ENVIRONMENTAL ASSESSMENT

MAMMAL DAMAGE MANAGEMENT
IN THE STATE OF CONNECTICUT

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

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ACRONYMS

APHIS	Animal and Plant Health Inspection Service
AMDUCA	Animal Medicinal Drug Use Clarification Act
AVMA	American Veterinary Medical Association
CAA	Connecticut Airport Authority
CBC	Canadian Broadcast Corporation
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGS	Connecticut General Statutes
CO_2	Carbon Dioxide
CT DEEP	Connecticut Department of Energy and Environmental Protection
CT DAG	Connecticut Department of Agriculture
CT DOT	Connecticut Department of Transportation
CT DPH	Connecticut Department of Public Health
CWD	Chronic Wasting Disease
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
FEMA	Federal Emergency Management Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FLIR	Forward Looking Infrared
FONSI	Finding of No Significant Impact
FY	Fiscal Year
MOU	Memorandum of Understanding
NASS	National Agricultural Statistics Service
NEFO	New England Field Office
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWCO	Nuisance Wildlife Control Operator
NWP	Nationwide Permit
NWRC	National Wildlife Research Center
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
TNR	Trap, Neuter, Release Program
UConnCES	University of Connecticut Cooperative Extension Service
USACE	U.S. Army Corps of Engineers
USC	United States Code
U.S.	United States
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VDGIF	Virginia Department of Game and Inland Fisheries
WD	Wildlife Division
WS	Wildlife Services

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.0 INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with the needs of wildlife which increases the potential for conflicting human/wildlife interactions. This Environmental Assessment (EA) evaluates the potential environmental effects of alternatives for WS involvement in mammal damage management (MDM) in Connecticut.

Wildlife has either positive or negative values, depending on varying human perspectives and circumstances (Decker and Goff 1987). . . wildlife are 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.

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program is the federal agency authorized to protect American resources from damage associated with wildlife (the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c)). WS' activities are conducted to prevent or reduce wildlife damage to agricultural, industrial, natural resources, property, livestock, and threats to public health and safety when requested by the property owner/manager on private and public lands in cooperation with federal, state and local agencies, tribes, private organizations, and individuals. The WS program uses an IWDM approach (WS Directive 2.105) in which a combination of methods may be used or recommended to reduce wildlife damage. These methods may include non-lethal techniques like alteration of cultural practices, habitat management, repellents, frightening devices, and physical exclusion to prevent or reduce damage. The reduction of wildlife damage may also require removal of individual animals, reducing the local animal populations through lethal means. In some instances, the goal may be to eradicate an invasive species. Program activities are not based on punishing offending animals but are conducted to reduce damage and risks to human and livestock health and safety, and are used as part of the WS Decision Model (Slate et al. 1992).

WS is a cooperatively funded, service-oriented program that receives requests for assistance with wildlife damage management from private and public entities, including tribes and other governmental agencies. As requested, WS cooperates with land and wildlife management agencies to reduce wildlife damage effectively and efficiently in accordance with applicable federal, state, and local laws and Memoranda of Understanding (MOUs) between WS and other agencies.

1.1 PURPOSE

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program in continues to receive requests for assistance or anticipates receiving requests for assistance to resolve or prevent damage or threats associated with black bear (*Ursus americanus*), coyote (*Canis latrans*), feral/free-ranging dog (*Canis familiaris*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), feral/free-ranging cat (*Felis domesticus*), bobcat (*Lynx rufus*), river otter (*Lontra canadensis*), fisher (*Martes pennanti*), mink (*Neovison vison*), long-tailed weasel (*Mustela frenata*), short-tailed weasel (*Mustela erminea*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus*), moose (*Alces*

alces), feral/free ranging swine (*Sus scrofa*), Eastern cottontail (*Sylvilagus floridanus*), snowshoe hare (*Lepus americanus*), European hare (*Lepus europaeus*), American beaver (*Castor canadensis*), North American porcupine (*Erethizon dorsatum*), woodchuck (*Marmota monax*), Eastern gray squirrel (*Sciurus carolinensus*), American red squirrel (*Tamiasciurus hudsonicus*), Northern flying Squirrel (*Glaucomys sabrinus*), Southern flying squirrel (*Glaucomys volans*), Eastern chipmunk (*Tamias striatus*), muskrat (*Ondatra zibethicus*), black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), woodland jumping mouse (*Napaeozapus insignis*), meadow jumping mouse (*Zapus hudsonius*), meadow vole (*Microtus pennsylvanicus*), woodland vole (*Microtus pinetorum*), Southern red-backed vole (*Myodes gapperi*), Southern bog lemming (*Synaptomys cooperi*), white-footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), short-tailed shrew (*Blarina brevicauda*), masked shrew (*Sorex cinereus*), smoky shrew (*Sorex fumeus*), American water shrew (*Sorex palustris*), least shrew (*Cryptotis parva*), star-nosed mole (*Condylura cristata*), hairy-tailed mole (*Parascalops breweri*), Eastern mole (*Scalopus aquaticus*), Eastern small-footed myotis (*Myotis leibii*), little brown bat/little brown myotis (*Myotis lucifugus*), Northern long-eared bat/Northern myotis (*Myotis septentrionalis*), Eastern pipistrelle bat/tri-colored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), Eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*).

The purpose of this Environmental Assessment (EA) is to evaluate the need for managing damage caused by mammals in Connecticut and to evaluate a range of alternatives to meet that need while addressing the issues associated with implementing the different approaches. The EA will also assist with determining if there are any potential significant or cumulative adverse effects that could occur from the implementation of the alternative approaches to meet the need for action.

This EA evaluates the need for action to manage damage associated with mammals in the state, the potential issues associated with mammal damage management, and the environmental consequences of conducting different alternatives to meet the need for action while addressing the identified issues. To facilitate planning and to promote interagency coordination with meeting the need for action, WS is coordinating the preparation of this EA with the Connecticut Department of Energy and Environmental Management (CT DEEP), Wildlife Division (WD) and the Connecticut Department of Agriculture (CTDOAG). The CT DEEP WD has statewide management authority of those mammal species addressed in this EA considered wildlife. The CTDOAG has authority of those species addressed in the EA considered feral or free ranging pets or livestock. As part of the scoping process during development, this EA will be made available for review and comment by the public to ensure public involvement and to clearly communicate to the public the analysis of individual and cumulative impacts of the alternatives prior to the issuance of a Decision[1].

1.2 NEED FOR ACTION

Some species of wildlife have adapted to and thrive in human altered habitats. Those species, in particular, are often responsible for the majority of conflicts between people and wildlife that lead to requests for assistance to reduce damage to resources and to reduce threats to the safety of people.

Both sociological and biological carrying capacities must be applied to resolve wildlife damage problems. The wildlife acceptance capacity, or cultural carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations. Biological carrying capacity is the land or habitat's ability to support healthy populations of wildlife

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

without degradation to the species' health or their environment during an extended period of time (Decker and Purdy 1988). These phenomena are especially important because they define the sensitivity of a person or community to a wildlife species. For any given damage situation, there are varying thresholds of tolerance exhibited by those people directly and indirectly affected by the species and any associated damage. This damage threshold determines the wildlife acceptance capacity. While the habitat may have a biological carrying capacity to support higher populations of wildlife, in many cases the wildlife acceptance capacity is lower or has been met. Once the wildlife acceptance capacity is met or exceeded, people begin to implement population or damage management to alleviate damage or address threats to human health and safety.

The alleviation of damage or other problems caused by or related to the behavior of wildlife is termed wildlife damage management and is recognized as an integral component of wildlife management (Leopold 1933, The Wildlife Society 2010, Berryman 1991). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated and the need for damage management is derived from the specific threats to resources.

The need for action to manage damage and threats associated with mammals in Connecticut arises from requests for assistance[2] received by WS to reduce and prevent damage associated with mammals from occurring to four major categories: agricultural resources, natural resources, property, and threats to human safety. WS has identified those mammal species most likely to be responsible for causing damage to those four categories based on previous requests for assistance. Table 1.1 lists WS' technical assistance projects involving mammal damage or threats of damage to those four major resource types from the federal fiscal year[3] (FY) 2010 through FY 2013. Technical assistance is provided by WS to those persons requesting assistance with resolving damage or the threat of damage by providing information and recommendations on mammal damage management activities that can be conducted by the requestor without WS' direct involvement in managing or preventing the damage. WS' technical assistance activities will be discussed further in Chapter 3 of this EA. Table 1.1 does not include direct operational assistance projects conducted by WS where WS was requested to provide assistance through the direct application of methods.

The technical assistance projects conducted by WS are representative of the damage and threats that are caused by mammals. Technical assistance projects conducted by WS from FY 2010 through FY 2014 include 22.2% associated with white-tailed deer. Red fox (12.35%), coyotes (9.88%) and feral/ free ranging cats (8.64%) rounded out the species with the most requests for technical assistance.

Table 1.1 – WS' Technical assistance projects conducted in Connecticut, FY 2010 - FY 2014

Species	Projects	Species	Projects
Bats (all)	1	**Fox, Red**	10
Bears, Black	3	**Mink**	1
Beaver	5	**Opossum, Virginia**	2
Cats, Feral/Free-ranging	7	**Rabbits, Cottontail (all)**	1
Coyote	8	**Raccoon**	5
Deer, White-tailed	18	**Rat, Norway**	3
Dogs, Feral, Free-ranging	1	**Skunk, Striped**	5
Fisher	2	**Squirrel, Eastern Gray**	1
Fox, Gray	2	**Woodchucks**	6
		TOTAL	**81**

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

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

Table 1.2 lists those mammal species and the resource types that those mammal species can cause damage to in Connecticut. Many of the mammal species can cause damage to or pose threats to a variety of resources. In Connecticut, most requests for assistance received by WS are associated with those mammal species causing damage or threats of damage to property and natural resources. For example, many of those mammal species listed in Table 1.2 are predators that feed on the eggs, chicks, and adults of colonial nesting seabirds and shorebirds, including T&E species such as federally and state threatened piping plovers.

Table 1.2 – Mammal species addressed in the EA with WS requests for assistance received and the resource type damage by those species, from 2010 to 2014.

	Resource[a]					Resource[a]			
Species	**A**	**N**	**P**	**H**	**Species**	**A**	**N**	**P**	**H**
Bat, Big Brown				X	**Fox, Gray**			X	
Bat, Eastern Red				X	**Fox, Red**		X	X	
Bat, Silver-haired				X	**Hare, Snowshoe**		X		
Bat, Eastern Pipistrelle				X	**Mink**		X		
Bat, Hoary				X	**Myotis, Eastern Small-footed**				X
Bat, Little Brown				X	**Opossum, Virginia**		X	X	
Bat, Northern long-eared				X	**Rabbit New England Cottontail**		X		
Bears, Black	X		X	X	**Rabbit, Eastern Cottontail**		X		
Beaver		X	X	X	**Raccoon**		X	X	
Cat, Feral/Free-ranging		X	X	X	**Rats, Norway**	X	X		
Coyote		X	X	X	**Skunk, Striped**		X	X	
Deer, White-tailed	X	X	X		**Squirrels, Eastern Gray**			X	
Dog, Feral/Free-ranging			X		**Woodchuck**			X	
Fisher		X							

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

Need for Mammal Damage Management to Protect Human Health and Safety

Zoonoses (*i.e.*, wildlife diseases transmissible to people) are a major concern of cooperators when requesting assistance with managing threats from mammals. Disease transmission can not only occur from direct interactions between humans and mammals but from interactions with pets and livestock that have direct contact with mammals. Pets and livestock often encounter and interact with mammals which can increase the opportunity of transmission of disease to humans. Table 1.3 shows common diseases affecting humans that can be transmitted by mammals in addition to diseases which affect other animals, including domestic species. These include viral, bacterial, mycotic (fungal), protozoal, and rickettsial diseases.

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

Individuals or property owners that request assistance with mammals frequently are concerned about

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

Table 1.3 - Wildlife Diseases in the Eastern United States that Pose Potential Health Risks through Transmission to Humans (Beran 1994, Davidson 2006)[†]

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

[†]Table 1.3 is not considered an exhaustive list of wildlife diseases that are considered infectious to humans that are carried by wildlife species. The zoonoses provided are the more common infectious diseases for the species addressed in this EA and are only a representation of the approximately 100 to 3,000 zoonoses known to exist.

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

In many circumstances when human health concerns are the primary reason for requesting WS' assistance there may have been no actual cases of transmission of disease to humans by mammals. Thus, it is the risk of disease transmission that is the primary reason for requesting and conducting wildlife management to lessen the threat of disease transmission. Situations where the threat of disease associated with wild or feral mammal populations may include:

- Exposure of residents to the threat of rabies due to high densities of raccoons in urban settings or from companion animals coming in contact with infected raccoons.
- Exposure of humans to threats of rabies posed by skunks denning and foraging in a residential community or from companion animals coming in contact with infected skunks.
- Concern about the threat of histoplasmosis from the disturbance of a large deposit of guano in an attic where a large colony of bats routinely roosts or raise young.

- Accumulated droppings from denning or foraging raccoons and subsequent exposure to raccoon roundworm in fecal deposits in a suburban community or at an industrial site where humans work or live.

Increasing populations of raccoons have been implicated in the outbreak of distemper in certain areas (Majumdar et al. 2005). Distemper has not been identified as transmissible to humans. However, cooperators who feel threatened by the possibility of disease transmission often request assistance after observing sick raccoons on their property. Symptoms of distemper often lead to abnormal behavior in raccoons that are similar to symptoms associated with rabies. Raccoons with distemper often lose their fear of humans and can act aggressively which increases the risk that people, livestock, or companion animals may be bitten. Distemper is also known to occur in coyotes, red fox, and gray fox with symptoms that are similar to those exhibited by animals infected with the rabies virus.

Diseases and parasites affecting feral cats and dogs can have particularly serious implications to human health given the close association of those animals with people and companion animals. The topic of feral animals and their impacts on native wildlife and human health elicits a strong response in numerous professional and societal groups with an interest in the topic. Feral cats are considered by most professional wildlife groups to be a non-native species that has detrimental impacts to the native ecosystems especially in the presence of a human altered landscape. However, a segment of society views feral animals to be an extension of companion animals that should be cared for and for which affection bonds are often developed especially when societal groups feed and care for individual feral animals. Of special concern are those cats and dogs considered companion animals that are not confined at all times but are allowed to range for extended periods of time. Those companion animals are likely to encounter and become exposed to a wide-range of zoonoses that are brought back into the home upon return where direct contact with people increases the likelihood of disease transmission, especially if interactions occur between companion animals and feral animals of the same species. Feral animals that are considered companion animals are also likely to impact multiple people if disease transmission occurs since those animals are likely to come in direct contact with several members of families and friends before diagnosis of a disease occurs.

Several known diseases that are infectious to humans, including rabies, have been found in feral cats. Another common zoonoses found in cats is ringworm. Ringworm (*Tinea* spp.) is a contagious fungal disease contracted through direct interactions with an infected person, animal, or soil. Other common zoonoses of cats are pasteurella, salmonella, cat scratch disease (fever), and numerous parasitic diseases, including roundworms, tapeworms, and toxoplasmosis.

Most of the zoonoses known to infect cats that are infectious to humans are not life threatening if diagnosed and treated early. However, certain societal segments are at higher risks if exposed to zoonoses. Women who are pregnant, people receiving chemotherapy for immunologic diseases and organ transplants, and those with weakened immune systems are at increased risk of clinical disease if exposed to toxoplasmosis (AVMA 2004). In 1994, five Florida children were hospitalized with encephalitis that was associated with cat scratch fever (AVMA 2004). The daycare center at the University of Hawaii in Manoa was closed for two weeks in 2002 because of concerns about potential transmission of murine typhus (*Rickettsia typhi*) and cat flea (*Ctenocephalides felis*) infestations afflicting 84 children and faculty. The fleas were from a feral cat colony that had grown from 100 cats to over 1,000, despite a trap, neuter, and release effort (AVMA 2004).

A study in France determined that stray cats serve as major reservoirs for the bacterium *Bartonella* spp. Consequently, stray cats and their fleas are the only known vectors for infecting house bound cats and humans with this bacterium. Humans are not infected via the flea, but pet cats often are infected by flea bites. Human infections that may result from exposure of this bacterium via stray cats include: cat scratch

disease in immunocompetent patients, bacillary angiomatosis, hepatic peliosis in immunocompromised patients, endocarditis, bacteremia, osteolytic lesions, pulmonary nodules, neuroretinitis, and neurologic diseases (Heller et al. 1997). In areas where canine rabies has been eliminated, but rabies in wildlife has not, cats often are the most significant animal transmitting rabies to humans (Vaughn 1976, Eng and Fishbein 1990, Krebs et al. 1996).

This discussion on zoonoses is intended to briefly address the more common known zoonoses found in the United States for those species specifically addressed in this EA but is not intended to be an exhaustive discussion of all potential zoonoses. The transmission of diseases from wildlife to humans is neither well documented nor well understood for most infectious zoonoses. Determining a vector for a human infected with a disease known to occur in wildlife populations is often complicated by the presence of the known agent across a broad range of naturally occurring sources. For example, a person with salmonella poisoning may have contracted salmonella bacterium from direct contact with an infected pet but may have also contracted the bacterium from eating undercooked meat or from other sources.

However, wildlife and feral animals are known carriers of diseases infectious to people which can increase the risk of transmission directly through contact with infected wildlife or feral animals and through exposure from contact with livestock and pets that have been exposed to diseased wildlife or feral animals. Disease transmission to humans from wildlife is uncommon with few documented occurrences. However, the infrequency of such transmission does not diminish the concerns of those individuals requesting assistance that are fearful of exposure to a diseased animal since disease transmissions have been documented to occur. WS actively attempts to educate the public about the risks associated with disease transmission from wildlife to humans through technical assistance and by providing technical leaflets on the risks of exposure.

Requests are also received for assistance from a perceived threat of physical harm from wildlife especially from predatory wildlife. Human encroachment into wildlife habitat increases the likelihood of human-wildlife interactions. Those species that humans are likely to encounter are those most likely to adapt to and thrive in human altered habitat. Several predatory and omnivorous wildlife species thrive in urban habitat due to the availability of food, water, and shelter. Many people enjoy wildlife to the point of purchasing food specifically for feeding wildlife despite laws prohibiting the act in many areas. The constant presence of human created refuse, readily available water supplies, and abundant rodent populations found in urban areas often increases the survival rates and carrying capacity of wildlife species that are adaptable to those habitats. Often the only limiting factor of wildlife species in and around urban areas is the prevalence of diseases, which can be confounded by the overabundance of wildlife congregated into a small area that can be created by the unlimited amount of food, water, and shelter found within urban habitats.

As people are increasingly living with wildlife, the lack of harassing and threatening behavior by people toward many species of wildlife, especially around urban areas, has led to a decline in the fear wildlife have toward people. When wildlife species begin to habituate to the presence of people and human activity, a loss of apprehension occurs that can lead to threatening behavior toward people. This threatening behavior continues to increase as human populations expand and the populations of those species that adapt to human activity increase. Threatening behavior can be in the form of aggressive posturing, a general lack of apprehension toward people, or abnormal behavior. Though wildlife attacking people occurs rarely, the number of attacks appears to be on the increase. In neighboring Rhode Island and Massachusetts, fisher attacks were reported on a six year old boy waiting for a school bus (Free Republic 2009), a woman walking her dog (Boston Herald 2012) and a twelve year old boy playing football in his back yard (WCVB 2014). Timm et al. (2004) reported that coyotes attacking people have increased in California. Recent, highly publicized coyote and black bear attacks, including a fatal coyote attack on a 19-year old woman in Nova Scotia (CBC 2009) and fatal predatory bear attack on a 22-year

old man in New Jersey (New Jersey Division of Fish and Wildlife 2014, Swist 2014, Augenstein 2014), have only heightened people's awareness of the threat of such encounters. WS has received requests for assistance in response to perceived threats of attacks from wildlife in Connecticut. Often, wildlife exhibiting threatening behavior or a loss of apprehensiveness to the presence of people is a direct result and indication of an animal inflicted with a disease. So, requests for assistance are caused by both a desire to reduce the threat of disease transmission and from fear of aggressive behavior either from an animal that is less apprehensive of people or induced as a symptom of disease.

Disease Surveillance and Monitoring

Public awareness and health risks associated with zoonoses (*i.e.*, diseases of animals that can be transmitted to humans) have increased in recent years. Several zoonotic diseases associated with mammals are addressed in this EA. Those zoonotic diseases remain a concern and continue to pose threats to human safety where people encounter mammals. WS has received requests to assist with reducing damage and threats associated with several mammal species and could conduct or assist with disease monitoring or surveillance activities for any of the mammal species addressed in this EA. Most disease sampling occurs ancillary to other wildlife damage management activities (*i.e.*, disease sampling occurs after wildlife have been captured or lethally taken for other purposes). For example, WS may sample or collect ticks from deer harvested during the annual hunting season or during other damage management programs for Chronic Wasting Disease (CWD), Lyme Disease and ehrlichiosis or may collect blood samples from fox, coyotes, beavers and muskrats that were lethally taken to alleviate damage occurring to property to test for tularemia.

Need for Mammal Damage Management at Airports

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

The civil and military aviation communities have acknowledged that the threat to human health and safety from aircraft collisions with wildlife is increasing (Dolbeer 2000, MacKinnon et al. 2001). Collisions between aircraft and wildlife are a concern throughout the world because wildlife strikes threaten passenger safety (Thorpe 1996), result in lost revenue, and repairs to aircraft can be costly (Linnell et al. 1996, Robinson 1996). Aircraft collisions with wildlife can also erode public confidence in the air transport industry as a whole (Conover et al. 1995).

Between 1990 and 2013, 3,149 aircraft strikes were reported involving terrestrial mammals and 1,008 involved bats (Dolbeer et al. 2014). The number of mammal strikes actually occurring is likely to be much greater, since an estimated 80% of civil wildlife strikes go unreported (Cleary et al. 2000) and terrestrial mammal species with body masses less than one kilogram (2.2 pounds) are excluded from the database (Dolbeer et al. 2005). Civil and military aircraft have collided with a reported 61 mammal species (41 terrestrial and 20 bat) and 11 mammal species groups (7 terrestrial and 5 bat) from 1990 through 2010 (Dolbeer et al. 2014). This includes 16 species of wild terrestrial mammals and seven species of bats found in Connecticut as well as six species of domestic mammals that are kept or occur as feral/free ranging animals.

Reported strikes involving terrestrial mammals in the United States caused an estimated $58,110,148 in damages from 1990 to 2013 (Dolbeer et al. 2014). Of the 3,194 reported terrestrial mammal strikes from 1990 to 2013 in the United States, 31.06% involved white-tailed deer and 14.07% involved coyotes (Dolbeer et al. 2014). Dolbeer et al. (2014) reported an estimated $43,888,843 due to white-tailed deer

strikes and an estimated $3,667,729 in damages due to coyote strikes from 1990 to 2013 in the United States. Other mammal species that occur in Connecticut have resulted in monetary damages to aircraft across the United States; these include domestic dogs ($383,311), Eastern cottontail rabbit ($93,806), red fox ($57,782), raccoon ($58,304), and gray fox ($269) (Dolbeer et al. 2014). Data indicates that a much higher percentage of mammal strikes resulted in aircraft damage compared to bird strikes (Dolbeer et al. 2014).

Costs of those collisions vary, but FAA data reveals that mammal strikes in the United States cost the civil aviation industry approximately 306,203 hours of down time in addition to $62,568,589 million in direct monetary losses between 1990 and 2012 (Dolbeer et al. 2014). For terrestrial mammals, the 24-year average of strikes causing damage is 32.45% based on 1,022 of 3,149 reported strikes resulting in damage (Dolbeer et al. 2014). This has declined from 79.6% in 1990 when 43 of 54 reported terrestrial mammal strikes resulted in damage to 15.35% in 2013 when only 31 or 202 terrestrial mammal strikes resulted in damage being reported (Dolbeer et al. 2014). In comparison, the 24-year average for bird strikes causing damage is 9.01%, based on 12,457 of 138,257 reported strikes resulting in damage (Dolbeer et al. 2014).

In addition to damages caused by mammal strikes involving aircraft, those incidents can pose serious threats to human safety. For example, damage to the landing gear during the landing roll and/or takeoff run can cause a loss of control of the aircraft, causing additional damage to the aircraft and increasing the threat to human safety. Dolbeer et al. (2014) reported that 63% of mammal strikes from 1990 through 2012 occurred at night, with 57% occurring during the landing roll, 31% during the takeoff run, 7% on approach, and 2% during taxi.

In Connecticut, there were 37 reported strikes with mammals from 1 January 1990 through 30 June 2013 (FAA 2014). Four of the mammal strikes involved bats, while 33 were terrestrial mammals. There were 18 white-tailed deer, six striped skunks, two coyotes, two red fox, two Virginia opossums, one raccoon, one woodchuck, and one red bat. These strikes reported a total of $85,000 in damage with inflation adjusted damage estimate of $ 115,315. There was also a reported 1,320 hours of aircraft down time (FAA 2014). Preventing damage and reducing threats to human safety is the goal of those cooperators requesting assistance at airports in Connecticut given that a potential strike can lead to the loss of human life and considerable damage to property.

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

Need for Mammal Damage Management to Protect Agricultural Resources

Wildlife can cause losses, injury or disease to livestock (*e.g.*, sheep, goats, cattle, pigs, horses, llamas, alpacas), poultry (*e.g.*, chickens, turkeys, geese, ducks), aquaculture (trout, shellfish), and crops through predation or close contact.

In Connecticut, the NASS (2011) reported that 100 calves were killed in 2010 by coyotes for a total cost of $30,000. Connecticut cattle producers reported using a number of non-lethal methods to reduce losses due to predators. This included guard animals reported used by 59.0% of survey respondents. In

addition, livestock producers used exclusion fencing (35.2%), carcass removal (1.2%), herding (1.2%), night penning (1.2%), and other non-lethal methods (5.9%) (NASS 2011).

The NASS (2010) reported that 300 sheep and 400 lambs were lost to predation in the New England region which includes Connecticut during 2009, resulting in $93,000 in monetary losses.

Black bears damage corn by trampling on stalks while feeding, damage orchard stock and vineyards by breaking branches and vines to reach fruit, damage bee hives and consume other agricultural crops. Black bears may also prey on livestock such as goats, sheep, and cattle and poultry.

River otters and mink, and to a lesser extent bears, raccoons and muskrats may prey on fish and other cultured species at hatcheries and aquaculture facilities (Bevan et al. 2002). River otters may even prey on fish in marine aquaculture facilities (Goldburg et al. 2001). Direct damage results when the fish or other cultured organism is killed or seriously maimed by the predator and is therefore lost from production. Indirect damage is highly variable, and includes: non-lethal wounding of fish; chronic stress with a consequent reduction in feeding efficiency or health; transfer of harmful disease-causing organisms, including bacteria, viruses and parasites; and sometimes even physical damage to the animal enclosure system leading to escapement. Often, the indirect damage caused by a predator can result in a greater economic loss than that caused by direct damage. So, the total extent of damage to an aquaculture stock by predators can be highly varied and extremely costly depending on many factors (Bevan et al. 2002).

The domestic cat has been found to transmit *Toxoplasma gondii* to both domestic and wild animal species. Cats have been found to be important reservoirs and the only species known to allow for the completion of the life cycle for the protozoan parasite *T. gondii* (Dubey 1973, Teutsch et al. 1979). Both feral and domiciled cats may be infected by this protozoan, but this infection is more common in feral cats. Fitzgerald et al. (1984) documented that feral cats transmitted *T. gondii* to sheep in New Zealand, resulting in abortion in ewes. The authors also found *Sarcocystis* spp. contamination in the musculature of sheep. Dubey et al. (1995) found cats to be 68.3% positive for seroprevalence of *T. gondii* on swine farms in Illinois and the major reservoir for this disease. The main sources for infecting cats are thought to be birds and mice.

Diseases that may be communicable from feral cats to companion cats include feline panleukopenia (FPL) infection, feline calicivirus infection, feline reovirus infection, and feline syncytium-forming virus infection (Gillespie and Scott 1973). Of the four feline diseases, feline panleukopenia is considered to be the most serious. Reif (1976) found that during the acute stages of feline panleukopenia, fleas were vectors of this disease to other cats. FPL infection is cyclic in nature, being more prevalent in the July to September time period.

Woodchucks (commonly referred to as groundhogs) are routinely reported to cause damage to field crops, such as row and forage crops, orchards, nursery plants, and commercial gardens. Cottontail rabbits and voles are reported to damage orchard trees by gnawing at the base of the tree. Trees are badly damaged or the bark is girdled and trees die when feeding by rabbits and voles is severe. Similar damage occurs in nurseries, which grow landscape ornamentals and shrubs.

Beaver have been observed damaging field and sweet corn by WS' personnel in neighboring Massachusetts and have been reported feeding on other field crops (D. Wilda, WS pers. comm. 2014). They have also been observed by WS' personnel feeding on commercially grown standing timber and seedling trees. Beaver activities cause flooding of prime bottomland crop fields, causing severe economic losses to agricultural producers. Similar flooding and subsequent killing of trees occurs in some commercial forest tracts, killing harvestable trees or seedlings.

Connecticut produced $6,946,473 worth of commercial sod in 2007 (NASS 2009). White-tailed deer damage commercially grown sod by overgrazing and by leaving holes in harvested sod created by hoof prints which reduce the value of sod per square foot. Connecticut also produced $130,097,751 in floriculture crops, $115,607,170 in nursery stock, 11,732 gallons of maple syrup, and 113,622 Christmas tree in 2007 (NASS 2009). Browsing, feeding, and gnawing by deer, rabbits, squirrels, chipmunks, and voles can cause damage or destroy floral and ornamental nursery plants, sap collection equipment, maple trees and Christmas trees.

Need to Resolve Damage Occurring to Natural Resources

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

Mammals can cause damage to natural resources. Mammals causing damage are often locally overabundant at the damage site and threaten the welfare of a species' population identified as a natural resource. An example of this would be nest predation of a local ground-nesting bird population by mammalian carnivores, such as raccoons, opossum, feral cats, fisher, skunks, coyotes, or fox. In 2013, predation of T&E species by red fox and other mammal species was reported to WS CT DEEP (L. Saucier per. Comm. 2013). Active mammalian predator management is conducted annually by WS in neighboring Rhode Island and Massachusetts to reduce predation by red fox, coyotes, raccoons, skunks, feral cats, and fisher on federally and state threatened piping plover, federally and state endangered roseate terns, and state listed least, common, and Arctic terns. Other T&E species could be jeopardized by mammals in Connecticut. For example, in neighboring Massachusetts, beaver damming destroys important nesting habitat of federally and state threatened bog turtles.

Deer overabundance can affect native vegetation and natural ecosystems in addition to ornamental landscape plantings. White-tailed deer selectively forage on vegetation (Strole and Anderson 1992), and thus, can have substantial impacts on certain herbaceous and woody species and on overall plant community structure (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, understory vegetation cover, plant density and diversity (Warren 1991). By one count, 98 species of threatened and endangered plants, many of them orchids and lilies, are disturbed by deer browsing (Ness 2003).

The alteration and degradation of habitat from over-browsing by deer 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 vegetative habitat destroyed by deer browsing (VDGIF 1999). Similarly, DeCalesta (1997) reported that deer browsing affected vegetation that songbirds need for foraging surfaces, escape cover, and nesting. Species richness and abundance of intermediate canopy nesting songbirds was reduced in areas with higher deer densities (DeCalesta 1997). Intermediate canopy-nesting birds declined 37% in abundance and 27% in species diversity at higher deer densities. Five species of birds were found to disappear at densities of 38.1 deer per square mile and another two disappeared at 63.7 deer per square mile. Casey and Hein (1983) found that three species of birds could no longer be found 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 a lower deer density. Waller and

Alverson (1997) hypothesized that by competing with squirrels and other fruit-eating animals for oak mast, deer may further affect many other species of animals and insects.

Scientists estimate that nationwide cats kill hundreds of millions of birds and more than a billion small mammals, such as rabbits, squirrels, and chipmunks, each year. Cats kill common species such as cardinals, blue jays, and house wrens, as well as rare and endangered species such as piping plovers (American Bird Conservancy (ABC) 2005). Some feral and free-ranging cats kill more than 100 animals each year. One well-fed cat that roamed a wildlife experiment station was recorded to have killed more than 1,600 animals (mostly small mammals) over 18 months (ABC 2005). Researchers at the University of Wisconsin coupled their four-year cat predation study with the data from other studies, and estimated that rural feral and free-ranging cats kill at least 7.8 million and perhaps as many as 217 million birds a year in Wisconsin. In some parts of the state, feral and free ranging cat densities reached 114 cats per square mile, outnumbering all similar-sized native predators (Coleman et al. 1997). Churcher and Lawton (1989) observed 77 well fed free-ranging cats in a Britain village for one year. Churcher and Lawton (1989) estimated that 30% to 50% of the animals captured by cats birds and that the cats had significantly affected house sparrow populations within the village. Based on information acquired in the study, Churcher and Lawton (1989) estimated that more than 20 million birds are killed by cats in Britain each year with more than 70 million animals overall being taken by cats annually. Most recently, Loss et al. (2013) estimated that free-ranging cats kill 1.4 to 3.7 billion birds and 6.9 to 20.7 billion mammals worldwide annually.

Need for Mammal Damage Management to Protect Property

Mammals cause damage to a variety of property types in Connecticut each year. From FY 2009 through FY 2013, WS received reports of damages or threats of damage caused by mammals to aircraft, airport runways and taxiways, roads and bridges, railroads and trestles, residential and non-residential buildings, swimming pools, landfills, machinery, equipment, trees, shrubs, flowers, and turf. The most frequently reported damage type is the threat of aircraft striking mammals. The direct threat of aircraft strikes with mammals can cause substantial damage requiring costly repairs and aircraft downtime. Indirect threats to aircraft may result from large populations of small mammals such as rabbits, insectivores, mice, and voles attracting mammal and avian predators to the airfield and increasing the risk of a wildlife strike.

Deer-vehicle collisions are a serious concern nationwide because of losses to property and the potential for human injury and death (Conover et al. 1995, Romin and Bissonette 1996, Conover 1997). The economic costs associated with deer-vehicle collisions include vehicle repairs, human injuries and fatalities, and picking up and disposing of deer (Drake et al. 2005). Annually, there are estimated to be more than 1,000,000 deer-vehicle collisions nationwide, but the 2011 statistics show a 7% decrease in the total over the previous year and a 9% decrease over the previous three years (Williams et al. 2012). Williams et al. (2012) estimated that there were more than 200 human deaths attributable to deer-vehicle collisions annually. State Farm Insurance (2013) estimated that 1,230,000 auto-deer collisions occurred in the U.S. between July 1, 2011 and June 30, 2012 causing an average of around $3,300 per collision. Based on the average repair costs associated with vehicle strikes estimated at $3,300 and 1,177 deer-vehicle collisions reported by Connecticut Department of Energy and Environmental Protection (CT DEEP) (2014a), an average of more than 3.2 deer killed per day in calendar year 2012 resulted in an estimated $3,884,100 in damage to property. Often, deer-vehicle collisions in which a deer carcass was not recovered or little vehicle damage occurred go unreported. A Cornell University study estimated that the actual number of deer-vehicle collisions could be as high as six times the reported number (Decker et al. 1990) and a CT DEEP study conducted from 2000 to 2001 estimated that for every deer reported killed, five additional deer are killed and not reported. Based on this, CT DEEP (2014a) estimates the actual number of deer killed in Connecticut during 2012 was 7,062, over 19.3 per day.

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

Need for Non-Damage Related Activities by WS Involving Mammals

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

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

Actions Analyzed

This EA evaluates the need for mammal damage management to reduce threats to human health and safety and to resolve damage to property, natural resources, and agricultural resources as well as all other WS' activities involving mammals, including but not limited to, research and monitoring, population and habitat management and enhancement for rare mammal species and emergency response on federal, state, tribal, municipal, and private land within Connecticut wherever such management or assistance is requested by a cooperator. This EA discusses the issues associated with conducting mammal damage management and other activities to meet the need for action and evaluates different alternatives to meeting that need while addressing those issues. The methods available for use or recommendation under each of the alternatives evaluated are provided in Appendix B.

Federal, State, County, City, and Private Lands

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

Native American Lands and Tribes

The WS program in Connecticut would only conduct damage management activities when requested by a Native American Tribe and only after a Memorandum of Understanding (MOU) or cooperative service agreement has been signed between WS and the Tribe requesting assistance. Because Tribal officials would be responsible for requesting assistance from WS and determining what methods would be available to alleviate damage, no conflict with traditional cultural properties or beliefs would be anticipated. Those methods available to alleviate damage associated with mammals on federal, state,

county, municipal, and private properties under the alternatives analyzed in this EA would also be available for use to alleviate damage on Tribal properties when the use of those methods have been approved for use by the Tribe requesting WS' assistance. Therefore, the activities and methods addressed under the alternatives would include those activities that could be employed on Native American lands, when requested and agreed upon.

Period for which this EA is Valid

If the analyses in this EA indicates an Environmental Impact Statement (EIS) is not warranted, this EA would remain valid until WS determines that new needs for action, changed conditions, new issues, or new alternatives having different environmental impacts must be analyzed. At that time, this analysis and document would be reviewed and supplemented pursuant to the NEPA. Review of the EA would occur to ensure that activities conducted under the selected alternative remain within the parameters evaluated in the EA. If the alternative analyzing no involvement in mammal damage activities by WS is selected, no additional analyses would occur based on the lack of involvement by WS. The monitoring of activities by WS would ensure the EA remains appropriate to the scope of mammal damage management activities conducted by WS in Connecticut under the selected alternative.

Site Specificity

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

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

Chapter 2 of this EA identifies and discusses issues relating to mammal damage management in Connecticut. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in the State (see Chapter 3 for a description of the Decision Model and its application). Decisions made using the model would be in accordance with WS' directives and Standard Operating Procedures (SOPs) described in this EA as well as relevant laws and regulations.

The analyses in this EA are intended to apply to any action that may occur in any locale and at any time within Connecticut. In this way, WS believes it meets the intent of the NEPA with regard to site-specific

analysis and that this is the only practical way for WS to comply with the NEPA and still be able to accomplish its mission.

Summary of Public Involvement

Issues related to mammal damage management as conducted by WS in Connecticut were initially developed by WS in cooperation with the CT DEEP. Issues were defined and preliminary alternatives were identified through the scoping process. As part of this process, and as required by the Council on Environmental Quality (CEQ) and APHIS' NEPA implementing regulations, this document is being noticed to the public through legal notices published in local print media, through direct mailings to parties that have requested to be notified or have been identified to have an interest in the reduction of threats and damage associated with mammals in the State, and by posting the EA on the APHIS website at http://www.aphis.usda.gov/wildlifedamage/nepa.

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

1.4 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

Environmental Assessment – Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Fox, and Coyotes in the United States: WS issued an EA that analyzed the environmental effects of WS' involvement in the funding of and participation in Oral Rabies Vaccination programs to eliminate or stop the spread of raccoon rabies in a number of eastern states (including Connecticut) and gray fox and coyote rabies in Texas (USDA 2009). WS determined the proposed action alternative would not have any significant impact on the quality of the human environment. Pertinent information from that EA has been incorporated by reference into this EA.

Draft Environmental Impact Statement - Feral Swine Damage Management: A National Approach: APHIS WS has prepared a Draft Environmental Impact Statement (EIS) to evaluate alternatives for reducing damage and risks to human health and safety from feral swine in the U.S. and Guam, Puerto Rico, U.S. Virgin Islands, the Northern Mariana Islands and American Samoa. Upon completion of the Final EIS and issuance of a Record of Decision, this EA will be reviewed for consistency with the EIS and updated as necessary.

1.5 AUTHORITY OF FEDERAL AND STATE AGENCIES

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

WS' Legislative Authority

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

United States Environmental Protection Agency (EPA)

The EPA is responsible for implementing and enforcing the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) which regulates the registration and use of pesticides.

Connecticut Department of Energy and Environmental Protection Legislative Authority

The Connecticut Department of Energy and Environmental Protection (CT DEEP) was established on July 1, 2011 with the consolidation of the Department of Environmental Protection, the Department of Public Utility Control, and energy policy staff from other areas of state government (CT DEEP 2014a). CT DEEP's authority in wildlife management is given under Volume 8, Title 26; Chapter 490, Sections 26-1 to 26-186a, and Chapter 495, Sections 26-303 to 26-316 of the General Statutes of Connecticut. This legislation covers general provisions; licenses, permits and stamps generally; wildlife generally; fish; wild animals and threatened and endangered species. CT DEEP's authority to manage pesticides is given under the Connecticut Pesticide Control Act, Volume 8, Title 22a; Chapter 441, Sections 22a-46 to 22a-66z.

Connecticut Department of Agriculture

The mission of the Connecticut Department of Agriculture (CT DAG) is to foster a healthy economic, environmental and social climate for agriculture by developing, promoting and regulating agricultural businesses; protecting agricultural and aquaculture resources; enforcing laws pertaining to domestic animals; and promoting an understanding among the state's citizens of the diversity of Connecticut agriculture, its cultural heritage and its contribution to the state's economy. CT DAG's authority in agriculture is given under Volume 8, Title 22; Chapters 422 to 438d, Sections 22-1 to 22-457 of the General Statutes of Connecticut. Of particular importance is Section 22-26g which requires a permit for and regulates the use of noise making devices, such as propane exploders, acetylene exploders, carbide exploders, electronic noisemakers and similar noise-making devices to disperse wildlife damaging agricultural resources. Also of importance are Sections 22-358 and 22-359 which authorize killing and/or quarantine of free ranging dogs, cats, and other animals that have killed or injured livestock, poultry, or pets or that have bitten people and regulate control of rabies in domestic and wild mammals.

Connecticut Department of Public Health

The mission of the Connecticut Department of Public Health (CT DPH) is to employ the most efficient and practical means for the prevention and suppression of disease and administer all laws under the jurisdiction of the CT DPH and the Public Health Code. As required by Connecticut General Statutes (CGS) Section 19a-2a and Section 19a-36-A2 of the Public Health Code, the list of Reportable Diseases, Emergency Illnesses and Health Conditions, and Reportable Laboratory Findings are revised annually by the CT DPH includes zoonotic diseases transmitted or vectored by mammals such as babesiosis, brucellosis, Lyme disease, plague, rabies, and tularemia.

Under the Public Health Emergency Response Plan (CT DPH 2005), the CT DPH works with federal, stated, regional, and local partners to improve Connecticut's ability to respond to public health emergencies. This is includes public health investigations that could involve health-related surveillance, epidemiological and laboratory investigation, environmental investigation and communication with investigative partners and persons who may have been exposed infectious diseases to include zoonotic diseases transmitted or vectored by mammals. It also includes public health interventions to minimize human morbidity and mortality during a public health emergency. More specific goals are to use medical

methods (prophylaxis, vaccination) and physical separation methods (isolation, quarantine, personal protection, cancellation of public events) to prevent disease in those exposed and/or to limit the potential for exposure in those not yet exposed. The public health system deals with populations and prevention that occurs outside of established medical settings. When medical or infection control-type intervention is needed for large groups outside the medical setting (e.g., mass vaccination, isolation or quarantine); public health agencies are responsible for organizing and providing such services (CT DPH 2005).

1.6 COMPLIANCE WITH LAWS AND STATUTES

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

National Environmental Policy Act

All federal actions are subject to the NEPA (Public Law 9-190, 42 USC 4321 et seq.). WS follows CEQ regulations implementing the NEPA (40 CFR 1500 et seq.) along with USDA (7 CFR 1b) and APHIS Implementing Guidelines (7 CFR 372) as 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. The NEPA also sets forth the requirement that all major federal actions be evaluated in terms of their potential to significantly affect the quality of the human environment for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. Federal activities affecting the physical and biological environment are regulated in part by CEQ through regulations in 40 CFR, Parts 1500-1508. In accordance with CEQ and USDA regulations, APHIS guidelines concerning Implementation of the NEPA Procedures, as published in the Federal Register (44 CFR 50381-50384) provide guidance to APHIS regarding the NEPA process.

Pursuant to the NEPA and CEQ regulations, this EA documents the analyses resulting from proposed 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 the NEPA are infused into federal agency actions. This EA was prepared by integrating as many of the natural and social sciences as warranted, based on the potential effects of the proposed actions. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

The NEPA requires federal agencies to incorporate environmental planning into federal agency actions and decision-making processes. The two primary objectives of the NEPA are: 1) agencies must have available and fully consider detailed information regarding environmental effects of federal actions and 2) agencies must make information regarding environmental effects available to interested persons and agencies before decisions are made and before actions are taken.

Endangered Species Act

Under the ESA, all federal agencies will seek to conserve T&E species and will utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with the United States Fish and Wildlife Service (USFWS) to use the expertise of the USFWS to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency will use the best scientific and commercial data available*" (Sec.7 (a)(2)).

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

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

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

Coastal Zone Management Act of 1972, as amended (16 USC 1451-1464, Chapter 33; P.L. 92-583, October 27, 1972; 86 Stat. 1280).

This law established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. Funds were authorized for cost-sharing grants to states to develop their programs. Subsequent to federal approval of their plans, grants would be awarded for implementation purposes. In order to be eligible for federal approval, each state's plan was required to define boundaries of the coastal zone, identify uses of the area to be regulated by the state, determine the mechanism (criteria, standards or regulations) for controlling such uses, and develop broad guidelines for priorities of uses within the coastal zone. In addition, this law established a system of criteria and standards for requiring that federal actions be conducted in a manner consistent with the federally approved plan. The standard for determining consistency varied depending on whether the federal action involved a permit, license, financial assistance, or a federally authorized activity. As appropriate, a consistency determination would be conducted by WS to assure management actions would be consistent with Connecticut's Coastal Zone Management Program established under the Coastal Zone Management Act CGS Sections 22a-90 to 22a-111.

Environmental Justice in Minority and Low Income Populations (Executive Order 12898)

Executive Order 12898, promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental

effects of federal programs, policies, and activities on minority and low-income persons or populations. All activities are evaluated for their impact on the human environment and compliance with Executive Order 12898.

WS would use only legal, effective, and environmentally safe wildlife damage management methods, tools and approaches. All chemicals that could be used by WS are regulated by the EPA through the FIFRA, by the CT DEEP, by the Drug Enforcement Agency (DEA), by MOUs with land managing agencies, and by WS' Directives. WS would properly dispose of any excess solid or hazardous waste. It is not anticipated that the proposed action or the alternatives would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations. In contrast, the alternatives may benefit minority or low-income populations by reducing threats to public health and safety and property damage.

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

Children may suffer disproportionately for many reasons from environmental health and safety risks, including the development of their physical and mental status. WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children. WS have considered the impacts that this proposal might have on children. The proposed activities would occur by using only legally available and approved methods where it would be highly unlikely that children would be adversely affected. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing the proposed action or the alternatives. Additionally, since the proposed mammal damage management program is directed at reducing human health and safety risks at locations where children are sometimes present, it is expected that health and safety risks to children posed by mammals would be reduced.

Invasive Species (Executive Order 13112)

Executive Order 13112 directs federal agencies to use their programs and authorities to prevent the spread or to control populations of invasive species that cause economic or environmental harm or harm to human health. The Order states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law: 1) reduce invasion of exotic species and the associated damages, 2) monitor invasive species populations and provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education of invasive species.

The Native American Graves and Repatriation Act of 1990

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

Occupational Safety and Health Act of 1970

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

Federal Insecticide, Fungicide, and Rodenticide Act

The FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The EPA is responsible for implementing and enforcing the FIFRA. All chemical methods that would be available for use by WS or could be recommended by WS under any of the alternatives would be registered with and regulated by the EPA and the CT DEEP, and would be used or recommended by WS in compliance with labeling procedures and requirements. There are several products registered for the control of mammals (fumigants, toxicants, repellents) in Connecticut listed in Appendix B.

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

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

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

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

Animal Medicinal Drug Use Clarification Act of 1994

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

Clean Water Act (Section 404)

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

Food Security Act

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

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

Memorandum of Understanding between the CT DEEP, CT DOA, UConnCES, CT DOT and WS

A MOU between the CT DEEP as the Connecticut Department of Environmental Protection, Connecticut Department of Public Health (CT DPH), University of Connecticut Cooperative Extension Service (UConnCE), Connecticut Department of Transportation (CT DOT), now the CT DOT and the Connecticut Airport Authority (CAA), and WS was developed in 2002. The purpose was to establish a cooperative relationship between State Agencies and WS for planning, coordinating and implementing policies to prevent or minimize damage caused by wildlife to agriculture, property, and natural resources and to safeguard public health and safety; to facilitate an exchange of information; to encourage research on wildlife damage management; and to provide a basis for the establishment of cooperative agreements to conduct wildlife damage management activities.

1.7 DECISIONS TO BE MADE

Based on agency relationships, MOUs, and legislative authorities, WS is the lead agency for this EA, and therefore, responsible for the scope, content, and decisions made. As the authority for the management of mammal populations in the state, the CT DEEP was involved in the development of the EA and provided input throughout the EA preparation process to ensure an interdisciplinary approach according to the NEPA and agency mandates, policies, and regulations. The CT DEEP is responsible for managing wildlife in the State, including those mammal species addressed in this EA. The CT DEEP establishes and enforces regulated hunting and trapping seasons in the State as well as pesticide regulations for toxicants and repellents/aversive agents that may be registered for use to manage damage associated with mammals. WS' activities to reduce and/or prevent mammal damage in the State under the alternatives would be coordinated with the CT DEEP which would ensure WS' actions are incorporated into population objectives established for mammal populations in the State.

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

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

CHAPTER 2: AFFECTED ENVIRONMENT AND ISSUES

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues that have driven the development of SOPs, and issues that will not be considered in detail, with rationale. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues. Additional descriptions of affected environments will be incorporated into the discussion of the environmental effects in Chapter 4.

2.1 AFFECTED ENVIRONMENT

Damage, threats of damage, or other requests for assistance related to those mammal species addressed in this EA can occur statewide wherever those mammals occur. Most species of mammals addressed in this EA can be found throughout the year across the state where suitable habitat exists for foraging and shelter. Those mammal species addressed in this EA are capable of utilizing a variety of habitats. Since those mammal species addressed in this EA can be found throughout most of the state, requests for

assistance to manage damage, threats of damage or for other reasons could occur in areas occupied by those mammal species. Additional information on the affected environment for each species is provided in Chapter 4.

Upon receiving a request for assistance, mammal damage and other management activities could be conducted on federal, state, tribal, municipal, and private properties in Connecticut. Areas where damage, threats of damage, or other requests for assistance could occur include, but are not limited to, agricultural fields, vineyards, orchards, farmyards, dairies, livestock operations, aquaculture facilities, fish hatcheries, railroad yards, waste handling facilities, industrial sites, natural resource areas, park lands, and historic sites; state and interstate highways and roads; railroads and their right-of-ways; property in or adjacent to subdivisions, businesses, and industrial parks; timberlands, croplands, and pastures; private and public property where burrowing mammals cause damage to structures, dikes, ditches, ponds, and levees; public and private properties in rural/urban/suburban areas where mammals cause damage to landscaping and natural resources, property, and are a threat to human safety through the spread of disease. The area would also include airports and military airbases where mammals are a threat to human safety and to property; areas where mammals negatively impact wildlife, including T&E species; and public property where mammals are negatively impacting historic structures, cultural landscapes, and natural resources.

Environmental Status Quo

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

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

When a non-federal entity (*e.g.*, agricultural producers, municipalities, counties, private companies, individuals, or any other non-federal entity) takes a mammal damage management action, the action is not subject to compliance with the NEPA due to the lack of federal involvement in the action. Under such circumstances, the environmental baseline or status quo must be viewed as an environment that includes those resources as they are managed or impacted by non-federal entities in the absence of the federal action being proposed. Therefore, in those situations in which a non-federal entity has decided that a management action directed towards mammals should occur and even the particular methods that would be used, WS' involvement in the action would not affect the environmental status quo. Given that non-federal entities can receive authorization to use lethal MDM methods from the CT DEEP (depending on the species state classification), and since most methods for resolving damage are available to both WS and to non-federal entities, WS' decision-making ability is restricted to one of three alternatives: 1) WS can either take the action using the specific methods discussed in this EA upon request; 2) WS can provide non-lethal assistance only; 3) or WS can take no action, at which point the non-federal entity could take the action anyway, either without a permit, during the hunting or trapping season, or through

the issuance of a permit by the CT DEEP. Under those circumstances, WS would have virtually no ability to affect the environmental status quo because the action would likely occur in the absence of WS' direct involvement.

2.2 ISSUES ASSOCIATED WITH MAMMAL DAMAGE MANAGEMENT ACTIVITIES

Issues are concerns of the public and/or professional community raised regarding potential adverse effects that might occur from a proposed action. Such issues must be considered in the NEPA decision-making process. Issues related to managing damage and other issues associated with mammals in Connecticut were developed by WS in consultation with the CT DEEP.

The issues as those issues relate to the possible implementation of the alternatives, including the proposed action, are discussed in detail in Chapter 4. The issues analyzed in detail in Chapter 4 are the following:

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

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on the populations of target species. Methods used to resolve damage or threats to human safety can involve altering the behavior of target species and may require the use of lethal methods when appropriate. Non-lethal methods can disperse or otherwise make an area unattractive to target species causing damage which reduces the presence of those species at the site and potentially the immediate area around the site where non-lethal methods are employed. Lethal methods would be employed to remove a mammal or those mammals responsible for causing damage or posing threats to human safety. The use of lethal methods would therefore result in local population reductions in the area where damage or threats were occurring. The number of target species removed from the population using lethal methods under the alternatives would be dependent on the number of requests for assistance received, the number of individuals involved with the associated damage or threat, and the efficacy of methods employed.

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

In addition, many of the mammal species addressed in this EA can be harvested during annual hunting and/or trapping seasons and can be addressed using available methods by other entities when those species cause damage or pose threats of damage when permitted by the CT DEEP.

Therefore, any mammal damage management activities conducted by WS under the alternatives addressed would be occurring along with other natural process and human-induced events such as natural mortality, human-induced mortality from private damage management activities, mortality from regulated harvest, and human-induced alterations of wildlife habitat.

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

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

The ESA states that all federal agencies *"...shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of the Act"* [Sec. 7(a)(1)]. WS conducts Section 7 consultations with the USFWS to ensure compliance with the ESA and to ensure that *"any action authorized, funded or carried out by such an agency...is not likely to jeopardize the continued existence of any endangered or threatened species…Each agency shall use the best scientific and commercial data available"* [Sec. 7(a)(2)].

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. Procedures for compliance with the ESA provided by the USFWS are further discussed in Chapter 4.

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

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

Safety of Chemical Methods Employed

The issue of using chemicals methods as part of managing damage associated with wildlife relates to the potential for human exposure either through direct contact with the chemical or exposure to the chemical from wildlife that have been exposed. Under the alternatives identified, the use of chemical methods would include immobilizing drugs, euthanasia drugs, reproductive inhibitors, fumigants, toxicants, and repellents.

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

Safety of Non-Chemical Methods Employed

Non-chemical methods employed to reduce damage and threats to safety caused by mammals, if misused, could potentially be hazardous to human safety. Non-chemical methods may include but are not limited to firearms, live-traps, exclusion, body-gripping traps, pyrotechnics, and other scaring devices. A complete list of non-chemical methods available to alleviate damage associated with mammals is

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

Issue 4 - Humaneness and Animal Welfare Concerns of Methods

Humaneness, in part, is a person's perception of harm or pain inflicted on an animal, 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 but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate damage management for societal benefits could be compatible with animal welfare concerns, if *"…the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process."*

According to the American Veterinary Medical Association (AVMA 1987), 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…"* Because suffering carries with it the implication of a time frame, a case could be made for *"…little or no suffering where death comes immediately…"* (California Department of Fish and Game 1991). Pain and physical restraint can cause stress in animals and the inability of animals to effectively deal with those stressors can lead to distress. Suffering occurs when action is not taken to alleviate conditions that cause pain or distress in animals.

Defining pain as a component in humaneness appears to be a greater challenge than that of suffering. Pain obviously occurs in animals, but assessing pain experienced by animals can be challenging (AVMA 2007, California Department of Fish and Game 1991). The American Veterinary Medical Association (AVMA) defines pain as being, "that sensation (perception) that results from nerve impulses reaching the cerebral cortex via ascending neural pathways" (AVMA 2007). The key component of this definition is the perception of pain. The AVMA (2007) notes that "pain" should not be used for stimuli, receptors, reflexes, or pathways because these factors may be active without pain perception. For pain to be experienced, the cerebral cortex and subcortical structures must be functional. If the cerebral cortex is nonfunctional because of hypoxia, depression by drugs, electric shock, or concussion, pain is not experienced.

Stress has been defined as the effect of physical, physiologic, or emotional factors (stressors) that induce an alteration in an animal's base or adaptive state. Responses to stimuli vary among animals based on the animals' experiences, age, species and current condition. Not all forms of stress result in adverse consequences for the animal and some forms of stress serve a positive, adaptive function for the animal. Eustress describes the response of animals to harmless stimuli which initiate responses that are beneficial to the animal. Neutral stress is the term for response to stimuli which have neither harmful nor beneficial effects to the animal. Distress results when an animal's response to stimuli interferes with its well-being and comfort (AVMA 2007).

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

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

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

Effects of Beaver Dam Removal on the Status of Wetlands in the State

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

Beaver dams, over time, can establish new wetlands. The regulatory definition of a wetland stated by the United States Army Corps of Engineers and the EPA (40 CFR 232.2) is:

"Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

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

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

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

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

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

WS has the discretion to determine the geographic scope of their analyses under the NEPA. The intent in developing this EA is to determine if the proposed action would potentially have significant individual and/or cumulative impacts on the quality of the human environment that would warrant the preparation of an EIS or a finding of no significant impact (FONSI). This EA addresses impacts for managing damage and threats to human safety associated with mammals in Connecticut to analyze individual and cumulative impacts, provide a thorough analysis of other issues relevant to MDM, and provides the public an opportunity to review and comment on the analysis and alternatives.

In terms of considering cumulative effects, one EA analyzing impacts for the entire state will provide a more comprehensive and less redundant analysis than multiple EAs covering smaller areas. As most mammals are regulated by the CT DEEP, the best available data for analysis is often based on statewide population dynamics. For example, an EA on county level may not have sufficient data for that area and have to rely on statewide analysis anyway. If a determination is made through this EA that the proposed action or the other alternatives might have a significant impact on the quality of the human environment, then an EIS would be prepared.

WS' Impact on Biodiversity

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

A Loss Threshold Should Be Established Before Allowing Lethal Methods

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

Mammal Damage Management Should Not Occur at Taxpayer Expense

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

Cost Effectiveness of Management Methods

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

Mammal Damage Should Be Managed By Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce mammal damage for property owners or property managers when deemed appropriate by the resource owner. Some property owners would prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity and thus could provide the service at less expense, or because they prefer to use a private business rather than a government agency. However, some property owners would prefer to enter into an agreement with a government agency. In particular, large industrial businesses, airports, and cities and towns may prefer to use WS because of security and safety issues. The relationship between WS and private industry is addressed in WS directive 3.101.

Effects from the Use of Lead Ammunition in Firearms

Questions have arisen about the deposition of lead into the environment from ammunition used in firearms to lethally take mammals. As described in Appendix B, the lethal removal of mammals with firearms by WS to alleviate damage or threats would occur using a rifle, air rifle or shotgun. In an ecological risk assessment of lead shot exposure in non-waterfowl birds, ingestion of lead shot was identified as the concern rather than just contact with lead shot or lead leaching from shot in the environment (Kendall et al. 1996).

The take of mammals by WS using firearms occurs primarily from the use of rifles. However, the use of shotguns could be employed to lethally take some species. To reduce risks to human safety and property damage from bullets passing through mammals, the use of rifles is applied in such a way (*e.g.*, caliber, bullet weight, distance) to ensure the bullet does not pass through mammals. Mammals that are removed using rifles would occur within areas where retrieval of all mammal carcasses for proper disposal is highly likely (*e.g.*, at an airport). With risks of lead exposure occurring primarily from ingestion of bullet fragments, the retrieval and proper disposal of mammal carcasses would greatly reduce the risk of scavengers ingesting or being exposed to lead that may be contained within the carcass.

However, deposition of lead into soil could occur if, during the use of a rifle, the projectile passes through a mammal, if misses occur, or if the mammal carcass is not retrieved. Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil is generally retained within the top 20 cm (about 8 inches). In addition, concerns occur that lead from bullets deposited in soil from shooting activities could lead to contamination of water, either ground water or surface water, from runoff. Stansley et al. (1992) studied lead levels in water that was subjected directly to high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Lead did not appear to "*transport*" readily in surface water when soils were neutral or slightly alkaline in pH (*i.e*., not acidic), but lead did transport more readily under slightly acidic conditions. Although Stansley et al. (1992) detected elevated lead levels in water in a stream and a marsh that were in the shot "*fall zones*" at a shooting range, the study did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot where it was believed the lead contamination was due to runoff from the parking lot, and not from the shooting range areas. The study also indicated that even when lead shot is highly accumulated in areas with permanent water bodies present, the lead does not necessarily cause elevated lead contamination of water further downstream. Muscle samples from two species of fish collected in water bodies with high lead shot accumulations had lead levels that were well below the accepted threshold standard of safety for human consumption (Stansley et al. 1992).

Craig et al. (1999) reported that lead levels in water draining away from a shooting range with high accumulations of lead bullets in the soil around the impact areas were far below the "*action level*" of 15 parts per billion as defined by the EPA (*i.e.*, requiring action to treat the water to remove lead). The study found that the dissolution (*i.e*., capability of dissolving in water) of lead declines when lead oxides form on the surface areas of the spent bullets and fragments (Craig et al. 1999). Therefore, the transport of lead from bullets or shot distributed across the landscape is reduced once the bullets and shot form crusty lead oxide deposits on their surfaces, which serves to naturally further reduce the potential for ground or surface water contamination (Craig et al. 1999). Those studies suggest that, given the very low amount of lead being deposited and the concentrations that would occur from WS' activities to reduce mammal damage using firearms, as well as most other forms of dry land small game hunting in general, lead contamination of water from such sources would be minimal to nonexistent.

Since the take of mammals can occur during regulated hunting seasons, through the issuance of kill permits by the CT DEEP, or without the need to obtain a permit for take if those species are considered a "*nuisance furbearer*", WS' assistance with removing mammals would not be additive to the environmental status quo since those mammals removed by WS using firearms could be lethally removed by the entities experiencing damage using the same method in the absence of WS' involvement. The amount of lead deposited into the environment may be lowered by WS' involvement in mammal damage management activities due to efforts by WS to ensure projectiles do no pass through but are contained within the mammal carcass which limits the amount of lead potentially deposited into soil from projectiles passing through the carcass. The proficiency training received by WS' employees in firearm use and accuracy increases the likelihood that mammals are lethally removed humanely in situations that ensure accuracy and that misses occur infrequently which further reduces the potential for lead to be deposited in the soil from misses or from projectiles passing through carcasses. In addition, WS' involvement ensures mammal carcasses lethally removed using firearms would be retrieved and disposed of properly to limit the availability of lead in the environment and ensures mammal carcass are removed from the environment to prevent the ingestion of lead in carcasses by scavengers. Based on current information, the risks associated with lead bullets that are deposited into the environment from WS' activities due to misses, the bullet passing through the carcass, or from mammal carcasses that may be irretrievable would be below any level that would pose any risk from exposure or significant contamination of water.

Effects on Human Health from Consumption of Deer and Other Mammal Meat Donated by WS
Of concern under this issue is the consumption of deer and other mammal meat such as rabbit donated to a charitable organization after being lethally taken by WS. Of recent concern is the potential for lead and other contaminants to be present in meat that has been processed for human consumption. The potential for the spreading of zoonotic diseases in deer and other mammal meat processed and donated for human consumption is also a concern. Under the proposed action alternative, meat from game or furbearer species that are traditionally eaten and that may be legally hunted or trapped in Connecticut including deer, rabbit, hare, gray squirrel, woodchuck, opossum, and raccoon lethally taken during damage management activities could be donated to charitable organizations for human consumption. WS could recommend the donation or consumption of meat under the technical assistance only alternative but would not be directly involved with damage management activities under that alternative.

If WS donates deer or other mammal meat for human consumption, WS' policies pertaining to the testing or labeling of meat would be followed in order to address potential health concerns. Mammal meat donated for human consumption may be tested for exposure to substances such as organophosphate and carbamate insecticides, lead, mercury, arsenic, organochlorines, and organic chemicals prior to distribution. The entity selecting the capture/euthanize (and donation for charitable consumption) program would be responsible for all costs associated with legal and appropriate donation for human consumption.

Connecticut allows for donation of meat under the Connecticut Hunters for the Hungry program authorized under § 26-78a *Donation of game to charitable organizations*, which limits liability for legally harvested game donated to Connecticut food banks and other charities in good faith. The meat must be legally harvested, properly processed, packaged, refrigerated, and labeled to be acceptable.

Deer and other mammals immobilized using immobilizing drugs or euthanized using euthanasia chemicals would not be donated for human consumption with disposal of carcasses occurring by deep burial or incineration. Mammals taken by any method at landfills, trash transfer stations, Superfund sites, or any other area of known environmental contamination or taken solely for disease sampling in an area where zoonotic diseases of concern are known to be prevalent and of concern to human health after consuming processed meat would not be donated for consumption and would be disposed of by deep burial or incineration.

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

Another issue commonly identified is a concern that mammal damage management activities conducted by WS would affect the ability of persons to harvest those species during the regulated hunting and trapping seasons either by reducing local populations through the lethal removal of mammals or by reducing the number of mammals present in an area through dispersal techniques. Those species that are addressed in this EA that also can be hunted or trapped during regulated seasons in Connecticut include: cottontail rabbit, snowshoe hare, gray fox, red fox, gray squirrel, raccoon, coyote, mink, muskrat, striped skunk, Virginia opossum, short-tailed and long-tailed weasel, beaver, fisher, and white-tailed deer.

Potential impacts could arise from the use of non-lethal or lethal damage management methods. Non-lethal methods used to reduce or alleviate damage reduce mammal densities by dispersing animals from areas where damage or the threat of damage is occurring. Similarly, lethal methods used to reduce damage could locally lower target species densities in areas where damage is occurring, resulting in a reduction in the availability of those species during the regulated harvest season. WS' MDM activities would primarily be conducted in areas where hunting access is restricted (e.g., airports, urban areas) or has been ineffective. The use of non-lethal (such as black bear relocation) or lethal methods often

disperses mammals from areas where damage is occurring to areas outside the damage area which could serve to move those mammal species from those less accessible areas to places more accessible to hunters. In addition, in appropriate situations, WS commonly recommends recreational hunting and trapping as a damage management alternative for many of the species listed in this EA.

Global Climate Change/Greenhouse Gas Emissions

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

CHAPTER 3: ALTERNATIVES

Chapter 3 contains a discussion of the alternatives which were developed to meet the need for action discussed in Chapter 1 and to address the identified issues discussed in Chapter 2. Alternatives were developed for consideration based on the need for action and issues using the WS Decision model (Slate et al. 1992). The alternatives will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences). Chapter 3 also discusses alternatives considered but not analyzed in detail, with rationale. SOPs for mammal damage management are also discussed in Chapter 3.

3.1 DESCRIPTION OF THE ALTERNATIVES

The following alternatives were developed to meet the need for action and address the identified issues associated with managing damage caused by mammals:

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

The proposed action/no action alternative would continue the current implementation of an adaptive integrated approach utilizing non-lethal and lethal techniques, as deemed appropriate using the WS Decision Model, to reduce damage and threats caused by mammals. WS, in consultation with the CT DEEP, would continue to respond to requests for assistance with, at a minimum, technical assistance, or when funding is available, operational damage management. Funding could occur through federal appropriations or from cooperative funding.

The adaptive approach to managing damage associated with mammals would integrate the use of the most practical and effective methods to resolve a request for damage management as determined by site-specific evaluation to reduce damage or threats to human safety for each request. City/town managers, agricultural producers, property owners, and others requesting assistance would be provided information regarding the use of appropriate non-lethal and lethal techniques. WS would work with those persons experiencing mammal damage in addressing those mammals responsible for causing damage as expeditiously as possible. To be most effective, damage management activities should begin as soon as mammals begin to cause damage. Mammal damage that has been ongoing can be difficult to resolve using available methods since mammals are conditioned to an area and are familiar with a particular location. Subsequently, making that area unattractive through the use of available methods can be difficult to achieve once damage has been ongoing. WS would work closely with those entities requesting assistance to identify situations where damage could occur and begin to implement damage

management activities under this alternative as early as possible to increase the likelihood of those methods achieving the level of damage reduction requested by the cooperating entity.

Under this alternative, WS would respond to requests for assistance by: 1) taking no action if warranted, 2) providing only technical assistance to property owners or managers on actions they could take to reduce damages caused by mammals, or 3) provide technical assistance and direct operational assistance to a property owner or manager experiencing damage. The take of many of the mammal species native to Connecticut or designated a game species can only legally occur through regulated hunting and trapping seasons or through the issuance of a permit or license by the CT DEEP and only at levels specified in the permit. Under the Connecticut General Laws § 26-72, "*No provision of this section shall be construed as prohibiting any landowner or lessee of land used for agricultural purposes or any citizen of the United States, or any person having on file in the court having jurisdiction thereof a written declaration of such person's intention to become a citizen of the United States, who is regularly employed by such landowner or lessee, from pursuing, trapping and killing at any time any fur-bearing animal, except deer, which is injuring any property,*" Activities conducted under this alternative would occur in compliance with the Connecticut General Statutes and the MOU signed between the CT DEEP and WS.

Property owners or managers requesting assistance would be provided with information regarding the use of effective and practical non-lethal and lethal techniques under this alternative. Property owners or managers may choose to implement WS' recommendations on their own (*i.e*., technical assistance), use contractual services of private businesses, use volunteer services of private organizations, use the services of WS (*i.e*., direct operational assistance), take the management action themselves without consulting another private or governmental agency, or take no action.

Euthanasia of live-captured mammals would occur through the use of euthanasia drugs or carbon dioxide once live-captured using other methods. Euthanasia drugs are an acceptable form of euthanasia for free-ranging wildlife while carbon dioxide is a conditionally acceptable[4] method of euthanasia (AVMA 2013). On occasion, mammals could be euthanized by gunshot once live-captured which is a method of euthanasia considered appropriate by the AVMA for free-ranging wildlife, when administered appropriately (AVMA 2013).

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

Non-lethal methods can disperse or otherwise make an area unattractive to mammals causing damage; thereby, reducing the presence of mammals at the site and potentially the immediate area around the site where non-lethal methods are employed. Non-lethal methods would be given priority when addressing requests for assistance (WS Directive 2.101). However, non-lethal methods would not necessarily be employed to resolve every request for assistance if deemed inappropriate by WS' personnel using the WS Decision Model, especially when the requesting entity has used non-lethal methods previously and found those methods to be inadequate to resolving the damage or threats of damage. Non-lethal methods are used to exclude, harass, and disperse target wildlife from areas where damage or threats are occurring. When effective, non-lethal methods would disperse mammals from the area resulting in a reduction in the presence of those mammals at the site where those methods were employed. For any management methods employed, the proper timing is essential in effectively dispersing those mammals causing damage. Employing methods soon after damage begins or soon after threats are identified increases the

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

likelihood that those damage management activities would achieve success in addressing damage. Therefore, coordination and timing of methods is necessary to be effective in achieving expedient resolution of mammal damage.

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

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

Technical Assistance Recommendations

Under the proposed action, WS would provide technical assistance to those persons requesting mammal damage management assistance as part of an integrated approach to managing damage. Technical assistance would occur as described in Alternative 2 of this EA. From FY 2006 through FY 2014, WS has conducted 125 technical assistance projects that involved mammal damage to property, natural resources, and threats to human safety with 187 participants and distributed 16 informational leaflets (see Table 1.1).

Operational Damage Management Assistance

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

Educational Efforts

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

recent developments in damage management technology, programs, laws and regulations, and agency policies.

Research and Development

The National Wildlife Research Center (NWRC) functions as the research unit of WS by providing scientific information and the development of methods that are effective and environmentally responsible. Research biologists with the NWRC work closely with wildlife managers, researchers, and others to develop and evaluate wildlife damage management techniques. NWRC biologists have authored hundreds of scientific publications and reports, and are respected world-wide for their expertise in wildlife damage management.

WS' Decision Making Procedures

WS' personnel use a thought process for evaluating and responding to damage complaints which is depicted by the WS Decision Model (WS Directive 2.201) and described by Slate et al. (1992). WS' personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for effectively reducing damage. WS' personnel assess the problem and then evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic, and social considerations. Following this evaluation, methods deemed to be practical for the situation are incorporated into a damage management strategy. After this strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model, most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions, including WS.

Community-based Decision-makers

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

Under a community based decision-making process, WS would provide information, demonstration, and discussion on all available methods to the appropriate representatives of the community for which services were requested to ensure a community-based decision is made. By involving decision-makers in the process, damage management actions can be presented to allow for decisions on damage management to involve those individuals that the decision-maker(s) represents. WS would provide technical assistance to the appropriate decision-maker(s) to allow for information on damage management activities to be presented to those persons represented by the decision-maker(s), including demonstrations and presentation by WS at public meetings to allow for involvement of the community. Requests for assistance to manage damage caused by mammals often originate from the decision-maker(s) based on community feedback or from concerns about damage or threats to human safety. As representatives of the community, the decision-maker(s) are able to provide the information to local interests either through

technical assistance provided by WS or through demonstrations and presentation by WS on mammal damage management activities. This process allows decisions on mammal damage management activities to be made based on local input.

The decision-maker for the local community would be elected officials or representatives of the communities. The elected officials or representatives are popularly elected residents of the local community or appointees who oversee the interests and business of the local community. This person or persons would represent the local community's interest and make decisions for the local community or bring information back to a higher authority or the community for discussion and decision-making. Identifying the decision-maker for local business communities is more complex because building owners may not indicate whether the business must manage wildlife damage themselves, or seek approval to manage wildlife from the property owner or manager, or from a governing Board. WS could provide technical assistance and make recommendations for damage reduction to the local community or local business community decision-maker(s). Direct control could be provided by WS only if requested by the local community decision-maker, funding is provided, and if the requested direct control was compatible with WS' recommendations.

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

Under this alternative, WS would be restricted to only using or recommending non-lethal methods to resolve damage caused by mammals (Appendix B). Lethal methods could continue to be used under this alternative by those persons experiencing damage by mammals without involvement by WS. In situations where non-lethal methods were impractical or ineffective to alleviate damage, WS could refer requests for information regarding lethal methods to the CT DEEP, local animal control agencies, or private businesses or organizations. Property owners or managers might choose to implement WS' non-lethal recommendations on their own or with the assistance of WS, implement lethal methods on their own, or request assistance (nonlethal or lethal) from a private or public entity other than WS. Property owners/managers frustrated by lack of WS' assistance with the full range of mammal damage management techniques may try methods not recommended by WS or use illegal methods (e.g., poisons). In some cases, property owners or managers may misuse some methods or use some methods in excess of what is necessary.

Alternative 3 – No Mammal Damage Management Conducted by WS

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

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

3.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

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

Non-lethal Methods Implemented Before Lethal Methods

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

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

Use of Lethal Methods Only by WS

This alternative would require the use of lethal methods only to reduce threats and damage associated with mammals. However, non-lethal methods can be effective in preventing damage in certain instances. Under WS Directive 2.101, WS must consider the use of non-lethal methods before lethal methods. Non-lethal methods have been effective in alleviating mammal damage. In those situations where damage could be alleviated using non-lethal methods deemed effective, those methods would be employed or recommended as determined by the WS Decision Model. Therefore, this alternative was not considered in detail.

Trap and Translocate Mammals Only

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

Translocation of all mammals is currently prohibited by CT DEEP regulations, without prior approval of the CT DEEP. Translocation sites would be identified and have to be pre-approved by the CT DEEP and the property owner where the translocated mammals would be placed prior to live-capture and translocation. Live-capture and translocation could be conducted as part of the alternatives analyzed in detail. When requested by the CT DEEP, WS could translocate mammals or recommend translocation under any of the alternatives analyzed in detail, except under the no involvement by WS alternative (Alternative 3). Since WS does not have the authority to translocate mammals unless permitted by the CT DEEP, this alternative was not considered in detail. In addition, the translocation of mammals by WS could occur under any of the alternatives analyzed in detail, except Alternative 3. However, translocation by other entities could occur under Alternative 3.

The translocation of mammals that have caused damage to other areas following live-capture generally would not be effective or cost-effective. Translocation is generally ineffective because problem mammal species are highly mobile and can easily return to damage sites from long distances, habitats in other areas are generally already occupied, and translocation would most likely result in mammal damage problems at the new location. Also, hundreds of mammals would need to be captured and translocated to solve some damage problems (*e.g.*, deer confined within a perimeter fence); therefore, translocation would be unrealistic. Translocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of the stress to the translocated animal, poor survival rates, and the difficulties that translocated wildlife have with adapting to new locations or habitats (Nielsen 1988). There is also a concern of spreading wildlife diseases by moving wildlife from one location to another.

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

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

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

Currently, no reproductive inhibitors are available for use to manage most mammal populations. Given the costs associated with live-capturing and performing sterilization procedures on mammals and the lack of availability of chemical reproductive inhibitors for the management of most mammal populations, this alternative was not evaluated in detail. If a reproductive inhibitor becomes available to manage a large number of mammal populations and has proven effective in reducing localized mammal populations, the use of the inhibitor could be evaluated under the proposed action as a method available that could be used in an integrated approach to managing damage. Currently, the only reproductive inhibitor that is registered with the EPA is Gonacon™, which is registered for use on white-tailed deer. However, Gonacon™ is not currently registered for use in Connecticut.

Compensation for Mammal Damage

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

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

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

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

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

- Not all resource owners would rely completely on a compensation program and 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.

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

Bounties

Payment of funds (bounties) for killing some mammals suspected of causing economic losses have not been supported by State agencies, such as the CT DEEP, as well as most wildlife professionals for many years (Latham 1960, Hoagland 1993). WS concurs with those agencies and wildlife professionals because of several inherent drawbacks and inadequacies in the payment of bounties. Bounties are often ineffective at controlling damage over a wide area, such as the entire state. The circumstances surrounding the take of animals are typically arbitrary and completely unregulated because it is difficult or impossible to assure animals claimed for bounty were not taken from outside the area where damage was occurring. In addition, WS does not have the authority to establish a bounty program.

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

This topic has undergone considerable debate in animal welfare and scientific communities for a number of years. The debate focuses on whether controlling feral, free-ranging, or invasive animal populations through Trap-Neuter-Release (TNR) programs, often including a vaccination component, are effective and alleviate problems (*i.e.*, diseases, predation, agricultural damage, and human safety).

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

In addition, the National Association of State Public Health Veterinarians and the AVMA oppose TNR programs based on health concerns and threats (AVMA 1996). Of major concern are the potential for diseases and parasites transmission to humans either from direct contact during sterilization or the risk of exposure after the animal is released. Once live-captured, performing sterilization procedures during field operations on anesthetized feral cats would be difficult. Sanitary conditions are difficult to maintain when performing surgical procedures in field conditions. To perform operations under appropriate conditions, live-captured feral cats would need to be transported from the capture site to an appropriate facility which increases the threat from handling and transporting. A mobile facility could be used but would still require additional handling and transporting of the live-captured feral cats to the facility. Once the

surgical procedure was completed, the feral cat would have to be held to ensure recovery and transported back to the area capture occurred.

TNR programs are often not as successful as desired and needed to reduce immediate threats posed by wildlife, especially when human safety is a concern (Barrows 2004, Levy and Crawford 2004, Jessup 2004, Winter 2004, AVMA 2009). Feral cats subjected to TNR would continue to cause the same problems[5] they caused before the TNR program was initiated because of slow attrition. TNR programs can take a decade or longer to reduce target species populations (Barrows 2004, Winter 2004) especially when acute issues need rapid solutions (Levy and Crawford 2004, Stoskopf and Nutter 2004). Several studies report that target species populations often remain stable or increase following TNR programs due to immigration and reproduction from other members of the groups (Castillo and Clarke 2003, Levy and Crawford 2004, Winter 2004) with little to no resolution of threats to human safety or damages (Barrows 2004, Slater 2004, Winter 2004).

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

3.3 STANDARD OPERATING PROCEDURES FOR MAMMAL DAMAGE MANAGEMENT

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

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

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

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

- Immobilizing and euthanasia drugs would be used according to the DEA, FDA, and WS' directives and procedures.

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

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

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

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

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

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

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

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

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

- WS would employ methods and conduct 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. Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazards to the public would be even further reduced.

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

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

- Non-target animals captured in traps would be released unless it is determined that the animal would not survive and/or that the animal cannot be released safely.

3.4 ADDITIONAL STANDARD OPERATING PROCEDURES SPECIFIC TO THE ISSUES

Several additional SOPs are applicable to the alternatives and the issues identified in Chapter 2 including the following:

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

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

- Management actions to reduce or prevent damage caused by mammals by WS would only target those individuals or groups of target species identified as causing damage or posing a threat to human safety.

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

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

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

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

- Personnel would use lures, trap placements, and capture devices that would be strategically placed at locations likely to capture a target animal and minimize the potential of non-target animal captures.

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

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

- Carcasses of mammals retrieved after damage management activities have been conducted would be disposed of in accordance with WS Directive 2.515.

- WS has consulted with the USFWS and the CT DEEP to evaluate activities to resolve mammal damage and threats to ensure the protection of T&E species.

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

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

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

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

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

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

Issue 4 - Humaneness and Animal Welfare Concerns of Methods

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

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

- The NWRC is continually conducting research to improve the selectivity and humaneness of wildlife damage management devices used by personnel in the field.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative to address the need for action described in Chapter 1 and the issues described in Chapter 2. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified. The following resource values in the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, critical habitats (areas listed in T&E species recovery plans), visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

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

Cumulative Effects: As defined by CEQ (40 CFR 1508.7), these are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

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

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

This section analyzes the environmental consequences of each alternative in comparison to determine the extent of actual or potential impacts on the issues. Therefore, the proposed action/no action alternative (Alternative 1) serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. The analysis also takes into consideration mandates, directives, and the procedures of WS and the CT DEEP.

4.1 Effects on Target Mammal Species Populations

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

A common issue is whether damage management actions would adversely affect the populations of target mammal species, especially when lethal methods are employed. Alternative 1 addresses requests for assistance received by WS through technical and operational assistance where an integrated approach to methods would be employed and/or recommended.

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

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

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

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

The issue of the potential impacts of conducting the alternatives on the populations of those target mammal species addressed in this EA are analyzed for each alternative below.

Generally, WS only conducts damage management on species whose population densities are high or concentrated and usually only after they have caused damage. Table 4.1 identifies average annual lethal removal of animals by WS, proposed maximum annual WS removal, and estimated annual harvest by hunters and trappers or nuisance take by NWCOs within Connecticut for calendar years 2010-2014. No indirect effects were identified for this issue.

Table 4.1 Quantitative impacts of lethal removal for selected species in Connecticut.

Species	Average Annual WS Removal 2010-2014 5-year Average[a]	Maximum Proposed WS Annual Removal[a]	Minimum CT Estimated Statewide Population	% WS Proposed Annual Removal Compared to Minimum CT Estimated Population	CT Statewide Average Annual Estimated Season Harvest 2009-2013[b]	% WS Proposed Annual Removal Compared to Average Annual CT Harvest
Beaver	0.4	40	6,000	0.67%	1,104.4	3.62%
Black Bear	0	2	200	1.00%	n/a	n/a
Bobcat	0	5	500	1.00%	n/a	n/a
Coyote	5.2	50	3,000	1.67%	156.2	32.01%
Deer Mouse	0	100	62,740	0.16%	n/a	n/a
Eastern Chipmunk	0	100	1,568,367*	0.006%	n/a	n/a
Eastern Cottontail	0	100	774,837*	0.01%	n/a	n/a
Eastern Gray Squirrel	0	100	1,882,196*	0.005%	n/a	n/a
Eastern Moose	0	2	100	2.00%	n/a	n/a
Eastern Cottontail	0	100	774,837*	0.01%	n/a	n/a
Eastern Gray Squirrel	0	100	1,882,196*	0.005%	n/a	n/a
Eastern Moose	0	2	100	2.00%	n/a	n/a
Feral/Free Range Cat	0	25	330,000	0.008%	n/a	n/a
Fishers	0	10	800	1.25%	160.6	6.23%
Gray Fox	0.2	25	1,500	1.67%	49.6	50.40%
Long -tailed Weasel	0	10	2,510*	0.40%	9.2†	100.70%
Mink	0	25	9,198*	0.27%	219.4	11.39%
Muskrat	0	100	196,835	0.05%	n/a	n/a
North American Porcupine	0	25	11,544*	0.22%	n/a	n/a
Northern Flying Squirrel	0	100	7,529	1.33%	n/a	n/a
Raccoon	6.8	50	24,225*	0.21%	756.8	6.61%
Red Fox	2.8	30	2,000	1.50%	84.2	35.63%
Red Squirrel	0	100	17,253*	0.56%	n/a	n/a
River Otter	0	5	947*	0.53%	190.8	2.62%
Short -tailed Weasel	0	10	1,339*	0.75%	9.2†	100.70%
Snowshoe Hare	0	10	1,255*	0.80%	n/a	n/a
Southern Flying Squirrel	0	100	627,399	0.02%	n/a	n/a
Striped Skunk	3.4	30	20,134	0.15%	65	53.85%
Virginia Opossum	0.2	25	3,150	0.79%	203.4	12.29%

Species	Average Annual WS Removal 2010-2014 5-year Average[a]	Maximum Proposed WS Annual Removal[a]	Minimum CT Estimated Statewide Population	% WS Proposed Annual Removal Compared to Minimum CT Estimated Population	CT Statewide Average Annual Estimated Season Harvest 2009-2013[b]	% WS Proposed Annual Removal Compared to Average Annual CT Harvest
White-footed Mouse	0	100	188,220	0.05%	n/a	n/a
White-Tailed Deer	12.5	125	126,000	1.0%	12,565	0.99%
Woodchuck	5.2	50	109,167	0.05%	n/a	n/a

[a]Only includes lethal removal
**10 European rabbits were taken by WS during FY 2006
†Harvest of weasels in Connecticut is not reported to species
[b]Annual harvest estimates from CT DEEP for trapper harvest for seasons 2009 to 2013 that correlate to FY 2010 to 2014
*Minimum population estimates derived from literature (Melquist and Dronkert 1987, Erickson et al. 1984, Heptner et al. 1967, Simms 1979, Glover 1943, Quick 1951, Craven 1994, McCabe 1949, Gerell 1971, Murray et al. 2002, Brander 1973, Curtis 1944, Barkalow et al. 1970, Manski et al. 1981, Kemp and Keith 1970, Saunders 1988, Waters and Zabel (1995, Williams and Corrigan 2005, Brooks and Dodge 1986, Hunt 1986, Terman 1993, Banfield 1974)

Raccoons

The raccoon is found throughout Connecticut. Absolute raccoon population densities are difficult or impossible to determine because of the difficulty in knowing the percentage of the population that has already been counted or estimated and the additional difficulty of knowing how large an area the raccoons are using (Sanderson 1987).

Population estimates for raccoons are not available. A population estimate will be derived based on the best available information for raccoons to provide an indication of the magnitude of take proposed by WS to alleviate damage and threats of damage. If raccoons were only found on 50% of the land area of the state and using densities of 10 to 80 raccoons per mi^2 found by Riley et al. (1998), the population could range from a low of 24,225 raccoons to nearly 193,790 raccoons.

Raccoons are classified as both a game and a furbearer species in Connecticut with a regulated annual hunting and trapping season. Raccoons have a five per day limit through hunting and no daily limit for trapping and there are no season limits for hunting or trapping. However, there were 80 hunting days scheduled during the 2014 hunting season, with a five per day limit there is a de facto seasonal hunting limit of 400 raccoon per hunter (CT DEEP 2014b). In addition, raccoons can be lethally taken as a nuisance by land owners or leasee when causing damage or posing a threat of damage or when permitted by the CT DEEP.

The number of raccoons estimated as harvested by sport trappers from 2010 through 2014 are shown in Table 4.1. Reported take of raccoons during the trapping seasons is based on estimates from trapping questionnaires. There is no mandatory reporting of raccoons harvested during the annual hunting season; therefore, take is considered as minimum take that likely occurred. During 2006, the last year with available data, 821 raccoons were euthanized by licensed NWCOs in the state.

Based upon an anticipated increase for requests for WS' assistance, up to 50 raccoons could be lethally removed by WS annually to alleviate damage. Using the average annual hunter harvest data to assess WS' impacts to the raccoon population, WS' removal of 50 raccoons would represent 0.21% of the lowest estimated population and 6.61% of the estimated trapper harvest (Table 4.1). This level of removal is considered to be a low magnitude. Given that the actual population is much higher than the low estimated population and estimated annual harvest, WS' removal is an even lower magnitude of the statewide population.

The unlimited trapper harvest and de facto seasonal take limit of 400 raccoons by hunting allowed by the CT DEEP during the length of the trapping and hunting seasons provides an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the raccoon population would occur resulting in an undesired population decline. The CT DEEP's oversight of WS, hunting/trapping seasons, and NWCOs or private pest control operator removal would ensure that the cumulative removal would not have a negative impact on the overall raccoon population.

Coyote

Coyote are found throughout Connecticut. The CT DEEP has established hunting and trapping seasons for coyotes from July through April with no bag limits. Also, coyotes may be taken without a license if the animal is doing or about do damage on private land.

The coyote is probably the most extensively studied carnivore, and considerable research has been conducted on population dynamics. Data from scent-station indices suggest that density increases from north to south. Coyote densities as high as 2/km^2 (5/mi^2) have been reported in the southwestern and west-central U.S., but are lower in other portions of the country including eastern North America, although few studies have accurately determined densities (Voigt and Berg 1987). Although coyote densities vary based on local habitat quality, Knowlton (1972) published that density estimates of 0.5 to 1.0 coyotes per square mile would likely be applicable to coyote densities across much of their range. Coyote densities as high as 2 per square kilometer (5 per square mile) have been reported in the southwestern and west-central United States, but are lower in other portions of the country including eastern North America, although few studies have accurately determined densities (Voigt and Berg 1987).

CT DEEP estimates the coyote population in Connecticut between 3,000 and 7,000 individuals (J. Hawley, CT DEEP, Pers. Comm. 2013) and received a total of 1,334 coyote complaints from 2007 to 2012 (C. Vann, CT DEEP. Pers. Comm. 2013).

There is currently a requirement for pelt tagging requirement for coyotes taken by trapping. Coyotes taken by hunting may be tagged or, alternately, reported to CT DEEP by telephone or online. Based on required pelt sealing or reporting of coyote pelts, an average of 156.2 coyotes were harvested annually through trapping and hunting from 2010 to 2014 (see Table 4.1).

Based on previous requests for assistance received by WS and anticipated future requests, the removal of coyotes by WS would not exceed 50 coyotes annually. WS take of 50 coyotes would represent 1.67% of the low population estimate of 3,000 provided by CT DEEP. This level of removal is insignificant and not expected to negatively impact coyote populations. The take of 50 coyotes by WS would represent 32.05% of the average annual harvest. Population modeling information provided by Connolly and Longhurst (1975) suggests that a viable coyote population can withstand an annual removal of 70% of their population without causing a decline in the population (Connolly 1995). Therefore, no significant cumulative impacts are expected when WS' removal is added to the average annual sportsman harvest. Based on the limited proposed removal by WS and the fact that the CT DEEP allows for unlimited harvest of coyotes, WS' activities will have no significant effects on statewide coyote populations. The unlimited harvest levels allowed by the CT DEEP during the length of the trapping and hunting seasons provide an indication that cumulative removal, including removal for damage management, would not reach a level where overharvest of the coyote population would occur resulting in an undesired population decline. The CT DEEP's oversight of WS, annual trapping seasons, and NWCO removal would ensure that the cumulative removal would not have a negative impact on the overall coyote population.

Feral/Free Ranging Dogs

Feral dogs are very rare and free-roaming dogs are rare in Connecticut due to Connecticut General Laws Chapter 435 particularly Sec. 22-338, Sec. 22-339, Sec. 22-342, Sec. 22-355, Sec. 22-364, Sec. and 22-

364a, local ordinances and state, regional, and municipal animal control officers and associated licensing requirements, vaccination, and leash laws. Feral dogs are dogs raised without human contact and are essentially wild. Free-ranging dogs can be either strays, abandoned or lost dogs without known owners, or dogs with owners that are either intentionally allowed to roam free or that have escaped from their property or their owner's immediate control. Feral or free-ranging domestic dogs can create a variety of problems. They may attack and/or kill livestock, poultry or pets. They may harass or kill native wildlife such as deer, rabbits, or T&E birds such as piping plovers (Lowry 1978, Green and Gipson 1994).

Domestic dogs may also access airports and create a threat to aviation safety. WS has not received any requests for assistance associated with domestic dogs in Connecticut previously. However, WS has had to capture multiple free ranging dogs found roaming loose on airports in neighboring Massachusetts and return them to their owners. Because all of Connecticut falls within a municipality and all municipalities have either an animal control officer or share a regional animal control officer, these officers have primary responsibility for managing issue regarding domestic dogs. However, if WS encounters feral or free-ranging domestic dogs either as a primary damage agent or while conducting other control operations, all reasonable attempts would be made to capture the dog(s) and turn them over to local animal control or shelter. If capture is not possible, information on the dog(s) would be provided to the local animal control officer. WS would not intentionally lethally remove feral or free-ranging domestic dogs in Connecticut unless they were observed in the act of attacking a human or under the specific authorization of the CT DOAG. It is anticipated that no more than five feral or free-ranging dogs could be lethally taken in an emergency situation or if specifically authorized by the CT DOAG.

Free Ranging/Feral Cats

Free-ranging cats are socialized and can be strays, lost or abandoned pets, or pets with homes that are allowed to roam outside. Feral cats, in contrast, are not socialized to humans and are traditionally not kept as pets. Feral cats are not native to North America and Executive Order 13112 states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law; 1) reduce invasion of exotic species and the associated damages, 2) monitor invasive species populations, provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education on invasive species. Removal of the animals will restore the environmental status quo for this area.

The number of feral cats in Connecticut is unknown. However, according to Debora Bresch, legal counsel for the American Society for the Prevention of Cruelty to Animals in New York City and an animal rights advocate, the estimated feral cat population in Connecticut was close to 330,000 in 2010 (The Invisible: Feral Cats In Connecticut 2010). Based on an estimate for determining feral cat populations of 0.5 feral cats per household provided by Dr. Julie Levy, DVM (2004), the cat population could be estimated at over 680,000 individuals based on 2008 to 2012 estimate of households in Connecticut (U. S. Census Bureau 2014).

In future programs, WS may be requested to address damage or threats to human health and safety being caused by free-ranging or feral cats anywhere in Connecticut and to protect any resource being damaged or threatened. Cats, including feral and free-ranging cats, are not regulated by the CT DEEP, but are regulated by the CT DOAG Animal Population Control Program and at the municipal level under Connecticut General Laws (Chapter 436a, Sec. 22-332d, Sec. 22-339d, and Sec. 22-380j). The CT DOAG regulates licensed pet shops and animal shelters that sell, adopt out, or accept abandoned or unwanted cats, and cruelty cases; other enforcement actions are generally handled at the municipal level by local animal control officers. All cats, including those being treated under a trap, neuter/spay/ vaccinate, release and monitor program must be marked for identification.

Control efforts by WS would typically be limited to live-trapping, primarily using cage traps, with subsequent transport and transfer of custody to a local animal control officer or state licensed animal shelter. After relinquishing the feral cats to a local animal control officer or animal shelter, the care and the final disposition of the cat would be the responsibility of the animal control officer and/or animal shelter. It is possible that WS could live capture as many as 100 feral cats each year in Connecticut to alleviate damage and threats of damage. In some circumstances, such as at airports or after a human bite which could result in exposure to rabies, WS may euthanize or use firearms to lethally take up to 25 free ranging/feral cats with the prior authorization of the CT DOAG or the Connecticut State Veterinarian. Feral cats would be removed in projects aimed at protecting human safety and alleviating damage or threats of damage to agricultural resources, property, and natural resources.

Based upon the low estimated feral cat populations of 330,000, WS' limited removal of up to 25 feral cats would represent 0.008% of the estimated population. This level of take would be insignificant and have no adverse effects on local or statewide populations of this species in Connecticut. Some local populations may be temporarily reduced as a result of live-capturing and removing feral cats at a local site. In those cases where feral cats are causing damage or are a nuisance and complete removal of the local population could be achieved, this would be considered as providing a benefit to the native environment since feral cats are a non-native species.

White–tailed deer

The authority for management of resident wildlife species is the responsibility of the CT DEEP Wildlife Division. The CT DEEP collects and compiles information on white-tailed deer population trends and harvest and uses this information to manage deer populations. The primary tool for the management of deer populations in Connecticut is through adjusting the allowed lethal take during the deer harvest season. CT DEEP provides commercial agriculturalists with a minimum annual gross income of $2,500 and an actual or potential loss of this income from their cultivated agricultural crops the opportunity to reduce damage caused by deer when the firearms deer hunting seasons are closed under the Deer Crop Damage Permit Program. These permits are issued pursuant to Connecticut General Statutes Section 26-82. Additionally, the CT DEEP, Division Wildlife may issue permits to allow take of deer outside of established seasons in areas with unique deer management needs, such airports.

Although WS removed an average of 12.5 deer annually from FY 2000 to FY 2014, forecasted requests for service may result in the annual removal of up to 125 deer (Table 4.2). All deer removal efforts would be authorized by the CT DEEP. In most years, annual removal is expected to be well below the maximum of 125 deer. The highest level of WS deer take in Connecticut occurred during FY 2008 when 37 deer were taken at Connecticut airports. Higher levels would be most likely to occur in situations where there is a disease outbreak such as the detection of Chronic Wasting Disease in deer, or where there is a need to remove/reduce high concentrations of deer from an airport, island or residential area.

The population of free-ranging deer in Connecticut is continually fluctuating and is impacted by a variety of natural and human related factors. Hunting is probably the most significant human factor impacting the Connecticut deer population. From 2009 to 2013, hunters have harvested an average of 12,565 annually. Mortality can also occur from crop damage permits, vehicle collisions, dogs, illegal take, tangling in fences, disease, and other causes (Crum 2003). CT DEEP (2014c) reported that during 2013, 831 deer were killed under crop damage permits. Also during 2013, 1,211 deer were reported killed in collisions with vehicles, equating to 3.3 deer killed per day. They also estimate that five additional deer are killed for every one deer reported killed by a vehicle to the Division of Wildlife. Based on this, CT DEEP estimated 7,266. This is down significantly from the annual estimated vehicle mortality of 18,000 during 2007 (Kilpatrick and LaBonte 2007). Annual deer mortality in Connecticut from other sources, specifically dogs, unknown causes, and illegal take are tracked by CT DEEP and was reported at 93 deer

during 2013. During 2013 to 2014, State Farm (2014) ranked Connecticut as 36 out of 51 states and the District of Columbia in likelihood of deer-vehicle collisions at a rate of one strike per 256 drivers. This is an increase of 24.6% from 2012 to 2013 when Connecticut was ranked 38th with a rate of one strike per 319 drivers. CT DEEP reported that 1,357 deer were killed by vehicle collisions in calendar year 2013 (see Table 4.2). From FY 2009 through FY 2014, WS lethally removed an average of 13 deer annually. During this period, WS non-lethally dispersed 62 deer to reduce threats to aviation safety at airports.

Table 4.2 - Known cumulative take of white-tailed deer in Connecticut, 2009-2014

Year	Harvest Take	Crop Depredation Permit Take	Known Vehicle Strikes	Other	WS' Take	Total Take	WS' Dispersal
2009	11,774	780	1,902	96	14	**14,566**	52
2010	12,183	715	1,456	60	15	**14,429**	26
2011	12,897	804	1,683	86	7	**15,477**	1
2012	13,421	864	1,177	66	16	**15,544**	32
2013	12,549	831	1,211	93	17	**14,701**	14
2014	N/A	N/A	N/A	N/A	6	**6**	4
Average	**12,565**	**799**	**1,486**	**80**	**13**	**14,945**	**22**

If WS' take reached 125 deer during the highest known mortality of deer that occurred in 2012, WS' take of 125 deer would represent 0.80% of the total known mortality.

The annual total known take of deer from 2009 to 2013 (*i.e.*, harvest take, take under depredation permits, vehicle collisions) has ranged from 11.45% to 12.37% of the 2006 estimated statewide deer population of 126,000 deer (Kaminski Leduc 2011). WS proposed removal of 125 combined with the kill levels in 2012 would represent 12.4% of the 2006 population estimate. WS' proposed removal level would not cause any cumulative adverse impacts to the statewide deer population.

Deer populations have shown to be sustainable through this harvest level, and WS expects no significant adverse cumulative impacts. The CT DEEP's oversight of hunting seasons and WS take removal would ensure that the cumulative removal would not have a negative impact on the overall deer population or the ability of hunters to harvest deer.

If requested, WS could also assist with sampling and/or removing deer from captive facilities where deer are confined inside a perimeter fence. According to Anderson et al. (2007), there were three captive cervid deer farms or facilities located in Connecticut in 2007. The detection of a disease at a captive facility often raises concerns of the potential spread of diseases to free-ranging herds. The spread of diseases among deer inside these facilities is often increased due to their close contact with one another. Often, once a disease is detected in a confined deer herd, the entire herd is destroyed to ensure the containment of the disease. Any involvement with the depopulation of deer confined inside a perimeter fence by WS would be at the request of the CT DEEP, CT DAG and/or the CT DPH. In those cases where WS is requested to assist with the removal of a captive deer herd in Connecticut, the take would not exceed 250 deer for purposes of disease monitoring or surveillance. Deer confined inside perimeter fences for the purposes of non-traditional farming are not included in statewide deer population estimates. However, since take of deer by WS for disease surveillance or monitoring could occur in free-ranging or captive herds, the potential take of up to 125 deer for disease surveillance and monitoring by WS would be considered as part of the impact analysis on the statewide free-ranging deer population.

Feral Swine

Feral swine, also known as "*wild pigs*", "*wild boars*", and "*feral hogs*", are medium to large sized hoofed mammals, which look similar to domestic swine. These animals breed any time of year but peak breeding

times usually occur in the fall. Litters sizes usually range from one to 12 piglets (Mayer and Brisbin 2009). Feral swine are the most prolific wild mammal in North America. Given adequate nutrition, a feral swine population can reportedly double in just four months (Barrett and Birmingham 1994). Feral swine may begin to breed as young as four months of age and sows can produce two litters per year (Mayer and Brisbin 2009). Feral swine are found in variable habitat in most of the United States, with the highest densities occurring in the southern United States. Populations are usually clustered around areas with ample food and water supplies.

There are currently no known populations of feral hogs in Connecticut. Feral hog populations are known in neighboring New York. If feral swine are detected in Connecticut, they and their damage may be addressed by the WS program in response to requests by federal agencies, state agencies, municipal agencies, or the public at any location in the state. Agricultural producers may request assistance with managing damage to standing crops or disease threats to domestic livestock. Natural resource managers may request assistance to protect natural areas, parks or recreation areas, or T&E species. Public health agencies may request assistance in reducing feral swine densities where disease threats to people may exist.

To address any future requests for assistance associated with feral swine, the Connecticut WS program may use any legal methods among those outlined by Barrett and Birmingham (1994), West et al. (2009), and Hamrick et al. (2011) as suitable for feral swine damage management to assist in ensuring feral swine do not become established in Connecticut. Feral swine would most likely be primarily lethally removed by shooting. Feral swine captured using live-capture methods would be subsequently euthanized pursuant to WS Directive 2.505 or custody transferred to allow for permanent captivity based on the preference of CT DEEP and/or the CT DOAG. The purpose of any feral swine management activities in Connecticut would be to completely eliminate any known population resulting in complete extirpation or transfer into permanent captivity, with an initial estimate of up to 50 feral swine annually. These goals would be consistent with Executive Order 13112.

Beaver

Beaver can be found in watersheds across the state (CT DEEP 2001). Beaver family groups are often referred to as colonies and are typically comprised of two adult parents with two to six offspring from the current or previous breeding season. In 2001, the CT DEEP estimated the statewide population between 5,000 and 8,000 individuals (CT DEEP 2001). In 2013, this estimate was revised to 6,000 to 10,000 beaver (J. Hawley CT DEEP pers. Comm. 2013).

Beaver are managed as furbearers by the CT DEEP with an annual trapping season. Pelts of beaver harvested by lawful methods or salvaged during the legal season that are to be sold or transferred out of state must be tagged in Connecticut. Tagging involves having a tag affixed to the pelt at an official furbearer check station (CT DEEP 2014b). Tagging is used by the CT DEEP to track beaver harvest during the trapping season. In addition, beaver can be lethally taken by special authorization of CT DEEP outside of the regulated season when beaver activity threatens public health and safety or causes damage to agricultural crops (CT DEEP 2001).

From 2009 to 2014, WS lethally removed four beaver in Connecticut, all at airports, and provided technical assistance on six occasions to 14 participants. Based on anticipated requests for assistance with beaver damage management in Connecticut, WS could lethally take up to 40 beaver annually. WS may remove or install flow control devices in up to 20 beaver dams as a method to address damage by beaver flooding and human health threats related to waterborne contaminants such as Giardia and increased numbers of mosquitoes and other biting insects which act as vectors for diseases such as Eastern equine encephalitis and West Nile Virus as part of an integrated damage management program.

As shown in Table 4.1 from 2009 through 2013, the latest year with harvest results available, the number of beaver taken annually in Connecticut during the annual harvest season has ranged from 891 beaver taken during 2011 to 1,601 beaver during 2012, with an average annual take of 1,104 beaver. WS' annual removal of up to 40 beaver would represent 0.67% of CT DEEP's lowest population estimate of 6,000 beaver. The population of beaver in Connecticut is likely greater than the low population estimate 6,000. An allowable harvest level for beaver has been estimated at 30% of the population (Novak 1987). Based on CT DEEP's estimated population of 6,000 beaver, 30% harvest would be 1,800 beavers. The total annual known take of beaver in Connecticut has not exceeded 30% of this estimated statewide population from 2009 to 2013 and would not have exceeded 30% if the estimated annual take of 40 beavers by WS was included if the population is at the low CT DEEP estimate.

The CT DEEP, as the agency with beaver management responsibility could impose restrictions on depredation and harvest as needed to assure cumulative take does not adversely affect the continued viability of populations if warranted based on population data. This should assure that cumulative impacts on beaver populations would have no significant adverse impact on the quality of the human environment.

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

Woodchucks

The woodchuck (also known as groundhogs or whistle pigs) is a large rodent, often seen in pastures, meadows, fields, and along highways in Connecticut and may be found throughout the state. Woodchucks have one litter a year and average five kits (Merritt 1987, Armitage 2003). Woodchucks breed at age one and live four to five years. Woodchuck populations in Connecticut are not monitored by CT DEEP or WS and no population estimates are available for woodchucks in Connecticut. Swihart (1992) measured population densities of woodchucks in Southington and Hamden, Connecticut before the dispersal of the majority of juvenile woodchuck. Adult population densities were 0.87 woodchucks per ha in Southington and 1.23 woodchucks per ha in Hamden. Adult and juvenile population densities were 1.59 woodchucks per ha in Southington and 2.19 woodchucks per ha in Hamden. Based on the land area of Connecticut, there are over 1,254,797 ha of land in the state. Using the assumption that only 10% of the land area of the state has sufficient habitat to support woodchucks, home ranges of woodchucks do not overlap, and adult woodchuck densities range from 0.87 to 1.23 woodchucks per ha, the statewide adult woodchuck population could be estimated at 109,167 to 154,327 individuals. The population of woodchucks is likely higher given that woodchucks occur at higher densities and can be found statewide. Therefore, the population estimated at 109,167 woodchucks would be considered a minimum population estimate.

This species is classified as a small game species in the state with seasons open during 2014 from March 15 to April 29; June 2 to October 10; and October 18 to November 18 with no harvest limit (CT DEEP 2014*b*). Nuisance take of woodchucks by licensed NWCOs for 2006, the only year currently available, was 232 euthanized and 198 relocated. A total of 26 woodchucks have been killed by WS from FY 2010

through FY 2014 by WS to alleviate damage or threats of damage in Connecticut. Based on previous requests for assistance and in anticipation of receiving additional requests in the future, up to 50 woodchucks could be lethally removed to alleviate damage by WS. In addition, up to 50 burrow entrances could be fumigated using gas cartridges annually by WS. Gas cartridges act as a fumigant by producing carbon monoxide when ignited. The cartridges contain sodium nitrate, which when burnt, produces carbon monoxide gas. The cartridges would be placed inside active burrows at the entrance, the cartridge would be ignited, and the entrance to the burrow would be sealed with dirt, which allows the burrow to fill with carbon monoxide. Carbon monoxide is a method of euthanasia considered conditionally acceptable by the AVMA for free-ranging mammal species (AVMA 2007). WS estimated take of 50 woodchucks would represent 21.55% of the only known nuisance take of 232 woodchucks in 2006. If treatment of 50 burrows resulted in an average of two woodchucks killed per burrow, this additional mortality would result in a total mortality of 150 woodchucks representing 0.14% of the lowest estimated population.

The removal of woodchucks would also occur using other methods, such as shooting, live traps, and body-gripping traps. However, the number of woodchucks lethally taken using gas cartridges and by other methods is not expected to exceed 150 woodchucks. Woodchuck damage management activities would target single animals or local populations of the species at sites where their presence was causing unacceptable damage to agriculture, human health or safety, natural resources, or property. Some local populations may be temporarily reduced as a result of damage management activities conducted under the proposed action alternative aimed at reducing damage at a local site. The unlimited take and continuous open season for woodchucks provides an indication that densities are sufficient that overharvest is unlikely to occur.

Given the productivity of the species and the limited and localized nature of WS' actions, WS lethal removal of woodchucks for MDM will not adversely impact woodchuck populations. The CT DEEP's oversight of WS, hunting seasons, and private NWCO removal would ensure that the cumulative removal would not have a negative impact on the overall woodchuck population.

Eastern Cottontail Rabbit

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

No population estimates are available for Eastern cottontails in Connecticut. Based on the land area of Connecticut, there are over 1,254,693.8 ha of land in the state. Using the assumption that only 25% of the land area of the state has sufficient habitat to support rabbits, home ranges of rabbits do not overlap, and rabbit densities average 2.47 rabbits per ha (one rabbit per acre) (Craven 1994), a statewide rabbit population could be estimated at 774,837 rabbits. The population of rabbits is likely higher than 774,837 rabbits given that rabbits occur at higher densities and can be found statewide. Therefore, the population

estimated at 774,837 rabbits would be considered a minimum population estimate.

Eastern cottontails are considered small game animals by the CT DEEP and can be harvested during the regulated hunting season in the fall and winter, with a daily bag limit of three cottontails, and season limit of 25. There is no hunter or nuisance take information available for cottontails in Connecticut. From FY 2006 to FY 2014, WS has non-lethally dispersed 74 cottontail rabbits, all at airports. Although strike risks directly associated with rabbits at airports are minimal, the presence of rabbits in areas of operations at an airport can act as attractants for other wildlife species that can pose risks of aircraft strikes, such as raptors and mammalian predators. However, it should be noted that an aircraft strike with an Eastern cottontail in North Carolina during 2006 resulted in the destruction of the aircraft (FAA 2014b).

Based on the number of airports that have requested assistance from WS previously and potential requests to manage damage or monitor for disease, WS could lethally take up to 100 Eastern cottontail rabbits annually to alleviate damage or threats of damage. If the population of cottontail rabbits remains at least stable in Connecticut, WS' take of up 100 Eastern cottontails annually would represent 0.01% of the minimum statewide population of 774,837 rabbits. Damages and threats of damages associated with cottontails most often occur in urban/suburban areas and at airports within Connecticut where hunting is restricted or not allowed. Studies show that even if hunters take as many as 40% of the rabbits available in autumn, the rabbit population the following year would not be adversely affected because of the tremendous reproductive potential of rabbits (Fergus 2006). Therefore, WS' proposed take would not adversely affect the ability to harvest rabbits during the annual regulated hunting season or result in adverse cumulative impacts to the statewide population.

Muskrat

Muskrats are highly prolific and produce three to four litters per year that average five to eight young per litter (Wade and Ramsey 1986), which makes them relatively immune to overharvest (Boutin and Birkenholz 1987). Young muskrats can reproduce the spring after their birth. Harvest rates from three to eight per acre have been reported to be sustainable in muskrat populations (Boutin and Birkenholz 1987). Muskrat home ranges vary from 529 feet^2 to 11,970 feet^2 (0.1 to 0.25 acres), with the size of muskrat home ranges depending on habitat quality and population density (Boutin and Birkenholz 1987).

The muskrat is found across Connecticut and are managed as furbearers by the CT DEEP with an annual trapping season which allows an unlimited number of muskrats to be harvested during the open season. Take can occur by licensed trappers during the regulated season using approved, foothold, conibear, colony, and cage-type traps (CT DEEP 2014*c*).

From the 2006 through 2013, the latest year with harvest data available, the number of muskrats reported harvested annually in Connecticut under trapper reports has ranged from 1,035 during 2011 to 4,207 during 2007 (J. Hawley, CT DEEP, Pers. Comm. 2013). WS lethally removed two muskrats and non-lethally dispersed five in Connecticut, all at airports, during this period and there was no nuisance take reported during this period.

Based on the number of muskrats harvested from 2006 through 2013, the relatively low level of legal harvest and a reasonable anticipation of an increase in the number of requests for assistance, WS could lethally take up to 100 muskrats per year as part of an integrated damage management program. WS anticipates the need to address damage and threats associated with muskrats on federal, state, municipal and private property, landfills, along road and railways and to protect T&E species from predation and habitat manipulation.

No population estimates are available in Connecticut for muskrat. Muskrat population densities have been reported at 48 muskrat per km in the Ware River watershed in neighboring Massachusetts and as

low as 23 per km in Pennsylvania (Brooks and Dodge 1986) and Chulick (1979) reported 40 muskrats per km in streams adjacent to agricultural fields. Hunt (1986) estimated 98,136.3 ha (242,500 acres) of muskrat habitat out of 449,079.7 ha (1,109,700 acres) of wetlands in Maine or 21.85% of wetlands representing muskrat habitat. Hunt (1986) also noted that this was likely a low estimate and estimated the population density at 3.71 muskrats per ha (1.5 per acre).

Assuming 50% of the 9,382.5 km (5,830 miles) of rivers and streams in Connecticut are acceptable muskrat habitat and the low density estimate of 23 muskrats per km (0.62 miles) of rivers and streams would result in a statewide estimate of 107,899 muskrats in rivers and streams. Assuming 25% of the 69,594.2 ha (169,500 acres) of wetlands and 26,293.6 ha (64,973 acres) of lakes and ponds in Connecticut are acceptable muskrat habitat and the density estimate of 3.71 muskrats per ha of wetlands, lakes and ponds would result in a statewide estimate of 88,936 muskrats in wetlands, lakes and ponds. The total statewide muskrat population for Connecticut could be estimated at 196,835.

Like many other mammal species, muskrats maintain sufficient population densities to allow for an annual trapping season. During the trapping season, there is no limit on the number of muskrats that can be harvested daily and no limit on the number of muskrats that can be lethally taken during the length of the season. As shown in Figure 4.2, from 2006 through 2013, a total of 18,650 muskrat have been harvested in the state. There was no nuisance take of muskrat reported during 2006, the only year with nuisance take currently unavailable. The number of muskrat taken annually in Connecticut during the annual harvest season from 2006 to 2013 has averaged an annual take of 2,331 muskrats.

Based upon anticipated requests for WS' assistance, it is possible that WS could kill as many as 100 muskrats each year under the proposed action alternative. Removing 100 muskrats would represent 0.05% of the estimated statewide population annually and would be of low magnitude when compared to the estimated statewide population of muskrats. When combined, the average annual harvest (2,331) and WS' estimated annual take of 100 muskrats would represent a cumulative take of 2,431 muskrats annually. If the statewide population of muskrats was estimated at 196,835 individuals, the average cumulative take of 2,431 muskrats would represent 1.24% of the estimated population.

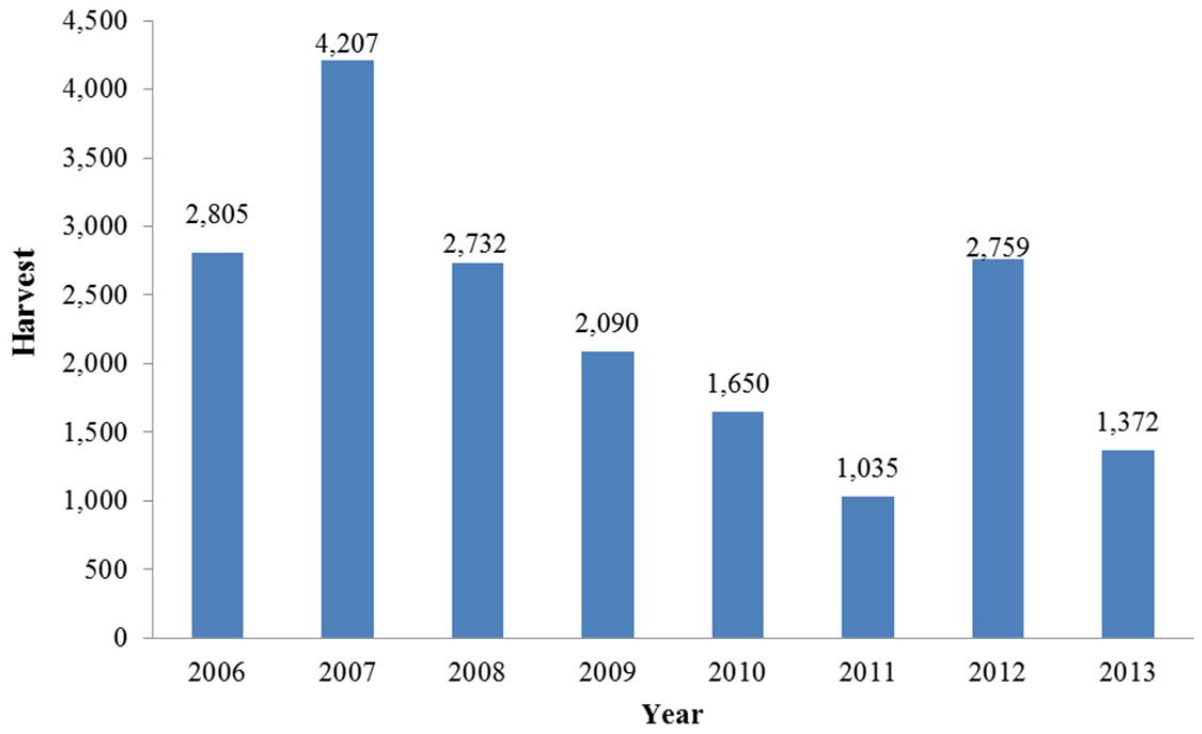

Figure 4.2 – Harvest of Muskrats in Connecticut, 2006-2013

Like other mammal species addressed in this EA, the unlimited take allowed by the CT DEEP during the trapping season and the permitting of take to alleviate damage by the CT DEEP provides an indication the CT DEEP believes that muskrat populations maintain sufficient densities within the state to sustain unlimited harvest and that overharvest is unlikely.

Bats and Insectivorous Mammals

Bats and insectivores (shrews and moles) may be removed by WS after an actual or potential human exposure, when found in occupied buildings where they pose a human health threat or during wildlife hazard management, assessment, and monitoring at airports and airbases because these species serve as attractants to birds such as raptors and mammalian carnivores, which create direct hazards to aircraft. Additionally, these species may be removed during wildlife disease outbreaks or monitoring to protect human health and safety or natural resources.

Bats species that WS may encounter during mammal damage management activities include the big brown bat, Eastern pipistrelle, Eastern red bat, Eastern small-footed bat, hoary bat, little brown bat, Northern long-eared bat, and silver-haired bat. Insectivorous mammals which may be the target of WS activities at airports and other locations include Eastern mole, hairy-tailed mole, star-nosed mole, Northern short-tailed shrew, masked shrew, smoky shrew, American water shrew, and least shrew. Insectivore species are very prolific: Eastern moles have one or two liters per year with two to five young each. Hairy-tailed mole litter size averages four to five (Eadie 1948, Conner 1960), but may be as high as eight (Richmond and Roslund 1949). Hairy-tailed moles litter size ranges from four to five young (Saunders 1988). Star-nosed mole females probably bear but one litter of 2-7 (average 5) young between late April and early July, a few as late as August (Saunders 1988). Northern short-tailed shrews have two to three liters with 5-7 young each (Godin 1977). Masked shrew litter size ranges from four to ten, averaging seven and young are weaned at approximately 20 days (Merritt 1995). Smoky shrew females

produce two to three litters per year that range in size from two to eight, averaging six (Owens 1984). American water shrew litter size is five to seven and females may bear two or three litters per year.

The primary method of lethal removal for bat species by WS would be euthanasia with AVMA approved methods after hand capture or live capture with hand or mist nets. Primary method of lethal removal of insectivores would be through snap trapping. Removal of these species by WS would be done at specific isolated sites (e.g., airports, orchards, etc.). Impacts of the levels of removal to bat and insectivorous mammal populations would be minimal due to the low level of take for bat species, the relatively high reproductive rates of insectivore species, and because damage management recommended and conducted by WS would be at a limited number of specific local sites within the range of these species. Based upon the above information, WS limited lethal removal of up to 40 bats and up to 210 insectivores may cause temporary reductions at the specific local sites where WS works, but would have no adverse direct or cumulative impacts on overall populations of the species in Connecticut.

Miscellaneous Rodents

Native Species: Rodents (squirrels, chipmunks, mice, voles, and rats) may be taken by WS during wildlife hazard management, assessment, and monitoring at airports and airbases because these species serve as attractants to birds such as raptors and mammalian carnivores, which create direct hazards to aircraft. Additionally, these species may be taken in orchards and other cultivated areas to reduce damage to agricultural resources, such as apple trees and blueberry bushes, in or near parks, and other structures to protect human health and safety, or natural resources.

Native rodents which may be the target of WS monitoring and operational activities at airports and other locations include the Eastern gray squirrel, red squirrel, Northern flying squirrel, Southern flying squirrel, Eastern chipmunk, white-footed mouse, deer mouse, meadow vole, pine vole, Southern red-backed vole, Southern bog lemming, meadow jumping mouse, and woodland jumping mouse. Large population fluctuations are characteristic of many small rodent populations and are highly prolific. For example, meadow voles may have up to 17 litters annually, typically with four to five young per litter, white-footed mice have multiple liters averaging five young each, and deer mice have three to four litters with four to six young each (Burt and Grossenheider 1980, National Audubon Society 2000). WS anticipates removing no more than 100 individuals of each species and no more than 1,500 individuals for all species combined.

The primary method of lethal removal for these species by WS would be trapping or toxicants. Removal of these species by WS would be done at specific isolated sites (e.g., airports, orchards, etc.). Impacts of the levels of removal to rodent and insectivore populations would be minimal due to the species' relatively high reproductive rates and because rodent/insectivore damage management recommended and conducted by WS would be at a limited number of specific local sites within the range of these species. Based upon the above information, WS limited lethal removal of 1,500 small rodents may cause temporary reductions at the specific local sites where WS works, but would have no adverse direct or cumulative impacts on overall populations of the species in Connecticut.

Non-native Species: Black rats, Norway rats, and house mice are not native to North America and were accidentally released into this country. In the wild, the impacts of these species are seen by many as entirely detrimental (Burt and Grossenheider, 1980). Executive Order 13112 B 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. Although removal of these species up to and including extirpation could be seen as desirable, because of the productivity and distribution of the species and the limited nature of WS work, WS is unlikely to ever do more than limit populations at specific local sites. Based on the above information and WS limited lethal

removal of rodents and insectivores in Connecticut, WS should have minimal effects on statewide rodent populations.

Urban Rodents

Under the Act of December 22, 1987 (7 U.S.C. 426c), APHIS-WS is authorized, except for urban rodent control, to conduct activities and enter into agreements to control nuisance bird and mammal species or those bird and mammal species that are reservoirs of zoonotic diseases. While the Act makes an exception for urban rodent control, it does not define the term. This has led to confusion about when APHIS-WS may provide wildlife damage control assistance and has created an overlap in services with private sector pest control companies in urban and suburban areas.

The term "rodent" refers to the group of mammals that includes rats, mice, chipmunks, squirrels, porcupines, and groundhogs, among other species. Therefore, to maximize federal resources and reduce duplication of services, WS considers "urban rodent control," for the purposes of activities authorized by the Act of December 22, 1987, to mean actions to directly control mice, rats, voles, squirrels, chipmunks, gophers, and woodchucks/groundhogs in a city or town with a population greater than 50,000 inhabitants, as well as the urbanized area contiguous and adjacent to such a city or town (Federal Register 2014).

There are some categories of actions for which APHIS will continue to consider requests for operational assistance. Specifically, actions involving federal agencies; government entities engaged in a cooperative service agreement with APHIS to provide direct control of rodents as of October 1, 2013; a state in which direct control of the rodent species has been expressly authorized by state law, rulemaking, or a local jurisdiction's ordinance promulgated by public notice and an opportunity for public comment or as otherwise promulgated as required and authorized by the respective state or local law; and railways and airport air sides areas are excluded from this definition. Otherwise, APHIS will refer all requests for operational assistance with urban rodent control from private entities such as home and business owners and associations to private sector pest control companies (Federal Register 2014).

Other Target Species

Target species, in addition to the mammals analyzed above, have been lethally taken in small numbers by WS or could be lethally taken when requested to resolve damage or threats of damage. WS could lethally remove the following species not to annually exceed the number associated with each species: black bear (2), river otter (5), fisher (10), mink (25), long-tailed weasels (10), short-tailed weasels (10), bobcat (5), moose (2), snowshoe hare (10), feral/domestic rabbit (10), opossum (25), gray fox (25), red fox (30), striped skunk (30), and North American porcupine (25). None of these mammal species are expected to be taken by WS at any level that would adversely affect overall statewide mammal populations. Damage management activities would target single animals or local populations at sites where their presence was causing unacceptable damage to agriculture, human health or safety, natural resources, or property. Some local populations may be temporarily reduced as a result of removal activities to reduce damage at a local site. The estimated WS removal would be of low magnitude when compared to the number of those game species harvested each year, and would be of extremely low magnitude when compared to the statewide population of those species. Those species are not considered to be of low densities in the state.

Wildlife Disease Surveillance and Monitoring

The ability to efficiently conduct surveillance for and detect diseases is dependent upon rapid detection of the pathogen if it is introduced. Effective implementation of a surveillance system will facilitate planning and execution at regional and state levels, and coordination of surveillance data for risk assessment. It will also facilitate partnerships between public and private interests, including efforts by federal, state, and local governments as well as non-governmental organizations, universities, and other interest groups.

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

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

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

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

Surveillance in Harvested Mammals: Check stations for harvestable mammal species provide an opportunity to sample dead mammals to determine the presence of a disease, and could supplement data collected during surveillance of live mammals. Sampling of mammals harvested or taken as part of damage management activities would focus on species that are most likely to be exposed to a disease.

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

Summary

Evaluation of WS' activities relative to wildlife populations indicated that program activities will likely have no cumulative adverse effects on populations in Connecticut. WS' actions would be occurring simultaneously, over time, with other natural processes and human-generated changes that are currently taking place. Those activities include, but are not limited to:

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

All those factors play a role in the dynamics of wildlife populations. In many circumstances, requests for assistance arise when some or all of those elements have contrived to elevate target species populations or

place target species at a juncture to cause damage to resources. WS' actions taken to minimize or eliminate damage are constrained as to scope, duration and intensity, for the purpose of minimizing or avoiding impacts to the environment. WS evaluates damage occurring, including other affected elements and the dynamics of the damaging species; determines appropriate strategies to minimize effects on environmental elements; applies damage management actions; and subsequently monitors and adjusts/ceases damage management actions (Slate et al. 1992). This process allows WS to take into consideration other influences in the environment, such as those listed above, in order to avoid cumulative adverse impacts on target species.

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

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

Although WS lethal removal of mammals would not occur, it is likely that without WS conducting some level of lethal MDM activities for these species, private MDM efforts would increase. Cumulative impacts on target species populations would be variable depending upon actions taken by affected landowners/resource managers and the level of training and experience of the individuals conducting the MDM. Some individuals experiencing damage may take illegal or unsafe action against the problem species either unintentionally due to lack of training, or deliberately out of frustration of continued damage. In these instances, more target species may be taken than with a professional MDM program (Alternatives 1). Overall impacts on target species populations would be similar to or slightly more significant than Alternative 1 depending upon the extent to which resource managers use the assistance provided by WS. However, for the reasons presented in the population effects analysis in section 4.1.1, it is unlikely that target mammal populations would be adversely impacted by implementation of this alternative.

Alternative 3 – No Mammal Damage Management Conducted by WS

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

Local mammal populations could decline, stay the same, or increase depending on actions taken by those persons experiencing mammal damage. Some resource/property owners may take illegal, unsafe, or environmentally harmful action against local populations of mammals out of frustration or ignorance. While WS would provide no assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in impacts similar to the proposed action.

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

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

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

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

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

WS personnel are experienced and trained in wildlife identification and to select the most appropriate methods for taking targeted animals and excluding non-target species. To reduce the likelihood of capturing non-target wildlife, WS would employ the most selective methods for the target species, would employ the use of attractants that are as specific to target species as possible, and determine placement of methods to avoid exposure to non-targets. SOPs to prevent and reduce any potential adverse impacts on non-targets are discussed in Chapter 3 of this EA. Despite the best efforts to minimize non-target take during program activities, the potential for adverse impacts to non-targets exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety.

Direct, Indirect, and Cumulative Effects:
Non-lethal methods that use auditory and visual stimuli to reduce or prevent damage are intended to elicit fright responses in wildlife. When employing those methods to disperse or harass target species, any non-targets in the vicinity of those methods when employed are also likely dispersed from the area. Similarly, any exclusionary device constructed to prevent access by target species also excludes access to non-target species. The persistent use of non-lethal methods would likely result in the dispersal or abandonment of those areas where non-lethal methods are employed of both target and non-target species. Therefore, any use of non-lethal methods has similar results on both non-target and target species. Though non-lethal methods do not result in lethal take of non-targets, the use of non-lethal methods can restrict or prevent access of non-targets to beneficial resources. Overall, potential impacts to non-targets from the use of non-lethal methods would not adversely impact populations since those methods are often temporary.

Other non-lethal methods available for use under this alternative include live traps, nets, and repellents. Live traps and nets restrain wildlife once captured and are considered live-capture methods. Live traps have the potential to capture non-target species. Trap and net placement in areas where target species are active and the use of target-specific attractants would likely minimize the capture of non-targets. If traps and nets are attended to appropriately, any non-targets captured can be released on site unharmed.

Only those repellents registered with the EPA pursuant to the FIFRA and the CT DEEP would be recommended and used by WS under this alternative. Therefore, the use and recommendation of repellents would not have negative impacts on non-target species when used according to label requirements. Most repellents for mammals pose a very low risk to non-targets when exposed to or when ingested.

Mammals could still be lethally taken during the regulated harvest season, when causing damage, and through the issuance of permits under this alternative. Impacts to non-targets from the use of non-lethal

methods would be similar to the use of non-lethal methods under any of the alternatives. Non-targets would generally be unharmed from the use of non-lethal methods under any of the alternatives since no lethal take would occur. Non-lethal methods would be available under all the alternatives analyzed. WS' involvement in the use of or recommendation of non-lethal methods would ensure non-target impacts are considered under WS' Decision Model. Impacts to non-targets under this alternative from the use of and/or the recommendation of non-lethal methods are likely to be low.

WS would also employ and/or recommend lethal methods under the proposed action alternative to alleviate damage. Lethal methods available for use to manage damage caused by mammals under this alternative would include shooting, body-gripping traps, snap traps, euthanasia after live-capture, and registered fumigants and toxicants. Available methods and the application of those methods to resolve mammal damage is further discussed in Appendix B.

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

While every precaution is taken to safeguard against taking non-targets during operational use of methods and techniques for resolving damage and reducing threats caused by mammals, the use of such methods can result in the incidental take of unintended species. Those occurrences are infrequent and should not affect the overall populations of any species under the proposed action. WS' take of non-target species during activities to reduce damage or threats to human safety associated with mammals in Connecticut is expected to be extremely low to non-existent. Between FY 2006 and FY 2011, no non-target mammals were unintentionally taken by WS in Connecticut. WS would monitor the take of non-target species to ensure program activities or methodologies used in mammal damage management do not adversely impact non-targets. Methods available to resolve and prevent mammal damage or threats when employed by trained, knowledgeable personnel are selective for target species. WS would annually report to the CT DEEP any non-target take to ensure take by WS is considered as part of management objectives established. The potential impacts to non-targets are similar to the other alternatives and are considered to be minimal to non-existent.

Only fumigants and toxicants registered with the EPA pursuant to the FIFRA and the CT DEEP would be recommended and used by WS under this alternative. Fumigants and toxicants, including restricted use toxicants, could be used by licensed non-WS' pesticide applicators in Connecticut, therefore, WS' use of fumigants and toxicants would provide no additional negative impacts on non-target species. WS personnel are trained and licensed in the safe and effective use of fumigants and toxicants as well as the behavior and biology of both target and non-target wildlife species. WS personnel's training in combination with following label requirements presents a low risk of exposure of non-targets species to registered fumigants and toxicants. Additionally, WS personnel would collect and/or properly dispose of all unused toxicant/treated bait and/or carcasses of target species taken with fumigants and toxicants to reduce threats to non-target species through direct or secondary exposure. WS would utilize locking bait stations to restrict access of non-target species to rodenticides such as anticoagulants. As appropriate, WS would use signage and other means of notification to ensure the public is aware of fumigant or toxicant applications or applications sites, to ensure non-target domestic species such as dogs are not exposed.

The proposed mammal damage management could benefit many other wildlife species that are impacted by predation or competition for resources. For example, fox often feed on the eggs, nestlings, and fledglings of ground nesting bird species, browsing damage from deer overabundance may affect species diversity, or raccoons may feed on T&E species of mussels in a stream. This alternative has the greatest possibility of successfully reducing mammal damage and conflicts to wildlife species since all available methods could possibly be implemented or recommended by WS.

T&E Species Effects

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or minimization measures. SOPs to avoid T&E effects are described in Chapter 3 of this EA.

Federally Listed Species - The current list of species designated as threatened and endangered in Connecticut as determined by the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Services was obtained and reviewed during the development of this EA. Appendix C contains the list of species currently listed in the state along with common and scientific names.

Because of the statewide scope and number of species and activities covered under this EA, WS will consult with and follow the procedures and guidelines provided by the USFWS New England Field Office (NEFO) to assist in determining whether a Section 7 consultation is needed on a project by project basis. These procedures are provided on the USFWS NEFO Endangered Species Consultation Project Review for Projects with Federal Involvement website as well as information on how to avoid or minimize adverse effects for specific projects. The website is located at http://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm.

For each mammal damage management project, WS personnel will access the website and review the list for the project location to determine if federally listed species are where the project is to be conducted, and if so, could they be located at the project site during the period when the project will be conducted. If the proposed project occurs in a city or town with no known federally listed, proposed, or candidate species present, no further coordination with the USFWS is needed. A “No Species Present” letter stating “no species are known to occur in the project area” will be included with the project file.

If one or more federally listed, proposed, or candidate species occurs in the city or town where the project will be conducted, WS will determine whether these species are likely to occur within the proposed project area by comparing the habitat present within the proposed project action area with habitat that is suitable for the species. This will be done through a review the information provided in species profiles and fact sheets on the USFWS NEFO website, from the CT DEEP Endangered Species Program, or any other sources of information available to WS to determine types of habitat the species use. This will be used by WS personnel to determine whether the proposed project area has any potential for listed species habitat. If the project site is in appropriate habitat for federally listed species, additional investigation will be made.

If the CT DEEP Endangered Species Program does not identify any listed species for the proposed project and there is no potential habitat for any listed species within the project area, no further coordination with the USFWS NEFO is required and a “no species present" letter stating "no species are known to occur in the project area" will be entered into the project file.

If potential listed species habitat is present although the species has not been documented from that specific location or if federally listed species are known to occur at the project site, WS personnel will consult with the USFWS NEFO, and if necessary obtain the appropriate formal or informal Section 7 Consultation as required under the ESA. By utilizing the established procedures from the USFWS, it ensures that WS’ operations comply with all USFWS regulations and mitigating measures. This will also ensure that significant direct, indirect, and cumulative impacts are avoided on T&E species.

State Listed Species – The current list of state listed species as determined by the CT DEEP was obtained and reviewed during the development of the EA (see Appendix C). Based on the review of species listed, WS has determined that the proposed activities would not adversely affect those species currently listed

by the state. Any activity involving state-listed mammals being analyzed in this EA, specifically, the state endangered least shrew and Indiana bat and species of special concern would require prior authorization by the CT DEEP through permitting or specific authorization. The CT DEEP has concurred with WS' determination for listed species.

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

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

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

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

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

Alternative 3 – No Mammal Damage Management Conducted by WS

Under this alternative, WS would not be directly involved with mammal damage management activities. Therefore, no direct impacts to non-targets or T&E species would occur by WS under this alternative. Mammals would continue to be taken under permits issued by the CT DEEP, take would continue to occur during the regulated harvest season, and non-native mammal species could continue to be taken without the need for a permit. Risks to non-targets and T&E species would continue to occur from those persons who implement mammal damage management activities on their own or through recommendations by the other federal, state, and private entities. Although some risks occur from those that implement mammal damage management in the absence of any involvement by WS, those risks are likely low and are similar to those under the other alternatives.

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

Effects on T&E species: WS will not have any direct impact on T&E species. Risks to T&E species from increased private efforts to address damage management problems will vary depending upon the training and level of experience of the individual conducting the MDM. As stated above, frustrated individuals may resort to use of unsafe or illegal methods like poisons which may increase risks to species like the state-listed peregrine falcon. Risks to T&E species may be higher with this alternative than with the other alternatives because WS would not have any opportunity to provide advice or assistance with the safe and effective use of MDM techniques or have the opportunity to advise individuals regarding the presence of T&E species.

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

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

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

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

WS' employees who conduct activities would be knowledgeable in the use of methods, wildlife species responsible for causing damage or threats, and WS' directives. That knowledge would be incorporated into the decision-making process inherent with the WS' Decision Model that would be applied when addressing threats and damage caused by mammals. Prior to and during the utilization of lethal methods, WS' employees would consider risks to human safety based on location and method. Risks to human safety from the use of methods would likely be greater in urban areas when compared to rural areas that are less densely populated. Consideration would also be given to the location where damage management activities would be conducted based on property ownership. If locations where methods would be employed occur on private property in rural areas where access to the property is controlled and monitored, the risks to human safety from the use of methods would likely be less. If damage management activities occur at parks or near other public use areas, then risks of the public encountering damage management methods and the corresponding risk to human safety increases. Activities would generally be conducted when human activity is minimal (e.g., early mornings, at night) or in areas where human activities are minimal (e.g., in areas closed to the public).

The issue of using chemical methods as part of managing damage associated with wildlife relates to the potential for human exposure either through direct contact with the chemical or exposure to the chemical from wildlife that have been exposed. Under the alternatives identified, the use of chemical methods would include immobilizing drugs, euthanasia drugs, reproductive inhibitors, fumigants, toxicants, and repellents.

The use of immobilizing drugs under the identified alternatives would only be administered to mammals that have been live-captured using other methods or administered through injection using a projectile (*e.g.*, dart gun). Immobilizing drugs used to sedate wildlife are used to temporary handle and transport animals to lessen the distress of the animal from the experience. Drug delivery to immobilize mammals is likely to occur on site with close monitoring of the animal to ensure proper care of the animal. Immobilizing drugs are fully reversible with a full recovery of sedated animals occurring. A list and description of immobilizing drugs available for use under the identified alternatives can be found in Appendix B.

Euthanizing drugs would be administered under similar circumstances to immobilizing drugs under the relevant proposed alternatives. Euthanizing drugs would be administered to animals live-captured using other methods. Euthanized animals would be disposed of in accordance with WS Directives; therefore, would not be available for harvest and consumption. If mammals were immobilized for sampling or translocation and released, risks could occur to human safety if harvest and consumption occurred. SOPs employed by WS to reduce risks are discussed in Chapter 3 and in Appendix B.

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

Safety issues related to the misuse of firearms and the potential human hazards associated with firearms use are issues identified when employed to reduce damage and threats. To help ensure safe use and awareness, WS' employees who use firearms during official duties are required to attend an approved firearm safety training course and to remain certified for firearm use must attend a safety training course in accordance with WS Directive 2.615. As a condition of employment, WS' employees who carry and use firearms are subject to the Lautenberg Domestic Confiscation Law, which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence (18 USC § 922(g)(9)). A safety assessment based on site evaluations, coordination with cooperating and local

agencies (if applicable), and consultation with cooperators would be conducted before firearms are deemed appropriate to alleviate or reduce damage and threats to human safety when conducting activities. WS and cooperating agencies would work closely with cooperators requesting assistance to ensure all safety issues are considered before firearms are deemed appropriate for use. The use of all methods, including firearms, must be agreed upon with the cooperator to ensure the safe use of those methods.

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

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

Other live-capture devices, such as cannon nets, pose minor safety hazards to the public since activation of the device occurs by trained personnel after target species are observed in the capture area of the net. Lasers also pose minimal risks to the public since application occurs directly to target species by trained personnel which limits the exposure of the public to misuse of the method.

All WS' personnel who handle and administer chemical methods would be properly trained in the use of those methods. Training and adherence to agency directives would ensure the safety of employees applying chemical methods. Mammals euthanized by WS or taken using chemical methods would be disposed of in accordance with WS Directive 2.515. All euthanasia would occur in the absence of the public to further minimize risks, whenever possible. SOPs are further described in Chapter 3 of this EA.

All WS' personnel who apply fumigants and toxicants registered with the EPA pursuant to the FIFRA and the CT DEEP are licensed as commercial pesticide applicators by the CT DEEP. WS personnel are trained in the safe and effective use of fumigants and toxicants. Training and adherence to agency directives and label requirements would ensure the safety of both employees applying fumigants and toxicants and members of the public. To the extent possible, toxicants, treated baits, and/or mammals taken with fumigants or toxicants by WS will be collected and/or disposed of in accordance with label requirements to reduce risk of secondary toxicity to people who may be exposed to them or attempt to consume them. WS would utilize locking bait stations to restrict access of children to rodenticides such as anticoagulants. As appropriate, WS would use signage and other means of notification to ensure the public is aware of fumigant or toxicant applications or applications sites, to ensure people, including children, are not exposed.

The recommendation of repellents or the use of those repellents registered for use to disperse mammals could occur under the proposed action as part of an integrated approach to managing mammal damage. Those chemical repellents that would be available to recommend for use or be directly used by WS under this alternative would also be available under any of the alternatives. Therefore, risks to human safety from the recommendation of repellents or the direct use of repellents would be similar across all the alternatives. Risks to human safety associated with the use or recommendation of repellents would be similar across all the alternatives. WS' involvement, either through recommending the use of repellents

or the direct use of repellents, would ensure that label requirements of those repellents are discussed with those persons requesting assistance when recommended through technical assistance or would be specifically adhered to by WS' personnel when using those chemical methods. Therefore, the risks to human safety associated with the recommendation of or direct use of repellents could be lessened through WS' participation.

Drugs used in capturing, handling, and euthanizing wildlife for wildlife hazard management purposes include ketamine, a mixture of ketamine and xylazine, sodium pentobarbital, potassium chloride, and Beuthanasia-D. Meeting the requirements of the Animal Medicinal Drug Use Clarification Act should prevent any significant adverse impacts on human health with regard to this issue. SOPs include:

- All drug use 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 WS.

- As determined on a state-level basis by those veterinary authorities (as allowed by Animal Medicinal Drug Use Clarification Act), 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 used. Ear tagging or other marking of animals drugged and released to alert hunters and trappers that they should contact state officials before consuming the animal.

- Most animals administered drugs would be released well before 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 control 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.

By following those procedures in accordance with Animal Medicinal Drug Use Clarification Act, wildlife management programs would avoid any significant impacts on human health with regard to this issue.

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

Direct, Indirect, and Cumulative Effects:

No adverse direct or indirect effects to human safety have occurred from WS' use of methods to alleviate mammal damage from FY 2009 through FY 2013. The risks to human safety from the use of non-lethal and lethal methods, when used appropriately and by trained personnel, is considered low. No adverse direct effects to human health and safety are expected through the use of live-capture traps and devices or other non-lethal methods. Since WS personnel are required to complete and maintain firearms safety training, no adverse direct effects to human health and safety are expected as a result of the misuse of firearms by WS personnel. Additionally, all WS personnel are properly trained on all chemicals handled and administered in the field, ensuring their safety as well as the safety of the public. Therefore, adverse

direct effects to human health and safety from chemicals used by WS are anticipated to be very low. The amount of chemicals used or stored by WS and cooperating agencies would be minimal to ensure human safety. No adverse indirect effects are anticipated from the application of any of the chemicals available for WS. WS does not anticipate any additional adverse cumulative impacts to human safety from the use of firearms when recommending that mammals be harvested during regulated hunting seasons to help alleviate damage.

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

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

Direct, Indirect, and Cumulative Effects:
Since most methods available to resolve or prevent mammal damage or threats are available to anyone, the direct, indirect, and cumulative effects to human safety from the use of those methods are similar between the alternatives. Private efforts to reduce or prevent damage would be expected to increase, and would likely result in less experienced persons implementing chemical or other damage management methods which may have variable adverse direct, indirect, and/or cumulative effects to human and pet health and safety than under Alternative 1. Ignorance and/or frustration caused by the inability to reduce losses could lead to illegal use of toxicants by others which could lead to unknown direct, indirect, and/or cumulative impacts to humans and pets.

Alternative 3 – No Mammal Damage Management Conducted by WS

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

Direct, Indirect, and Cumulative Effects:
Similar to Alternative 2, reproductive inhibitors, immobilizing drugs, and euthanasia chemicals would not be available under this alternative to those persons experiencing damage or threats from mammals. However, fumigants, toxicants, and repellents would continue to be available to those persons with the appropriate pesticide applicators license. Since most methods available to resolve or prevent mammal damage or threats are available to anyone, the threats to human safety from the use of those methods are similar between the alternatives. Habitat modification and harassment methods are also generally regarded as posing minimal adverse direct and indirect effects to human safety. Although some risks to safety are likely to occur with the use of pyrotechnics, propane cannons, and exclusion devices, those risks are minimal when those methods are used appropriately and in consideration of human safety. However, methods employed by those not experienced in the use of methods or are not trained in their proper use, could increase threats to human safety. Overall, the methods available to the public, when applied correctly and appropriately, pose minimal risks to human safety.

Issue 4 - Humaneness and Animal Welfare Concerns of Methods

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

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

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

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

The AVMA states "... euthanasia is the act of inducing humane death in an animal" and that "...that if an animal's life is to be taken, it is done with the highest degree of respect, and with an emphasis on making the death as painless and distress free as possible" (AVMA 2013). Additionally, euthanasia methods should minimize any stress and anxiety experienced by the animal prior to unconsciousness." Although use of euthanasia methods to end an animal's life is desirable, as noted by the AVMA, "For wild and feral animals, many of the recommended means of euthanasia for captive animals are not feasible. In field circumstances, wildlife biologists generally do not use the term euthanasia, but terms such as killing, collecting, or harvesting, recognizing that a distress- free death may not be possible" (AVMA 2007). AVMA (2013) notes, "While recommendations are made, it is important for those utilizing these recommendations to understand that, in some instances, agents and methods of euthanasia identified as appropriate for a particular species may not be available or may become less than an ideal choice due to differences in circumstances. Conversely, when settings are atypical, methods normally not considered appropriate may become the method of choice. Under such conditions, the humaneness (or perceived lack thereof) of the method used to bring about the death of an animal may be distinguished from the intent or outcome associated with an act of killing. Following this reasoning, it may still be an act of euthanasia to kill an animal in a manner that is not perfectly humane or that would not be considered appropriate in other contexts. For example, due to lack of control over free-ranging wildlife and the stress associated with close human contact, use of a firearm may be the most appropriate means of euthanasia. Also, shooting a suffering animal that is in extremis, instead of catching and transporting it to a clinic to euthanize it using a method normally considered to be appropriate (e.g., barbiturates), is consistent with one interpretation of a good death. The former method promotes the animal's overall interests by ending its misery quickly, even though the latter technique may be considered to be more acceptable under normal conditions (Yeates 2010). Neither of these examples, however, absolves the individual from her or his responsibility to ensure that recommended methods and agents of euthanasia are preferentially used."

AVMA (2013) recognizes that there is "an inherent lack of control over free-ranging wildlife, accepting that firearms may be the most appropriate approach to their euthanasia, and acknowledging that the quickest and most humane means of terminating the life of free-ranging wildlife in a given situation may not always meet all criteria established for euthanasia (i.e., distinguishes between euthanasia and methods

that are more accurately characterized as humane killing). Because of the variety of situations that may be encountered, it is difficult to strictly classify methods for termination of free-ranging wildlife as acceptable, acceptable with conditions, or unacceptable. Furthermore, classification of a given method as a means of euthanasia or humane killing may vary by circumstances. These acknowledgments are not intended to condone a lower standard for the humane termination of wildlife. The best methods possible under the circumstances must be applied, and new technology and methods demonstrated to be superior to previously used methods must be embraced.

Direct, Indirect, and Cumulative Effects:
The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology. MDM methods viewed by some persons as inhumane would be employed by WS under this alternative. These methods would include shooting, trapping, toxicants/chemicals, and snares. Despite SOPs and state trapping regulations designed to maximize humaneness, the perceived stress and trauma associated with being held in a trap or snare until the WS employee arrives at the capture site to dispatch or release the animal, is unacceptable to some persons. Other MDM methods used to remove target animals including shooting and body-gripping traps (i.e., Conibear) result in a relatively humane death because the animals die instantly or within seconds to a few minutes. These methods however, are also considered inhumane by some individuals.

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

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

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

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

Alternative 3 – No Mammal Damage Management Conducted by WS

Under this alternative, WS would have no involvement in any aspect of mammal damage management in Connecticut. Those persons experiencing damage or threats associated with mammals could continue to

use those methods legally available. Those methods would likely be considered inhumane by those persons who would consider methods proposed under any alternative as inhumane. The issue of humaneness would likely be directly linked to the methods legally available to the general public since methods are often labeled as inhumane by segments of society no matter the entity employing those methods.

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

SUMMARY

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

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APPENDIX A: LITERATURE CITED

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APPENDIX B

Methods Available for Resolving or Preventing Mammal Damage in the State of Connecticut

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

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

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

Non-chemical Wildlife Damage Management Methods

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

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

Cultural Methods and Habitat Management includes the application of practices 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 through barriers or fences to deter animals from entering a protected area, or planting lure crops on fringes of protected crops. Removal of trees from around buildings can sometimes reduce damage associated with raccoons.

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 are a problem, making trash and garbage unavailable, and removing all pet food from outside during nighttime hours can reduce their presence.

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

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

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

Live Capture and Relocation can be accomplished through the use of cage traps, species specific traps, live snares, nets, foothold traps, and other methods to capture some species of mammals for the purpose of translocating them for release to wild sites. Unless specifically requested by the CT DEEP, WS does not use or recommend this method to resolve mammal damage in Connecticut. Additionally, translocation of all mammals is currently prohibited by CT DEEP regulations, without prior approval of the CT DEEP.

Trapping can utilize a number of devices, including footholds, species specific traps, cage-type traps, body gripping (conibear) traps, snaps traps, and glue traps. These techniques are implemented by WS personnel because of the technical training required to use such devices.

Foothold Traps can be effectively used to capture a variety of mammals. Foothold traps are either placed beside, or in some situations, in travel ways being actively used by the target species. Placement of traps is contingent upon the habits of the respective target species, habitat conditions, and presence of non-target animals. Effective trap placement and adjustment and the use and placement of appropriate baits and lures by trained WS personnel also contribute to the foothold trap's selectivity. An additional advantage is that foothold traps can allow for the on-site release of non-target animals. The use of foothold traps requires more skill than some methods, but they are indispensable in resolving many damage problems.

Species Specific Traps can be effectively used specifically to capture raccoons. Species specific traps are either placed beside travel ways or foraging areas being actively used by raccoons. These types of traps require bait to be placed inside the trap and the raccoon is required to reach in with its paw in an attempt to access the bait resulting in capture.

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

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

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

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

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

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

Chemical Wildlife Damage Management Methods

All pesticides used by WS are registered under the FIFRA and administered by the EPA and CT DEEP. All WS personnel in Connecticut who apply restricted-use pesticides are certified pesticide applicators by CT DEEP and have specific training by WS for MDM pesticide application. The EPA and CT DEEP require pesticide applicators to adhere to all certification requirements set forth in the FIFRA.

Pharmaceutical drugs, including those used in wildlife capture and handling, are administrated by FDA and/or DEA.

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

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

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.

Sodium Pentobarbital is a barbiturate that rapidly depresses the central nervous system to the point of respiratory arrest. There are DEA restrictions on who can possess and administer this drug. Some states may have additional requirements for personnel training and particular sodium pentobarbital products available for use in wildlife. Certified WS personnel are authorized to use sodium pentobarbital and dilutions for euthanasia in accordance with DEA and state regulations.

Potassium Chloride used in conjunction with prior general anesthesia is used as a euthanasia agent for animals, and is considered acceptable and humane by the AVMA (Beaver et al. 2001). Animals that have been euthanized with this chemical experience cardiac arrest followed by death, and are not toxic to predators or scavengers.

Beuthanasia-D combines pentobarbital with another substance to hasten cardiac arrest. Intravenous (IV) and intracardiac (IC) are the only acceptable routes of injection. As with pure sodium pentobarbital, IC injections with Beuthanasia-D are only acceptable for animals that are unconscious or deeply anesthetized. With other injection routes, there are concerns that the cardiotoxic properties may cause cardiac arrest before the animal is fully unconscious. It is a Schedule III drug, which means it can be obtained directly from the manufacturer by anyone with a DEA registration. However, Schedule III drugs are subject to the same security and record-keeping requirements as Schedule II drugs.

CO_2 is sometimes used to euthanize mammals which are captured in live traps and when relocation is not a feasible option. Live mammals are placed in a sealed chamber. CO_2 gas is released into the chamber and the animal quickly dies after inhaling the gas. This method is approved as a euthanizing agent by the AVMA. CO_2 gas is a byproduct of animal respiration, is common in the atmosphere, and is required by plants for photosynthesis. It is used to carbonate beverages for human consumption and is also the gas released by dry ice. The use of CO_2 by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society.

Repellents are usually naturally occurring substances or chemicals formulated to be distasteful or to elicit pain or discomfort for target animals when they are smelled, tasted, or contacted. Only a few repellents are commercially available for mammals, and are registered for only a few species. 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. Again, acceptable levels of damage control are usually not realized unless repellents are used in conjunction with other techniques.

APPENDIX C

Federally and State Listed Threatened and Endangered Species in the State of Connecticut

RARE NATIVE ANIMALS OF CONNECTICUT
Effective July 1, 2010

Endangered, Threatened & Special Concern Mammals

Endangered, Threatened & Special Concern Mammals					
SC	Gray wolf*+	*Canis lupus*	E	Indiana bat+	*Myotis sodalis*
E	Least shrew	*Cryptotis parva*	SC	Eastern woodrat*	*Neotoma magister*
SC	Silver-haired bat	*Lasionycteris noctivagans*	SC	Harbor porpoise	*Phocoena phocoena*
SC	Red bat	*Lasiurus borealis*	SC	Eastern cougar*+	*Puma concolor couguar*
SC	Hoary bat	*Lasiurus cinereus*	SC	Southern bog lemming	*Synaptomys cooperi*
SC	Eastern small-footed bat*	*Myotis leibii*			

Endangered, Threatened & Special Concern Birds					
E	Sharp-shinned hawk	Accipiter striatus	E	Common moorhen	Gallinula chloropus
SC	Northern saw-whet owl	Aegolius acadicus	SC	Common loon	Gavia immer
SC	Saltmarsh sharp-tailed sparrow	Ammodramus caudacutus	T	American oystercatcher	Haematopus palliatus
SC	Henslow's sparrow*	Ammodramus henslowii	T	Bald eagle	Haliaeetus leucocephalus
T	Seaside sparrow	Ammodramus maritimus	E	Yellow-breasted chat	Icteria virens
E	Grasshopper sparrow	Ammodramus savannarum	T	Least bittern	Ixobrychus exilis
T	Blue-winged teal (nesting population only)	Anas discors	E	Black rail (nesting population only)	Laterallus jamaicensis
T	Great egret	Ardea alba	E	Red-headed woodpecker	Melanerpes erythrocephalus
T	Short-eared owl (wintering populations)	Asio flammeus	SC	Eskimo curlew*+	Numenius borealis
E	Long-eared owl	Asio otus	SC	Yellow-crowned night-heron	Nyctanassa violacea
E	Upland sandpiper	Bartramia longicauda	SC	Northern parula	Parula americana
E	American bittern	Botaurus lentiginosus	SC	Savannah sparrow	Passerculus sandwichensis
SC	Broad-winged hawk	Buteo platypterus	SC	Ipswich sparrow (wintering populations)	Passerculus sandwichensis ssp. princeps
SC	Whip-poor-will	Caprimulgus vociferus	SC	Glossy ibis	Plegadis falcinellus
T	Piping plover^	Charadrius melodus	E	Pied-billed grebe	Podilymbus podiceps
E	Common nighthawk	Chordeiles minor	E	Vesper sparrow	Pooecetes gramineus
E	Northern harrier	Circus cyaneus	T	Purple martin	Progne subis
E	Sedge wren	Cistothorus platensis	E	King rail (nesting population only)	Rallus elegans
SC	Bobolink	Dolichonyx oryzivorus	E	Roseate tern+	Sterna dougallii
SC	Little blue heron	Egretta caerulea	SC	Common tern	Sterna hirundo
T	Snowy egret	Egretta thula	T	Least tern	Sternula antillarum
SC	Alder flycatcher	Empidonax alnorum	SC	Eastern meadowlark	Sturnella magna

E	Horned lark	Eremophila alpestris	SC	Brown thrasher	Toxostoma rufum
T	Peregrine falcon	Falco peregrinus	E	Barn owl	Tyto alba
T	American kestrel	Falco sparverius	E	Golden-winged warbler	Vermivora chrysoptera
Endangered, Threatened & Special Concern Reptiles					
T	Loggerhead^	*Caretta caretta*	E	Bog turtle^	*Glyptemys muhlenbergii*
T	Atlantic green turtle^	*Chelonia mydas*	SC	Eastern hognose snake	*Heterodon platirhinos*
E	Timber rattlesnake	*Crotalus horridus*	E	Atlantic ridley+	*Lepidochelys kempii*
E	Leatherback+	*Dermochelys coriacea*	SC	Smooth green snake	*Liochlorophis vernalis*
T	Five-lined skink	*Eumeces fasciatus*	SC	Eastern box turtle	*Terrapene carolina carolina*
SC	Wood turtle	*Glyptemys insculpta*	SC	Eastern ribbon snake	*Thamnophis sauritus*
Endangered, Threatened & Special Concern Amphibians					
SC	Jefferson salamander "complex"	*Ambystoma jeffersonianum*	T	Northern slimy salamander	*Plethodon glutinosus*
E	Blue-spotted salamander (diploid populations)	*Ambystoma laterale*	SC	Northern leopard frog	*Rana pipiens*
SC	Blue-spotted salamander "complex"	*Ambystoma laterale*	E	Eastern spadefoot	*Scaphiopus holbrookii*
T	Northern spring salamander	*Gyrinophilus porphyriticus*			
Endangered, Threatened & Special Concern Fish					
E	Short-nose sturgeon+	*Acipenser brevirostrum*	E	American brook lamprey	*Lampetra appendix*
T	Atlantic sturgeon+	*Acipenser oxyrinchus oxyrinchus*	E	Burbot	*Lota lota*
SC	Blueback herring	*Alosa aestivalis*	SC	Bridle shiner	*Notropis bifrenatus*
SC	Long-nose sucker	*Catostomus catostomus*	E	Rainbow smelt (anadromous populations only)	*Osmerus mordax*
SC	Banded sunfish	*Enneacanthus obesus*			
Endangered, Threatened & Special Concern Invertebrates (Insects)					
T	Coastal heathland cutworm	Abagrotis nefascia benjamini	T	Pink streak	Faronta rubripennis
SC	Barrens dagger moth*	Acronicta albarufa	SC	Ground beetle	Geopinus incrassatus
SC	Noctuid moth*	Acronicta lanceolaria	T	Mustached clubtail	Gomphus adelphus
SC	Ground beetle	Agonum darlingtoni	T	Harpoon clubtail	Gomphus descriptus
SC	Ground beetle	Agonum mutatum	T	Midland clubtail	Gomphus fraternus
SC	Spotted dart moth	Agrotis stigmosa	T	Rapids clubtail	Gomphus quadricolor
SC	Ground beetle	Amara chalcea	SC	Cobra clubtail	Gomphus vastus
E	Common roadside skipper	Amblyscirtes vialis	SC	Skillet clubtail	Gomphus ventricosus
E	Noctuid moth	Anarta luteola	SC	Horse fly	Goniops chrysocoma
SC	Tusked sprawler	Anthopotamus verticis	E	Phyllira tiger moth	Grammia phyllira
SC	Apamea moth	Apamea burgessi	E	Bog tiger moth	Grammia speciosa
SC	Apamea moth	Apamea inordinata	SC	Ground beetle	Harpalus caliginosus
SC	Apamea moth	Apamea lintneri	SC	Ground beetle	Harpalus eraticus
T	New Jersey tea inchworm	Apodrepanulatrix liberaria	SC	Ground beetle	Helluomorphoides praeustus bicolor

SC	Short-lined chocolate	Argyrostrotis anilis	T	Slender clearwing	Hemaris gracilis
SC	Tabanid fly	Atylotus ohioensis	E	Buck moth	Hemileuca maia maia
SC	Ground beetle	Badister transversus	T	American rubyspot	Hetaerina americana
SC	Ground beetle	Bembidion carinula	T	Horse fly	Hybomitra frosti
SC	Ground beetle	Bembidion lacunarium	E	Horse fly	Hybomitra longiglossa
SC	Ground beetle	Bembidion planum	SC	Horse fly	Hybomitra luridus
SC	Ground beetle	Bembidion pseudocautum	SC	Horse fly	Hybomitra trepida
SC	Ground beetle	Bembidion quadratulum	SC	Horse fly	Hybomitra typhus
SC	Ground beetle	Bembidion semicinctum	SC	Hop vine borer moth*	Hydraecia immanis
SC	Ground beetle	Bembidion simplex	SC	Blue corporal dragonfly	Ladona deplanata
SC	Affable bumblebee	Bombus affinis	SC	Noctuid moth	Lepipolys perscripta
SC	Ashton's bumblebee*	Bombus ashtoni	T	Crimson-ringed whiteface	Leucorrhinia glacialis
SC	Yellowbanded bumblebee	Bombus terricola	SC	Lemmer's noctuid moth*	Lithophane lemmeri
SC	Bombardier beetle	Brachinus cyanipennis	SC	Pale green pinion moth*	Lithophane viridipallens
SC	Bombardier beetle	Brachinus fumans	SC	Yellow-horned beaded lacewing	Lomamyia flavicornis
SC	Bombardier beetle	Brachinus medius	SC	Black lordithon rove beetle*	Lordithon niger
SC	Bombardier beetle	Brachinus ovipennis	SC	Ground beetle	Loxandrus vulneratus
SC	Bombardier beetle	Brachinus patruelis	SC	Bog copper	Lycaena epixanthe
E	Northern metalmark	Calephelis borealis	SC	Bronze copper	Lycaena hyllus
SC	Henry's elfin	Callophrys henrici	SC	Fringed loosestrife oil-bee	Macropis ciliata
E	Hessel's hairstreak	Callophrys hesseli	SC	Eastern cactus-boring moth	Melitara prodenialis
T	Frosted elfin	Callophrys irus	SC	Newman's brocade	Meropleon ambifuscum
SC	Hoary elfin*	Callophrys polios	SC	Tabanid fly	Merycomyia whitneyi
T	Sparkling jewelwing	Calopteryx dimidiata	E	Barrens metarranthis moth	Metarranthis apiciaria
SC	Ground beetle*	Calosoma wilcoxi	SC	Syrphid fly*	Mixogaster johnsoni
SC	Ground beetle*	Carabus serratus	SC	Ground beetle	Nebria lacustris lacustris
SC	Ground beetle*	Carabus sylvosus	SC	American burying beetle*+	Nicrophorus americanus
SC	Ground beetle	Carabus vinctus	SC	Ground beetle*	Omophron tesselatum
E	Herodias underwing	Catocala herodias gerhardi	SC	Dune oncocnemis	Oncocnemis riparia
SC	Precious underwing moth*	Catocala pretiosa pretiosa	SC	Ground beetle*	Panagaeus fasciatus
T	Appalachian blue	Celastrina neglectamajor	E	Pitcher plant borer	Papaipema appassionata
SC	Noctuid moth	Chaetaglaea cerata	SC	Hops-stalk borer moth*	Papaipema circumlucens
SC	Harris' checkerspot*	Chlosyne harrisii	SC	Seaside goldenrod stem borer	Papaipema duovata
SC	Silvery checkerspot*	Chlosyne nycteis	T	Columbine borer	Papaipema leucostigma
SC	Northeastern beach tiger beetle*^	Cicindela dorsalis dorsalis	SC	Maritime sunflower borer moth*	Papaipema maritima
SC	Pine barrens tiger beetle	Cicindela formosa generosa	SC	Culvers root bore moth*	Papaipema sciata
SC	Tiger beetle	Cicindela hirticollis	SC	Mayfly	Paraleptophlebia assimilis
E	Dune ghost tiger beetle	Cicindela lepida	T	Lanced phaneta	Phaneta clavana

SC	Tiger beetle	Cicindela marginata	E	Labrador tea tentiform leafminer	Phyllonorycter ledella
E	Puritan tiger beetle^	Cicindela puritana	SC	Gray comma*	Polygonia progne
SC	Tiger beetle*	Cicindela purpurea	T	Common sanddragon	Progomphus obscurus
SC	Dark-bellied tiger beetle	Cicindela tranquebarica	T	Pink sallow	Psectraglaea carnosa
SC	Regal moth*	Citheronia regalis	SC	Annointed sallow moth*	Pyreferra ceromatica
SC	C9 Lady beetle*	Coccinella novemnotata	SC	Aureolaria seed borer	Rhodoecia aurantiago
T	Tiger spiketail	Cordulegaster erronea	SC	Soldier fly	Sargus fasciatus
SC	Noctuid moth*	Cucullia speyeri	SC	Eyed brown	Satyrodes eurydice
T	False heather underwing	Drasteria graphica atlantica	SC	Ground beetle*	Scaphinotus elevatus
SC	Imperial moth*	Eacles imperialis imperialis	SC	Ground beetle	Scaphinotus viduus
T	Atlantic bluet	Enallagma doubledayi	SC	Noctuid moth	Schinia spinosae
SC	Little bluet	Enallagma minusculum	SC	Ski-tailed emerald	Somatochlora elongata
SC	Scarlet bluet	Enallagma pictum	SC	Spartina borer moth	Spartiniphaga inops
E	Macropis cuckoo	Epeoloides pilosula	T	Barrens itame	Speranza exornata
T	Sleepy duskywing	Erynnis brizo	T	Atlantis fritillary butterfly	Speyeria atlantis
SC	Horace's duskywing	Erynnis horatius	SC	Regal fritillary*	Speyeria idalia
E	Columbine duskywing	Erynnis lucilius	SC	Tabanid fly	Stonemyia isabellina
SC	Mottled duskywing*	Erynnis martialis	T	Riverine clubtail	Stylurus amnicola
E	Persius duskywing	Erynnis persius persius	SC	Horse fly	Tabanus fulvicallus
SC	Scrub euchlaena	Euchlaena madusaria	SC	Ground beetle	Tetragonoderus fasciatus
SC	Noctuid moth	Eucoptocnemis fimbriaris	T	Grassland thaumatopsis	Thaumatopsis edonis
T	Morrison's mosaic	Eucosma morrisoni	SC	Cicada	Tibicen auletes
SC	Brown-bordered geometer	Eumacaria latiferrugata	E	Banded bog skimmer	Williamsonia lintneri
T	Two-spotted skipper	Euphyes bimacula	T	Noctuid moth	Zale curema
SC	Sedge skipper	Euphyes dion	SC	Noctuid moth	Zale obliqua
SC	Noctuid moth	Euxoa pleuritica	T	Noctuid moth	Zale submediana
T	Violet dart moth	Euxoa violaris	T	Noctuid moth	Zanclognatha martha
SC	Pitcher plant moth	Exyra fax			
Endangered, Threatened & Special Concern Invertebrates (Other Invertebrates)					
E	Dwarf wedge mussel+	*Alasmidonta heterodon*	SC	Eastern pond mussel	*Ligumia nasuta*
E	Brook floater	*Alasmidonta varicosa*	SC	Eastern pearl shell	*Margaritifera margaritifera*
SC	Mystic valley amphipod	*Crangonyx aberrans*	SC	Slender walker	*Pomatiopsis lapidaria*
E	Fairy shrimp	*Eubranchipus holmanii*	SC	Whiteriver crayfish	*Procambarus acutus*
SC	Clam shrimp*	*Eulimnadia agassizii*	SC	Purse web spider	*Sphodros niger*
SC	Lymnaeid snail*	*Fossaria galbana*	SC	Lymnaeid snail	*Stagnicola catascopium*
SC	Lymnaeid snail	*Fossaria rustica*	SC	Piedmont groundwater amphipod	*Stygobromus tenuis tenuis*
SC	Aquatic snail	*Gyraulus circumstriatus*	SC	Coastal pond amphipod	*Synurella chamberlaini*
E	Yellow lamp mussel	*Lampsilis cariosa*	SC	Boreal turret snail	*Valvata sincera*

SC	Tidewater mucket	*Leptodea ochracea*	SC	Turret snail	*Valvata tricarinata*
Endangered, Threatened & Special Concern Plants					
E	Balsam fir (native populations only)	*Abies balsamea*	E	Globe-fruited false-loosestrife	*Ludwigia sphaerocarpa*
SC	Virginia copperleaf	*Acalypha virginica*	E	Foxtail clubmoss	*Lycopodiella alopecuroides*
E	Sandplain gerardia+	*Agalinis acuta*	SC	Clasping-leaved water-horehound	*Lycopus amplectens*
E	Yellow giant hyssop	*Agastache nepetoides*	SC	Climbing fern	*Lygodium palmatum*
E	Purple giant hyssop	*Agastache scrophulariifolia*	SC	Stagger-bush*	*Lyonia mariana*
E	Small white snakeroot	*Ageratina aromatica*	E	Winged loosestrife	*Lythrum alatum*
T	Orange foxtail	*Alopecurus aequalis*	T	Three-leaved false Solomon's-seal	*Maianthemum trifolium*
SC	Sea-beach amaranth*^	*Amaranthus pumilus*	E	Bayard's white adder's mouth	*Malaxis bayardii*
T	Bog rosemary	*Andromeda polifolia var. glaucophylla*	E	White adder's-mouth	*Malaxis brachypoda*
T	Canada anemone	*Anemone canadensis*	E	Green adder's-mouth	*Malaxis unifolia*
E	Sea-coast angelica	*Angelica lucida*	E	Tall millet-grass	*Milium effusum*
SC	Hairy angelica*	*Angelica venenosa*	T	Mountain sandwort	*Minuartia glabra*
SC	Field pussytoes*	*Antennaria howellii ssp. petaloidea*	SC	Naked miterwort	*Mitella nuda*
SC	Puttyroot*	*Aplectrum hyemale*	E	Large-leaved sandwort	*Moehringia macrophylla*
E	Dwarf mistletoe	*Arceuthobium pusillum*	E	One-flower wintergreen	*Moneses uniflora*
SC	Arethusa*	*Arethusa bulbosa*	E	Red mulberry	*Morus rubra*
SC	Needlegrass	*Aristida longespica*	E	Long-awn hairgrass	*Muhlenbergia capillaris*
SC	Arrowfeather	*Aristida purpurascens*	E	Slender water-milfoil	*Myriophyllum alterniflorum*
E	Beach needle grass	*Aristida tuberculosa*	E	Cutleaf water-milfoil	*Myriophyllum pinnatum*
SC	Virginia snakeroot	*Aristolochia serpentaria*	T	Northern water-milfoil	*Myriophyllum sibiricum*
SC	Purple milkweed	*Asclepias purpurascens*	SC	Large yellow pond lily*	*Nuphar advena*
SC	White milkweed*	*Asclepias variegata*	SC	Small yellow pond lily	*Nuphar microphylla*
E	Green milkweed	*Asclepias viridiflora*	E	Bog aster	*Oclemena nemoralis*
SC	Mountain spleenwort	*Asplenium montanum*	E	Blake's aster	*Oclemena X blakei*
T	Wallrue spleenwort	*Asplenium ruta-muraria*	SC	Sundrops*	*Oenothera fruticosa*
SC	Orache	*Atriplex glabriuscula*	E	Prairie goldenrod	*Oligoneuron album*
SC	Swamp birch	*Betula pumila*	E	Stiff goldenrod	*Oligoneuron rigidum*
T	Water-marigold	*Bidens beckii*	E	Gravel-weed	*Onosmodium virginianum*
T	Eaton's beggars-tick	*Bidens eatonii*	T	Adder's-tongue	*Ophioglossum pusillum*
SC	Downy wood-mint*	*Blephilia ciliata*	SC	Eastern prickly pear	*Opuntia humifusa*
SC	Hairy woodmint*	*Blephilia hirsuta*	SC	Golden club	*Orontium aquaticum*
SC	Bayonet grass	*Bolboschoenus maritimus ssp. paludosus*	SC	One-sided pyrola*	*Orthilia secunda*
SC	Salt marsh bulrush	*Bolboschoenus novae-angliae*	SC	Violet wood-sorrel	*Oxalis violacea*
SC	Little grape fern*	*Botrychium simplex*	T	Ragwort	*Packera paupercula*

E	Side-oats grama-grass	*Bouteloua curtipendula*	SC	American ginseng	*Panax quinquefolius*
SC	Reed bentgrass	*Calamagrostis stricta ssp. inexpansa*	T	Panic grass	*Panicum amarum*
SC	Low bindweed*	*Calystegia spithamaea*	SC	Tall flat panic-grass*	*Panicum rigidulum var. elongatum*
SC	Purple cress	*Cardamine douglassii*	SC	Warty panic grass*	*Panicum verrucosum*
SC	Summer sedge	*Carex aestivalis*	SC	Hairy forked chickweed*	*Paronychia fastigiata*
E	Broadwing sedge	*Carex alata*	E	Field paspalum	*Paspalum laeve*
T	Foxtail sedge	*Carex alopecoidea*	SC	Bead grass*	*Paspalum setaceum*
SC	Sedge	*Carex aquatilis var. aquatilis*	T	Swamp lousewort	*Pedicularis lanceolata*
E	Sedge	*Carex backii*	E	Smooth cliff-brake	*Pellaea glabella*
E	Barratt's sedge	*Carex barrattii*	T	Sweet coltsfoot	*Petasites frigidus var. palmatus*
SC	Sedge	*Carex bushii*	SC	Wild kidney bean*	*Phaseolus polystachios var. polystachios*
E	Brown bog sedge	*Carex buxbaumii*	E	Red pine (native populations only)	*Pinus resinosa*
E	Chestnut-colored sedge	*Carex castanea*	E	Slender mountain ricegrass	*Piptatherum pungens*
SC	Collins sedge*	*Carex collinsii*	E	Sickle-leaved golden aster	*Pityopsis falcata*
T	Crawe's sedge	*Carex crawei*	SC	Hoary plantain	*Plantago virginica*
SC	Crawford sedge*	*Carex crawfordii*	E	White-fringed orchid	*Platanthera blephariglottis*
T	Clustered sedge	*Carex cumulata*	T	Yellow-fringed orchid	*Platanthera ciliaris*
T	Davis' sedge	*Carex davisii*	SC	Tall white bog orchid*	*Platanthera dilatata*
E	Sedge	*Carex exilis*	SC	Pale green orchid	*Platanthera flava var. herbiola*
SC	Bronze sedge*	*Carex foenea*	SC	Hooker's orchid*	*Platanthera hookeri*
SC	Handsome sedge	*Carex formosa*	SC	Large round-leaved orchid*	*Platanthera orbiculata*
SC	Hitchcock's sedge	*Carex hitchcockiana*	SC	Threadfoot	*Podostemum ceratophyllum*
T	Sedge	*Carex limosa*	SC	Clammy-weed*	*Polanisia dodecandra*
E	Sedge	*Carex magellanica*	E	Field milkwort	*Polygala cruciata*
SC	Troublesome sedge	*Carex molesta*	E	Nuttall's milkwort	*Polygala nuttallii*
SC	Black-edge sedge*	*Carex nigromarginata*	E	Seneca snakeroot	*Polygala senega*
SC	New England sedge	*Carex novae-angliae*	SC	Seabeach knotweed*	*Polygonum glaucum*
SC	Eastern few-fruited sedge	*Carex oligocarpa*	E	Small-flowered leafcup	*Polymnia canadensis*
SC	Few-seeded sedge*	*Carex oligosperma*	T	Swamp cottonwood	*Populus heterophylla*
SC	Few-flowered sedge*	*Carex pauciflora*	E	Pondweed	*Potamogeton confervoides*
E	Variable sedge	*Carex polymorpha*	E	Fries' pondweed	*Potamogeton friesii*
SC	Prairie sedge	*Carex prairea*	E	Hill's pondweed	*Potamogeton hillii*
E	Cyprus-like sedge	*Carex pseudocyperus*	E	Ogden's pondweed	*Potamogeton ogdenii*
E	Schweinitz's sedge	*Carex schweinitzii*	T	Capillary pondweed	*Potamogeton pusillus ssp. gemmiparus*
SC	Sedge	*Carex squarrosa*	E	Straight-leaved pondweed	*Potamogeton strictifolius*
SC	Dioecious sedge	*Carex sterilis*	T	Vasey's pondweed	*Potamogeton vaseyi*

SC	Sedge	*Carex trichocarpa*	SC	Tall cinquefoil	*Potentilla arguta*
SC	Tuckerman's sedge	*Carex tuckermanii*	SC	Alleghany plum*	*Prunus alleghaniensis*
SC	Sedge	*Carex typhina*	SC	Grave's beach plum*	*Prunus maritima var. gravesii*
E	Little green sedge	*Carex viridula*	SC	Goose grass*	*Puccinellia tenella ssp. alaskana*
E	Willdenow's sedge	*Carex willdenowii*	E	Basil mountain-mint	*Pycnanthemum clinopodioides*
T	Indian paintbrush	*Castilleja coccinea*	E	Torrey mountain-mint	*Pycnanthemum torrei*
SC	Eastern redbud (native populations only)*	*Cercis canadensis*	SC	Bur oak	*Quercus macrocarpa*
E	Devil's-bit	*Chamaelirium luteum*	E	Water-plantain spearwort	*Ranunculus ambigens*
E	Hairy lip-fern	*Cheilanthes lanosa*	E	Seaside crowfoot	*Ranunculus cymbalaria*
SC	Coast blite*	*Chenopodium rubrum*	SC	Creeping spearwort*	*Ranunculus flammula var. filiformis*
E	Yellow thistle	*Cirsium horridulum*	SC	White water-crowfoot	*Ranunculus longirostris*
E	Long-bracted green orchid	*Coeloglossum viride*	SC	Bristly buttercup*	*Ranunculus pensylvanicus*
SC	Early coral root	*Corallorhiza trifida*	T	Labrador tea	*Rhododendron groenlandicum*
T	Yellow corydalis	*Corydalis flavula*	SC	Fragrant sumac (native populations only)*	*Rhus aromatica*
E	Pygmyweed	*Crassula aquatica*	E	Capillary beak-rush	*Rhynchospora capillacea*
SC	Elliptical rushfoil*	*Croton willdenowii*	T	Beaked rush	*Rhynchospora macrostachya*
E	Slender cliff-brake	*Cryptogramma stelleri*	E	Long-beaked bald rush	*Rhynchospora scirpoides*
SC	Blue waxweed*	*Cuphea viscosissima*	SC	Skunk currant	*Ribes glandulosum*
SC	Hazel dodder*	*Cuscuta coryli*	SC	Swamp black currant*	*Ribes lacustre*
SC	Wild comfrey*	*Cynoglossum virginianum*	SC	Wild currant	*Ribes rotundifolium*
SC	Ram's-head lady's-slipper*	*Cypripedium arietinum*	E	Swamp red currant	*Ribes triste*
SC	Yellow lady's-slipper	*Cypripedium parviflorum*	SC	Shining rose	*Rosa nitida*
E	Showy lady's-slipper	*Cypripedium reginae*	T	Toothcup	*Rotala ramosior*
E	Dew-drop	*Dalibarda repens*	SC	Sand bramble	*Rubus cuneifolius*
SC	Tufted hairgrass	*Deschampsia caespitosa*	SC	Sea-side dock*	*Rumex maritimus*
E	Large-bracted tick-trefoil	*Desmodium cuspidatum*	SC	Large marsh pink*	*Sabatia dodecandra*
SC	Dillenius' tick-trefoil	*Desmodium glabellum*	E	Marsh pink	*Sabatia stellaris*
E	Trailing tick-trefoil	*Desmodium humifusum*	E	Waputo	*Sagittaria cuneata*
SC	Sessile-leaf tick-trefoil*	*Desmodium sessilifolium*	SC	Arrowleaf	*Sagittaria subulata*
SC	Squirrel corn	*Dicentra canadensis*	T	Sandbar willow	*Salix exigua*
SC	Panic grass	*Dichanthelium ovale var. addisonii*	E	Bog willow	*Salix pedicellaris*
E	Panic grass	*Dichanthelium scabriusculum*	SC	Slender willow	*Salix petiolaris*
SC	Panic grass*	*Dichanthelium sphaerocarpon var. isophyllum*	SC	Autumn willow	*Salix serissima*

SC	Panic grass*	*Dichanthelium xanthophysum*	E	Lizard's tail	*Saururus cernuus*
SC	Persimmon	*Diospyros virginiana*	E	Pod grass	*Scheuchzeria palustris ssp. americana*
E	Narrow-leaved glade fern	*Diplazium pycnocarpon*	SC	Purple oat	*Schizachne purpurascens*
SC	Whitlow-grass	*Draba reptans*	T	Hard-stemmed bulrush	*Schoenoplectus acutus*
SC	Thread-leaf sundew*	*Drosera filiformis*	T	Torrey bulrush	*Schoenoplectus torreyi*
E	Mountain wood-fern	*Dryopteris campyloptera*	SC	Chaffseed*+	*Schwalbea americana*
SC	Goldie's fern	*Dryopteris goldiana*	SC	Georgia bulrush	*Scirpus georgianus*
E	Bur-head	*Echinodorus tenellus*	SC	Long's bulrush*	*Scirpus longii*
E	Horse-tail spike-rush	*Eleocharis equisetoides*	E	Few-flowered nutrush	*Scleria pauciflora var. caroliniana*
SC	Spike-rush*	*Eleocharis microcarpa var. filiculmis*	E	Reticulated nutrush	*Scleria reticularis*
E	Spike-rush	*Eleocharis quadrangulata var. crassior*	E	Nutrush	*Scleria triglomerata*
SC	Wiegand's wild rye	*Elymus wiegandii*	SC	Low nutrush*	*Scleria verticillata*
SC	Marsh horsetail*	*Equisetum palustre*	E	Hyssop skullcap	*Scutellaria integrifolia*
E	Meadow horsetail	*Equisetum pratense*	E	Small skullcap	*Scutellaria parvula var. missouriensis*
E	Dwarf scouring rush	*Equisetum scirpoides*	SC	Wild senna	*Senna hebecarpa*
E	Parker's pipewort	*Eriocaulon parkeri*	T	Three-toothed cinquefoil	*Sibbaldiopsis tridentata*
T	Hare's tail	*Eriophorum vaginatum var. spissum*	T	Starry champion	*Silene stellata*
E	White thoroughwort	*Eupatorium album*	SC	Bristly greenbriar*	*Smilax hispida*
E	Rough aster	*Eurybia radula*	SC	Elliott's goldenrod	*Solidago latissimifolia*
T	Showy aster	*Eurybia spectabilis*	SC	Early wrinkle-leaved goldenrod*	*Solidago rugosa var. sphagnophila*
SC	Hervey's aster	*Eurybia X herveyi*	E	Floating bur-reed	*Sparganium fluctuans*
E	False mermaid-weed	*Floerkea proserpinacoides*	E	Small bur-reed	*Sparganium natans*
E	Bog bedstraw	*Galium labradoricum*	T	Canada sand-spurry	*Spergularia canadensis*
SC	Purple cudweed*	*Gamochaeta purpurea*	SC	Little ladies'-tresses	*Spiranthes tuberosa var. grayi*
SC	Creeping snowberry	*Gaultheria hispidula*	E	Rough dropseed	*Sporobolus clandestinus*
T	Dwarf huckleberry	*Gaylussacia dumosa var. bigeloviana*	T	Sand dropseed	*Sporobolus cryptandrus*
E	Stiff gentian	*Gentianella quinquefolia*	E	Northern dropseed	*Sporobolus heterolepis*
SC	Bicknell's northern crane's-bill*	*Geranium bicknellii*	E	Small dropseed	*Sporobolus neglectus*
SC	Dwarf rattlesnake plantain*	*Goodyera repens var. ophioides*	E	Hyssop-leaf hedge-nettle	*Stachys hyssopifolia*
E	Sweet-scented Indian-plantain	*Hasteola suaveolens*	SC	Smooth hedge-nettle	*Stachys tenuifolia*
SC	Bush rockrose*	*Helianthemum dumosum*	SC	Northern stitchwort	*Stellaria borealis*
T	Low frostweed	*Helianthemum propinquum*	T	White mandarin	*Streptopus amplexifolius*

SC	Sharp-lobed hepatica	*Hepatica nobilis var. acuta*	SC	Crooked-stem aster*	*Symphyotrichum prenanthoides*
SC	Kidneyleaf mud-plantain*	*Heteranthera reniformis*	E	Yellow pimpernel	*Taenidia integerrima*
SC	Seabeach sandwort	*Honckenya peploides*	T	Northern white cedar (native populations only)	*Thuja occidentalis*
SC	Featherfoil	*Hottonia inflata*	SC	Appalachian gametophyte	*Trichomanes intricatum*
T	Longleaf bluet	*Houstonia longifolia*	SC	Cotton bulrush*	*Trichophorum alpinum*
E	Golden-heather	*Hudsonia ericoides*	E	False pennyroyal	*Trichostema brachiatum*
T	False beach-heather	*Hudsonia tomentosa*	E	Narrow-leaved horse gentian	*Triosteum angustifolium*
SC	Fir clubmoss*	*Huperzia selago*	E	Nodding pogonia	*Triphora trianthophora*
SC	Green violet*	*Hybanthus concolor*	SC	Spiked false oats	*Trisetum spicatum*
E	Golden seal	*Hydrastis canadensis*	T	Spreading globe flower	*Trollius laxus*
E	Water pennywort	*Hydrocotyle umbellata*	E	Bladderwort	*Utricularia resupinata*
E	Whorled pennywort	*Hydrocotyle verticillata*	E	Large-flowered bellwort	*Uvularia grandiflora*
SC	Virginia waterleaf	*Hydrophyllum virginianum*	E	Velvetleaf blueberry	*Vaccinium myrtilloides*
SC	Creeping St. John's-wort*	*Hypericum adpressum*	SC	Mountain cranberry*	*Vaccinium vitis-idaea ssp. minus*
SC	Great St. John's-wort	*Hypericum ascyron*	SC	Beaked corn-salad*	*Valerianella radiata*
T	Inkberry (native populations only)	*Ilex glabra*	SC	Hybrid bunchflower*	*Veratrum latifolium*
E	Small whorled pogonia^	*Isotria medeoloides*	SC	Narrow-leaved vervain*	*Verbena simplex*
SC	Weak rush*	*Juncus debilis*	SC	Possum haw*	*Viburnum nudum*
SC	Two-flowered cynthia	*Krigia biflora*	SC	Smooth black-haw	*Viburnum prunifolium*
E	Carolina redroot (native populations only)	*Lachnanthes caroliana*	SC	Hook-spurred violet	*Viola adunca*
E	Saltpond grass	*Leptochloa fusca ssp. fascicularis*	E	Coast violet	*Viola brittoniana*
SC	Creeping bush-clover	*Lespedeza repens*	SC	Canada violet	*Viola canadensis*
SC	Blazing star	*Liatris scariosa var. novae-angliae*	SC	Southern wood violet*	*Viola hirsutula*
E	Scotch lovage	*Ligusticum scothicum*	SC	Northern bog violet	*Viola nephrophylla*
SC	Lilaeopsis	*Lilaeopsis chinensis*	SC	Kidney-leaf white violet*	*Viola renifolia*
SC	Mudwort	*Limosella australis*	SC	Great-spurred violet	*Viola selkirkii*
E	Twinflower	*Linnaea borealis ssp. americana*	SC	Striped violet*	*Viola striata*
SC	Sandplain flax*	*Linum intercursum*	SC	New England grape	*Vitis X novae-angliae*
E	Yellow flax	*Linum sulcatum*	E	Barren strawberry	*Waldsteinia fragarioides*
E	Lily-leaved twayblade	*Liparis liliifolia*	T	Northern yellow-eyed grass	*Xyris montana*
T	Dwarf bulrush	*Lipocarpha micrantha*	E	Small's yellow-eyed	*Xyris smalliana*
SC	Sweet gum (native populations only)	*Liquidambar styraciflua*	E	Golden Alexanders	*Zizia aptera*
SC	Many-fruited false-loosestrife*	*Ludwigia polycarpa*	* Believed Extirpated + Federally Endangered ^ Federally Threatened		

APPENDIX D

CRITERIA FOR BEAVER DAM BREACHING/REMOVAL

Wetlands are recognized by three characteristics: hydric soils, hydrophytic vegetation, and general hydrology. Hydric soils are either entirely composed of, or have a thick surface layer of decomposed plant materials; sandy soils have dark stains or streaks from organic material in the upper layer where plant material has attached to soil particles. In addition, hydric soils may be bluish gray or gray below the surface or brownish black to black and have the smell of rotten eggs. Wetlands also have hydrophytic vegetation such as cattails, bulrushes, willows, sedges, and water plantains. The final indicator is general hydrology which includes standing and flowing water or waterlogged soils during the growing season; high water marks are present on trees and drift lines of small piles of debris are usually present. Beaver dams usually will develop a layer of organic material at the surface because siltation can occur rapidly, but aquatic vegetation and high water marks (a new high water mark is created by the beaver dam) are usually not present. However, cattails and willows can show up rapidly if they are in the vicinity, but most hydrophytic vegetation takes time to establish.

When a dam is removed, debris is discharged into the water. The debris that ends up in the water is considered "*incidental fallback*" or discharge fill. However, in most beaver dam removal operations, the material that is displaced, if considered to be discharge, is exempt from permit requirements under 33 CFR 323 or 330. A permit would be required if the impoundment caused by a beaver dam was considered a true wetland. WS personnel survey the beaver dam site and impoundment and determine whether conditions exist suggesting that the area may be a wetland as defined above. If such conditions exist, the landowner is asked the age of the dam or how long he/she has known of its presence to determine whether Swampbuster, Section 404 permit exemptions or NWPs allow removal of the dam. If not, the landowner is required to obtain a Section 404 permit before the dam will be removed by WS personnel.

The following information explains Section 404 exemptions and conditions that pertain to the removal of beaver dams.

33 CFR 323 – Permits For Discharges of Dredged or Fill Material into Waters of the United States. This regulation provides guidance to determine whether certain activities require permits under Section 404.

> **Part 323.4 Discharges not requiring permits.** This section establishes exemptions for discharging certain types of fill into waters of the United States without a permit. Certain minor drainage activities connected with normal farming, ranching, and silviculture activities where they have been established do not require a permit as long as these drainages do not include the immediate or gradual conversion of a wetland (i.e. beaver ponds greater than 5 years old) to a non-wetland. Specifically part (a)(1)(iii)(C)(i) states, *"…fill material incidental to connecting upland drainage facilities* [*e.g.*, drainage ditches] *to waters of the United States, adequate to effect the removal of excess soil moisture from upland croplands…"*. This indicates that beaver dams that block ditches, canals, or other structures designed to drain water from upland crop fields can be removed without a permit.
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> Moreover, part (a)(1)(iii)(C)(iv) states the following types of activities do not require a permit "*The discharges of dredged or fill materials incidental to the emergency removal of sandbars, gravel bars, or other similar blockages which are formed during flood flow or other events, where such blockages close or constrict previously existing drainageways and, if not promptly removed, would result in damage to or loss of existing crops or would impair or prevent the plowing, seeding, harvesting or cultivating of crops in land in established use for crop production. Such removal does not include enlarging or extending the dimensions of, or*

changing the bottom elevations of, the affected drainageway as it existed prior to the formation of the blockage. Removal must be accomplished within one year of discovery of such blockages in order to be eligible for exemption." This allows the removal of beaver dams in natural streams to restore drainage of agricultural lands within one year of discovery.

Part 323.4(a)(2) allows "*Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption."* This allows beaver dams to be removed without a permit where they have resulted in damage to roads, culverts, bridges, or levees if it is done in a reasonable amount of time.

Connecticut regulates discharges into the waters of the state through the CT DEEP, which grants exemptions from permitting for discharges based on guidelines and exemptions provided by the Army Corps of Engineers. CT DEEP does not consider removal of beaver dams by WS in the state to require permits in those situations exempted by the Corps. CT DEEP DFW does not have any restrictions or regulations regarding breeching or removing beaver dams in the State.

33 CFR 330 – Nationwide Permit (NWP) Program: The Corps Chief of Engineers is authorized to grant certain dredge and fill activities on a nationwide basis if they have minimal impact on the environment. The NWPs are listed in Appendix A of 33 CFR 330 and permittees must satisfy all terms and conditions established in order to qualify for their use. Individual beaver dam removal activities by WS may be covered by any of the following NWPs if not already exempted from permit requirements by the regulations discussed above. WS complies with all conditions and restrictions placed on NWPs for any instance of beaver dam removal done under a specific NWP.

The Corps reevaluated its NWP during 2001-2002 and presented revised guidelines in 2002 (USACE 2002). Based on those guidelines, NWPs can be used except in any component of the National Wild and Scenic River System (16 U.S.C. §§ 1271-1287 as amended). Any beaver dam removal in these designated areas which might be contemplated by WS may require consultation with the Corps and CT DEEP to obtain permits for any such activities.

NWP 3 authorizes the rehabilitation of those structures, such as culverts, homes, and bridges, destroyed by floods and "*discrete events*" such as beaver dams provided that the activity is commenced within 2 years of the date when the beaver dam was established.

NWP 18 allows minor discharges of dredged and fill material, including the removal of beaver dams, into all waters of the United States provided that the quantity of discharge and the volume of excavated area does not exceed 25 cubic yards below the plane of the ordinary high water mark (this is normally well below the level of the beaver dam) and will not cause the loss of more than $1/10^{th}$ acre of special aquatic site including wetlands. The District Engineer must be "notified" (general conditions for notification apply), if the discharge is between 10 and 25 cubic yards for a single project if the project is in a special aquatic site, including wetlands. Beaver dams rarely would exceed 2 or 3 cubic yards of backfill into the waters and probably no more than 5 cubic yards would ever be exceeded. Therefore, this stipulation is not restrictive. Beaver dams periodically may be removed in a special aquatic area, but in most instances the aquatic site will be returned to normal. However, if a true wetland exists, and beaver dam removal is not allowed under another permit, then a permit may be obtained from the District Engineer.

NWP 27 provides for the discharge of dredge and fill for activities associated with the restoration of wetland and riparian areas with certain restrictions. On non-federal public and private lands,

the owner must have: a binding agreement with USFWS or NRCS to conduct restoration; a voluntary wetland restoration project documented by NRCS; or notified the District Engineer according to "notification' procedures. On Federal lands, including Corps and USFWS, wetland restoration can take place without any contract or notification. This NWP *"…applies to restoration projects that serve the purpose of restoring "natural" wetland hydrology, vegetation, and function to altered and degraded non-tidal wetlands and "natural" functions of riparian areas. This NWP does not authorize the conversion of natural wetlands to another aquatic use…"* If operating under this permit, the removal of a beaver dam would be allowed as long as it was not a true wetland (i.e., 5 or more years old), and for non-federal public and private lands the appropriate agreement, project documentation, or notification is in place.

A quick response without delays resulting from permitting requirements can be critical to the success of minimizing or preventing damage. Exemptions contained in the above regulations or NWPs provide for the removal of the majority of beaver dams that WS in Connecticut encounters. The primary determination that must be made by WS personnel is whether a beaver impounded area has become a true wetland or is just a flooded area. The flexibility allowed by these exemptions and NWPs is important for the efficient and effective resolution of many beaver damage problems because damage escalates rapidly in many cases the longer an area remains flooded.