total of 832 animals tested positive for rabies since the onset of the epizootic in 1989 (Iowa Department of Public Health (IDPH): www.uhl.uiowa.edu/Application/rabies).

1.5.2 Need for Mammal Damage Management to Protect Agricultural Resources

Livestock and dairy production in Iowa contribute substantially to the State's economy. In 2005, Iowa feedlot operators maintained 3.8 million cattle and calves valued at an estimated $4 billion (NASS 2006 - www.nass.usda.gov:8080/QuickStats/PullData_US.jsp). Milk production in Iowa in 2005 was valued at an estimated $620.1 million. There were an estimated 194,000 milk and beef cows, 16.3 million pigs, 235,000 sheep, and 48.8 million chickens in Iowa during 2005 (NASS 2006 - www.nass.usda.gov:8080/QuickStats/PullData_US.jsp).

The IDNR receives requests for assistance from Iowa citizens experiencing agricultural damage from mammals, including: 1) predation on livestock and poultry from coyotes and fox, 2) threat and occurrence of damage to crops and stored feed due to mammals such as deer, woodchucks and other rodents, 3) risk of disease transmission, and 4) other problems. WS would conduct and assist to reduce damage from deer, and other mammals, coordinated by or with the IDNR, IDPH, APHIS-Veterinary Services (VS).

Risk of Disease Transmission

Several diseases, including chronic wasting disease (CWD), pseudorabies virus (PRV), TB, and potentially, foot-and-mouth disease (FMD), affect livestock and wildlife. Monitoring for and containment or eradication of these diseases could include mammal damage management activities conducted by WS in cooperation with APHIS-VS program, IDNR, the Iowa State Board of Animal Health (ISBAH) or other governmental agencies. As with WS' activities to protect human health and safety, WS plays an important role in the surveillance for diseases transmissible between livestock and wildlife. Samples provided by WS serve to establish baseline data on the presence of diseases in the state and can help identify areas to focus disease management efforts.

CWD is a disease of the nervous system of deer and elk. The disease is similar to a group of diseases referred to as transmissible spongiform encephalopathies (TSE). This group of diseases includes scrapie of sheep, bovine spongiform encephalopathy (Mad Cow Disease) and Creutzfeld-Jakob Disease of humans. The agents that cause these infections are called prions, an abnormal form of a naturally occurring nervous system protein. The disease was first recognized in 1967 at a Colorado wildlife research facility. It has now been diagnosed in wild deer and elk in Colorado and Wyoming and in wild deer in Nebraska, South Dakota, Wisconsin, West Virginia, New York, New Mexico, and Saskatchewan. It has also been found on deer and elk farms in a number of states. Cervid (deer, elk, etc.) farming is legal in Iowa. To date, CWD has not been found in any captive or wild cervids in Iowa.

If it were to occur in Iowa, management of CWD would be focused on natural resource protection by controlling/eliminating the spread of the disease to the native Iowa white-tailed deer herd. WS involvement in a CWD management program in Iowa would be as requested by IDNR and could include use of lethal and non-lethal deer and other wildlife management methods to accomplish disease management/monitoring and natural resource protection objectives. Iowa WS would conduct and assist in surveillance and management efforts involving infected and potentially infected animals to control the occurrence and spread of CWD. If warranted, these efforts could include helping the appropriate regulatory agency(ies) depopulate herds of captive cervids.

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 and the U.S. 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 and experimental studies have clearly demonstrated that it also threatens wildlife. FMD does not infect humans or horses, however, both could potentially transmit the virus and State officials could contact Iowa WS to request assistance for FMD surveillance and monitoring purposes.

PRV is a disease of swine that can also affect cattle, horses, dogs, cats, sheep, and goats and is caused by an extremely contagious herpes virus that causes reproductive problems, including abortion, stillbirths, and even occasional death in breeding and finishing hogs. The U.S. is one of the world's largest producers of pork and is the second largest exporter of pork; the retail value of pork sold to consumers exceeds $30 billion annually. In addition, the pork industry supports more than 600,000 jobs. PRV costs U.S. pork producers about $40 million annually in lost production as well as testing and vaccination costs (USDA 2000). PRV in recent years has been found in Iowa, Tennessee, and New Jersey and State officials could contact the Iowa WS to request assistance for PRV surveillance and monitoring purposes.

TB in livestock is caused by *M. bovis* and TB has been reported in a wide variety of mammals including cattle, bison, elk, deer and various zoo animals (Davidson and Nettles 1997). Non ruminants including cats, dogs, coyotes and feral hogs can also be infected however the ability of some of these species to subsequently shed and spread the virus is unclear. The presence of TB in wildlife populations can complicate and delay efforts to eradicate TB in livestock (Davidson and Nettles 1997).

Feral hogs are potential reservoirs for several diseases and parasites that threaten livestock. Of greatest concern is infection of hog production facilities with diseases like swine brucellosis and PRV. A study (Corn et al. 1986) conducted in Texas found that feral hogs do represent a reservoir of diseases transmissible to livestock. Hogs harvested in this study tested positive for PRV, brucellosis, and leptospirosis. Other diseases carried by feral hogs 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 (PRRS). WS could be requested to assist with the collection of blood and tissue samples from feral hogs to determine the diseases present in feral hogs in Iowa and subsequent risks, if any, to the state livestock industry.

Damage to Crops

Deer damage to agricultural crops represents a serious negative economic impact with farmers. In 2005 IDNR received 195 deer crop damaged complaints; most instances of deer damage to crops are handled by the IDNR which may issue crop depredation permits or they could request WS' assistance.

Feral hogs have the potential for large scale destruction of crops, hay meadows, and pasture primarily by rooting and wallowing. Rooting is a common activity and is done year-round in search of food (Stevens 1996). The feral hog's rooting and wallowing activities damage pastures and hay meadows, spoil watering holes and can severely damage riparian habitats. Damage to crops results both from direct consumption of crop, and feeding related activities (*i.e.*, trampling and rooting).

Cotton-tailed rabbits are reported to damage orchard trees by gnawing. 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 which grow landscape ornamentals and shrubs, and WS could be requested to provide assistance to help reduce crop damage.

Predation and Livestock

Red fox, gray fox, coyotes, and feral dogs can cause predation losses or injury to livestock (*e.g.*, sheep, goats, cattle, pigs, horses) and poultry (*e.g.*, chickens, turkeys, geese ducks). Sheep and lamb losses from predators in the U.S. totaled 273,000 head and $16.5 million during 1999 (NASS 2000). Coyotes and dogs accounted for 60.7% and 15.1% of these predator losses, respectively. In 2000, cattle and calf losses from predators in the U.S. totaled 147,000 head and $51.6 million (NASS 2001). Coyotes and dogs accounted for 64.6% and 17.7% of these predator losses, respectively. Coyotes were also the most commonly reported predator of goats in the U.S., accounting for 35.6% of predator losses (NASS 2000). The value of goats lost from all predators in the U.S. in 1999 was $3.4 million. Cattle and calves are most vulnerable to predation at calving time and less vulnerable as they get older and larger (Horstman and Gunson 1982).

Feral hogs can also be efficient predators. Calves, kids, lambs, and poultry have been known to become prey of feral swine (Stevens 1996, Beach 1993) and WS could be requested to provide assistance to help reduce predation.

1.5.3 Need for Mammal Damage Management to Protect Property

In Iowa during FY 2000-2006, mammal damage to property has been reported to WS involving: white-tailed deer (damage to landscaping), cotton-tailed rabbits (damage to vegetable gardens and vehicles), raccoons (damage to residential buildings and other property), coyotes (predation on pets), beaver (damage to property), skunks (damage to landscaping, property), moles (general property damage), and other mammal species. In addition, the IDNR receives requests from the public in situations where deer, beaver, coyote and other mammals are causing property damage.

Deer browsing damages and destroys landscaping and ornamental trees, shrubs, and flowers. As rural areas are developed, deer habitat may actually be enhanced because fertilized lawns, gardens, and landscape plants serve as high quality sources of food (Swihart et al. 1995). Furthermore, deer are prolific and adaptable, characteristics that allow them to exploit and prosper in most suitable habitat near urban areas, including residential areas (Jones and Witham 1990). The succulent nature of many ornamental landscape plants, coupled with high nutrient contents from fertilizers, offers an attractive food. In addition to browsing pressure, male deer damage ornamental trees and shrubs from antler rubbing which results in broken limbs and bark removal. While large trees may survive antler-rubbing damage, smaller trees often die or become scarred to the point that they are not aesthetically acceptable for landscaping.

Most of the damage caused by beaver is a result of dam building, bank burrowing, tree cutting, obstructing overflow structures and spillways, or flooding. Some cases of beaver damage include roads being flooded, reservoir dams being destroyed by bank den burrows, and train derailments being caused by continued flooding and burrowing (Miller and Yarrow 1994). Housing developments have been threatened by beaver dam flooding. Some small bridges also have been destroyed because of beaver dam-building activity. Miller (1983) estimated that the annual damage by beavers in the U.S. was $75-$100 million. The estimated value of beaver damage is perhaps greater than that of any other single wildlife species in the U.S. with economic damage estimated to have exceeded $4 billion in the southeastern U.S. over a 40-year period (Arner and Dubose 1980). In some southeastern states, losses from beaver damage have been estimated at $3 million to $5 million dollars annually (Miller and Yarrow 1994), with timber losses the most common type of damage (Hill 1982). Tracts of bottomland hardwood timber up to several thousand acres in size may be lost to beaver damage (Miller and Yarrow 1994). Surveys in North

Carolina and Alabama indicate that the majority of landowners with beaver damage desire damage management via beaver removal (Hill 1976, Lewis 1979, Woodward et al. 1985).

Loker et al. (1999) found that suburban residents also may desire lethal management to resolve beaver damage. Beaver often inhabit sites in or adjacent to urban/suburban areas and cut or girdle trees and shrubs in yards, undermine yards and walkways by burrowing, flood homes, roads and other structures, destroy pond and reservoir dams by burrowing, gnaw on boat houses and docks, and cause other damage to private and public property (Wade and Ramsey 1986).

1.5.4 Need for Mammal Damage Management to Protect Natural Resources

Natural resources may be described as assets belonging to the public and often managed and held in trust for citizens by government agencies. Such resources may be plants or animals, including T&E species, historic properties, or habitats. Examples of natural resources in Iowa are historic structures and places, parks and recreation areas, natural areas, including unique habitats or topographic features, T&E plants or animals, and any plant or animal population which has been identified as a natural resource.

Examples of mammal damage to natural resources is vegetation at a park being damaged by excessive browsing by overabundant deer populations, or ground-nesting game bird populations being decimated by predators such as raccoons, coyotes, or fox. Other instances where mammals may damage or negatively affect natural resources include, but are not limited to, over browsing by deer in forest habitats, damage to wetland and stream banks by muskrat and burrowing mammals, and beaver damage to timber, seedlings, and other vegetation in natural areas, parks, and private properties. Patterson (1951) and Avery (1992) reported the presence of beaver dams can negatively affect fisheries. Beaver dams may adversely affect stream ecosystems by increasing sedimentation in streams and water temperatures, and thereby negatively affect wildlife that depend on cool, clear water.

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, which 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 mi^2. Casey and Hein (1983) found that three species of birds were lost in a research preserve stocked with high densities of ungulates and that the densities of several other species of birds were lower than in an adjacent area with lower deer density. Waller and Alverson (1997) hypothesize that by competing with squirrels and other fruit-eating animals for oak mast, deer may further affect many other species.

Feral hogs can compete with and prey upon native wildlife and severely damage a variety of habitats. Feral hogs are omnivorous and feed on a wide variety of items, many of which are staples for native fauna. One of the more important seasonal food resources used by feral hogs is wild fruit and nut crops, especially oak mast (Wood and Roark 1980). Oak mast is also an important food source for deer and wild turkey. When feral hogs actively compete for mast, resident deer and wild turkey may enter the winter with inadequate fat reserves, thus threatening the viability of these native wildlife (Beach 1993). Feral hogs also predate native wildlife, especially young and injured wildlife, and ground nesting birds, their nestlings and eggs (Beach 1993). The rooting and foraging behavior of feral swine can completely destroy the understory in forests and make trees less stable during windstorms. Their wallowing and foraging can significantly damage wetlands, which may be important for T&E, and sensitive species.

Need to Protect T&E Species

Some of the species listed as T&E under the ESA and Iowa's Endangered Species Conservation Act are preyed upon or otherwise adversely affected by certain mammals. Predator damage management can be an important tool for achieving and maintaining game, nongame, and T&E species and management objectives. Massey (1971) and Massey and Atwood (1979) found that predators can prevent least terns from nesting or cause them to abandon previously occupied sites. In another study, mammal predators were found to have significantly impacted the nesting success of least terns on sandbars and sandpits (Kirsch 1996). Skunks (Massey and Atwood 1979), red fox (Minsky 1980), coyotes (Grover and Knopf 1982), and raccoons (Gore and Kinnison 1991) are common predators of least terns. During one 2-year study, coyotes destroyed 25.0-38.5% of all interior least tern nests (Grover 1979). Raccoons are considered a major predator of ground-nesting upland bird nests and poults (Speake 1980, Speake et al. 1969, Speake et al. 1985). In Massachusetts, predators destroyed 52-81% of all active piping plover nests from 1985-1987 (MacIvor et al. 1990). Red fox accounted for 71-100% of the nests destroyed by predators at the site.

Trautman et al. (1974) concluded that a single species predator damage management program showed some promise for enhancing ring-necked pheasant (*Phasianus colchicus)* populations. However, Balser et al. (1968) recommended that predator damage management programs target the entire predator complex or compensatory predation may occur by a species not under control, a phenomena also observed by Greenwood (1986).

1.6 WS RECORD KEEPING REGARDING REQUESTS FOR MAMMAL DAMAGE MANAGEMENT ASSISTANCE

WS maintains a Management Information System (MIS) database to document assistance that the agency provides when addressing wildlife damage management requests. MIS data is limited to information that is collected from people who have requested services or information from WS. It does not include requests received or responded to by local, State or other federal agencies, and it is not a complete database for all wildlife damage occurrences. In Iowa, the IDNR has the responsibility to manage resident wildlife, and conducts mammal management programs for species such as furbearers, game species, and nongame mammals. The number of requests for assistance to WS does not necessarily reflect the extent of need for action, but this data does provide an indication that needs exist.

The WS database includes, but is not limited to, the following information: species of wildlife involved in the damage complaint; the number of individuals involved in a damage situation; tools and methods used or recommended to alleviate the conflict; and the resource that is in need of protection. Table 1-3 provides a summary of Technical Assistance projects completed by the Iowa WS program for Fiscal Years 2000-2006.

Table 1-3. Number of Requests for Technical Assistance involving Mammals for Iowa WS during 2000-2006.

Fiscal Year	Agriculture	Human Health and Safety	Property	Natural Resources
2000	18	2	26	2
2001	11	1	23	1
2002	7	1	28	2
2003	4	5	42	1
2004	5	2	10	1
2005	10	5	15	1
2006	1	8	5	0

1.7 PROPOSED ACTION

WS proposes to continue the current damage management program that responds to mammal damage in the State of Iowa. An adaptive IWDM approach would be implemented to reduce mammal damage to property, agricultural resources, and natural resources, to reduce adverse mammal impacts on human and livestock health and safety, and to obtain samples for surveillance of wildlife diseases. Damage management would be conducted on public and private property in Iowa when the resource owner (property owner) or manager requests assistance or, in the case of animal disease management and surveillance, when assistance is requested by an appropriate State, federal or local government agency. The IWDM strategy would encompass the use of practical and effective methods to prevent or reduce damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods after applying the WS Decision Model (Slate et al. 1992). When appropriate, non-lethal methods like physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, mammals would be removed as humanely as possible using shooting, trapping, registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy. WS involvement in mammal damage management in Iowa is closely coordinated with the IDNR. All WS actions are conducted in compliance with applicable federal, State, tribal, and local laws, regulations, policies, orders and procedures.

1.8 DECISION TO BE MADE

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

- Should WS implement an adaptive integrated mammal damage management strategy, including technical assistance and direct operational assistance, to meet the need for mammal damage management in Iowa?
- If not, should WS attempt to implement one of the alternatives to an integrated mammal damage management strategy as described in the EA?
- Would the proposed action have significant impacts on the quality of the human environment, requiring preparation of an EIS?

1.9 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.9.1 Actions Analyzed

This EA evaluates mammal damage management by WS in Iowa to protect: 1) property, 2) agricultural and natural resources; 3) public health and safety, and 4) wildlife through disease sampling. Protection of other resources or other program activities would be addressed in other NEPA analysis, as appropriate.

1.9.2 American Indian Lands and Tribes

Currently, Iowa WS does not have any MOUs with any American Indian tribes. If WS enters into an agreement with a tribe for mammal damage management, this EA would be reviewed and supplemented, if appropriate, to insure compliance with NEPA. MOUs, agreements and NEPA documentation would be prepared as appropriate before conducting activities on tribal lands.

1.9.3 Period for which this EA is Valid

This EA would remain valid until the WS program in Iowa and other appropriate agencies determine that new needs for action, changed conditions or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document would be supplemented pursuant to NEPA. Review of the EA would be conducted each year to ensure that the EA is sufficient.

1.9.4 Site Specificity

This EA analyzes the potential impacts of mammal damage management and addresses activities on all lands in Iowa under MOUs, Cooperative Agreements and in cooperation with public land management agencies, as appropriate. It also addresses the impacts of mammal damage management on areas where additional agreements may be signed in the future. Because the proposed 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 management efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

Planning for the reduction of mammal damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, etc. Although some of the sites where mammal damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible, however, many issues apply wherever mammal damage and resulting management occurs, and are treated as such. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in Iowa (see Chapter 3 for a description of the Decision Model and its application).

The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* in Iowa. In this way, WS believes it meets the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with NEPA and still be able to accomplish its mission to reduce damages in a timely manner as requested.

1.9.5 Summary of Public Involvement

Issues related to the proposed action were initially developed by WS and reviewed and refined by the cooperating agencies. As part of WS' environmental analysis process, and as required by the Council on Environmental Quality (CEQ 1981) and APHIS-NEPA implementing regulations, this document and its Decision will be made available to the public through "Notices of Availability" (NOA) published in local media and through direct mailings of NOA to parties that have specifically requested to be notified. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA should be revisited and, if appropriate, revised prior to issuance of a Decision.

1.10 RELATIONSHIP TO OTHER ENVIRONMENTAL DOCUMENTS

ADC Programmatic Environmental Impact Statement. WS, previously called Animal Damage Control (ADC), issued a Final EIS on the national APHIS/WS program (USDA 1997). Pertinent and current information available in the EIS has been incorporated by reference into this EA.

Starling, Pigeon, Sparrow Damage Management EA and Finding of No Significant Impact. In 2005, the Iowa WS program issued a Finding of No Significant Impact and a Final Environmental Assessment entitled, "Starling, Pigeon and Sparrow Damage Management in Iowa," which evaluated alternatives and impacts to the environment and selected an IWDM approach to reduce damage associated with those species (USDA 2005).

1.11 PREVIEW OF THE REMAINDER OF THIS EA

The remainder of this EA is composed of four (4) chapters and three (3) appendices. Chapter 2 discusses the issues relevant to the analysis. Chapter 3 contains a description of each alternative, alternatives not considered in detail, and standard operating procedures (SOP) that may be used by WS. Chapter 4 analyzes environmental consequences and the environmental impacts associated with each alternative considered in detail. Chapter 5 contains the list of preparers, reviewers and those consulted during the EA process. Appendix A is a list of the literature cited used for the preparation of the EA, Appendix B is a description of agency authorities, and Appendix C is a detail description of methods used for mammal damage management in Iowa.

CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

2.1 INTRODUCTION

Chapter 2 contains a discussion of the issues, including issues that received detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues used to develop SOPs, and issues not considered in detail, with the rationale. Pertinent portions of the affected environment are included in this chapter and in the discussion of the environmental impacts in Chapter 4.

2.2 AFFECTED ENVIRONMENT

The proposed action could occur in and around commercial, industrial, public, and private buildings, facilities and properties and at other sites as requested where mammals burrow, feed, or otherwise cause damage. Examples of areas where mammal damage management activities could be conducted are, but are not necessarily limited to: agricultural fields, orchards, farmyards, dairies, ranches, livestock operations, waste handling facilities, airports, industrial sites, natural areas, government properties and facilities, private homes and properties, corporate properties, schools, hospitals, parks and recreation areas, natural areas, wildlife refuges and management areas, ponds, rivers, and inlets, and surrounding areas.

2.2.1 The *"Environmental Status Quo"* for Reducing Damage and Conflicts Associated with State Managed or Unprotected Wildlife Species.

As defined by NEPA implementing regulations, the "*human environment* shall 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 in the absence of the federal action or actions potentially taken by others. This concept is applicable to situations involving federal assistance to reduce damage associated with wildlife species.

Iowa resident wildlife is managed under state authority or law without any federal oversight. For damage management of mammals in Iowa, Further, the IDNR and local governments often have the means, will, and authority to conduct a mammal damage management program, and a program could be implemented regardless of whether there is federal agency involvement or not. When a non-federal entity (*i.e.,* state wildlife, agriculture or health agencies, municipalities, counties, private companies, individuals, etc.) takes a management action on a state-resident wildlife species or unprotected wildlife species, the action is not subject to NEPA due to lack of federal involvement. Under such circumstances, the environmental *baseline* or *status quo* must be viewed as an environment that includes mammals *as they are managed or impacted by non-federal entities*. Therefore, for those situations in which a non-federal entity has decided that a management action will occur and even the particular methods that will be used, WS' involvement will not affect the *environmental status quo (ESQ)*.

The inability to change the ESQ in the types of situations described above presents the question of whether there is enough federal control over the action to make WS' assisance a federal action requiring NEPA compliance. Clearly, under these circumstances, by any analysis we can envision, WS would have virtually no affect on the ESQ by selecting any possible alternative, even the alternative of no WS action.

Therefore, in those situations where a non-federal entity has obtained the appropriate permit or authority, and has already made the decision to remove mammals to reduce damage or potential damage with or without WS assistance, WS participation in carrying out the action will not affect the ESQ. In some situations, however, certain aspects of the human environment may actually benefit more from WS' involvement. For example, if WS has moore expertise to selectively remove a target species than a non-WS entity, WS involvement would actually have a *beneficial* effect on the human environment.

2.3 ISSUES ANALYZED IN DETAIL IN CHAPTER 4

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

- Effects on target mammal species
- Effects on other wildlife species, including T&E species
- Effects on human health and safety
- Impacts to stakeholders, including aesthetics
- Humaneness and animal welfare concerns of methods used

2.3.1 Effects on Target Mammal Species

Of interest to WS, program recipients, decision-makers, and members of the public is whether wildlife damage management actions adversely affect the viability of target species populations. The target species selected for analysis in this EA include, but are not necessarily limited to: white-tailed deer, coyotes, badgers, raccoons, opossums, red fox, bobcats, striped skunks, beaver, river otter, mink, muskrats, woodchucks, black-tailed jackrabbits, pocket gophers, Franklin's ground squirrels, cotton-tailed rabbits, moles, feral hogs, feral cats, and feral dogs.

2.3.2 Effects on Other Wildlife Species, including T&E Species

WS, wildlife management professionals, as well as the public, are concerned about whether the proposed action or any of the alternatives might result in adverse impacts to non-target wildlife species, especially State and Federally listed T&E species. WS' SOPs are designed to reduce potential impacts on non-target species' populations and are presented in Chapter 3. To reduce the risks of adverse affects to non-target species, WS would select damage management methods that are as target-specific as possible and apply mammal damage management methods in ways to reduce the likelihood of capturing or killing non-target species.

T&E species listed by the USFWS and State of Iowa were reviewed to identify potential effects on those species. Special efforts would be made to avoid adversely affecting T&E species through biological evaluations of the potential effects and the establishment of special restrictions or SOPs. WS has consulted with the USFWS under Section 7 of the ESA concerning potential effects of the national WS program on T&E species and has obtained a Biological Opinion (BO) (USDI 1992). WS has consulted with the USFWS, Ecological Services Office, Rock Island, Illinois (J. Millard, USFWS email to E. Colboth, WS, and September 6, 2006) and the IDNR on a proposed action and would reinitiate consultation prior to the initiation of new damage management activities.

Some members of the public are concerned that the use of registered pesticides to reduce mammal damage would have adverse impacts on other wildlife species, including T&E species.

Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997, Appendix P). WS only uses pesticides that have been approved by the EPA and Iowa Department of Agriculture and Land Stewardship (IDALS) and applies these in accordance with the label directions. Under the alternatives proposed in this EA, the primary pesticides proposed for use and recommendation by WS are gas cartridges and zinc phosphide baits; Appendix C contains detailed descriptions of these products.

2.3.3 Effects on Human Health and Safety

Safety and efficacy of chemical control methods

Some individuals may have concerns that chemicals used for wildlife damage management should not be used because of potential adverse effects on people from direct exposure to chemicals or exposure to animals that have died as a result of chemical use.

Under the alternatives proposed in this EA, pesticide products proposed for use by WS are gas cartridges (for rodent control) and zinc phosphide bait and WS may provide technical assistance on the use of repellents. Use of these products is regulated by the EPA through FIFRA, and by IDALS and WS Directives. The use of registered pesticides and repellants for mammal damage management poses no risk to public health and safety when applied according to label instructions. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997, Appendix P). Further, all Iowa WS personnel that would apply pesticides are certified pesticide applicators by the State of Iowa and apply pesticides according to label instructions.

WS also uses food and Drug Administration (FDA) registered chemicals for animal immobilization and euthanasia. Some individuals are concerned that the drugs used in animal capture, handling, and euthanasia may cause adverse health effects in humans that hunt and eat the species involved. Iowa WS follows all guidance for the storage and use of these chemicals which eliminates any risk of exposure of these chemical to the public.

Impacts on Human Safety of Mammal Damage Management Methods

Some people may be concerned that WS' use of firearms, traps, snares and pyrotechnic scaring devices could cause injuries to people. WS personnel occasionally use traps, snares and firearms to remove mammals that are responsible for damage or potential damage. However, WS personnel are trained in the handling and use of all mammal damage management equipment and use traps, snares, pyrotechnics and all their other equipment as selectively as possible. Further, firearm use is a very sensitive issue and a concern because of public fears regarding the risks associated with unsafe firearms use and the threat of misuse of firearms. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS personnel, who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence. To date, no members of the public have been harmed by Iowa WS' use of damage management equipment.

Conversely, the absence of adequate mammal damage management could result in adverse effects on human health and safety because mammal damage would not be curtailed or reduced to levels that would not pose risks to the public. The potential impacts of not conducting such work could lead to increased incidence of injuries, illness, or loss of human lives because of disease transmission, mammal/aircraft strikes, etc.

2.3.4 Impacts to Stakeholders, including Aesthetics

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

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

The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public is no exception and today a large percentage of households have pets. Some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals. Others may experience anxiety or fear when wild animals come into close proximity to their homes and families. It is not surprising that the public reaction to wildlife damage management is mixed because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to reduce conflicts/problems between humans and wildlife.

Many people, directly affected by wildlife problems and threats to public health or safety may insist upon removal of the animal(s) from the property or public location. Some members of the public have an idealistic view and believe that all wildlife should be captured and relocated to another area to alleviate damage or threats to public health or safety. Others, not directly affected by the specific wildlife "problem" may not agree that there is a problem. They may perceive that the issue is normal animal behavior and a consequence of living in proximity to nature and should be tolerated. Further, individuals not directly affected by the harm or damage may be supportive, neutral, or totally opposed to any removal of wildlife from specific locations or sites. Individuals totally opposed to mammal damage management want WS to teach tolerance for damage and threats to public health or safety, and that wildlife should never be killed. Some people would strongly oppose removal of mammals regardless of the amount and type of damage. Some who oppose removal of wildlife do so because of human-affectionate bonds with individual animals. These human-affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment. Advocates of animal rights believe that animals are entitled to the same rights and protections as humans and that if an action is unacceptable treatment for a human it is unacceptable treatment for an animal.

The WS program in Iowa only conducts wildlife damage management at the request of the affected property owner or resource manager and after a need is established. If WS received requests from an individual or official for mammal damage management, WS would address the issues/concerns and consideration would be made to explain the advantages and disadvantages of the available damage management actions available. Management actions would be carried out in a caring, humane, and professional manner.

2.3.5 Humaneness and Animal Welfare Concerns of Methods Used

Humaneness, in part, is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important and very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns, if "*. . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process.*" Suffering is described as a "*. . . highly unpleasant emotional response usually associated with pain and distress.*" However, suffering "*. . . can occur without pain . . . ,*" and "*. . . pain can occur without suffering . . .*" (AVMA 1987). Because suffering carries with it the implication of a time frame, a case could be made for "*. . . little or no suffering where death comes immediately . . .*" (CDFG 1991), such as shooting.

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

The American Veterinary Medical Association (AVMA) states "*. . . euthanasia is the act of inducing humane death in an animal*" and "*. . . the technique should minimize any stress and anxiety experienced by the animal prior to unconsciousness*" (AVMA 2001). Some people would prefer AVMA accepted methods of euthanasia to be used when killing all animals, including wild and feral animals. The AVMA states that "*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 2001).

The decision-making process involves tradeoffs between the above aspects of pain and humaneness. Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. 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. One challenge with coping with this issue is how to achieve the least amount of animal suffering within the constraints of current technology and resources. 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 mammal damage management methods are used in situations where non-lethal damage management methods are not practical or effective.

Iowa WS personnel are experienced and professional in their use of management methods so that they are humane within the constraints of current technology and resources. SOP used to maximize humaneness are described in Chapter 4.

2.4 ISSUES NOT CONSIDERED IN DETAIL WITH RATIONALE

2.4.1 No Wildlife Damage Management at Taxpayer Expense; Wildlife Damage Management should be Fee Based

Funding for WS comes from a variety of sources in addition to federal appropriations. In Iowa, funds to implement wildlife damage management activities and programs are derived from a number of sources, including, but not limited to federal, State, county and municipal governments/agencies, private organizations, corporations and individuals, homeowner/property owner associations, and others under Cooperative Service Agreements and/or other contract documents and processes. Federal, State, and local officials have decided that wildlife damage management should be conducted by appropriating funds. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the U.S. Wildlife damage management is an appropriate sphere of activity for government programs, since aspects of wildlife damage management are a government responsibility and authorized, restricted and directed by law.

2.4.2 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 owners could attempt to reduce their own damage problems. Some property owners prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity, 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 prefer to contract with a government agency. In particular, large industrial businesses and cities and towns may prefer to use WS because of security and safety issues and reduced administrative burden.

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

Some individuals might question whether preparing an EA for an area the size of the State of Iowa would meet the NEPA requirements for site specificity. If in fact a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the State may provide a better analysis than multiple EAs covering smaller zones. In addition, the WS program in Iowa only conducts damage management activities on a relatively small area of the State where damage is occurring or likely to occur, and only after a request for services is received.

2.4.4 Effectiveness of Mammal Damage Management Methods

A concern among members of the public is whether the methods used to reduce mammal damage will be effective for reducing or alleviating damage and conflicts. The effectiveness of each method or methods can be defined in terms of decreased potential for health risks, decreased human safety hazards, reduced property damage, reduced agricultural damage, and reduced natural resource damage. In terms of the effectiveness of a specific method or group of methods, this would not only be based on the specific method used, but more importantly upon the skills and abilities of the person implementing the method(s) and the ability of that person to determine the appropriate course of action to take. It would be expected that the more experience a person has addressing mammal damage conflicts and implementing control methods, the more likely they would be to successfully reduce damage to acceptable levels. The WS technical assistance program provides information to assist persons implementing their own damage management program, but at times the person receiving WS technical assistance may not have the skill or ability to implement the methods recommended by WS. Therefore, in those cases it is more likely that a specific damage management method or group of methods would be effective at reducing damage to acceptable levels when WS professional wildlife damage assistance is provided than would occur when the inexperienced person attempts to conduct damage management activities on their own.

CHAPTER 3: ALTERNATIVES

3.1 INTRODUCTION

This chapter consists of seven parts: 1) introduction, 2) description of alternatives considered and analyzed in detail including the Proposed Action (Alternative 2), 3) mammal damage management approaches used by WS, 4) mammal damage management methods that could be authorized for use or recommended by WS, 5) methodologies recommended but deemed impractical, ineffective, or unsafe at the present time, 6) a description of alternatives considered, but eliminated from detailed analysis, and 7) SOPs. Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992), Methods of Control (USDA 1997), and "*Risk Assessment of Wildlife Damage Control Methods Used by the USDA Animal Damage Control Program*" (USDA 1997).

Four alternatives were recognized, developed, and analyzed in detail. An additional three alternatives were considered, but not analyzed in detail. The four alternatives analyzed in detail are:

- Alternative 1: Technical Assistance Only
- Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)
- Alternative 3: Non-lethal Mammal Damage Management Only By WS
- Alternative 4: No Federal WS Mammal Damage Management

3.2 DESCRIPTION OF THE ALTERNATIVES

3.2.1 Alternative 1: Technical Assistance Only

This alternative would not allow for WS' operational mammal damage management in Iowa. WS would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, corporations, or others could conduct mammal damage management using any legal lethal or non-lethal method available to them.

3.2.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

The No Action alternative is a procedural NEPA requirement (40 CFR 1502.14(d)) and is a viable and reasonable alternative that could be selected and serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with guidance from the CEQ (1981). In this guidance, the No Action alternative, for situations where there is an ongoing management program, may be interpreted as "no change" from current management direction.

WS proposes to continue the current mammal damage management program in Iowa. WS involvement in mammal damage management in Iowa is closely coordinated with the IDNR, and WS' take of mammals is authorized through permits and/or other authorities granted by IDNR. An adaptive IWDM approach would be implemented to reduce mammal damage to property, agricultural and natural resources, to reduce mammal impacts on human/public health and safety, and disease monitoring. Damage management would be conducted on public and private property in Iowa when the resource owner (property owner) or manager requests assistance. The adaptive IWDM strategy would encompass the use and recommendation of practical and effective methods to prevent or reduce damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate non-lethal techniques like physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, mammals would be removed as humanely as possible using shooting, trapping, and registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy.

3.2.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

This alternative would require WS to only use and recommend non-lethal methods to resolve mammal damage problems. Information on lethal mammal damage management methods would still be available to producers and property owners through other sources such as IDNR, USDA Agricultural Extension Service offices, universities, or pest control organizations; requests for information regarding lethal management approaches would be referred to these entities. Individuals might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS direct assistance with non-lethal mammal damage management, use contractual services of private businesses, or take no action. Persons receiving WS' non-lethal technical and direct operational assistance could still resort to lethal methods that were available to them.

3.2.4 Alternative 4: No Federal WS Mammal Damage Management

This alternative would eliminate WS involvement in mammal damage management in Iowa. WS would not provide direct operational or technical assistance and requesters of WS' assistance would have to conduct their own management actions without WS input. Information on mammal damage management methods would still be available through other sources such as IDNR, USDA Agricultural Extension Service offices, universities, or pest control organizations; requests for information would be referred to these entities. Individuals might choose to conduct their own damage management, use contractual services of private businesses, or take no action.

3.3 MAMMAL DAMAGE MANAGEMENT STRATEGIES USED BY WS

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2 and 3 described above. Alternative 4 would terminate both WS technical assistance and operational mammal damage management. Appendix C contains a more thorough description of the methods that could be used or recommended by WS.

3.3.1 Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in the most cost-effective[14] manner while minimizing the potentially harmful effects on humans, target and non-target species, and the

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

environment. IWDM may incorporate cultural practices (*e.g.*, animal husbandry), habitat modification (*e.g.*, exclusion), animal behavior modification (*e.g.*, scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

3.3.2 IWDM Strategies Employed by WS

Technical Assistance Recommendations - Technical assistance is information, demonstrations, and advice on available and appropriate wildlife damage management methods and approaches. However, the implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for 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 requester 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 adaptive IWDM approach for resolving mammal damage problems.

Operational Damage Management Assistance - Operational damage management assistance are activities conducted or supervised by WS personnel. Operational damage management may be initiated when the problem cannot effectively be resolved through technical assistance and when *Agreements for Control* or other comparable instruments provide for operational 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.

Educational Efforts - Education is an important element of WS program because wildlife management is about finding balance and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations, lectures, courses, and demonstrations are provided to producers, homeowners, State and county agents, colleges and universities, and other interested groups. WS frequently cooperates with other agencies with education and public information efforts. Additionally, 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.

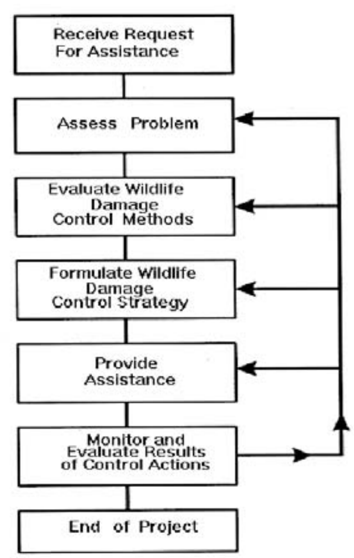
Examples of WS Direct Operational and Technical Assistance in Mammal Damage Management in Iowa

Des Moines International Airport (DSM) entered into Cooperative Service Agreements with Iowa WS for the purpose of assessing, managing, and monitoring wildlife-related public safety and aviation hazards at DSM. Mammal-aircraft strikes and hazards have created safety concerns at the airport. Since 1996, WS has implemented an IWDM approach consisting of technical assistance and operational components (*i.e.,* WS' review of airport development and landscaping plans, habitat management recommendations, provision of training to DSM personnel, T&E species monitoring, hazardous mammal species population management, and exclusion). WS involvement at DSM has considerably reduced or prevented strikes with hazardous mammals at the airport. Additional airports or facilities may enter into agreements with WS for similar services in the foreseeable future.

3.3.3 WS Decision Making[15]

WS personnel use a thought process for evaluating and responding to damage complaints which is depicted by the WS Decision Model (Figure 3-1) and described by Slate et al. (1992). WS personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate to reduce damage. WS personnel assess the problem, and then evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, methods deemed 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 Decision Model, most damage management efforts consist of a continuous feedback between receiving the request and monitoring the results of the damage management strategy.

Figure 3.1 WS Decision Model for Developing Strategies to Respond to a Wildlife Conflicts (Slate et al. (1992).



15 The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions.

3.4 MAMMAL DAMAGE MANAGEMENT METHODS AVAILABLE TO WS (See Appendix C for a more detailed description of methods or approaches.)

3.4.1 Non-chemical Methods

Exclusionary devices (*i.e.,* fencing, netting, or other physical barriers) to prevent wildlife access to protected resources.

Cultural methods and habitat modifications are typically implemented by agricultural producers or property owners. They consist of non-lethal preventive methods which minimize exposure and/or reduce the amount or attractiveness of the protected resource to wildlife that would cause damage or pose a threat. Examples include: installation of water control devices, planting lure crops, providing alternate foods, animal husbandry practices, crop selection, picking less palatable landscape plants, providing raptor perches, and keeping the vegetation around the protected resource short.

Animal behavior modification refers to tactics that alter the behavior of mammals to reduce damage. Some but not all of these tactics include the following:

- Propane exploders
- Pyrotechnics
- Distress calls and sound producing devices
- Visual repellents and other scaring tactics
- Livestock guarding animals

Live capture and relocation of target animals. Captured target mammals can be relocated to other field locations or to animal shelters, pursuant to State laws and regulations. Alternatively, when monitoring for diseases in wildlife, samples may be collected and then the animal is released at the capture site.

Capture Devices, including body-gripping traps (Conibear), snap traps, snares, Hancock/Bailey Traps, corral traps, and box/cage traps are used to capture wildlife. Some devices, like body-gripping traps kill the animal, others hold the animal for relocation or euthanasia.

Shooting is helpful in some situations to supplement and reinforce dispersal techniques, to euthanize trapped mammals, and shooting is selective for target species. It may be used in conjunction with spotlights, calling, and other legal strategies (elevated positions, stands, etc.). Shooting with firearms is used to reduce mammal damage when lethal methods are determined to be appropriate. The animals are killed as quickly and humanely as possible.

Sport harvest through hunting and trapping is an important part of mammal damage management strategies and is recommended by WS to enhance the effectiveness of other damage management techniques and to accomplish population management objectives developed by the IDNR.

3.4.2 Chemical Methods

Repellents are usually naturally occurring substances that are chemically formulated to be distasteful or to elicit pain or discomfort to target animals when they are encountered. In Iowa, wildlife repellents are registered with the IDALS.

Pesticides such as the gas cartridges and zinc phosphide (see Appendix C) may be used and recommended to lethally remove mammals associated with damage when the pesticide is registered for that use. Label directions would be followed, and application by WS occurs at specific sites, pursuant to landowner requests and all pertinent laws, regulations, and policies.

Carbon dioxide (CO_2) gas is an AVMA-approved euthanasia method (AVMA 2001) which is sometimes used to euthanize mammals that have been chemically immobilized or live captured. Live animals are placed in an enclosed space into which CO_2 gas is released. The animals quickly expire after inhaling the CO_2.

3.5 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered, but not analyzed in detail. These are:

3.5.1 Lethal Mammal Damage Management Only By WS

Under this alternative, WS would not conduct any non-lethal mammal damage management in the State. This alternative was eliminated from further analysis because some mammal damage problems can be resolved effectively through non-lethal means. Additionally, lethal methods may not always be available for use due to safety concerns or local ordinances prohibiting the use of some lethal methods, such as the discharge of firearms.

3.5.2 Compensation for Mammal Damage Losses

The compensation alternative would require the establishment of a system to reimburse persons impacted by mammal damage. This alternative was eliminated from further analysis because currently there are no federal or State laws to authorize such action and compensation would be difficult to determine for public health and safety problems/accidents. Under such an alternative, WS would not provide any operational or technical assistance. Aside from lack of legal authority, analysis of this alternative in USDA (1997) indicated that it has many drawbacks:

- 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. Responding in a timely fashion to all requests to assess and confirm damage would be difficult and certain types of damage could not be conclusively verified. For example, proving conclusively in individual situations that mammals were responsible for disease outbreaks would be impossible, even though they may actually have been responsible. Thus, a compensation program that requires verification would not meet its objective for mitigating such losses.
- Compensation would give little incentive to resource owners to limit damage through improved cultural, husbandry, or other practices and management strategies.
- Not all resource owners would rely completely on a compensation program and unregulated lethal control would most likely continue as permitted by state law.
- Compensation would not be practical for reducing threats to human health and safety.

3.5.3 Reproduction Control

Reproductive control is often considered for use where wildlife populations are overabundant and where traditional hunting or lethal programs are not acceptable (Muller et al. 1997). Use and effectiveness of reproductive control as a wildlife population management tool is limited by population dynamic characteristics (longevity, age at onset of reproduction, population size and biological/cultural carrying capacity, etc.), habitat and environment (isolation of target population, cover types and access to target individuals, etc.), 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, requirements for repeated treatments with some contraceptive products, 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. Research into reproductive control technologies, however, has been ongoing, and the approach will probably be considered in an increasing variety of wildlife management situations.

Reproductive control for wildlife could be accomplished either through sterilization (permanent) or contraception (reversible).

Sterilization could be accomplished through:

- Surgical sterilization (*i.e*., vasectomy, castration, and tubal ligation),
- Chemosterilization
- Gene therapy.

Contraception could be accomplished through:

- Hormone implantation (*e.g*., synthetic steroids such as progestins)
- Immunocontraception (*e.g*., contraceptive vaccines)
- Oral contraception (*e.g*., progestin administered daily).

Research into the use of these techniques consists of laboratory/pen experimentation to determine and develop the sterilization or contraceptive material or procedure, field trials to develop the delivery system, and field experimentation to determine the effectiveness of the technique in achieving population reduction. Prior to implementation, the product must be registered and approved by the appropriate Federal and state regulatory agencies.

The use of hormones was investigated (Matschke 1976, 1977 a, 1977b, 1977c; Roughton 1979), and eventually rejected as an effective and efficient reproductive control technique for deer. Additionally, concerns related to costs and logistics of widespread distribution of drugged baits, dosage control and ingestion of baits by children and nontarget animals make oral contraception (by steroids) largely impractical (Lowery et al. 1993). More recently, immunocontraception has been studied in various situations and locations, but its potential use appears limited due to considerable constraints regarding treatment and follow-up treatment of a sufficiently large number of target animals, varying immunogenecity of vaccines, genetic backgrounds of individual animals, age, nutritional status, stress and other factors (Becker and Katz 1997, Becker et al. 1999). Immunocontraceptive vaccines prevent conception by stimulating the production of antibodies that bioneutralize proteins or hormones essential for reproduction (Miller et al. 2000). The use of porcine zona pellucida (PZP) as a contraceptive agent in wildlife management has been investigated recently (Kirkpatrick et al. 1990, Turner and Kirkpatrick 1991, Turner et al. 1992, 1996), but to date, there is no published documentation that immunocontraceptive vaccines have successfully reduced any free-ranging deer herd or population. Additionally, Underwood and Verret (1998) reported that despite 5 years of PZP treatment, the Fire Island, NY white-tailed deer population continued to grow, albeit at a slower rate.

Other components of the reproductive system have been studied for immunocontraception as well, such as GnRH (Becker and Katz 1997, Becker et al. 1999). The USDA/APHIS/WS-NWRC has been instrumental in the development of a single-injection GnRH immunocontraceptive vaccine (GonaCon^{TM}) which has been shown to provide contraceptive effects lasting up to 2 years without needing booster vaccination (Miller et al. 2000, Miller et al. 2004). The NWRC is working with the FDA to obtain registration of this product for use as a new animal drug. Although the GnRH immunocontraceptive appears promising, it has limitations. GnRH has been documented to have adverse impacts on antler growth in male deer (Miller et al. 2000). If true, then it may be necessary to determine a way to only treat female deer or application may be limited to fenced-in sites where shifts in antler growth will not have as great an impact on the recreational and aesthetic value of the deer, or areas where requesters have decided that the reduction in reproduction is worth the cost of altered antler growth in bucks.

Canadian researchers at Dalhousie University investigated the use of a single-dose immunocontraceptive vaccine based on liposome delivery of PZP antigens (Spay Vac^{TM}), and reported a 90% reduction in pup production by gray seals (*Halichoerus grypus*) (Brown et al. 1997). Fraker et al. (2002) reported that fertility of an island population of fallow deer (*Dama dama*) was greatly reduced by a single administration of Spay Vac ^{TM} during the first year of treatment. However, SpayVac, has failed in field trials in Princeton, CT and the manufacturer has stated that it will discontinue efforts to register the product with the FDA for the time being (Campbell 2005).

Turner et al. (1993) note that although contraception in white-tailed deer may be used to limit population growth, it will not reduce the number of animals in excess of the desired level in many circumstances. They further contend that initial population reductions by various other means may be necessary to achieve management goals, and that reproduction control would be one facet of an integrated program. In sum, although immunocontraceptive technology has been variously effective in laboratories, pens, and in island field applications, it has not been effective to reduce populations of free-ranging deer.

Development of a single-shot sterilization technique as an alternative to immunocontraception was investigated by Rutgers University scientists in 2000. One possible approach is gene therapy which could accomplish reproductive control via sterilization through producing death of the anterior pituitary cells that synthesize luteinizing hormone, which triggers ovulation in females and spermatogenesis in males. Efficacy testing and development of a delivery system will be investigated over the next few years.

The use of reproductive control is subject to federal and State regulation. Additionally:

- No chemical or biological agent to accomplish reproductive control for free-ranging mammals has been approved for operational use by federal and Iowa authorities.
- If an effective tool was legally available, and if the project area was fenced, it would still take many years for some mammal populations to stabilize at a lower level, and ongoing damage would continue to occur at unacceptably high levels.
- There are considerable logistic, economic and socio-cultural limitations to trapping, capturing and chemical treatment of the hundreds or thousands of mammals that would be necessary to affect an eventual decline in the population.

Because there is no tool currently available for field application, and due to considerable logistic, economic, and socio-cultural limitations to the use of fertility control on free-ranging mammals, this approach is not considered for further analysis in this EA. However research into this area of wildlife damage management continues. WS will monitor new developments and, where practical and appropriate, could incorporate this technique into its program after necessary NEPA review is completed.

3.6 STANDARD OPERATING PROCEDURES FOR MAMMAL DAMAGE MANAGEMENT TECHNIQUES

3.6.1 Standard Operating Procedures (SOPs)

The current WS program, nationwide and in Iowa has developed SOPs for its activities that reduce the potential impacts of these actions on the environment. These procedures are discussed in detail in Chapter 5 of USDA (1997). Some key SOP pertinent to the proposed action and alternatives of this EA include:

- Use of the WS Decision Model (Slate et al. 1992) to identify effective wildlife damage management strategies and their effects.
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid effects to T&E species.
- EPA-approved label directions are followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects to the environment when chemicals are used in accordance with label directions.
- All WS personnel in Iowa using restricted chemicals and controlled substances (immobilization and euthanizing drugs) are trained and certified by, or operate under the direct supervision of, program personnel or others who are trained in the safe and effective use of chemical damage management materials. Management controls are in place within WS and its Immobilization and Euthanasia Committee to maintain personnel training and certification.
- Research is being conducted to improve management methods and strategies so as to increase selectivity for target species, to develop effective non-lethal management methods, and to evaluate non-target hazards and environmental effects of damage management techniques

3.6.2 Additional SOPs Specific to the Issues

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

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

- WS has consulted with the USFWS regarding potential effects of management methods on T&E species and abides by reasonable and prudent alternatives (RPAs) and/or reasonable and prudent measures (RPMs) established as a result of that consultation (USDI 1992).
- WS has consulted with the IDNR Endangered and Nongame Species Program regarding potential effects of damage management methods on State-listed T&E species.
- WS uses chemical methods for damage management that have undergone rigorous research to prove their safety and lack of serious effects on non-target animals and the environment.
- All WS actions are conducted in accordance with applicable State, Federal and local laws, including regulations mandating that traps be checked at least once every 24 hours.
- WS policy (2.45) requires that appropriate warning signs be posted on main entrances or commonly used access points to areas where leg-hold traps, snares or rotating jaw (conibear-type) traps are in use.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative(s) for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2. The environmental consequences of each alternative are analyzed in comparison with the no action alternative (Alternative 2) to determine if the real or potential effects would be greater, lesser, or the same.

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

Cumulative Effects: Cumulative effects are discussed in relationship to each of the alternatives analyzed, with emphasis on potential cumulative effects from methods employed, and including summary analyses of potential cumulative impacts to target and non-target species, including T&E species.

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

Effects on sites or resources protected under the National Historic Preservation Act: WS mammal damage management actions are not undertakings that could adversely affect historic resources.

Evaluation of Significance: Each major issue is evaluated under each alternative and the direct, indirect and cumulative impacts were analyzed. NEPA regulations describe the elements that determine whether or not an impact is "*significant*." Significance is dependent upon the magnitude, duration, context intensity and extent of the action. The following factors were used to evaluate the significance of impacts in this EA that relate to context and intensity (adapted from USDA 1997) for this proposal:

- **Magnitude of the Impact (size, number, or relative amount of impact) (intensity).** The "*Magnitude*" analysis for the alternatives analyzed in this EA follows the process described in USDA (1997: Table 4-2). Magnitude is defined in USDA (1997) as "*. . . a measure of the number of animals killed in relation to their abundance.*" Magnitude may be determined either quantitatively or qualitatively. Quantitative analysis is used whenever possible as it is more rigorous and is based on allowable harvest levels, population estimates and harvest data. Qualitative analysis is based on population trends and harvest data or trends and modeling. Allowable harvest levels were determined from research studies cited in USDA (1997, Table 4-2) and from the IDNR data. "*Other Harvest*" includes the known fur harvest, sport harvest, and other information obtained from the IDNR. "*Total Harvest*" is the sum of the Iowa WS kill combined with the "*Other Harvest*." Generally, WS only conducts damage management on species whose population densities are relatively high and only after they have caused damage or the risk of damage is present.
- **Duration and Frequency of the Impact.** Duration and frequency of mammal damage management in Iowa is highly variable. Abiotic and biotic factors affecting mammal

behavior will affect the duration and frequency of mammal damage management activities conducted by WS in Iowa. Mammal damage management in specific areas may be long duration projects but the frequency of individual operational mammal damage management projects may be highly variable depending upon spatial, temporal, and biotic factors affecting the behavior of the mammals that are causing damage.

- **Likelihood of the Impact.** Mammal damage management in Iowa will have a low magnitude of impact on overall populations as compared to natural mortality factors that these populations experience. Because all populations experience compensatory and additive mortalities year round, the impact of WS mammal damage management will generally not result in adverse affects to populations.
- **Geographic Extent.** Mammal damage management could occur anywhere in Iowa where management has been requested, agreements for such actions are in place and action is warranted as determined by implementing the WS Decision Model (Slate et al. 1992). Actions would generally be limited to areas receiving damage, areas with historical mammal damage, or areas where a threat of damage exists.

4.2 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

This Section analyzes the environmental consequences of the issues analyzed in detail using the current program as the baseline for comparison with the other alternatives to determine if the real or potential impacts are high, moderate or low (Table 4-1). Five key potential issues of this program have been identified, and each of these issues is analyzed for each alternative. The five issues are:

- Effects on target mammal species populations
- Effects on other wildlife species, including T&E species
- Effects on human health and safety
- Impacts to stakeholders, including aesthetics
- Humaneness and animal welfare concerns of methods used

4.2.1 Effects on Target Mammal Species Populations

4.2.1.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would have no impact on target mammal populations in the State because the program would not provide any operational damage management. The program would be limited to providing advice only and making recommendations. It is likely that most landowners/resource managers would continue to attempt to do something about their mammal damage as permitted under Iowa state law. 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 management activities. Some individuals experiencing damage may take illegal or unsafe actions 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 taken than by professional WS personnel (Alternatives 2). Use of WS' technical assistance may decrease the risks associated with uninformed use of lethal management techniques and may increase the use of non-lethal alternatives over that expected in the absence of any WS involvement (Alternative 4). Overall impacts on target species populations would be similar to or slightly higher than Alternative 2 depending upon the extent to which resource managers use the technical assistance provided by WS. However, for the reasons presented in the population effects analysis in section 4.2.1.2, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

4.2.1.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

The IDNR is responsible for the management of the State's resident wildlife (Iowa Code §§455A.2) including: coyotes, raccoons, opossums, red fox, gray fox, striped skunk, beaver, muskrat, mink woodchuck and white-tailed deer populations. Every fur dealer must report the number of raw furs purchased from Iowa trappers and hunters (IDNR 2005) and these data help the IDNR manage furbearer populations (Iowa Code §§109.97). At this time, the IDNR conducts limited population census for most of these species, in addition to monitoring the sales of pelts. Recent harvest trends generally show declines, likely due to overall reduced trapping effort that is occurring with most furbearer species. Total fur harvests for target species analyzed in this EA are provided in Table 4-1. Currently, IDNR has regulated harvest seasons for these species, but there are no bag or possession limits.

During 2004, Iowa WS killed seven beaver and three coyotes, and during 2005 WS killed one badger, two beaver, one coyote, four raccoons and three red fox to protect resources (Table 4-2).

Table 4-1. Mammals Lethally Removed by WS for Mammal Damage Management and Sport Harvest during 2001 through 2004 in Iowa.

Species	WS Take	Sport Harvest	Pop. Trend[1]
Badger	1	2,562	S
Beaver	6	36,516	I
Coyote	4	25,823	I
Muskrat	2	268,723	S
Opossum	0	18,308	S
Raccoon	3	618,237	F
Red Fox	1	44,948	I
Striped Skunk	1	2,585	S

[1] Population trend estimates provided by IDNR (R. Andrews Furbearer Biologist, pers. comm.). S = Stable, D = Decreasing, I = Increasing, F = Fluctuating due to weather, habitat, etc.

Badger Biology and Population Information

Badgers are relatively large members of the weasel family which prefer open plains, farmlands and the edges of woods. The range of the badger extends across most of the western ⅔ of the U.S., parts of southern Canada, and northern Mexico (Figure 4-1). In the U.S., badgers can be found from the west coast to Texas, Oklahoma, Missouri, Illinois, Ohio, Michigan and Indiana. They can move over long distances (up to 52 km for females and 110 km for males) through seemingly unsuitable terrain. Males do not breed in their first year, but females mate during their first summer.

Table 4-2. Annual Take of Furbearers in Iowa from 2003 through 2005.

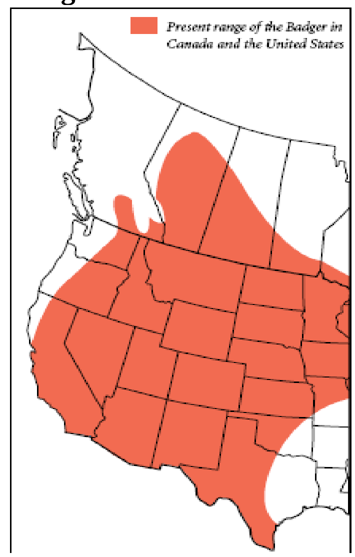
Species	Pelts Sold[1]			WS Take		
	2003	2004	2005[2]	2003	2004	2005
Badger	912	761	na	0	0	1
Beaver	8,591	6,221	na	8	7	2
Coyotes	8,178	5,197	na	1	3	1
Gray Fox	365	198	na	0	0	0
Mink	10,711	11,662	na	0	0	0
Muskrats	54,919	45,516	na	0	0	0
Opossums	6,184	5,858	na	0	0	0
Raccoons	177,315	193,185	na	0	0	4
Red Foxes	10,608	7,122	na	0	0	3
Striped Skunks	842	930	na	0	0	0

[1] Numbers may be underestimates of total sport take because not all pelts are taken to fur buyers.
[2] Data are not yet available.

Home range sizes of adults averaged 1.6 and 2.4 km^2 for females and males in Idaho (Messick and Hornocker 1981) and ranged from 1.4 to

6.3 km^2 in Utah (Lindzey 1978). Home ranges of two radio-tracked females in Minnesota were 8.5 and 17.0 km^2 (Sargeant and Warner 1972, Lampe and Sovada 1981). Although results have varied somewhat among these studies, average densities have ranged from 0.38 to 5 badgers/km^2 (0.98-12.95 badgers/mi^2). Preliminary results at a field site in west-central Illinois suggest that individual badger home range size in Illinois is an order of magnitude larger than that of western badgers. The badger's range may be expanding eastward from its former boundaries within the Midwest; observations of range expansion in Missouri, southern Illinois, Indiana, and Ohio suggest that agricultural practices have converted previously forested acres to more suitable badger habitat (Moseley 1934, Leedy 1947, Mumford 1969, Hubert 1980, Mumford and Whitaker 1982, Long and Killingley 1983, Gremillion-Smith 1985, Whitaker and Gammon 1988). IDNR's assessment of badger populations in Iowa indicates they are healthy, productive and stable. Based upon current and an anticipated increase in badger management activities, it is possible that WS could remove up to 10 badgers per year in Iowa. Future WS projects may involve live-capture and relocation of badgers where such actions would align with IDNR wildlife management objectives for this species.

Figure 4-1. Distribution of Badgers in North America.

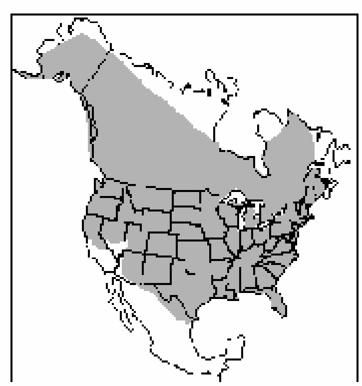


Badger Impact Analysis
Under the current program, WS rarely takes badgers as a target species (Table 4-2), but requests are sometimes received and WS responds. The badger is classified as a furbearer within the state of Iowa but there is no closed season. Badger populations can safely sustain an annual harvest rate of 30-40% annually (Boddicker 1980). IDNR furbearer harvest data for the 2003 and 2004 seasons suggest private trappers harvested an average of 836 badgers annually in Iowa and WS removed one badger during the last three years. Therefore, WS takes less than 0.12% of the Iowa total harvested population. Because this is substantially less than the allowable harvest level, and because badger populations in Iowa appear to be stable (R. Andrews, IDNR, pers. comm. 2006), cumulative impacts are of a low magnitude.

<u>Beaver Biology and Population Information</u>

The beaver is the sole representative of the family *Castoridae* in North America and occupies a wide range of habitats (Figure 4-2). Water is the most important feature in the daily lives of beavers. Ideal beaver habitats are ponds, small lakes with muddy bottoms, and meandering streams although they occupy artificial ponds, reservoirs and drainage ditches if food is available. The current distribution of beaver is determined by food and water availability and home range is greatly affected by the water system where beaver live. Small ponds and potholes may contain only one family; home ranges on streams have been reported to be about 0.5 mi of stream (Busher et al. 1983, Bergerud and Miller 1977). If food is present, parts of Iowa provide

Figure 4-2. Distribution of Beaver



excellent beaver habitat except during periods of drought when beaver populations decline as water tables drop and wetlands dry up.

Beaver occur mostly in family groups that consist of two adult parents, offspring from the current breeding season and yearlings from the previous breeding season, totaling 2-6 individuals (Novak 1987). In central North America, beaver generally mate during January to March, with a gestation period from 105 to 107 days. Male and female beaver do not reach sexual maturity until about 21 months (Woodward 1977). Each family's breeding female produces one litter per year (Novak 1977, Wigley et al. 1983). Average litter size in North America is three or four offspring, however litter size can vary because of such factors as food availability (Longley and Moyle 1963, Huey 1956, Gunson 1970), elevation (Rutherford 1964, Harper 1968), weight of female (Wigley et al. 1983, Gunson 1970) and age (Henry and Bookhout 1969, Gunson 1970, Payne 1984a). Gunson (1970) and Payne (1984a) concluded that beaver fecundity was also density-dependent.

The total number of beaver in an area depends on the number of families (colonies) found there and the average number of individuals per family. Beaver abundance has been reported in terms of families per kilometer of stream or per square kilometer of habitat. Novak (1987) summarized reported beaver family abundance as ranging from 0.3 to 1.5 families per kilometer of stream, or 0.5 - 2.4 families per mile of stream. Densities reported in terms of families have been reported to range from 0.2 to 3.9, or 0.2 to 6.3 per square mile (Novak 1987).

IDNR's assessment of beaver populations in Iowa indicates they are healthy, productive and increasing (R. Andrews, IDNR, pers. comm. 2006). The Iowa beaver population is high and they continue to generate more complaints because of flooding, foraging on crops and blocking tiles (IDNR 2005).

Beaver Impact Analysis

The beaver is classified as a furbearer within the State of Iowa, managed by the IDNR, but there is no closed season. Few studies have been conducted on adult beaver mortality factors, but the mortality factors that have been identified are trapping (Henry and Bookhout 1969, Novak 1977, Boyce 1981, Payne 1984b), severe winter weather (Lyons 1979), under ice starvation and malnutrition (Aleksiuk 1968, Bergerud and Miller 1977, Payne 1984b), water fluctuations and floods (Kennelly and Lyons 1983), and falling trees (Ellarson and Hickey 1952, Hitchcock 1954). Seven to eighteen percent of the beaver found by Payne (1984b) had shotgun wounds. Estimates of trapping mortality on various beaver populations were 25-70% (Hendry 1966), 13-19% (Henry and Bookhout 1969), 43% (Novak 1977), 20% (Boyce 1981) and 13-25% (Payne 1984b). The effect of predators on beaver populations is variable and dependent on the species of predator and alternate prey bases. IDNR furbearer harvest data for the 2003 and 2004 seasons suggests private trappers harvested an average of 7,406 beaver annually in Iowa. Therefore, WS takes less than 0.13% of the Iowa total harvested population.

Based upon current and possible increase in requests for assistance with beaver damage, it is possible that WS could remove up to 100 beaver per year in Iowa. Future WS projects may involve live-capture and relocation of beaver where such actions would align with IDNR wildlife management objectives for this species. Because WS' take is substantially less than the allowable harvest level, and because beaver populations in Iowa appear to be increasing (R. Andrews, IDNR, pers. comm. 2006), cumulative impacts are of a low magnitude.

Black-tailed Jackrabbit Biology and Population Information

Jackrabbits belong to the genus *Lepus* and differ from rabbits because their young are precocial, meaning that the newly born are fully furred with their eyes open and are able to move about at birth; nor are jackrabbits rodents. The primary difference being that hares (and rabbits) have four upper incisors where rodents have only two.

The black-tailed jackrabbit is the most widely distributed jackrabbit species in North America (Hall and Kelson 1959) and can be distinguished from the white-tailed jackrabbit by its large tail with a black middorsal stripe extending onto the back and by the black-edged ears and the less pronounced area of white on the sides of the body (Hall and Kelson 1959). It has been described as flexible in habitat requirements, however the species has definite habitat preferences (Wagner and Stoddart 1972, Fagerstone et al. 1980, Porth et al. 1994). Where food and shelter are available in one place, no major daily movement of jackrabbits occurs. When food and shelter areas are separated, morning and evening movements may occur. Daily movements of 1-2 miles each way are fairly common. In dry seasons, 10-mile round trips from desert to crop fields have been reported (Knight 1994).

The black-tailed jackrabbit inhabits open plains, fields and deserts, and open country with scattered thickets or patches of shrubs. They adapt well to areas of agricultural development and significant damage can occur when jackrabbit populations are high and they feed on agricultural crops. Fagerstone et al. (1980) reported that black-tailed jackrabbit densities in their southern Idaho study area were highest in July on the mixed barley and alfalfa field, where there were about 100 jackrabbits/mi^{2,} concluding that cultivated crops are a large part of the spring and summer jackrabbit diet. MacCracken and Hansen (1982) and Fagerstone et al. (1980) both reported that jackrabbit densities were highest where there was a greater biomass of vegetation.

Jackrabbit populations are cyclic, reaching peak levels about every 7-10 years (Wagner and Stoddart 1972, Gross et al. 1974). They have a high reproductive rate and may produce up to four litters per year with 2-8 young per litter, depending on environmental conditions. Estimates of jackrabbit populations run as high as 400 jackrabbits/mi^2 extending over several hundred mi^2. Porth et al. (1994) estimated the peak jackrabbit population in winter in their study area to be about 2000 over a 1.5 mi^2 area and observed a drastic overwinter decline (around 100% mortality). Stoddart (1985) reported that jackrabbit populations can experience drastic population fluctuations. During a study in northern Utah, radio-tracked jackrabbits declined by 34% over a 68-hour period during a severe winter storm. Mortalities were 13 times greater during this 68-hour period than that observed during the rest of January and February and mortalities were not restricted to jackrabbits with transmitters. Smith and Nydegger (1985) also reported that populations can abruptly decline because of natural causes.

Jackrabbits are classified by the IDNR as a Species of Special Concern and they are protected in the State.

Black-tailed Jackrabbit Impact Analysis

Iowa WS did not receive any requests for assistance from individuals during FY03 through FY05. In future programs, Iowa WS may be requested to address damage or potential damage caused by jackrabbits anywhere in the State but primarily on airports. Jackrabbits may serve as a prey species for raptors at airports and the risk of a bird aircraft strike could prompt WS to take action to protect human health and safety and property. Based upon a possible increase for requests for WS assistance, it is possible that WS could remove up to five jackrabbits annually. Jackrabbit damage management activities would target single animals or local populations of the species at sites where their presence was causing or could potentially cause unacceptable risks to human health and safety, or property. The IDNR has also determined that there is no evidence to suggest that human caused mortality, including removal by WS, will be detrimental to the survival of the jackrabbit populations in the State (R. Andrews, IDNR, pers. comm. 2006) and therefore cumulative impacts are of a low magnitude.

Bobcat Biology and Population Information

The bobcat, also called "wildcat," is a medium-sized member of the North American cat family, and may be mistaken for a large bob-tailed domestic cat by some people. This species is actually 2-3 times larger than most domestic cats and appears more muscular and fuller in body. Bobcats are capable of hunting and killing prey that range from the size of a mouse to that of a deer. Rabbits, tree squirrels, ground squirrels, woodrats, porcupines, pocket gophers, and ground hogs comprise most of their diet. Opossums, raccoon, grouse, wild turkey, and other ground nesting birds are also eaten. Occasionally, insects and reptiles can be part of a bobcat's diet; they also can resort to scavenging. They are opportunistic predators, and may feed on livestock and domestic animals such as poultry, sheep, goats, house cats, small dogs, exotic birds and game animals, and rarely, calves (Virchow and Hogeland 1994).

Bobcats reach reproductive maturity at 9 to 12 months of age and may have one to six kittens following a two-month gestation period (Crowe 1975, Koehler 1987). Reported bobcat densities, as summarized by McCord and Cardoza (1982), have ranged between 0.1-7.0 per mi^2. Bobcat densities vary from about 1 per ½ mi^2 in coastal plains to about 1 per 66 mi^2 in portions of the Appalachian foothills. Knick (1990) estimated that bobcat densities on his study area in southeastern Idaho ranged from 0.35 per mi^2 during a period of high jackrabbit densities, to about 0.04 per mi^2 during a period of low jackrabbit densities. Bailey (1974) estimated bobcat densities in the same area to average about 0.14 per mi^2. Mid-Atlantic and mid-western states usually have scarce populations of bobcats (Virchow and Hogeland 1994).

Populations are stable in many northern states and reviving in other states where intensive trapping formerly decimated the species (National Audubon Society 2000). They may live up to 14 years, but annual mortality is as high as 47% (Rolley 1985). Crowe (1975) estimated a 3% mortality rate in a protected population, based on Bailey's (1972) study of bobcats in southeastern Idaho. Causes of natural mortality for adult bobcats include starvation (Hamilton 1982), disease and predation (Lembeck 1978), and injuries inflicted by prey (Fuller et al. 1985). Given IDNR's assessment that bobcat populations in Iowa are healthy and productive, they conservatively estimate the Iowa bobcat population at about 2,500 animals and the population is increasing (R. Andrews, IDNR, pers. comm. 2006).

Bobcats are regulated furbearers in Iowa and the IDNR established a harvest season and quotas for the purpose of managing the populations in the state. As mandated through the Convention on International Trade in Endangered Species (CITES), the IDNR requires that all bobcats pelts to be sold must be tagged.

Bobcat Impact Analysis

No bobcats have been killed by Iowa WS from FY03 through FY05. For future programs, WS may be requested to address damage being caused by bobcats anywhere in the State to protect any resource being damaged or threatened. Based upon current and an anticipated increase in bobcat damage management activities, it is possible that WS could remove up to five bobcats annually in

Iowa. Future WS projects may involve live-capture and relocation of bobcats where such actions would align with IDNR wildlife management objectives for this species. Some bobcats could be killed in actions to protect human health or safety, or livestock.

Based upon the above information, WS limited lethal take of bobcats would have no adverse impacts on overall bobcat populations in the state (R. Andrews, IDNR pers. comm. 2006). The IDNR has determined that there is no evidence to suggest that human mediated mortality resulting from regulated hunting and damage management, including removal by WS, will be detrimental to the bobcat population in the State and therefore the cumulative impact is of a low magnitude.

Coyote Biology and Population Information

The cost to accurately determine absolute coyote densities over large areas would be prohibitive (Connolly 1992) and would not appear to be warranted for this EA given the coyote's relative abundance and Iowa WS' low take. Because determinations of absolute coyote densities are frequently limited to educated guesses (Knowlton 1972), many researchers have estimated coyote populations (Pyrah 1984, Camenzind 1978, Knowlton 1972, Clark 1972, USDI 1979). The presence of unusual food concentrations and non-breeding helpers at the den can influence coyote densities and complicate efforts to estimate abundance (Danner and Smith 1980). Coyote densities range from 0.2 per mi^2 when populations are low (pre-whelping) to 3.6 per mi^2 when populations are high (post-whelping) (USDI 1979, Knowlton 1972). Knowlton (1972) concluded that coyote densities may approach a high of 5-6 per mi^2 under extremely favorable conditions with densities of 0.5 to 1.0 per mi^2 possible throughout much of their range, while Roy and Dorrance (1985) identified a positive relationship between coyote densities in mid to late winter and the availability of dead livestock.

The literature on coyote spatial organization is also confusing (Windberg and Knowlton 1988, Messier and Barrette 1982). Coyotes are highly mobile animals with home ranges that vary by sex, age of the animal, and season of the year (Pyrah 1984, Althoff 1978, Todd and Keith 1976). Coyote home ranges may vary from 2.0 to 21.3 mi^2 (Andelt and Gipson 1979, Gese et al 1988). Ozoga and Harger (1966), Edwards (1975), and Danner (1976) observed overlap between coyote home ranges and did not consider coyotes to be territorial. Other studies have shown that coyotes occupy territories and that each territory may have several non-breeding helpers at the den during whelping (Allen, et al. 1987, Bekoff and Wells 1982). Therefore, each coyote territory may support more than just a pair of coyotes. Gese et al. (1988) reported that coyote groups of 2, 3, 4, and 5 comprised 40%, 37%, 10% and 6% of the resident population, respectively, and Messier and Barrette (1982) reported that during November through April, 35% of the coyotes were in groups of 3 to 5 animals.

IDNR's assessment of coyote populations in Iowa indicates they are healthy, productive and increasing in the State (R. Andrews, IDNR, pers. comm. 2006). Based upon current and an anticipated increase in requests for assistance with coyote damage, it is possible that WS could remove up to 20 coyotes annually in Iowa. Future WS projects may involve live-capture and relocation of coyotes where such actions would align with IDNR wildlife management objectives. Some coyotes could be killed in actions to protect human health or safety, or livestock.

Coyote Impact Analysis

In Iowa, the coyote has expanded its range during the last several decades, moving in an easterly direction, suggesting that coyote numbers in Iowa are stable or increasing (R. Andrews, IDNR, pers. comm. 2006). In FY03, 04 and 05, Iowa WS took one, three, and one coyote, respectively. Undoubtedly coyotes were killed by the public, but there is no reliable tracking system in place for this mortality and that data could not be included in this analysis.

However, the unique resilience of the coyote, its ability to adapt, and its perseverance under adverse conditions is commonly recognized among biologists and rangeland managers. Despite intensive historical damage management efforts in livestock production areas and despite sport hunting and trapping for fur, coyotes continue to thrive and expand their range (Miller 1995). Connolly and Longhurst (1975) determined that, "*If 75% of the coyotes are killed each year, the population would be exterminated in slightly over 50 years.*" The authors further state that their, "*Model suggests that coyotes through compensatory reproduction can withstand an annual control level of 70%. To further demonstrate the coyote's recruitment (reproduction and immigration) ability, if 75% control occurred for 20 years, coyote populations would regain precontrol densities by the end of the fifth year after control was terminated*." Furthermore, immigration, not considered in the Connolly/ Longhurst model can result in rapid occupancy of vacant territories (Windberg and Knowlton 1988). While removing animals from small areas at the appropriate time can protect vulnerable livestock (Wagner and Conover 1999), immigration of coyotes from the surrounding area will replace the animals removed (Stoddart 1984). Pitt et al (2001) noted that coyote removals below 60% result in populations returning to pre-control levels within the year. Based on this information, WS' adverse effect on the coyote population, even with possible "*Other Harvest*" under reporting, will not affect the coyote population in Iowa, results in a *"low magnitude of impact"* and is having no adverse effect on coyote populations in Iowa (R. Andrews, IDNR, pers. comm. 2006).

Eastern Cottontail Rabbit Biology and Population Information

There are nine species of cottontail rabbits in North America north of Mexico with the eastern cottontail is the most abundant and widespread. These animals 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. They are rarely found in dense forest or open grasslands, but fallow crop fields may provide suitable habitat. Within these habitats they spend their entire lives in an area of 10 acres or less. Occasionally they may move a mile or so from summer range to winter cover or to a new food supply. In suburban areas, rabbits are numerous and mobile enough to fill any "empty" habitat created when other rabbits are removed. Population densities vary with habitat quality, but one rabbit per acre is a reasonable average (Craven 1994).

Rabbits live only 12-15 months, yet make the most of time available reproductively. They can raise as many as six litters a year of 1-9 young (usually 4-6), having a gestation period of 28 -32 days. If no young were lost, a single pair together with their offspring could produce 350,000 rabbits in 5-years (National Audubon Society 2000).

No population estimates were available for cotton-tailed rabbits in Iowa. However, cottontails are a regulated game species in Iowa and are harvested recreationally and for food. The IDNR sets seasons and limits on this species annually. There are no figures available regarding the total number of cottontail rabbits killed in Iowa each year, however, the harvest is believed to be in the thousands (R. Andrews, IDNR, pers. comm. 2006).

Eastern Cottontail Impact Analysis
Iowa WS personnel did not kill any cottontail rabbits from FY03 through FY05. Requests for assistance to WS may be made by those experiencing damage from rabbits anywhere in the State and actions would be to protect any resource being damaged. Cottontail rabbit damage management activities would target single rabbits or local populations of the species at sites where their presence was causing unacceptable damage or potential damage and would most probably be removed as part of an integrated management plan at airports to protect human health and safety and aircraft. Additionally, cottontails could be removed from urban, commercial, or industrial habitat to protect resources. The IDNR's assessment of cottontail populations in Iowa indicates they are healthy, productive and increasing in the State. Based upon current and an anticipated increase in requests for assistance with cottontail damage, it is possible that WS could remove up to 50 cottontails annually in Iowa. This level of take is inconsequential to the numbers of animals taken by hunters each year and is not expected to affect populations of the species in the state (R. Andrews, IDNR, pers. comm. 2006). The IDNR has determined that there is no evidence to suggest that human caused mortality resulting from regulated hunting and damage management, including removal by WS is or will be detrimental to the survival of the cottontail rabbit populations in Iowa (R. Andrews, IDNR, pers. comm. 2006) and the cumulative impact is of a low magnitude.

Eastern Mole Biology and Population Information

The eastern or common mole is found throughout Iowa and inhabits open fields, lawns, gardens and sometimes woods in well-drained loose soils but is often confused with voles and shrews. The small eyes and the opening of the ear canal are concealed in fur; there are no external ears. The forefeet are very large and broad with the palms wider than they are long (Henderson 1994) to allow moles to tunnel through soil by using a kind of breast stroke, enabling them to "virtually swim" through porous soil at about a foot a minute (National Audubon Society 2000). They range throughout most of the eastern U.S. from southern Minnesota and extreme southeastern Wyoming, Kansas and central Texas east to the Atlantic and Gulf coasts (National Audubon Society 2000).

Moles eat several kinds of invertebrates including earthworms, grubs, beetles, beetle larvae, centipedes, ants, wasps, spiders, and flies, among others. The also eat seeds and some other plant materials. Their familiar damage, occurring as tunnels in gardens, lawns, and other grassy areas, results from their incessant search for food. Networks of runways made independently occasionally join otherwise separate burrows (Godfrey and Crowcroft 1960, Henderson 1994). They eat between 70% and 100% of their body weight each day (Godfrey and Crowcroft. 1960, Holbrook and Timm 1986, Henderson 1994).

Moles have few natural enemies, which allows them to maintain populations by producing only one annual litter of 2-6 (National Audubon Society 2000) or 3-5 offspring (Henderson 1994). Gestation period of moles is approximately 42 days with young being born mainly in March and early April (Henderson 1994). Home range estimates for moles range form 1,385 to 114,486 sq. ft (Yates and Pedersen 1982).

No specific population estimate is available for moles in Iowa; however, based on habitat preferences and considering moles are rodents with high reproductive rates, mole populations are healthy and viable in Iowa (R. Andrews, IDNR, pers. comm. 2006). Using the assumption that 25% of the non-forested areas throughout the state have sufficient habitat to support moles, mole home ranges average 1 mole per 2.6 acre, and no home ranges overlap, a conservative statewide mole population could be estimated at more than 720,000 moles.

Eastern Mole Impact Analysis

Iowa WS personnel did not kill any moles from FY03 through FY05. Requests for assistance to WS may be made by those experiencing damage from mole infestations anywhere in the State and would be to protect any resource being damaged. Moles would most probably be removed as part of a management plan at airports to protect human health and safety and aircraft from raptors hunting moles and flying in aircraft flight paths. Additionally, moles could be removed from urban, commercial, or industrial habitat to protect resources. WS' level of take would be considered inconsequential and is not expected to affect populations of the species in the State (R. Andrews, IDNR, pers. comm. 2006). Mole damage management activities would target local populations at sites where their presence was causing or could potentially cause unacceptable damage or potential damage. Based upon current and possible increase in requests for assistance with mole damage, it is possible that WS could remove up to 25 moles per year in Iowa which would result in a low magnitude of impact.

Groundhog Biology and Population Information

The groundhog, also known as the "woodchuck," is a large rodent, often seen in pastures, meadows, and fields. Their range in the U.S. extends throughout the East, northern Idaho, northeastern North Dakota, southeastern Nebraska, eastern Kansas, and northeastern Oklahoma, as well as south to Virginia and Alabama. They dig large burrows, generally 8-12 inches at the opening, sometimes 5 feet deep and 30 feet long with more than one entrance to a spacious grass filled chamber. Green vegetation such as grasses, clover, alfalfa forms its diet; at times it will feed heavily on corn and can cause extensive damage in a garden to other crops (National Audubon Society 2000). They may also jeopardize the integrity of earthen dams, present hazards to livestock and farm equipment as a result of burrowing, gnaw electrical cables, and damage hoses by gnawing (Bollengier 1994).

The breeding season for groundhogs is usually from March through April (Bollengier 1994) and female groundhogs usually produce from four to six young (Chapman and Feldhamer 1982). The off-spring breed at age 1 and live 4 - 5 years. If a pair of groundhogs and their offspring all survived to breed as soon as possible, with an average litter size of four with a 1:1 sex ratio; they could produce more than 645 groundhogs through their life time.

Groundhogs are considered game animals in most states, however there is usually no bag limit or closed season (Bollengier 1994), including Iowa. Information regarding the total number of groundhogs killed in Iowa annually is not available nor a population density, however IDNR data indicate that the population is healthy, productive and increasing (R. Andrews, IDNR, pers. comm. 2006). Field observations related to the presence of groundhogs in urban environments in Iowa also suggest that they are locally abundant in many such areas of the State (R. Andrews, IDNR, pers. comm. 2006).

Groundhog Impact Analysis

Iowa WS personnel did not kill any groundhogs from FY03 through FY05. Requests for assistance to WS may be made by those experiencing damage from groundhogs anywhere in the State and would be to protect any resource being damaged. Groundhogs would most probably be removed as part of an integrated management plan at airports to protect human health and safety and aircraft. Additionally, they could be removed from urban, commercial, or industrial habitat to protect resources and management activities would target a single groundhog or local populations. This level of take would be inconsequential and is not expected to affect populations of the species in the State as the IDNR's assessment of groundhog populations in Iowa indicates they are healthy, productive and increasing (R. Andrews, IDNR, pers. comm. 2006). Based upon current and possible increase in requests for assistance, it is possible that WS could remove up to 25 groundhogs per year in Iowa which would result in a low magnitude of impact.

Franklin's Ground Squirrel Biology and Population Information

Franklin's ground squirrels are larger than the average ground squirrel with pelage short salt-and-pepper colored and the tail is bushy. The head and tail are grayish as a result of alternating bands of black and white on the individual hairs. They are most active on bright, sunny days, spending approximately 10% of their time above ground inhabiting an area about 300 feet in diameter. They dig burrows that may extend up to 8 ft underground, and that have several branches and openings. Burrows can be found in tall grass or weed cover, on rocky slopes, on railroad embankments, and under logs, rocks, and fences.

The mating phase of the reproductive process is completed by mid-April with a gestation period is about 28 days. Franklin's ground squirrels have one litter annually, usually in May or June, which contains from 5-10 babies (average 7). At birth the young are naked and blind but at ten days fuzzy hair appears. At 20 days their eyes open and they can emit whistle calls. At 30 days the young venture outside and at 40 days the weaning process is completed. By the time winter comes, the young are almost adult size. The young squirrels are not interested in mating until after hibernation at the end of their first year.

Franklin's ground squirrels' diet consists of tough vegetable fibers and hard-shelled seeds and fruits. They feed on the vegetative parts of grasses, clovers, mustard, dandelion, strawberry, thistle and other plants. Seeds and fruits as well as cultivated crops such as corn, oats, wheat and a variety of garden vegetables are also part of their diet. Franklin's ground squirrels are also carnivorous and eat some animal material, including beetles, caterpillars, grasshoppers, crickets, ants, small birds, ducks, deer mice, frogs, toads, birds' or ducks' eggs, and even other ground squirrels.

Franklin's Ground Squirrel Impact Analysis

Iowa WS did not receive any requests for assistance from individuals during FY03 and FY05 for Franklin's ground squirrel damage management. In future programs, Iowa WS may be requested to address damage or potential damage being caused by Franklin's ground squirrels to protect resources being damaged or threatened. Based upon an anticipated increase for requests for WS assistance, it is possible that WS could remove up to 50 Franklin's ground squirrels each year. These animals would be removed primarily at airports where their presence would attract raptors. Damage management actions would target a local population at sites where their presence was causing unacceptable risks to human health or safety, natural resources, or property resulting in a low magnitude of impact. The IDNR has also determined that there is no evidence to suggest that various mortality factors are resulting in adverse effects to Franklin's ground squirrel populations (D. Howell, IDNR, pers. comm. 2006).

Thirteen-lined Ground Squirrel Biology and Population Information

The thirteen-lined ground squirrel is so named because of the "thirteen" stripes found along its back. It is a small ground squirrel found in the midwestern U.S.; of all the squirrels listed as "ground squirrels," the thirteen-lined ground squirrel is most often misidentified as a gopher or chipmunk. These mammals typically inhabit short-grass prairie, but they have invaded the tall-grass areas where they live principally in pastures and along fencerows, but can also be found in prairies, golf courses, cemeteries, and open areas from Canada to the southern U.S. They live in burrows in the ground from which radiate well-marked paths to the feeding areas. Thirteen-lined ground squirrels are strictly diurnal and can be seen scurrying around during day-light hours on most summer days; in winter they hibernate.

Breeding begin about 2 weeks after squirrels emerge from hibernation. The males are sexually active for only 2-3 months. Normally one litter is produced annually, but one study found about 25% of the females produced two litters. The gestation period is 27-28 days. The young vary in number from 2 to 13; the yearling females produce the smallest litters. They mature sexually at about 9 or 10 months of age.

Their food is chiefly green grasses and herbs but seeds, flower heads, and insects contribute importantly to their diet as the season advances. They also eat mice and have been reported capturing and eating small chickens. Quantities of dry seeds stored in underground caches probably serve to carry the squirrels through the period of scarcity shortly after they emerge in the spring. Where concentrated in pastures and farming areas they may cause serious loss of forage and crops.

Thirteen-line Ground Squirrel Impact Analysis
Iowa WS did not receive any requests for assistance from individuals during FY03 and FY05 for thirteen-lined ground squirrel damage management. In future programs, Iowa WS may be requested to address damage or potential damage being caused by thirteen-lined ground squirrels anywhere in Iowa to protect resources. Based upon possible increases for WS assistance, it is possible that WS could remove up to 50 thirteen-lined ground squirrels each year. These animals would be removed primarily at airports where their presence would attract raptors. Damage management actions would target a local population at sites where their presence was causing unacceptable risks to human health or safety, natural resources, or property. The IDNR has also determined that there is no evidence to suggest that various mortality factors are resulting in adversely affects to thirteen-lined ground squirrel populations (D. Howell, IDNR, pers. comm. 2006) and therefore WS' activities would result in a low magnitude of impact.

Mink Biology and Population Information

The mink, as well as the skunk, is a member of the *Mustelidae* family. Mink are semiaquatic mustelids and associated with semipermanent and permanent wetlands, streams and rivers. Mink are distributed throughout North America, except in the desert southwest where stream flows are irregular (Jones et al. 1985).

Mink are opportunistic predators and feed primarily on birds and mammals including, but not limited to waterfowl, grebes (*Podicipedidae*), blackbirds (*Icterinae*), gulls (*Larinae*), partridges (*Perdix* spp.), ground squirrels (*Sciuridae*), and muskrats (Sargeant et al. 1973, Yeager 1943). They have also been found to prey on tiger salamanders (*Ambystoma tigrinum*) (Sargeant et al. 1973), crayfish (*Decapod*), and fish (*Osteichthyes*).

During the spring of the year, territorial males occupy large areas and females occupy smaller areas (Gerell 1970, Whitman 1981, Eagle and Whitman 1987, Eagle 1989). Female mink with kits (offspring) restrict their activities to an average of one wetland (Eberhardt and Sargeant 1977, Eagle 1989). In the prairie pothole region, mink tend to occupy circular habitats that may encompass many wetlands (Sargeant et al. 1993). Home ranges of adult male mink during May through July in the pothole habitat of Manitoba averaged 2.5 mi^2 (range = 1.2 - 6.3 mi^2) and included all or parts of 285 wetlands (Arnold 1986). They make their dens in muskrat houses, burrows, holes, crevices, logjams, or abandoned beaver lodges. They are active mainly at night and are active year-round except for brief intervals during periods of low temperature or heavy snow (Boggess 1994a). They may, however, adjust hunting times to prey availability (National Audubon Society 2000).

Population densities for mink vary spatially according to habitat and may be influenced by weather, trapping, and intraspecific aggression. Often mink harvests will parallel muskrat harvest but will lag a year or two behind the muskrat harvest. That is primarily due the fact that muskrat trappers will take advantage of mink that like to prey upon muskrats when the muskrat population is high (IDNR 2005). In general, population densities typically range from 0.025 to 0.247 mink per acre (McVey et al. 1993). In Montana, Mitchell (1961) estimated that 280 mink inhabited a 12.8 mi^2 area, resulting in a density of one mink per 29.2 acres. However, the following year he estimated that there were only 109 mink in the area, a density of one mink per 74.7 acres. Marshall (1936) estimated densities from mink tracks in snow in Michigan at 0.6 females per 1.5 mile of riverbank and a 1:1 sex ratio following heavy trapping. Errington (1943) counted 1 to 5 mink families occupying a 450 acres marsh in Iowa from 1933 to 1938. Errington also suggested that intraspecific aggression was responsible for the upper limit of mink inhabiting the marsh. McCabe (1949) estimated that there were 24 mink on a 1,100 acres refuge in Wisconsin during 1944, a density of one mink per 46.3 acres. In interior British Columbia, Ritcey and Edwards (1956) caught 11, 6, and 5 mink on 1.2 miles of stream during 3years. Their densities were similar to the estimate of 1.5–3mink to 2.5–5 mink per mile of shoreline reported by Hatler (1976) for a coastal area of Vancouver Island. Mitchell (1961) reported that a turnover of the population occurred during a 3-year period, and Gerell (1971) concurred (Novak 1987).

No population estimates were available for mink in Iowa. Therefore the best available information was used to estimate statewide populations. There are more than 161,000 acres of wetlands in Iowa including an estimated minimum of 71,665 miles of streams (USFWS 2001). Using the conservative estimate that 50% of Iowa's wetlands support mink and at an average density of 0.1 mink per acre would result in an estimated 8,050 mink in wetlands, and using 71,665 miles of streams with 50% occupied with mink at a density of 0.1 per mile results in 3,580 mink found in streams in Iowa.

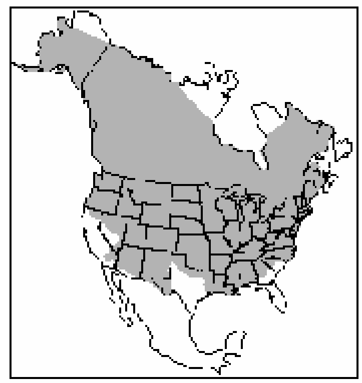
Mink Impact Analysis

Iowa WS personnel did not kill any mink from FY03 through FY05. Requests for assistance to WS may be made by those experiencing damage or potential damage from mink where suitable habitat occurs and would be to protect any resource. Mink would most probably be removed as part of an integrated management plan to protect fowl or other small livestock. Based upon current and possible increases in requests for assistance with mink damage, it is possible that WS could remove up to 5 mink per year in Iowa. Mink damage management activities would most probably target a single mink where their presence was causing unacceptable damage. The IDNR's determination of mink populations in Iowa indicates they are healthy, productive and stable and there is no evidence to suggest that human caused mortality, including removal by WS, will be detrimental to mink populations in Iowa (R. Andrews, IDNR, pers. comm. 2006) and resulting in a low magnitude of impact.

Muskrat Biology and Population Information

The muskrat is distributed throughout North America and is one of the most heavily harvested furbearers (Boutin and Birkenholz 1987) (Figure 4-3). They live in diverse habitats and can be found in freshwater and brackish marshes, ponds, sloughs, lakes, ditches, streams, and rivers (Boutin and Birkenholz 1987), but must have a source of permanent water and a protected site for shelter and rearing of young. Muskrats are considered the most prolific of the harvested North American furbearers (Smith et al. 1981) and muskrat harvest data show that muskrat harvests are (IDNR 2005), primarily based on water levels. Breeding generally occurs when ponds and streams become ice-free (Olsen 1959). The gestation period is 28 to 30 days, and females can remate immediately after giving birth (Wilson 1955). Thus muskrats have the potential to produce a litter every month, but the number of litters per female in any breeding season is generally about 3-4 (Wade and Ramsey 1986). Average litter size varies from three to nine; litter size tends to be larger in more northern populations (Danell 1978). These characteristics help make muskrats relatively immune to over-harvest (Boutin and Birkenholz 1987). However, drought cycles can directly influence populations and consequently harvest. Because of the muskrat's prolific reproductive capability, however, populations responded quickly as adequate water conditions returned. For example, in 1997, after an extended high water period, as "exploding" muskrat populations appeared vegetation disappeared due to muskrat "eat outs," the population rapidly declined (IDNR 2005).

Figure 4-3. Distribution of Muskrats.



Sustainable harvest rates from three to eight muskrats per acre have been reported (Boutin and Birkenholz 1987). Clearly, any mortality because of fur harvest (Table 4-2) or damage reduction would have an imperceptible impact on the population.

Muskrat Impact Analysis

Iowa WS personnel did not kill any muskrats from FY03 through FY05. Requests for assistance to WS may be made by those experiencing damage from muskrats anywhere in the State were suitable habitat occurs and to protect any resource being damaged or potentially damaged. The IDNR's assessment of muskrat populations in Iowa indicates they are healthy, productive and stable; Smith et al. (1981), using a model, determined that muskrats could sustain an annual harvest of 74% of the fall population. Based upon current and possible increases in requests for assistance, it is possible that WS could remove up to 100 muskrats annually without adversely affecting muskrat populations. This level of take is inconsequential to the numbers of animals taken by other entities and is not expected to affect populations of the species in the State (R. Andrews, IDNR, pers. comm. 2006) and the impact is determined to be of a low magnitude.

Opossum Biology and Population Information

Opossums are cat-sized and are the only marsupials (possess a pouch in which young are reared) found north of Mexico (Seidensticker et al. 1987). They frequent the eastern and central U.S. and are also found in parts of the southwestern U. S., Oregon, and Washington (Jackson 1994, National Audubon Society 2000). Adults range in size from less than 2 lbs to about 13 lbs, depending on sex and time of year; they grow throughout life (Seidensticker et al. 1987). They have a fairly broad range of pelage colors, but are usually considered as "gray" or "black" phase.

Their fur is grizzled white above; long white hairs cover black tipped fur below. They climb well and feed on a variety of foods, including carrion. In addition, these animals eat insects, frogs, birds, snakes, small mammals, earthworms, and berries and other fruits; persimmons, apples, and corn are favorite foods (National Audubon Society 2000). They use a home range of about 10-50 acres, foraging throughout this area (Jackson 1994), but concentrating on a few sites where fruits abound (Seidensticker et al. 1987).

The reproductive season of the opossum typically occurs from December to February, depending on latitude, and extends into November (Gardner 1982). Gestation is relatively short, averaging 12.8 days, and 1-14 (National Audubon Society 2000) or 1-17 (Gardner 1982) with young are born in an embryonic state, climbing up the mothers belly to the marsupium (pouch), attach to teats, and begin to suckle. The young remain in the pouch for about 2 months at which time they begin to explore and may be found traveling on their mother's back with their tails grasping hers (Whitaker and Hamilton 1998). Opossums live for only 1-2 years, with as few as 8% of a population surviving into the second year; the mean density during the study was 3.9 per 2.4 mi^2 (Seidensticker et al 1987).

Opossums Impact Analysis
Iowa WS did not receive any requests for assistance from individuals during FY03 through 05 concerning opossum damage. Opossums are classified as a regulated furbearer in Iowa and seasons for take and bag limits are set by IDNR, however, few of these animals are trapped by fur trappers. Information regarding the total number of opossum killed in Iowa annually is not available. In future programs, Iowa WS may be requested to reduce damage caused by opossums anywhere in the State. Based upon possible increases for WS assistance, it is possible that WS could remove up to five opossums each year. Opossum damage management activities would target single animals or local populations at sites where their presence was causing unacceptable damage or potential damage. The IDNR has determined that there is no evidence to suggest that human caused mortality is detrimental to opossum populations in the State (R. Andrews, IDNR, pers. comm. 2006). Based upon the above information, WS limited removal of opossums would have no adverse impacts on overall populations and result in a low magnitude of impact.

Pocket Gopher Biology and Population Information

Pocket gophers often live out their entire lives on less than an acre of land, and aside from brief encounters during the mating season, lead a solitary existence. The plains pocket gopher is a medium to small sized, dark brown gopher with large, furlined cheek pouches. The body is thick-set and appears heaviest anteriorly, from which it gradually tapers to the tail, widening a little at the thighs. The eyes are tiny and beadlike, and the ears are very rudimentary, represented only by a thickened ridge of skin at the base. Long curved claws are present on the front feet for digging; the claws on the hind feet are much smaller. They typically inhabit sandy soils where the topsoil is 4 inches or more in depth.

Breeding may begin in late January or early February and continues for a period of some 3 or 4 months. One litter a year, or two in quick succession, appears to be the rule. The young, usually two or three, are born from March to July. The young are nearly naked, blind, and helpless at birth. They remain with their mother until nearly full-grown and then are evicted to lead an independent life.

As long as they remain in their burrows, pocket gophers are relatively safe from predators other than those which are specialized for digging, such as badgers. However, when a gopher leaves its burrow it is highly vulnerable, and most predation losses probably occur on the surface. As a result of the protection offered by the burrow, pocket gophers are long-lived relative to many other rodents, insectivores, and lagomorphs, living an average of 1-2 years in the wild.

In farming regions pocket gophers can be destructive to crops and orchards. The amount of damage is closely associated with the number of animals; the highest population density of record is about seven per acre.

Pocket Gopher Impact Analysis
Iowa WS did not receive any requests for assistance from individuals during FY03 and FY05 to conduct pocket gopher damage management. However, in future programs Iowa WS may be requested to address damage being caused by pocket gophers anywhere in the State. Based upon possible increases for WS assistance, it is possible that WS could remove up to 50 pocket gophers each year. These animals would be removed primarily from at airports, or in urban and suburban settings; management activities would target single animals or local populations of the species at sites where their presence was causing unacceptable damage or potential damage. The IDNR has determined that there is no evidence to suggest that human caused mortality will be detrimental to pocket gopher populations in the State (R. Andrews, IDNR, pers. comm. 2006) and a low magnitude of impact.

Raccoon Biology and Population Information

The raccoon is a member of the family *Procyonidae* that includes ringtails and coatis in North America. Raccoons are one of the most omnivorous of animals, feeding on carrion, garbage, birds, mammals, insects, crayfish, mussels, other invertebrates, a wide variety of grains, various fruits, other plant materials, and most or all foods prepared for human or animal consumption (Sanderson 1987).

Sanderson (1987) stated that absolute population densities of raccoons are difficult if not impossible to determine because of the difficulty in knowing what percentage of the population has been counted or estimated, and the additional difficulty of knowing how big an area the raccoons are using. Twichell and Dill (1949) reported one of the highest densities, with 100 raccoons removed from a winter tree den area on 101 acres of a waterfowl refuge in Missouri during winter. Other studies have found raccoon densities that ranged from 9.3 per mi^2 to 80 per mi^2 (Yeager and Rennels 1943, Urban 1970, Sonenshine and Winslow 1972, Hoffman and Gottschang 1977, Rivest and Bergeron 1981).

Raccoons have been an interesting species in Iowa with comparatively low harvests until 1967 and then noticeably increased harvests through 1986-87 when a record 390,800 raccoon were taken (IDNR 2005). A quarter million raccoons were harvested annually for 15 years (1973-1987) and yet the population remained very high. It is likely that the high raccoon harvest has kept raccoon populations at very healthy levels. Since 1989 the raccoon harvest has leveled off at near 100,000 pelts which is indicative of the suppressed raccoon fur values.
In 1978 the IDNR initiated a Raccoon and Deer Spotlight Survey in an effort to establish population trend index for raccoon and deer. Based on the mean number of raccoons observed per route it appears that the raccoon population has fluctuated considerably. Low harvests appear associated with increased raccoons observed per route the subsequent spring. The spotlight survey index of the 1990's has been the highest ever recorded since the survey began in 1978. Reduced raccoon harvest since 1987 is most likely the major reason for the record high population of recent years.

Raccoon Impact Analysis
The raccoon harvest accounts for nearly 60% of the total fur value (IDNR 2005) and the reported allowable harvest level for raccoons was established at 49% of the total population (USDA 1997).

Iowa WS did not receive any requests for assistance from individuals during FY03 and FY04, however WS removed four raccoon during FY05. Raccoons are classified as a regulated furbearer in Iowa and seasons for take and bag limits are set by IDNR. In future programs, Iowa WS may be requested to address damage being caused by raccoons anywhere in the State to protect resources with activities targeting single animals or local populations at sites where their presence was causing unacceptable damage. Based upon possible increases for WS assistance, it is possible that WS could remove up to 25 raccoons each year primarily from urban and suburban populations, which are not hunted. The available harvest information shows the Iowa WS removed less than 1% of the 2005 estimated harvest in Iowa. The IDNR has also determined that there is no evidence to suggest that human caused mortality is detrimental to raccoon populations in the State (R. Andrews, IDNR, pers. comm., 2006). As the WS take is substantially less than 49% of the allowable harvest, the magnitude of impact is low.

Red Fox Biology and Population Information

Red fox are the most common and well-known species in the genus *Vulpes* and are the most widely distributed nonspecific predator in the world (Voigt 1987). Red fox are regarded as nuisance predators in many regions, preying on wildlife and livestock, and have become notorious in many areas of the world as carriers of diseases (Ables 1969, Andrews et al. 1973, Tabel et al. 1974, Tullar et al. 1976, Pils and Martin 1978, Sargeant 1978, Voigt 1987, Allen and Sargeant 1993). Red fox have been the subject of many studies during the last 25 years and investigations have revealed that red fox are extremely adaptive and diverse in their behavior and habitats (*e.g.*, Sargeant 1982).

The density of red fox populations is difficult to determine because of the species secretive and elusive nature. However, the red fox has a high reproductive rate and dispersal capacity similar to coyotes, and can withstand high mortality within the population (Allen and Sargeant 1993, Voigt 1987, Voigt and MacDonald 1984, Harris 1979, Pils and Martin 1978, Storm et al. 1976, Andrews et al. 1973, Phillips and Mech 1970). Storm et al. (1976) stated that 95% of the females (43.6% were less than 1 year old) bred successfully in a population in Illinois and Iowa. Litter sizes averaged about 4.7 for 13 research studies and litters with as many as 14 and 17 offspring have been reported (Storm et al. 1976, Voigt 1987). Ables (1969) and Sheldon (1950) reported that more than one female was observed at the den and suggested that red fox have *"helpers"* at the den, a phenomena observed in coyotes and other canids. Reported red fox population densities have been more than 50 per mi^2 (Harris 1977, MacDonald and Newdick 1982, Harris and Rayner 1986) where food was abundant; Ontario population densities are estimated at 2.6 animals per mi^2 (Voigt 1987), and Sargeant (1972) reported 1 fox den per 3 mi^2 in North Dakota.

Red fox dispersal serves to replace and equalize fox densities over large areas and over a wide range of population densities. Annual harvests in localized areas in one or more years will likely have little impact on the overall population in subsequent years, but may reduce localized predation (Allen and Sargeant 1993). Phillips (1970) stated that fox populations are resilient and in order for fox control operations by trapping to be successful, pressure on the population must be almost continuous. Phillips (1970) and Voigt (1987) further state that habitat destruction that reduces prey numbers, water, and cover will affect fox populations to a greater extent than a short-term harvest.

Red Fox Impact Analysis

Red fox harvests have increased significantly since the mid-1960s in Iowa, stabilizing between 12,000 and 20,000 fox pelts during the past couple of decades. The red fox population is making a slow comeback in the modern day traditional fox areas of northwest and north-central Iowa. An outbreak of mange in the early 1980s and the suppressed fur market greatly reduced the fox population as well as the harvest during the past six seasons.

Iowa WS did not receive any requests for assistance from individuals during FY03 and FY04, however WS removed three red fox during FY05. Red fox are classified as a regulated furbearer in Iowa and seasons for take and bag limits are set by IDNR. In future programs, Iowa WS may be requested to address damage being caused by red fox anywhere in the State and WS could remove up to 10 red fox annually; activities would target single animals or local populations from rural populations and airports which are not hunted or trapped. The available harvest information shows the Iowa WS' kill to be less than 1% of the 2005 estimated take in Iowa; USDA (1997) determined the allowable harvest level for red fox was 70% of the total population. Further, the IDNR has determined that there is no evidence to suggest that human caused mortality resulting from regulated fur harvest and damage management will be detrimental to red fox populations in the State (R. Andrews, IDNR, pers. comm. 2006) and the magnitude of impact is low

River Otter Biology and Population Information

Historically, river otters inhabited aquatic systems throughout much of North America, excluding the frozen Arctic and arid Southwest (Hall and Kelson 1959). As its broad geographic distribution suggests, the river otter is able to adapt to diverse aquatic habitats. Otters are found in both marine and freshwater environments ranging from coastal to high mountainous habitat. Riparian vegetation adjacent to lakes, streams, and other wetland areas are a key component of otter habitat.

In 1977 the river otter was placed on the Iowa's list of Species of Special Concern and provided special protection under Iowa Law (Code 571 Chapter 77.1). River otter populations increased in Iowa to the point where in 2006 the Wildlife Commission removed the river otter from the list in all drainages and implemented a harvest season (IDNR 2005).

River Otter Impact Analysis
Population estimates available for river otters in Iowa indicate that there are about 7,500 in the State. WS did not respond to any requests for assistance nor removed any otter from FY03 through FY05. Some aquaculture producers or fish hatchery managers could request assistance to reduce the loss of fish taken by river otter. It is possible that as many as 25 river otters per year could be intentionally removed by WS conducting damage management programs. The IDNR has determined that there is no evidence to suggest that human caused mortality resulting from regulated fur harvest and damage management will be detrimental to river otter populations in the State (R. Andrews, IDNR, pers. comm. 2006). Based upon the above information, WS limited removal of river otter would have no adverse impacts on overall populations in the State and of a low magnitude of impact.

Striped Skunk Biology and Population Information

The striped skunk is the most common member of the *Mustelidae* family. Striped skunks have increased their geographical range in North America with the clearing of forests, however there is no well-defined land type that can be classified as skunk habitat (Rosatte 1987). Striped skunks are capable of living in a variety of environments, including agricultural and urban areas.

The home range of striped skunks is not sharply defined over space and time, but is altered to accommodate life history requirements such as raising young, winter denning, feeding activities, and dispersal (Rosatte 1987). Home ranges averaged between 0.85 to 1.9 per mi^2 for striped skunks in rural areas (Houseknecht 1971, Storm 1972, Bjorge et al. 1981, Rosaette and Gunson 1984). The range of skunk densities is from 0.85 to 67 per mi^2 (Jones 1939, Ferris and Andrews 1967, Verts 1967, Lynch 1972, Bjorge et al. 1981). Many factors may contribute to the widely differing population densities. Type of habitat, food availability, disease, season of the year, and geographic area are only a few of the reasons (Storm and Tzilkowski 1982). Specific population density estimates for striped skunks in Iowa are not available although populations appear to be

Striped Skunk Impact Analysis
WS did not respond to any requests for assistance nor removed any striped skunks from FY03 thorough FY05. It is possible that as many as 20 striped skunks per year could be intentionally removed by WS annually. Skunk populations can reportedly sustain a 60% annual harvest level indefinitely (Boddicker 1980). IDNR furbearer harvest data from 2003 and 2004 suggests an average annual harvest of 875 skunks per year by private trappers in Iowa. However, the total annual harvest of striped skunks in Iowa is likely about 2,600 animals. The IDNR has determined that there is no evidence to suggest that human caused mortality resulting from regulated fur harvest and damage management will be detrimental to striped skunk populations in the State (R. Andrews, IDNR, pers. comm. 2006). Because this level of harvest is substantially less than the sustainable harvest level, there are no adverse impacts on overall populations in the State and cumulative impacts are of a low magnitude.

White-tailed Deer Biology and Population Information

Iowa WS responded to 10 requests for assistance for white-tailed deer damage during FY 2003 through 2005 and totaling $100,000[16] in damage. The IDNR is responsible for managing damage associated with white-tailed deer and WS refers most complaints to them, however in some

[16] Loss values were not obtained for all reports and requesters were rarely able to provide loss values for human health and safety threats.

situations technical assistance was provided. Resources affected included human health and safety, aviation safety, gardens, golf courses, soybeans, and trees and shrubs.

The IDNR is responsible for the management and monitoring the State's white-tailed deer population. The IDNR manages deer in accordance with their white-tailed deer strategic plan, including the monitoring of harvest, deer-vehicle collisions, crop damage, and deer hunter survey data. The State uses a management unit-based deer population model and sets harvest limits on a management unit basis.

White-tailed deer range throughout most of the U. S., except the far southwest, and also inhabit the southern half of the Canadian provinces. This species inhabits farmlands, brushy areas, woods, and suburbs. Although they are primarily nocturnal, white-tailed deer may be active at any time. They move to feeding areas along established trails, then spread out to feed (National Audubon Society 2000). They thrive in agricultural areas interspersed with woodlots and riparian habitat and favor early successional stages which keep browse within reach. Dense cover is used for shelter and protection (Craven and Hygnstrom 1994).

The IDNR uses three types of surveys to determine if the deer population appears to have increased or decreased through time. One of the original sources of information to keep track of deer populations is the number of deer that are killed on highways. A second survey, a spotlight survey, was initiated in 1978 and designed to provide the IDNR with changes in both raccoon and deer populations. The final technique is aerial counts of selected areas across the State following the hunting seasons (www.iowadnr.com/wildlife/files/drmany.html). This survey was first conducted in 1983.

Figure 4-4. White-tailed Deer Population Trend in Iowa.

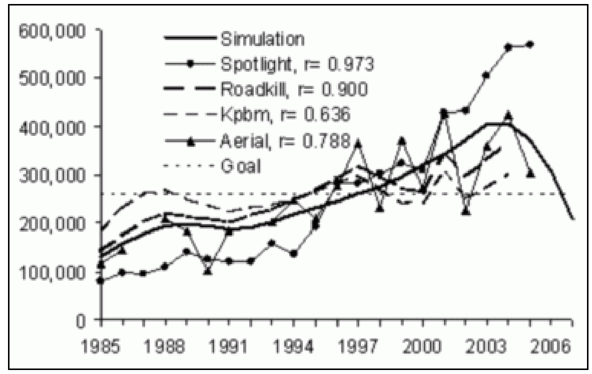


Table 4-3. White-tailed Deer Harvest in Iowa, 2005 (iowadnr.com/wildlife/pdfs/deerlog.pdf).

Season	License Type	Licenses Issued	Number of Hunters	Harvest	Success Rate
REGULAR GUN					
Paid	Season 1	71,455	70,812	49,283	70%
	Antlerless	13,074	12,813	8,691	68%
	Season 2	48,057	46,920	32,427	69%
	Antlerless	15,211	14,842	7,429	49%
	Nonresident	4,507	4,337	2,515	58%
	Total	152,304 (+ 8%)*a*	149,723 (+10%)	100,345 (+ 1%)	
Landowner	Any sex	45,406	38,785	22,561	58%
	Antlerless	8,276	5,494	3,772	69%
	Total	53,682 (+ 3%)	44,279 (+ 8%)	26,333 (+ 4%)	
GUN SEASON TOTAL		**205,986 (+ 7%)**	**194,002 (+10%)**	**126,678 (+ 2%)**	**65%**
MUZZLELOADER					
Early	Paid	7,510	7,185	4,340	60%
	Antlerless	2,378	2,272	1,249	55%
	Landowner	3,237	2,026	1,229	61%
	Total	13,125 (+10%)	11,483 (- 1%)	6,818 (+11%)	59%
Late	Paid	13,800	13,308	6,648	50%
	Antlerless	12,760	11,647	6,090	52%
	Landowner	2,677	1,695	812	48%
	Nonresident	851	697	350	50%
	Total	30,088 (+22%)	27,347 (+24%)	13,900 (+12%)	51%
MUZZLELOADER TOTAL		**43,213 (+18%)**	**38,830 (+16%)**	**20,718 (+12%)**	**53%**
JANUARY SEASON					
	Paid	14,182	12,509	7,455	60%
	Landowner	9,131	5,242	2,608	50%
	Total	**23,313 (+28%)**	**17,751 (+58%)**	**10,063 (+51%)**	**57%**
HOLIDAY ANTLERLESS		**349**	**329**	**102**	**31%**
YOUTH	Paid	3,978	3,948	2,066	52%
	Landowner	304	262	91	35%
	Disabled	90	82	40	49%
	Total	**4,372 (+12%)**	**4,292 (+15%)**	**2,197 (+16%)**	**51%**
ARCHERY	Paid	41,321	39,092	17,964	46%
	Antlerless	20,268	18,984	9,951	52%
	Landowner	5,804	4,538	2,110	46%
	Nonresident	2,745	2,588	1,020	39%
ARCHERY TOTAL		**70,138 (+11%)**	**65,202 (+17%)**	**31,045 (+13%)**	**48%**
TOTAL *b*		**353,172 (+10%)**	**326,207 (+13%)**	**194,512 (+ 6%)**	

a - the numbers in parentheses are the percent change from 2003-2004
b - total include licensed hunters and kill from hunts in special deer management zones and depredation licenses

These survey indicate that the overall State's deer population is healthy, productive and increasing (Figure 4-4) (W. Suchy, IDNR, pers. comm. 2006). The Statewide deer population has been increasing since at least about 1985 and significant increases have occurred in localized areas (*i.e.*, Iowa City, Des Moines). These increases are likely due to a number of factors, including poor hunter access, local and State ordinances limiting discharge and use of firearms and bows, improved habitat, and better deer habitat management practices.

White-tailed Deer Impact Analysis
A record number of deer were killed during the 2004-2005 season[17] (iowadnr.com/wildlife/pdfs/deerlog.pdf); the estimated kill was 194,512 deer which is about 6% higher than in 2003[18] (Table 4-3). The number of does killed increased by about 7,415 or 8% over 2003. Most of the increase was due to the extra 30,500 antlerless licenses available during all seasons as well as during the January season. Five of the top 10 counties for total kill were in the northeast corner of the state, with Clayton County the top for total kill at 8,436 deer or about 10.8 deer/mi^2 of area.

Special Purpose Deer Control Permit Program[19]. The IDNR is authorized to issue Shooting Permits as necessary to achieve program goals and address issues of concern (*i.e.*, damage or potential damage). WS activities to reduce deer hazards at airports and in other areas have been covered under these types of IDNR permits.

Deer Damage Control Permits[19]. Iowa has a tiered approach when dealing with deer damage occurring on commercial or non-commercial property. On land exhibiting deer damage, most complaints are observed on agricultural properties. A landowner complaint results in an inspection by a biologist who will discuss management options. If lethal options are deemed appropriate, Deer Damage Control Permits for out-of-season harvest may be issued.

WS did not kill any deer between FY03 through FY05, however based on potential increases for requests (*i.e*., increased airport requests, municipality and county) WS' actions may result in localized damage management efforts. However, given the reproductive capacity of deer, the relatively high density of deer in the State, and the high mobility of deer, these reductions would only be short-term. Based upon an anticipated increase in future requests for WS assistance, WS predicts that up to 500 deer could be removed annually or less than 0.2% of the estimated population in Iowa and about 0.25% of the legal annual harvest in Iowa. These deer, however, would almost always be removed from urban, airport and industrial environments where hunting is not allowed and the cumulative impact would be of a low magnitude.

Feral (Other) Target Species[20]

A feral animal is one that escaped from domestication and returned, partly or wholly, to a wild or semi-wild state. Rarely will the natural environment have evolved to accommodate the feral species into its established ecology. Therefore, feral animals can cause disruption or extinction to some indigenous species, reduce the quality of the environment and other fragile ecosystems and often cause excessive damage to property or other protected resources.

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17 Success rates were good across most of the state. Hunters in almost all counties had success rates greater than 60% especially during the first season.

18 The previous record harvest was in 2003 when an estimated 182,856 deer were harvested.

19 About 2,000 deer were taken during special management hunts in urban areas and State and county parks and another 1,700 deer were taken on special depredation tags issued to landowners with damage problems.

20 Operational activities should be coordinated with animal, wildlife management and/or law enforcement agencies, as appropriate (WS Directive 2.320).

Feral Hog Biology and Population Information

Feral hogs are a non-native species primarily found in the southern portions of Iowa and the most prolific feral mammal in North America. The IDNR currently considers feral hogs as an invasive species and does not track harvest or population densities. Although WS has not received any requests for assistance with feral hogs, biologists with WS and the IDNR are reporting an increase in feral hog sightings and activity, and are concerned that feral hog populations in Iowa are increasing. Feral hogs have destructive feeding habits, a potential to spread disease and they can be a substantial liability to agriculture and native wildlife. WS could be requested to assist with the removal of feral hogs for the reduction of: 1) damage to agricultural and natural resources, 2) risks to human health and safety, or 3) for disease surveillance and management.

Good feral hog habitat consists of diverse forests with some openings and a good litter layer to support soil invertebrates and/or ground vegetation, roots, and tubers. Hogs are also fond of marshy areas particularly during hot summer months where "wallows" or depressions dug in the mud are used.

Feral hogs generally breed year round but peak breeding occurs in January-February and early summer and they may begin to breed before 6 months of age with sows capable of producing two 2 litters per year (Barrett and Birmingham 1994). Litters sizes are usually 3-12 (National Audubon Society 2000) and given adequate food, a wild hog population can double in just 4 months.

Feral hogs often have negative impacts on the environment and are considered by many to be an undesirable component of wild and native ecosystems. Executive Order 13112 – Invasive Species - directs federal agencies to use their programs and authorities to prevent the spread of or to control populations of invasive species that cause economic or environmental harm, or harm to human health. As a result, agricultural producers may request assistance to reduce damage to standing crops or disease threats to livestock. Natural resource managers may request assistance to protect natural areas, parks or recreation areas, or T&E species. Public health agencies may request assistance where disease threats to humans may be present.

Feral Hog Impact Analysis

No feral hogs were killed by WS from FY03 through FY05, however, damage may increase dramatically in areas where this species has ample resources and opportunity to expand. It is possible that WS could remove up to 100 individuals annually and activities would target single animals or local populations where their presence was causing unacceptable damage. Such management actions are not expected to affect overall statewide populations because of high reproductive rates exhibited by these animals (Barrett and Birmingham 1994) and result in a low magnitude of impact.

Feral Cat Biology and Population Information

Feral cats are house cats living in the wild and can be found in commensal relationships wherever people are found. In many suburban and rural areas, feral cats are the most abundant predator and are opportunistic predators and scavengers that feed on rodents, rabbits, shrews, moles, birds, insects, reptiles, amphibians, fish, carrion, garbage, vegetation, and leftover pet food (Fitzwater 1994). Feral cats can produce 2 - 10 kittens during any month of the year and an adult female may produce three litters per year where food and habitat are sufficient. Cats may be active during the day but typically are more active during twilight or night. After several generations, feral cats can be considered to be totally wild in habits and temperament (Fitzwater 1994).

Where it has been documented, the impact of feral cats on wildlife populations from predation and competition for food has been enormous (Coleman and Temple 1989). In the United Kingdom, one study determined that house cats may take 70 million animals and birds (Churcher and Lawton 1987). In addition, feral cats serve as a reservoir for human and wildlife diseases, including cat scratch fever, distemper, histoplasmosis, leptospirosis, mumps, plague, rabies, ringworm, salmonellosis, toxoplasmosis, tularemia, and various parasites (Fitzwater 1994).

Feral Cat Impact Analysis
WS did not provide technical advice or receive any requests for assistance with feral cat damage in Iowa during FY03 through FY05 and no feral cats were killed by Iowa WS from FY03 through FY05. However, in future programs WS may be requested to reduce damage or potential damage from feral cats anywhere in the State and it is possible that WS could remove up to 10 feral cats annually to protect human health and safety, valued wildlife, or captive birds and other animals. Based upon the above information, WS limited removal of feral cats should have no adverse effects on overall populations of this species and a low magnitude of impact.

Feral Dog Biology and Population Information

Most feral dogs are difficult, if not impossible, to distinguish from domestic dogs because they are found in a variety of shapes, sizes, colors, and even breeds. Most feral dogs appear similar to dog breeds that are locally common (Green and Gipson 1994). Feral dogs are usually secretive and wary of people, thus they are active during dawn, dusk, and at night much like other wild canids. They often travel in packs or groups and may have rendezvous sites like wolves. Travel routes to and from the gathering or den sites may be well defined and food scraps and other evidence of concentrated activity may be observed at the sites. Home ranges of feral dogs vary in size and are probably influenced by the availability of food. Like coyotes, feral dogs are best described as opportunistic feeders. They can be efficient predators, preying on small and large animals, including domestic livestock; feral dogs can also cause damage by preying on house cats, or domestic dogs. They may also feed on fruits including melons, berries, grapes, and native fruit and have been known to attack people, especially children. This is especially true where they feed at and live around garbage dumps near human dwellings (Green and Gipson 1994). Many rely on carrion, particularly road-killed animals, crippled waterfowl and refuse at garbage dumps (Green and Gipson 1994). Dog packs that are primarily dependent on garbage may remain in the immediate vicinity of a dump, while other packs that depend on livestock or wild game may forage over an area of 50 mi^2 or more (Green and Gipson 1994). In some areas of the U.S., including Iowa, feral dogs can pose threats to air traffic by invading airport environments to forage (E. Colboth, USDA-WS, pers. comm., 2006). Some local populations may be reduced at a local site and in those cases this would be considered a beneficial impact on the human environment since feral dogs are not considered part of the native ecosystem.

Feral Dog Impact Analysis
No feral dogs were killed by WS during mammal damage management from FY03 through FY05. However, requests may be received in areas where this species has ample resources and opportunity to expand. In future programs, WS may be requested to reduce damage or potential damage caused by feral dogs and WS could remove 10 feral dogs annually anywhere in the State. Many of these would be removed in projects aimed at protecting human health and safety, valuable wildlife, or captive birds and other animals. Based upon the above information, WS

limited lethal removal of feral dogs should have no adverse effects on overall populations of this species in Iowa. Any damage management involving actions by WS would be restricted to isolated individual sites and a low magnitude of impact.

4.2.1.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would not kill any target mammal species because no lethal methods would be used. Although WS lethal take of mammals would not occur, it is likely that private mammal damage management efforts would increase. Cumulative impacts on target species would be variable depending upon actions taken by affected landowners/resource managers and the level training and experience of the individuals conducting the damage management. Some individuals experiencing damage may take illegal or unsafe action either unintentionally due to lack of training, or deliberately out of frustration of continued damage. In these instances, more target species may be taken than with a WS adaptive IWDM program. Ready access to WS assistance with non-lethal mammal damage management may decrease private efforts to use lethal techniques. Therefore, take of target species may be less than anticipated with Alternatives 1 and 4. Overall impacts on target species populations would be similar to or slightly higher than Alternative 2 depending upon the extent to which resource managers use the assistance provide by WS. However, for the reasons presented in the population effects analysis in section 4.2.1.2, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

4.2.1.4 Alternative 4: No Federal WS Mammal Damage Management

Under this alternative, WS would have no impact on mammal populations in the State. Private efforts to reduce or prevent damage or potential damage would likely increase. As with Alternatives 1 and 3, cumulative impacts on target species populations would be variable depending upon actions taken by affected landowners/resource managers and the level training and experience of the individuals conducting the mammal damage management. Impacts on target species are likely to be similar to or slightly higher than Alternative 2. Because resource owners/managers would not have access to WS technical assistance or, at least, operational assistance with non-lethal techniques, impacts may be greater than alternatives 1 and 3. For the same reasons shown in the population effects analysis in section 4.2.1.2, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

4.2.2 Effects on Other Wildlife Species, including T&E Species

4.2.2.1 Alternative 1: Technical Assistance Only

Effects on Non-target (non-T&E) Species - Alternative 1 would not allow any WS direct operational mammal damage management in Iowa; therefore WS would not take any non-target species under this alternative. The IDNR or other natural resource management entities may have to allocate staff time and resources to protect T&E and rare species because WS could no longer assist. Only technical assistance or self-help information would be provided. Although technical assistance might lead to more selective use of methods than that which might occur under Alternative 4, efforts to reduce or prevent damage could still result in less experienced persons implementing methods, leading to greater risks to non-target wildlife than under the proposed action. It is hypothetically possible that, similar to Alternative 3 and 4, frustration caused by the inability to reduce damage and associated losses could lead to illegal use of toxicants which could lead to unknown risks to non-target species populations. Hazards to wildlife could therefore be greater under this alternative if toxicants that are less selective or that cause secondary poisoning are used by frustrated entities.

Effects on wetlands - WS would have no direct impact on wetlands. WS would only provide technical advice to those entities requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance. Overall impacts should be less than Alternative 4 when WS technical advice is requested and followed, however impacts could be greater than under Alternative 2.

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 will vary depending upon the training and level of experience of the individual(s) conducting the mammal damage management. As stated above, frustrated individuals may resort to use of unsafe or illegal methods like poisons which may increase risks to listed species. Risks to T&E species may be lower with this Alternative than with Alternative 4 because WS could advise individuals as to the potential presence of State and federally listed species and could facilitate consultation with the appropriate agency.

4.2.2.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

Effects on Non-target (non-T&E) Species - Direct impacts on non-target species could occur if WS program personnel were to inadvertently kill, injure, or harass animals that are not target species. In general, these effects result from the use of methods that are not completely selective for target species. Non-target species are usually not affected by WS' non-lethal management methods except for the occasional scaring from harassment devices. In these cases, some affected non-target wildlife may leave the immediate vicinity, but may return after conclusion of the action.

There has been no lethal take of non-target species by WS while conducting mammal damage management activities in Iowa. WS' take of non-target species during mammal damage management activities is expected to be extremely low to non-existent. If take of non-target species would occur, these occurrences would be rare and should not affect the overall populations of any species under the current program.

WS personnel are experienced and trained in wildlife identification and to select the most appropriate method(s) for excluding non-target species. Shooting is virtually 100% selective for the target species; therefore no adverse impacts are anticipated from use of this method. WS personnel use animal lures and set traps and snares in locations that are conducive to capturing target animals while minimizing potential impacts to non-target species. Any non-target species captured would be subsequently released on site unless it is determined by WS personnel that the animal will not survive.

WS' SOPs require compliance with pesticide labels, use restrictions, and establish training requirements for all employees applying pesticides as built-in measures to assure that use of registered products do not result in significant adverse effects on non-target species. WS' risk assessments concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997). Chemical pesticides that have come into use since the risk assessment was completed have undergone considerable environmental review through EPA and State registration processes, which means they have been found to present no unreasonable risk to the environment or human health and safety when used according to label directions. SOPs designed and implemented to avoid adverse effects on non-target species are described in Chapter 3.

Effects on wetlands – Under this alternative, the only activity which could affect wetlands is the breaching of beaver dams for the purpose of returning streams, channels, dikes, culverts, and irrigation canals to their original drainage pattern. WS breaches/removes most beaver dams because of flooding in areas such as yards, parks, roads, timberlands, croplands, pastures, and other types of property or resources that were not previously flooded. Recently flooded sites do not possess true wetland characteristics, and wildlife habitat values are not the same as established wetlands. Dam breaching in these situations restores the status quo for these sites and will likely be beneficial to most resident plants and animals. In the relatively rare instances when WS has been requested to breach a dam from an area where wetland communities have developed, WS uses the procedures established by the USACE and IDNR described in Appendix C to assure compliance with pertinent laws and regulations. For these reasons WS beaver dam removal/breaching activities would have no impact on wetlands.

Effects on T&E Species - WS mammal damage management activities in Iowa would have "no effect" on Federal or State listed T&E species. This determination is based on the conclusions made by the USFWS during their 1992 programmatic consultation on the National WS program and subsequent BO (USDI 1992) and consultation with USFWS personnel with jurisdiction for Iowa (J. Millard, USFWS email to E. Colboth, WS September 6, 2006). Iowa WS adheres to all applicable Reasonable and Prudent Measures and Terms and Conditions from USDI (1992). In addition, WS will also consult with the State and Federal Endangered Species programs prior to the initiation of new damage management methods.

4.2.2.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Effects on Non-target (non-T&E) Species - WS' efforts to protect T&E species would not be as effective as the preferred alternative because WS would not have access to all available techniques. Lethal efforts to protect these species would have to be conducted by other natural resource management entities (*e.g.*, IDNR). Non-target species are usually not affected by WS' management methods, except for the occasional scaring or harassment. In these cases, affected non-target wildlife may leave the vicinity of scaring, but could return after conclusion of the action. Capture and release (*e.g.*, for disease monitoring) and capture and relocate would be allowed under this alternative. There is the remote chance that some 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 using non-lethal methods, members of the public may resort to lethal control, such as the use of shooting or the use of toxicants. This could result in less experienced persons implementing control methods and could lead to greater risks to non-target species 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 toxicants which could lead to unknown effects on local non-target species populations, including T&E species. Hazards to wildife, including bald eagles, could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Effects on wetlands - Beaver created impoundments could be breached/removed by hand by WS for the purpose of returning streams, channels, ditches, and irrigation canals to the original drainage under this alternative. Overall effects would be similar to Alternative 2.

Effects on T&E species – WS would not have any long-term adverse impact on T&E species. Risks to T&E species from increased private efforts to address management problems vary depending upon the training and level of experience of the individual conducting the management action. As stated above, frustrated individuals may resort to use of unsafe or illegal methods like poisons which may increase risks to T&E species. Risks to T&E species may be lower with this Alternative than with Alternative 4 because people would have ready access to assistance from WS with non-lethal mammal damage management techniques. WS could advise individuals as to the potential presence of State and federally listed species in their area.

4.2.2.4 Alternative 4: No Federal WS Mammal Damage Management

Effects on Non-target (non-T&E) Species - Alternative 4 would not allow any WS mammal damage management in the State; therefore WS would not take any non-target species under this alternative. The IDNR or other natural resource management entities would have to allocate staff time and resources for projects to protect resources because WS would no longer be available to assist. Private efforts to reduce or prevent damage could increase which could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than under the proposed action. It is possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of toxicants which could impact local non-target species, including some T&E species. Hazards to wildlife, including bald eagles, could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated individuals.

Effects on wetlands - WS would have no impact on wetlands. Under this alternative, beaver dam breaching and removal would be met by private, State, or local government entities. Some beaver impounded areas that WS would advise against draining might be drained under other direction, which could have adverse effects on wetland habitats in localized circumstances.

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 would vary depending upon the training and level of experience of the individual conducting the management action. As stated above, frustrated individuals may resort to use of unsafe or illegal methods like poisons which may increase risks to species like the bald eagle. 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 mammal damage management techniques or have the opportunity to advise individuals regarding the presence of T&E species.

4.2.3 Effects on Human Health and Safety

4.2.3.1 Safety and Efficacy of Chemical Management Methods

4.2.3.1.1 Alternative 1: Technical Assistance Only

Alternative 1 would not allow any operational management assistance by WS. Concerns about human health risks from WS' use of chemical mammal damage management methods would be alleviated because no such use would occur. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing management methods and leading to a greater risk than Alternative 2. However, because some of these private parties would be receiving advice and instruction from WS, concerns about human health risks from chemical mammal damage management methods use should be less than under Alternative 4.

Hazards to humans and pets could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. It is possible that frustration caused by the inability to alleviate damage could lead to illegal use of certain toxicants that could pose secondary poisoning hazards. Some chemicals that could be used illegally could present greater risks of adverse effects on humans than those potentially used under the Proposed Action.

4.2.3.1.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

Pesticides - Pesticides that could be used by WS under this alternative are described in detail in Appendix C and USDA (1997) and include zinc phosphide bait and gas cartridges. Gas cartridges and zinc phosphide bait are only used by WS personnel who are certified pesticide applicators, in accordance with label restrictions. Based on a thorough risk assessment, APHIS concluded that, when WS Program chemical methods, including those referenced above, are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997). Therefore, mammal damage management programs in Iowa where such pesticides are used are not expected to adversely affect public safety. There have been no observed symptoms of chronic poisoning due to zinc phosphide exposure in humans.

Other Mammal Damage Management Chemicals. Non-lethal mammal damage management chemicals that might be used or recommended by WS would include repellents such Hinder, Deer Away and others that are registered with the IDALS. Such chemicals must undergo rigorous testing and research to prove safety, and low environmental risks before they would be registered by the EPA or FDA. Any operational use of chemical repellents would be in accordance with labeling requirements under federal and State pesticide laws and regulations which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in SOP that would assure that use of registered chemical products would avoid significant adverse effects on human health.

Drugs used in capturing, sedating, handling, and euthanizing wildlife for management purposes include: ketamine hydrochloride, a mixture of tiletamine and zolazepam (Telazol), xylazine (Rompun), sodium pentabarbitol, potassium chloride, Yohimbine, antibiotics, and others. WS would adhere to all applicable requirements of the Animal Medicinal Drug Use Clarification Act (AMDUCA) to prevent any significant adverse impacts on human health with regard to this issue. SOPs for the use of drugs would include

- All drugs used in capturing and handling wildlife would be under the direction and authority of State veterinary authorities, either directly or through procedures agreed upon between those authorities and APHIS-WS. As determined on a State-level basis by these veterinary authorities (as allowed by AMDUCA), wildlife hazard management programs may choose to avoid capture and handling activities that utilize immobilizing drugs within a specified number of days prior to the hunting or trapping season for the target species to avoid release of animals that may be consumed by hunters prior to the end of established withdrawal periods for the particular drugs. Animals that have been drugged and released would be ear tagged or otherwise marked to alert hunters and trappers that they should contact state officials before consuming the animal.

- Most drug administration would be scheduled to occur well before state controlled hunting/trapping seasons which would give the drug time to completely metabolize out of the animals' systems before they might be taken and consumed by humans. In some instances, animals collected for mammal damage management purposes would be euthanized when they are captured within a certain specified time period prior to the legal hunting or trapping season to avoid the chance that they would be consumed as food while still potentially having immobilizing drugs in their systems.
- Activities involving the handling and administering drugs, drugs selected for use, animal marking systems, and the fate of any animals that must receive drugs at times during or close to scheduled hunting seasons would be coordinated with the IDNR.

By following these procedures, the proposed action would avoid any significant impacts on human health with regard to this issue.

4.2.3.1.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Alternative 3 would not allow any lethal mammal damage management by WS in Iowa. WS could only implement non-lethal methods such as harassment and exclusion devices and materials. Non-lethal methods could, however, include use and recommendation of repellents and the use of capture and handling drugs for capture and release projects. Impacts from WS' use of these chemicals would be similar to those described under the proposed action.

Excessive cost or ineffectiveness of non-lethal techniques could result in some entities rejecting WS' assistance and resorting to other means of management. Risks associated with non-WS' use of toxicants vary depending upon the training and experience of the individuals conducting the management and the toxicant used. Such means could include illegal toxicant uses. Hazards could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. Some chemicals that could be used illegally could present greater risks of adverse effects on humans than those used under the proposed alternative. Overall risks to human health and safety from this alternative are likely to be greater than Alternative 2.

4.2.3.1.4 Alternative 4: No Federal WS Mammal Damage Management

Alternative 4 would not allow any WS mammal damage management in Iowa. Concerns about human health risks from WS' use of chemical management methods would be alleviated because no such use would occur. Private efforts to reduce or prevent damage would be expected to increase. Risks from chemical management methods would be variable depending upon the training and experience of the individual conducting the mammal damage management and the toxicant used. Hazards to humans and pets could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used or if chemicals are used improperly by inexperienced persons. It is possible that frustration caused by the inability to alleviate mammal damage could lead to illegal use of toxicants that could pose secondary poisoning hazards to pets. Some chemicals that could be used illegally could present greater risks of adverse effects on humans than those used under the current program alternative.

4.2.3.2 Impacts on Human Safety from Non-chemical Mammal Damage Management Methods

4.1.3.2.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would not engage in direct operational use of any non-chemical mammal damage management methods. Risks to human safety from WS' use of firearms, traps, snares and pyrotechnics would not exist because WS would not be conducting operational activities. However, WS would provide technical advice to those persons requesting assistance. Landowners/resource managers could use information provided by WS or implement damage reduction methods without WS technical assistance. Hazards to humans and property could be greater under this alternative if persons conducting management activities using non-chemical methods are poorly or improperly trained. Negative impacts to public safety resulting from the improper use of methods should be less than Alternative 4 when WS technical advice is followed.

4.2.3.2.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

Non-chemical damage management methods that might raise safety concerns include the use of firearms, traps and snares, and harassment with pyrotechnics. All WS personnel are trained in the safe and effective use of management techniques. The Iowa WS program has not had any accidents involving the use of any non-chemical mammal management techniques. A formal risk assessment of WS' operational management methods found that when used in accordance with applicable, laws, regulations, policy and directives, risks to human safety from the proposed methods were low (USDA 1997, Appendix P). Therefore, no adverse affects on human safety from WS' use of these methods is expected. SOPs designed and implemented to avoid adverse effects on human and pet health and safety are described in Chapter 3. Therefore, no adverse affects on human safety from WS' use of these methods is expected.

Shooting and trapping are methods used by WS which pose minimal or no threat to pets and/or human health and safety. All firearm safety precautions are followed by WS when conducting damage management and WS complies with all laws and regulations governing the lawful use of firearms. Shooting is virtually 100% selective for target species and may be used in conjunction with spotlights. WS may use firearms to humanely euthanize animals caught in live traps. WS' traps are strategically placed to minimize exposure to the public and pets and signs are posted on all properties where traps are set to alert the public of trap presence. Body-grip (***e.g***., conibear-type) traps used for beaver are restricted to water sets which further reduces threats to public and pet health and safety.

Firearms and firearm misuse are a concern because of issues relating to public safety and accidental injury or death. To ensure safe firearms use, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees who use firearms as a condition of employment must comply with all applicable federal State and local regulations including the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

4.2.3.2.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, non-chemical management methods that might raise safety concerns include shooting with firearms when used as a harassment technique, cage traps, and harassment with pyrotechnics. Risks associated with firearms used as a harassment technique are as discussed for firearms use in Alternative 2. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. A formal risk assessment of WS operational management methods including the non-lethal techniques that would be available under this alternative, found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no adverse affects on human safety from WS' use of these methods is expected.

Some resource owners/managers may not feel that non-lethal techniques are adequate to resolve their wildlife conflict and may use lethal mammal damage management methods without WS' assistance. Risks to human safety from these actions will depend on the method selected and the experience and training of the individual using the technique.

4.2.3.2.4 Alternative 4: No Federal WS Mammal Damage Management

Alternative 4 would not allow any WS mammal damage management in the State. Concerns about human health risks from WS' use of non-chemical mammal damage management methods would be alleviated because no such use would occur. However, private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the proposed action alternative. Non-WS personnel would be able to use pyrotechnics, traps, snares or firearms in mammal damage management programs and this activity would likely occur to a greater extent in the absence of WS' assistance. Hazards to humans and property could be greater under this alternative if personnel conducting mammal damage management activities using non-chemical methods are poorly or improperly trained.

4.2.3.3 Effects on Human Health and Safety from Mammals

4.2.3.3.1 Alternative 1: Technical Assistance Only

With WS' technical assistance but no direct management, entities requesting mammal damage management assistance for human health concerns would either take no action, which means the risk of human health problems would likely continue or increase as mammal numbers are maintained or increased, or implement WS' recommendations for non-lethal and lethal control methods. Potential impacts would be variable depending upon the training and experience of the individuals conducting the mammal damage management. Individuals or entities that implement methods may lack the experience necessary to efficiently and effectively conduct a mammal damage management program and risks could continue or increase. Therefore, the odds of successfully reducing wildlife risks to human health and safety may be similar to or lower than Alternative 2. The likelihood that individual efforts would reduce mammal conflicts would be higher under this alternative than Alternative 4 if people request and use WS' recommendations.

4.2.3.3.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

An adaptive IWDM strategy has the greatest potential to successfully reduce human health and safety risks. Under this alternative, all legal mammal damage management methods could possibly be implemented and recommended by WS. Efficacy of any given mammal damage management method varies depending on site specific conditions. Access to the full range of damage management methods results in the greatest possibility of alleviating risks to human health and safety by allowing WS specialists to select the methods best suited to the situation.

In most cases, it is difficult to conclusively prove that mammals were responsible for transmission of individual human cases or outbreaks of mammal-borne diseases. However, the limited records of disease occurrence in Iowa does not necessarily mean absence of risk but may only mean lack of reliable research in this area. Study of this issue is complicated by the fact that some disease-causing agents associated with wildlife, may also be contracted from other sources. WS works with entities on a case-by-case basis to assess the nature and magnitude of the wildlife conflict including providing information on the limitations about what we know regarding health risks associated with wild mammals. In most cases, the risk of contracting a disease from wild mammals is relatively low. It is the choice of the individual entity to tolerate the potential health risks or to seek to reduce those risks. Some requesters of damage management may consider even a low level of risk to be unacceptable (*i.e*., school properties). Many property owners/managers wish to eliminate risks *before* someone actually gets sick because of conditions at their site. In such cases, mammal damage management, either by lethal or non-lethal means would, if successful, reduce the risk of mammal-borne disease transmission at the site for which mammal damage management is requested.

In some situations the implementation of non-lethal methods, such as barriers and harassment, could actually increase the risk of human health problems at other sites by causing the mammals to move to other sites not previously affected. In such cases, lethal removal of the mammals may actually be the best alternative from the standpoint of overall human health concerns in the local area. If WS is providing operational assistance to relocate mammals, coordination with local authorities would be conducted to assure they do not reestablish in other undesirable locations.

4.2.3.3.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would be restricted to implementing and recommending only non-lethal methods. Non-lethal methods may not be effective at or suitable for all situations. The efficacy of some techniques may be limited by habituation (*i.e*., the ability of an animal to become accustomed to and not respond to an otherwise frightening sight or sound). Other techniques like fencing may not be suitable because of zoning, visual impacts on the site or because they may adversely impact other non-injurious species. In some situations the implementation of non-lethal methods such as barriers and harassment could actually increase the risk of human health problems at other sites by causing the mammals to move to other sites not previously affected.

4.2.3.3.4 Alternative 4: No Federal WS Mammal Damage Management

With no WS assistance available, entities would be responsible for developing and implementing their own damage management program. Success of others' efforts to reduce or prevent risks to human health and safety from wildlife depends on the training and experience of the individual conducting the damage management. If less experienced persons attempt to implement control methods, risks of not reducing mammal hazards could be greater than under the proposed action. For example, in some situations the implementation of non-lethal controls such as barriers and harassment could actually increase the risk of human health problems at other sites by causing the mammals to move to other sites not previously affected.

4.2.4 Impacts to Stakeholders, including Aesthetics

4.2.4.1 Effects on Human Affectionate Bonds with Individual Mammals and on Aesthetic Values of Wild Mammal Species

4.2.4.1.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would not conduct any operational mammal damage management, but would provide technical assistance or self-help advice to entities requesting assistance. Those who oppose operational assistance by the government, but favor government technical assistance, would favor this alternative. Persons who have developed affectionate bonds with individual wild mammals would not be affected by WS' activities under this alternative because the animal would not be dispersed or killed by WS. However, other entities could conduct management activities which would mean the effects could be similar to the Proposed Action alternative.

4.2.4.1.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

Those who routinely view or feed individual animals would likely be disturbed by removal of such mammals if WS receives a request for such an action. WS is aware of such concerns and takes these concerns into consideration when developing site specific management plans. WS may be able to mitigate such concerns by leaving certain animals that have been identified by interested individuals.

Some members of the public have expressed opposition to the killing of any mammals during management activities. Under this Proposed Action, some lethal damage management could occur and these persons would be opposed. However, many persons who voice opposition have no direct connection or opportunity to view or enjoy the particular mammals that could be affected by WS' activities. Lethal actions would generally be restricted to local sites and to small, inconsequential percentages of overall populations. Therefore, the species subjected to lethal actions would remain common and abundant and would continue to remain available for viewing by persons with that interest.

4.2.4.1.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would not conduct any lethal damage management, but may conduct harassment of mammals that are causing damage. Some people who oppose lethal actions but are tolerant of non-lethal wildlife damage management would favor this alternative. Persons who have not developed affectionate bonds with individual wild mammals would not probably be affected by the death of individual mammals under this alternative, but might oppose dispersal or relocation of certain mammals particularly if the mammals move to other areas and continue to cause problems. WS may be able to mitigate such concerns by leaving certain animals that have been identified by interested individuals. Although WS would not perform any lethal activities under this alternative, private entities could possibly conduct lethal mammal damage management activities which means the effects would then be similar to the proposed action alternative (*i.e.,* environmental status quo).

4.2.4.1.4 Alternative 4: No Federal WS Mammal Damage Management

Under this alternative, WS would not conduct any lethal removal or harassment of mammals. Those in opposition of any government involvement in wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild mammals would not be affected by WS' activities under this alternative. However, private entities could conduct lethal mammal damage management activities which means the effects would be similar to the proposed action alternative (*i.e.,* environmental status quo).

4.2.4.2 Effects on Aesthetic Values of Property Damaged by Mammals

4.2.4.2.1 Alternative 1: Technical Assistance Only

WS would provide technical advice to those persons requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance. When WS' advice is requested and followed, impacts on those persons adversely affected by mammal damage should be less than Alternative 4. However, some resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing management methods. Therefore, damage management could be take longer and may be less effective under this alternative than the proposed action, depending on the skills and abilities of the person implementing the management methods.

Relocation of mammals through harassment, barriers, or habitat alteration can sometimes result in the mammals causing the same problems at the new location. If WS has only provided technical assistance, coordination with local authorities to monitor the mammals' movements to assure the mammals do not reestablish in other undesirable locations might not be conducted, thereby increasing the potential of adverse effects to nearby property owners.

4.2.4.2.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

Damage to property would be expected to decrease under this alternative since all available damage management methods and strategies would be available for WS use and consideration. Relocation or dispersal of mammals by harassment can sometimes result in the mammals causing the same or similar problems at the new location. If WS provides operational assistance to relocate such mammals, coordination with local authorities would be conducted to assure they do not re-establish in other undesirable locations.

4.2.4.2.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, WS would be restricted to implementing and recommending only non-lethal methods when providing assistance with mammal damage problems. While this may improve the use of non-lethal methods over that which might be expected under Alternative 4, the efficacy of non-lethal methods can be variable. If non-lethal methods were ineffective at reducing damage, WS would not be able to provide any other type of assistance. In these situations, mammal damage would likely continue to increase unless resource owners implement an effective mammal damage management program in the absence of WS. Resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods. Therefore, mammal damage management could take longer to execute and may be less effective under this alternative than the proposed action depending on the skills and abilities of the person implementing the management methods.

Assuming property owners would choose to allow and pay for the implementation of non-lethal methods, this alternative could result in mammals relocating to other sites where they could cause or aggravate similar problems for other property owners. Thus, this alternative could result in more property owners experiencing adverse effects on their properties than the Proposed Action.

Relocation or dispersal of mammals by harassment can sometimes result in the mammals causing the same or similar problems at the new location. If WS is providing operational assistance in relocating such mammals, coordination with local authorities would be conducted to assure they do not re-establish in other undesirable locations.

4.2.4.2.4 Alternative 4: No Federal WS Mammal Damage Management

Mammal damage would likely continue to increase unless resource owners implemented an effective mammal damage management program in the absence of WS. Resource owners would be required to implement their own damage reduction program without WS assistance. Resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods. Therefore, mammal damage management could take longer to execute and may be less effective under this alternative than the proposed action depending on the skills and abilities of the person implementing mammal damage management methods.

Relocation of mammals through harassment, barriers, or habitat alteration can sometimes result in the mammals causing the same problems at the new location. Coordination of relocation and dispersal activities by local residents with local authorities to monitor the mammal's movements to assure the mammals do not re-establish in other undesirable locations might not be conducted, thereby increasing the potential of adverse effects to nearby property owners.

4.2.5 Humaneness and Animal Welfare Concerns of Methods Used

4.2.5.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would provide self-help advice only. Lethal methods viewed as inhumane by some persons would not be used by WS. Resource owners could use the information provided by WS or implement their own damage reduction program without WS' technical assistance. Many of the methods considered inhumane by some individuals and groups might still be used by resource owners. Overall impacts should be less than Alternative 4 when WS technical advice is requested and followed.

4.2.5.2 Alternative 2: Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)

Mammal damage management methods viewed by some persons as inhumane would be employed by WS under this alternative. WS personnel are experienced, professional and humane in their use of management methods. Under this alternative, mammals would be killed by experienced WS personnel using the best and most appropriate method(s) available. These methods would include shooting, trapping, pesticides, 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. Although Iowa WS would only use drowning sets if all other capture and removal methods had failed or are unsuitable for the site, some individuals will find even this rare (likely less than 2 site per year) use objectionable. Other damage management methods used to remove target animals including shooting and body-gripping traps (*i.e*., Conibear) result in a relatively humane death. These methods however, are also considered inhumane by some individuals.

WS uses EPA registered and approved pesticides, such as zinc phosphide baits and gas cartridges, to reduce damage caused by some mammals in Iowa. Some individuals may consider the use of such chemicals to be inhumane because they oppose all lethal methods of damage management. 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 maybe preceived when some mammal damage management methods are used in situations where non-lethal damage management methods are not practical or effective.

4.2.5.3 Alternative 3: Non-lethal Mammal Damage Management Only by WS

Under this alternative, lethal methods would not be used by WS. Although WS would not perform any lethal activities under this alternative, other entities would likely conduct mammal damage management similar to those that would no longer be conducted by WS, resulting in impacts similar to the proposed action alternative (*i.e.,* environmental status quo).

4.2.5.4 Alternative 4: No Federal WS Mammal Damage Management

Under this alternative, WS would not conduct any mammal damage management in Iowa. Although WS would not perform any activities under this alternative, other entities would likely conduct mammal damage management similar to those that would no longer be conducted by WS, resulting in impacts similar to the proposed action alternative (*i.e.,* environmental status quo).

4.3 CUMULATIVE IMPACTS

Cumulative impacts 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 (40 CFR 1508.7). Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Under Alternatives 1, 2 and 3, WS would, to varying extents, address damage associated with mammals throughout Iowa. WS' mammal damage management program would be the primary federal program with mammal damage management responsibilities; however, some State and local government agencies may conduct mammal damage management activities. Through ongoing coordination with these agencies, WS is aware of such mammal damage management activities and may provide technical assistance in such efforts. WS does not normally conduct operational damage management activities concurrently with other entities in the same area, but may conduct mammal damage management activities at adjacent sites within the same time frame. In addition, commercial pest control companies may conduct mammal damage management activities in the same area. IDNR keeps records of all animals taken by WS and this information is presented in the cumulative impact analysis section of this EA. Potential cumulative impacts could occur either as a result of WS' mammal damage management activities, or as a result of effects of other agencies and individuals.

Cumulative Impacts on Wildlife Populations

As shown in Section 4.2.2, mammal damage management methods used or recommended by the WS program in Iowa will have no cumulative adverse effects on target and non-target wildlife populations. WS limited lethal take of target mammal species is expected to have minimal effects on target mammal populations in Iowa. When management actions are implemented by WS, the potential lethal take of non-target wildlife species is expected to be minimal to non-existent and will not adversely affect populations of these species.

Cumulative Impact Potential from Chemical Components

Mammal damage management which includes the use of pesticides as a lethal management component may have the greatest potential for cumulative impacts on the environment. The pesticides, zinc phosphide and gas cartridge, are the chemicals most frequently used or recommended by the Iowa WS. These chemicals have been evaluated for possible residual effects in soil, water, or other environmental sites in risk assessments in USDA (1997). Based on use patterns, the chemical and physical characteristics of mammal damage management pesticides, and factors related to the environmental fate of these pesticides, no cumulative impacts are expected from the chemical components used or recommended by WS in Iowa.

Non-lethal chemicals, such as repellents, may also be used or recommended by the WS in Iowa. Characteristics of these chemicals and use patterns indicate that no significant cumulative impacts related to environmental fate are expected.

Cumulative Impact Potential from Non-chemical Components

Non-chemical methods used by WS may include exclusion through use of various barriers, live trapping and relocation or euthanasia of mammals, harassment of mammals, trapping, snaring, and shooting. Based on analysis in Sections 4.2.1 and 4.2.2, no cumulative impacts from WS' use of these methods are expected especially given that take would be authorized and/or permitted with IDNR oversight.

SUMMARY

No significant cumulative environmental impacts were identified or are expected from implementation of the four alternatives. Under the Proposed Action, the removal of mammals by WS would not have significant impacts on target mammal populations in Iowa, but some short-term localized reductions could occur. No risk to public safety is expected when WS' services are provided to requesting individuals under Alternative 2 since only trained and experienced wildlife biologists/specialists would conduct and recommend mammal damage management activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations in Alternatives 1, 2 and 3 conduct their own mammal damage management activities, and when no WS assistance is provided in Alternative 4. In Alternative 4, however, the increase in risk would not be to the point that the impacts would be significant. Although some persons could be opposed to WS' participation in mammal damage management activities on public and private lands in Iowa, the analysis in this EA indicates that WS' adaptive IWDM program will not result in significant cumulative adverse impacts on the quality of the human environment. Table 4-4 summarizes the expected impact of each of the alternatives on each of the issues.

Table 4-4. Summary of Potential Impacts.

Issue	Alternative 1 Technical Assistance Only	Alternative 2 Adaptive Integrated Mammal Damage Management Program (Proposed Action/No Action)	Alternative 3 Non-lethal Mammal Damage Management Only by WS	Alternative 4 No Federal WS Mammal Damage Management Program
1. Target Mammal Species Effects	No effect by WS. Low effect - reductions in local target mammal numbers by non-WS personnel variable but likely would not significantly affect local or state populations.	Low effect - reductions in local target mammal numbers; would not significantly affect local or state populations.	No effect by WS. Low effect - reductions in local target mammal numbers by non-WS personnel variable but likely would not significantly affect local or state populations.	No effect by WS. Low effect - reductions in local target mammal numbers by non-WS personnel variable but likely would not significantly affect local or state populations.
2. Effects on Other Wildlife Species, Including T&E Species	No effect by WS. Impacts by non-WS personnel would be variable. WS would not provide operational assistance with T&E species protection.	Low effect - methods used by WS would be highly selective with very little risk to non-target species. WS would provide operational assistance with T&E species protection.	Low effect - methods used by WS would be highly selective with very little risk to non-target species. WS only able to provide limited operational assistance with T&E species protection.	No effect by WS. Impacts by non-WS personnel would be variable. WS would not provide operational assistance with T&E species protection.
3. Human Health and Safety Effects	Efforts by non-WS personnel to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater risk of injuries and greater potential of not reducing mammal damage than under the proposed action.	The proposed action has the greatest potential of successfully reducing this risk. Low risk from methods used by WS.	Low risk of injuries from methods used by WS. WS less likely to resolve risks associated with animals than with Alt 2. Efforts by non-WS personnel to use lethal mammal damage management techniques could result in less experienced persons implementing control methods, a greater risk of injuries and greater potential of not reducing mammal damage than under the proposed action.	Efforts by non-WS personnel to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater risk of injuries and greater potential of not reducing mammal damage than under the proposed action.
4a. Aesthetic Values of Wild Mammal Species and Human Affectionate Bonds Effects	Low to moderate effect. Local mammal numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall	Low effect at local levels; some local populations may be reduced; WS mammal damage management activities do not adversely affect overall state target mammal populations.	Low effect. Local mammal numbers in damage situations would remain high or possibly increase when non-lethal methods are ineffective unless non-WS personnel successfully implement lethal methods; no adverse	Low to moderate effect. Local mammal numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on

	State target mammal populations.		affect on State target mammal populations.	overall State target mammal populations.
4b. Aesthetic Values of Property Damaged by Mammals	Mammal damage may not be reduced to acceptable levels; mammal may move to other sites which can create aesthetic damage problems at new sites.	Low effect - mammal damage problems most likely to be resolved without creating or moving problems elsewhere.	Mammal damage may not be reduced to acceptable levels; mammals may move to other sites which can create aesthetic damage problems at new sites.	High effect - mammal problems less likely to be resolved without WS involvement. Mammals may move to other sites which can create aesthetic damage problems at new sites
5. Humaneness and Animal Welfare Concerns of Methods Used	No effect by WS. Impacts by non-WS personnel would be variable.	Impact by WS low effect - methods viewed by some people as inhumane would be used by WS.	Impact by WS lower effect than Alt. 2 since only non-lethal methods would be used by WS. Impacts by non-WS personnel would be variable.	No effect by WS. Impacts by non-WS personnel would be variable.

CHAPTER 5: LIST OF PREPARERS AND PERSONS CONSULTED

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APPENDIX A
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APPENDIX B
AUTHORITIES AND COMPLAINACE

USDA-APHIS-Wildlife Services

USDA is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for USDA is the *Act of March 2, 1931* and the *Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (7 USC 426-426c; 46 Stat. 1468)*, as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, which provides that:

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

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

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

Under the Act of March 2, 1931, and 7 U.S.C. §426c, APHIS may carry out these wildlife damage management programs itself, or it may enter into cooperative agreements with states, local jurisdictions, individuals and public and private agencies whereby they may fund and assist in carrying out such programs. Id. These laws do not grant any regulatory authority. Therefore, there are no regulations promulgated under these statutes for wildlife services or animal damage management activities.

To fulfill this Congressional direction, WS conducts activities to prevent or reduce wildlife damage to agricultural, industrial and natural resources, property, and threats to public health and safety on private and public lands in cooperation with other federal, state and local agencies, private organizations, and individuals. Therefore, wildlife damage management is not based on punishing animals but as one means of reducing damage, with actions being implemented using the WS Decision Model (Slate et al. 1992). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated. The need for action is derived from the specific threats to resources or the public. WS' mission is to improve the coexistence of people and wildlife by providing federal leadership to reduce problems.

Federal Aviation Administration

The FAA is the federal agency responsible for developing and enforcing air transportation safety regulations and is authorized to reduce wildlife hazards at commercial and non-commercial airports. Many of these regulations are codified in the FARs. The FAA is responsible for setting and enforcing the FARs and policies to enhance public safety. For commercial airports, 14CFR, Part 139.337 (Wildlife Hazard Management) directs the airport sponsor to conduct a wildlife hazard assessment if an air carrier aircraft experiences multiple wildlife strikes or an air carrier aircraft experiences substantial damage from striking wildlife. At non-commercial airports, the FAA also expects that the airport be aware of wildlife hazards in and around their airport and take corrective action if warranted; the FAA uses Advisory Circular 150/5200-33 to guide their decision making process.

Regulations concerning Bird Aircraft Strike Hazards (BASH)

The FAA is empowered to issue airport operation certificates to airports serving air carriers, and to establish minimum safety standards for the operation of airports. Some of these regulations and polices directly involved the management of wildlife and wildlife hazards on and/or near airports. Under the Federal Aviation Regulations (FAR) 139.337 Wildlife Hazard Management, an airport is required to conduct a Wildlife Hazards Assessment and a Wildlife Management Plan when specific wildlife event(s) occur. Under the FAA/ADC MOU, the WS programs support all of the requirements contained in FAR 139.337. FAA Certalert No. 97-02 further clarifies the roles of and relationships between the FAA and WS with regards to wildlife hazards on or near airports. (USDA Managing Wildlife Hazards at Airports July 1998)

Iowa Department of Natural Resources (IDNR)

"A department of natural resources is created, which has the primary responsibility for state parks and forests, protecting the environment, and managing energy, fish, wildlife, and land and water resources in this state" (Iowa Code §§455A.2).

Iowa Department of Agriculture and Land Stewardship (IDALS)

The IDALS is charged, with the suppression and prevention of infectious and contagious diseases among animals within Iowa (Iowa Code Chapter 163). The IDALS is also charged with the regulation of animals in the pet industry including the transportation of the animals, the sale of the animals, and only permitting the sale of animals which appear to be free from infectious or communicable diseases (Iowa Code Chapter 162). The IDALS has the power to:

1. Make all necessary rules for the suppression and prevention of infectious and contagious diseases among animals within the state.
2. Provide for quarantining animals affected with infectious or contagious diseases, or that have been exposed to such diseases, whether within or without the state.
3. Determine and employ the most efficient and practical means for the prevention, suppression, control, and eradication of contagious or infectious diseases among animals.
4. Establish, maintain, enforce, and regulate quarantine and other measures relating to the movements and care of diseased animals.
5. Provide for the disinfection of suspected yards, buildings, and articles, and the destruction of such animals as may be deemed necessary.

6. Enter any place where any animal is at the time located, or where it has been kept, or where the carcass of such animal may be, for the purpose of examining it in any way that may be necessary to determine whether it was or is infected with any contagious or infectious disease.
7. Regulate or prohibit the arrival in, departure from, and passage through the state, of animals infected with or exposed to any contagious disease; and in case of violation of any such regulation or prohibition, to detain any animal at the owner's cost.
8. Regulate or prohibit the bringing of animals into the state, which, in its opinion, for any reason, may be detrimental to the health of animals in the state.
9. Co-operate with and arrange for assistance from the USDA in performing its duties under this chapter.
10. Impose civil penalties as provided in this chapter. The department may refer cases for prosecution to the attorney general.

Compliance with Federal Laws, Executive Orders and Regulations

WS consults and cooperates with other federal and state agencies as appropriate to ensure that all WS activities are carried out in compliance with all applicable federal laws.

<u>National Environmental Policy Act:</u> All federal actions are subject to NEPA (Public Law 91-190, 42 U.S.C. 4321 et seq.). WS and the USFWS follow CEQ regulations implementing NEPA (40 CFR 1500 et seq.), USDA (7 CFR 1b), and WS follows the APHIS Implementing Guidelines (7 CFR 372) as a part of the decision-making process. These 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. 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 CEQ through regulations in 40 CFR, Parts 1500-1508. In accordance with CEQ and USDA regulations, APHIS Guidelines Concerning Implementation of NEPA Procedures, as published in the Federal Register (44 CFR 50381-50384) provide guidance to APHIS regarding the NEPA process.

Pursuant to NEPA and CEQ regulations, this EA documents the analysis of a proposed impact resulting from federal actions, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse impacts, and serves as a decision-aiding mechanism to ensure that the policies and goals of 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 proposed action. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

<u>Endangered Species Act</u>: Under the ESA, all federal agencies are charged with a responsibility to conserve endangered and threatened species and to utilize their authorities in furtherance of the purposes of the ESA (Sec.2(c)). WS conducts Section 7 consultations with the USFWS to utilize the expertise of the USFWS to ensure that, "*Any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species* . . ." (Sec.7 (a) (2)). WS conducts formal Section 7 Consultations with the USFWS at the national level (USDI 1992) and consultations with the USFWS at the local level as appropriate (J. Millard, USFWS Ecological Services email to E. Colboth, WS, September 6, 2006).

<u>Federal Insecticide, Fungicide, and Rodenticide Act:</u> FIFRA requires the registration, classification and regulation of all pesticides used in the United States. The EPA is responsible for implementing and

enforcing FIFRA. All pesticides used or recommended by the WS program in Iowa are registered with, and regulated by, the EPA and the IDALS. Iowa WS uses all chemicals according to label directions as required by the EPA and IDALS.

National Historical Preservation Act (NHPA) of 1966 as amended: The NHPA and its implementing regulations (CFR 36, 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. Each of the bird damage management methods described in this EA that might be used operationally by WS: does not cause major ground disturbance, does not cause any physical destruction or damage to property, does not cause any alterations of property, wildlife habitat, or landscapes, and does not involve 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 proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

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

Native American Graves Protection and Repatriation Act. 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.

Environmental Justice and Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Environmental Justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. 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. A critical goal of Executive Order 12898 is to improve the scientific basis for decision-making by conducting assessments that identify and prioritize environmental health risks and procedures for risk reduction. Environmental Justice is a priority within USDA, APHIS, and WS. APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA.

WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to ensure Environmental Justice. WS personnel use WDM methods as selectively and environmentally conscientiously as possible. All chemicals used by WS are regulated by the EPA through FIFRA, IDALS, by MOUs, and by WS Directives. Based on a thorough Risk Assessment, USDA (1997, Appendix P) concluded that when WS program chemicals are used following label directions, they are highly selective for the target species or populations, and such use has negligible impacts on the environment. The WS operational program properly disposes of any excess solid or hazardous waste. WS assistance is provided on a request basis in cooperation with State and local governments and without discrimination against people who are of low income or in minority populations. The nature of WS' mammal damage management activities is such that they do not have much, if any, potential to result in disproportionate environmental effects on minority or low-income populations. Therefore, no such adverse or disproportionate environmental impacts to such persons or populations are expected.

Executive Order 13045 - Protection of Children from Environmental Health and Safety Risks. Children may suffer disproportionately from environmental health and safety risks, including their developmental physical and mental status, for many reasons. Because WS makes it a high priority to identify and assess environmental health and safety risks, WS has considered the impacts that alternatives analyzed in this EA might have on children. All WS mammal damage management is conducted using only legally available and approved damage management methods where it is highly unlikely that children would be adversely affected at all, let alone in any disproportionate way. Based on the Risk Assessment (USDA 1997, Appendix P) concluded that when WS program chemicals and non-chemical methods are used following label directions and normally accepted safety practices and WS standard operating procedures, such use has negligible impacts on the environment or on human health and safety, which includes the health and safety of children.

Executive Order 13186 and MOU between USFWS and WS**:** EO 13186 directs federal agencies to protect migratory birds and strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and minimize the take of migratory birds through enhanced collaboration between WS and the USFWS, in coordination with state, tribal, and local governments. A national-level MOU between the USFWS and WS has been drafted to facilitate the implementation of EO 13186.

Executive Order 13112 - Invasive Species**:** Authorized by former President Clinton, EO 13112 establishes guidance to federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. The EO, in part, 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 on invasive species.

The EO also established an Invasive Species Council (Council) whose members include the Secretary of State, the Secretary of the Treasury, the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Transportation, and the Administrator of the EPA. The Council shall be Co-Chaired by the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Commerce. The Council oversees: 1) the implementation of this order, 2) that federal agency activities concerning invasive species are coordinated, complementary, cost-efficient, and effective, 3) the development of recommendations for international cooperation in addressing invasive species, 4) the development, in consultation with the CEQ, of guiding principles for federal agencies, 5) the development of a coordinated network among federal agencies to document, evaluate, and monitor impacts from invasive species on the economy, the environment, and human health, 6) the establishment of a coordinated, up-to-date information-sharing system and 7) preparation and issuance of a national Invasive Species Management Plan.

Occupational Safety and Health Act of 1970

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

APPENDIX C

MAMMAL DAMAGE MANAGEMENT METHODS

Resource owners and government agencies use a variety of techniques as part of adaptive integrated mammal damage management program. All lethal and non-lethal methods have limitations based on costs, logistics, practicality, or effectiveness. There are also regulatory constraints on the availability and use of some mammal damage management techniques. Mammal damage management methods currently available to the Iowa WS program are described here. If other methods are proven effective and legal to use in Iowa, they could be incorporated into the Iowa WS program, pursuant to permits, other authorizations, agreements with landowners, NEPA compliance, and other laws, regulations, and policies.

NONLETHAL METHODS-NONCHEMICAL

Cultural Methods and Habitat Management includes the application of practices which seek to minimize exposure of the protected resource to damaging animals through processes other than exclusion. They may include 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 to deter animals from entering a protected area, removing trees along stream banks to discourage the presence of beavers, removal of trees from around buildings to reduce access by squirrels and raccoons, or planting lure crops on fringes of protected crops. Continual destruction of beaver dams and removal of dam construction materials on a daily basis will sometimes cause beavers to move to other locations, although this strategy can be far more expensive than removing beavers in conjunction with dam breaching. Water control devices such as the 3-log drain (Roblee 1983), the T-culvert guard (Roblee 1987), wire mesh culvert (Roblee 1983), and the Clemson beaver pond leveler (Miller and Yarrow 1994) can sometimes be used to control the water in beaver ponds to desirable levels that do not cause damage. Use of these devices is very limited among private landowners, but is sometimes done by the IDNR in certain circumstances. Such methods have variable results and rarely provide acceptable levels of control unless used in an integrated program with other strategies. Some mammals which 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 and opossums are a problem, making trash and garbage unavailable and removing all pet food from outside during night time hours can reduce their presence.

Animal Behavior Modification. This 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 noise or visual stimuli (*e.g.*, flashing lights). Unfortunately many of these techniques are only effective for a short time before animals habituate (*i.e.,* learn there is not a real threat) (Conover 1982). Combining frightening stimuli and regularly changing the location, source and type of stimuli can extend the protective period of non-lethal methods. Using motion activated systems instead of systems which are activated on regular intervals may also extend the effective period for a frightening devices. Devices used to modify behavior in mammals include:

- Electronic guards (siren strobe-light devices)
- Propane exploders
- Pyrotechnics
- Laser lights

- Human effigies

Wildlife – Exclusion (Physical Exclusion) pertains to preventing access to resources through fencing or other barriers. Fencing of small critical areas can sometimes prevent animals which cannot climb from entering areas. Fencing of culverts, drain pipes, and other water control structures like that used with a Beaver Deceiver can sometimes prevent beavers from building dams which plug these devices. In those applications, however, consideration must be given for water flow so that the fence does not act to catch and hold water-borne debris. Fencing, especially if it is installed with an underground skirt, can prevent access to areas for many mammal species which dig, including coyotes, foxes, woodchucks, beaver, and muskrat. 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. Applying a mixture of sand in paint can also block beaver from gnawing trees. Construction of concrete spillways may reduce or prevent damage to dams by burrowing aquatic rodents. Riprap can also be used on dams or levies at times, especially to deter muskrat, woodchucks, and other burrowing rodents. Electrical water barriers have proven effective in limited situations for beaver; an electrical field through the water in a ditch or other narrow channel, or hot-wire suspended just above the water level in areas protected from public access, have been effective at keeping out beaver. The effectiveness of an electrical barrier is extended when used in conjunction with an odor or taste cue that is emitted because beaver will avoid the area even if the electrical field is discontinued (Kolz and Johnson 1997). Similarly, electric fences of various constructions have been used effectively to reduce damage to various crops by deer, raccoons, and other species (Hygnstrom and Craven 1994, Boggess 1994b).

Beaver Dam Breaching/Removal

Dam breaching involves the removal of debris deposited by beaver that impedes the flow of water. Breaching a beaver dam is generally conducted to maintain existing streams and irrigation channels, restore drainage patterns, and reduce flood waters that have negatively impacted silvicultural, agricultural, residential or ranching/farming activities. Beaver dams removed by Iowa WS are normally from recent beaver activity, and sites have not had enough time to develop characteristics of a true wetland (*i.e.*, hydric soils, hydrophytic vegetation, and hydrological function).

Because beaver dams involve waters of the United States, removal may be regulated under Section 404 of the CWA. Iowa WS beaver dam breaching does not affect substrate or natural course of streams but to re-establish preexisting conditions with similar flows and circulations. Most beaver dam breaching operations, if considered discharge, are covered under 33 CFR 323 or 330 and do not require a permit. WS personnel survey the site or impoundment to determine if conditions exist for classifying the site as a true wetland. If the site appears to have conditions over 3 years old or appears to meet the definition of a true wetland, the landowner or cooperator is required to obtain a permit before proceeding. Unwanted beaver dams would be removed by WS using a shovel or other hand tools and therefore no permit is required[21] (M. Hayes, Rock Island District, USACE email to E. Colboth, WS 2006) and the IDNR does not regulate the removal of beaver dams[22] (T. Bishop, Special Projects Coordinator, Wildlife Bureau, IDNR email to E. Colboth, WS 2006).

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21 If the dam requires a backhoe or bulldozer for removal, then the dam material removed must be placed on an upland (*i.e.*, non-wetland) site. If it is not feasible to place the dam material on an upland site (*i.e.*, material is to be deposited within a wetland area), then a permit from the USACE is required.

22 As long as dam materials are not deposited within a wetland (*i.e.*, they are removed and placed on an upland site), beaver dam removal is not a regulated activity by the IDNR.

Relocation of damaging mammals to other areas following live capture generally would not be effective or cost-effective. Relocated animals can have poor survival rates at the new site (Rosatte and MacInnes 1989, Wright 1978, Frampton and Webb 1974) although careful timing of relocation and selection of release site can markedly improve survival rates (Griffith et al. 1989). Relocating animals also runs the risk of spreading parasites and diseases to previously uninfected areas. For example, the spread of raccoon variant of rabies in the eastern United States was likely unintentionally accelerated through the translocation of infected raccoons (Krebs et al. 1999). Relocation of wildlife is discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats.

However, there are exceptions for the relocation of damaging mammals that might be a viable solution, such as when the birds or mammals are considered to have high value such as migratory waterfowl, raptors, or T&E species. Under the right conditions, relocating wildlife can be a viable and effective wildlife management technique (Craven et al. 1998). Iowa WS would only relocate wildlife at the direction of and only after consulting with the USFWS and/or IDNR to coordinate capture, transportation, and selection of suitable relocation sites, as well as compliance with all proper guidelines.

Animal Capture Devices:

WS specialists can use a variety of devices to capture mammals. For reasons discussed above under “Relocation”, captured animals are usually killed via gunshot, cervical dislocation, or one of the chemical euthanasia methods listed below. However there are occasions where captured animals are relocated, or, in the case of some disease surveillance projects, may be released on site.

Leg-hold traps are small traps that come in a variety of sizes that allows the traps to be species specific of some degree. These traps are used for both mammals and birds and can be set on land or in water. The traps are made of steel with springs to close the jaws of the trap around the foot and leg of the target species. These traps may have steel or padded jaws, which hold the animal. Pan-tension devices which increase the pressure required to release the trigger on the trap can reduce risks to nontarget species (Phillips and Gruver 1996, Turkowski et al. 1984).

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 generally made of galvanized wire mesh, and consists of a treadle in the middle of the cage that triggers the door to close behind the animal being trapped. Cage traps can range from the extremely small, intended for the capture of rodents and other small mammals to the large corral/panel traps used to live-capture feral hogs.

Hancock traps (suitcase/basket type cage 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.

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 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 it 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

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

NON-LETHAL METHODS – CHEMICAL

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, on occasion, seizures. Usually, ketamine is combined with other drugs 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.

Telazol (tiletamine) is another anesthetic used in wildlife capture. It is 2.5 to 5 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. It is often the drug of choice for these wild species (Fowler and Miller 1999). This drug is sold in a powder form and must be reconstituted with sterile water before use. Once mixed with sterile water, the shelf life is four days at room temperature and 14 days if refrigerated.

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.

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. Many repellents are commercially available for mammals, and are registered primarily for herbivores such as rodents and deer (Table B-1). Repellents are not available for many species which 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, as part of an IWDM program. In Iowa, repellents must be registered with the IDALS.

LETHAL METHODS - MECHANICAL

Table B-1. List of Example Mammal Repellents Available in Iowa

Mammal Species	Example Repellents*
White-tailed Deer	Deer-Away Big Game Repellent, Deer-Off Repellent Concentrate, Hinder Rabbit and Deer Repellent
Squirrel	Miller Hot Sauce Animal Repellent, Squirrel Away
Field Mice	Chaperone Rabbit and Deer Repellent
Moles	Scoot Mole Evacuator
Raccoon	Outdoor Animal Repellent
Vole	Miller Hot Sauce Animal Repellent

* All repellents listed may be variably effective in reducing damage and may have other effects on surfaces where applied, and on other animals or plants. Read labels carefully.

For reasons discussed above under "Relocation", animals captured using the non-lethal capture methods discussed above are usually killed via gunshot, cervical dislocation, or one of the chemical euthanasia methods listed below. Other lethal mechanical methods are:

Conibear (Body Gripping) Traps are the steel framed traps used to capture and quickly kill aquatic mammals. These traps come in a variety of sizes and may be used on land or in the water depending on size and State and local laws. The traps are made of two steel square frames that are hinged on two sides and have one or two springs.

Shooting is selective for target species and may involve the use of spotlights and either a handgun, shotgun or rifle. Shooting is an effective method to remove a small number of mammals in damage situations. 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 efficiently 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. Firearm use may be a public concern because of issues relating to safety and misuse of firearms. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees, who carry firearms as a condition of employment, are required to meet criteria contained in the Lautenberg Amendment which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence. WS activities where shooting is used include, but are not limited to, implementation of Community-Based Deer Management Plans (CBDMP), take of mammals as authorized in Permits to Kill Wild Deer and Special Wildlife Management Permits, and take of mammals in damage situations pursuant to IDNR permits.

Sport Hunting is sometimes recommended by WS as a viable damage management method when the target species can be legally hunted, and activities can meet security and safety compliance. A valid hunting license and other licenses or permits may be required by the IDNR. This method provides sport and food for hunters and requires no cost to the landowner. Sport hunting is occasionally recommended if it can be conducted safely for white-tailed deer, coyotes, and other damage causing mammals.

Snap traps are used to remove small rodents. The trap treadle is baited with peanut butter or other taste attractants and attached near the damage area. These traps pose no imminent danger to pets or the public.

Cervical Dislocation is sometimes used to euthanize small rodents which 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, poultry and other small birds (Beaver et al 2001). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Beaver et al 2001).

LETHAL METHODS - CHEMICAL

All chemicals used by WS are registered as required by FIFA (administered by the EPA and the IDALS) or the FDA. WS personnel that use restricted-use chemical methods are certified as pesticide applicators IDALS and are required to adhere to all certification requirements set forth in FIFRA and Iowa pesticide control laws and regulations. Chemicals are only used on private, public, or tribal property sites with authorization from the property owner/manager.

Zinc Phosphide, at concentrations of 0.75% to 2.0% on grain, fruit, or vegetable baits, has been used successfully for species such as meadow mice (voles), ground squirrels, prairie dogs(*Cynomys* spp*)*, Norway rats (*Rattus rattus*), and muskrats. Zinc phosphide is a heavy, finely ground gray-black powder that is partially insoluble in water and alcohol. When exposed to moisture, it decomposes slowly and releases phosphine gas (PH_3). PH_3 is highly flammable, may be generated rapidly if the material comes in contact with dilute acids. Zinc phosphide concentrate is a stable material when kept dry and hermetically sealed.

Although zinc phosphide baits have a strong, pungent, phosphorous-like odor (garlic like), this characteristic seems to attract rodents, and apparently makes the bait unattractive to some other animals. For many uses of zinc phosphide formulated on grain or grain-based baits, pre-baiting is recommended or necessary for achieving good bait acceptance.

When zinc phosphide comes into contact with dilute acids in the stomach, PH_3 is released. It is this substance that causes death. Animals that ingest lethal amounts of bait usually succumb overnight with terminal symptoms of convulsions, paralysis, coma, and death from asphyxia. If death is prolonged for several days, intoxication that occurs is similar to intoxication with yellow phosphorous, in which the liver is heavily damaged. Prolonged exposure to PH_3 can produce chronic phosphorous poisoning.

Because zinc phosphide is not stored in muscle or other tissues of poisoned animals, there is no secondary poisoning with this rodenticide. The bait however, remains toxic up to several days in the gut of the dead rodent. Other animals can be poisoned if they eat enough of the gut content of rodents recently killed with zinc phosphide.

Gas Cartridges are used in conjunction with denning operations. When ignited, the cartridge burns in the den of an animal and produces large amounts of carbon monoxide, a colorless, odorless, tasteless, poisonous gas. The combination of carbon monoxide exposure and oxygen depletion kills animals in the den. This technique could be used on private and public lands where target animals are found and causing damage.