ENVIRONMENTAL ASSESSMENT

MAMMAL DAMAGE MANAGEMENT IN GEORGIA

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

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ACRONYMS

ABC	American Bird Conservancy
ADC	Animal Damage Control
AMDUCA	Animal Medicinal Drug Use Clarification Act
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BO	Biological Opinion
CDC	Centers for Disease Control and Prevention
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CINS	Cumberland Island National Seashore
DEA	Drug Enforcement Administration
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
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FPL	Feline Panleukopenia
FY	Fiscal Year
GDA	Georgia Department of Agriculture
GDNR	Georgia Department of Natural Resources
IWDM	Integrated Wildlife Damage Management
MDM	Mammal Damage Management
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NWRC	National Wildlife Research Center
ORV	Oral Rabies Vaccination
PEP	Post - Exposure Prophylaxis
PETA	People for the Ethical Treatment of Animals
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
TNR	Trap, Neuter, Release Program
TWS	The Wildlife Society
USC	United States Code
U.S.	United States
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Services
WDM	Wildlife Damage Management
WS	Wildlife Services

1.0 CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

Across the United States (U.S.), human populations have expanded and land has been transformed to meet varying human needs. As the landscape has been altered to meet human needs, the availability of wildlife habitat has been substantially changed. Those human needs often compete with wildlife and have inherently increased the potential for negative interactions between wildlife and people. Negative interactions between people and wildlife occur when wildlife cause damage to resources and threaten human safety. Some species of wildlife have adapted to, and thrive in, human altered habitats. Those species, in particular, are often responsible for the majority of interactions between humans and wildlife. When negative interactions occur, people often seek assistance to manage damage to resources and to reduce threats to human safety associated with wildlife. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services' (WS)[1] Final Environmental Impact Statement (FEIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way (USDA 1997):

> *"Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife generally is 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."*

Both sociological and biological carrying capacities must be applied to resolving wildlife damage problems. The wildlife acceptance capacity, or cultural carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations. Biological carrying capacity is the land or habitat's ability to support healthy populations of wildlife without degradation to the species' health or their environment during an extended period of time (Decker and Purdy 1988). Those phenomena are especially important because they define the sensitivity of a community to a wildlife species. For any given damage situation, there are varying thresholds of tolerance exhibited by those directly and indirectly affected by the species and any associated damage. This damage threshold is a factor in determining the wildlife acceptance capacity. While Georgia may have a biological carrying capacity to support a higher population of some mammal species, 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 management or damage reduction methods, including lethal methods, to alleviate damage or address threats to public safety.

The alleviation of damage or other problems caused by or related to the behavior of wildlife is termed wildlife damage management (WDM) and is recognized as an integral component of wildlife management (Leopold 1933, The Wildlife Society 1992, Berryman 1991). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated and the need for WDM is derived from those specific threats to resources. Those individuals of a wildlife species have no *intent* to do harm. They utilize habitats (*i.e.,* reproduce, walk, forage) where they can find a *niche*. If their activities result in actions resulting in lost economic value of resources or threaten human safety, people often characterize this as damage.

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

When wildlife damage and threats to human safety reaches a threshold, people often seek assistance to resolve or alleviate those damages or threats associated with wildlife. The threshold triggering a request for assistance is often unique to the individual requesting assistance and can be based on many factors (*i.e.*, economic, social, aesthetics).

The USDA is authorized to protect agriculture and other resources from damage caused by wildlife. This function is carried out by the WS program. The primary statutory authorities for WS' program are 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). Appendix D contains a complete discussion of WS' authorities and those federal, state, and local agencies with authority over the mammal species addressed in this EA along with WS' compliance with relevant laws and regulations.

WS' mission, developed through its strategic planning process, is to provide leadership in WDM in the protection of agricultural resources, natural resources, property, and to safeguard public health and safety. WS' Policy Manual[2] reflects this mission and provides guidance for engaging in WDM through:

- Training of WDM professionals;
- Development and improvement of strategies to reduce losses and threats to humans from wildlife;
- Collection, evaluation, and dissemination of management information;
- Informing and educating the public on how to reduce wildlife damage;
- Providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989)

WS' activities are conducted to prevent or reduce wildlife damage to agricultural, industrial and natural resources, property, livestock, and threats to public health and safety on private and public lands in cooperation with federal, state and local agencies, private organizations, and individuals. This EA evaluates a portion of WS' activities, specifically damage to agriculture, property, natural resources, and threats to human health and safety caused by certain mammal species in Georgia.

To effectively manage damage caused by wildlife, an adaptive Integrated Wildlife Damage Management (IWDM) approach is often employed to resolve wildlife damage or threats to public safety, where a combination of methods may be used or recommended. Adaptive IWDM is a site-specific strategy to evaluate each damage situation and devise a management approach to resolve/alleviate the damage in the most effective and environmental friendly manner. Adaptive management may require the modification of human or animal behavior, or that the animal responsible for the damage is removed or that local populations or groups are reduced through lethal methods. Damage is not determined merely in spatial terms but also with respect to time and other circumstances that define the level of damage (*i.e.,* mammals living in the natural habitats of Georgia may not be a problem while mammals inhabiting a human occupied structure could cause human safety concerns, potential human injuries and property damage).

An adaptive IWDM strategy employs safe and practical methods for the prevention and reduction of damage caused by wildlife based on local problem analyses (Slate et al. 1992) and the informed judgment of trained personnel. WS' adaptive IWDM approach to managing wildlife damage is further described in WS' FEIS (USDA 1997). Potential environmental effects resulting from the application of various damage management techniques to resolve damage and threats to human safety from certain mammal species in Georgia are evaluated in this Environmental Assessment (EA) (See Appendix B for a description of potential methods).

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

1.2 PURPOSE

Normally, according to the APHIS' procedures implementing the National Environmental Policy Act (NEPA), individual WDM actions could be categorically excluded (7 CFR 372.5(c), 60 Fed. Reg. 6000-6003, (1995)). To evaluate potential individual and cumulative impacts to the human environment from WS' actions to resolve mammal damage in Georgia and to clearly communicate to the public the analyses of those potential impacts, WS is preparing this EA. The development of this EA will also be used by WS to assist in planning, to facilitate interagency coordination, and to streamline program management. The analyses contained in the EA are based on information derived from WS' Management Information System and published documents (Appendix A), including the analyses in WS' programmatic FEIS[3] to which this EA is tiered[4] (USDA 1997).

Mammal species addressed in this EA include: Nine-banded armadillo (*Dasypus novemcinctus*), bobcats (*Felis rufus*), coyotes (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), raccoons (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), striped skunks (*Mephitis mephitis*), river otters (*Lutra canadensis*), woodchucks (*Marmota monax*), feral cats (*Felis domesticus*), feral dogs (*Canis familiaris*), and gray squirrels (*Sciurus carolinensus*).

1.3 NEED FOR ACTION

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

Zoonoses are a major concern of cooperators when requesting assistance for managing threats from free-ranging mammals. Disease transmission can not only occur from direct interactions between humans and free-ranging mammals but from interactions with pets and livestock that have direct contact with free-ranging mammals. Pets and livestock often encounter and interact with free-ranging mammals which can increase the opportunity of transmission of disease to humans. Table 1.1[5] 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.

Table 1.1 - Wildlife Diseases in the Eastern United States that Pose Potential Health Risks through Transmission to Humans (Beran 1994, Davidson and Nettles 1997)

Disease	Causative Agent	Hosts[a]	Human Exposure
Anthrax	*Bacillus antracis*	cats, dogs	inhalation, ingestion
Tetanus	*Clostridium tetani*	mammals	direct contact
Dermatophilosis	*Dermatophilus congolensis*	mammals	direct contact
Leprosy	*Mycobacterium leprae*	armadillo	inhalation, direct contact
Pasteurellaceae	*Haemophilus influenzae*	mammals	bite or scratch

[3] WS' FEIS contains a detailed discussion of potential environmental impacts of methods used by WS' to manage damage caused by mammals in Georgia. WS' FEIS may be obtained by contacting USDA/APHIS/WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

[4] CEQ regulations encourage federal agencies to tier Environmental Assessments to previously prepared Environmental Impact Statements and to incorporate material by reference in order to reduce the volume of NEPA documents (40 CFR 1502.20, 40 CFR 1502.21). To comply with CEQ regulations, information and analyses contained in WS' FEIS have been referenced in this EA.

[5] Table 1.1 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.

Disease	Causative Agent	Hosts[a]	Human Exposure
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 migrans	*Baylisascaris procyonis*	raccoons, skunks	ingestion, direct contact
Leptospirosis	*Leptospira interrogans*; 180 different serovars	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, cats, dogs	ingestion, direct contact
Giardiasis	*Giardia lamblia, G. Duodenalis*	coyotes, cats, dogs	ingestion, direct contact

[a] The host species provided for each zoonoses includes only those mammalian species addressed in this EA unless the zoonoses listed potentially infects a broad range of mammalian wildlife. Zoonoses infecting a broad range of mammals are denoted by the general term "mammals" as the host species. The diseases listed do not necessarily infect only those mammalian species covered under this EA but likely infect several species of mammals or groups of mammals. For a complete discussion of the more prevalent diseases in free-ranging mammals, please refer to Beran (1994) and Davidson and Nettles (1997).

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. Under the proposed action, WS could assist in resolving those types of requests for assistance.

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 in Georgia where the threat of disease associated with wild or feral mammal populations include:

- Exposure of residents to the threat of raccoon 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.

- Threats of parasitic infections to humans from *Giardia* spp. resulting from high feral cat populations in a park or recreation area.

The most common disease concern expressed by individuals requesting assistance is the threat of rabies transmission to humans, pets, and companion animals. Rabies is an acute, fatal viral disease of mammals most often transmitted through the bite of a rabid animal that poses an indirect and direct threat to humans. Indirect threats to humans occur from exposure from pets or livestock that have been infected from bites of a rabid animal. Direct threats can occur from handling infected wildlife or from aggressive animal behavior caused by rabies. The disease can be effectively prevented in humans when exposure is identified early and treated while domestic animals and pets can be vaccinated for rabies. However, the abundant and widely distributed reservoir among wild mammals complicates rabies control. The vast majority of rabies cases reported to the Centers for Disease Control and Prevention (CDC) each year occur in raccoons, skunks (primarily *Mephitis mephitis*), and bats (Order Chiroptera) (USDA 2001).

Over the last 100 years, the vector of rabies in the U.S. has changed dramatically. About 90% or greater of all animal cases reported annually to CDC now occur in wildlife (Krebs et al. 2000, CDC 2001a). Before 1960, the majority of cases were reported in domestic animals. The principal rabies hosts today are wild carnivores and bats. The number of rabies-related human deaths in the U.S. has declined from more than 100 annually at the turn of the century to an average of one or two people per year in the 1990's. Modern day prophylaxis, which is the series of vaccine injections given to people who have been potentially or actually exposed, has proven nearly 100% successful in preventing mortality when administered promptly (CDC 2001a). In the U.S., human fatalities associated with rabies occur in people who fail to seek timely medical assistance, usually because they were unaware of their exposure to rabies. According to the CDC (2001a), there have been two human deaths attributed to rabies in Georgia with one death occurring in 1991 and one occurring 2000. Although human rabies deaths are rare, the estimated public health costs associated with disease detection, prevention, and control have risen, exceeding $300 million annually. Those costs include the vaccination of companion animals, maintenance of rabies laboratories, medical costs such as those incurred for exposure case investigations, rabies post-exposure prophylaxis (PEP), and animal control programs (CDC 2001a).

Accurate estimates of the aforementioned expenditures are not available. Although the number of PEPs given in the U.S. each year is unknown, it has been estimated to be as high as 40,000. When rabies becomes epizootic or enzootic (i.e., present in an area over time but with a low case frequency) in a region, the number of PEPs in that area increases. Although the cost varies, a course of rabies immune globulin and five doses of vaccine given over a 4-week period typically exceeds $1,000 (CDC 2001a) and has been reported to be as high as $3,000 or more (Meltzer 1996). As epizootics spread in wildlife populations, the risk of "mass" human exposures requiring treatment of large numbers of people that contact individual rabid domestic animals infected by wild rabid animals increases. One case in Massachusetts involving contact with, or drinking milk from, a single rabid cow required PEPs for a total of 71 persons (CDC 2001b). The total cost of this single incident exceeded $160,000 based on a median cost of $2,376 per PEP in Massachusetts. Likely the most expensive single mass exposure case on record in the U.S. occurred in 1994 when a kitten from a pet store in Concord, New Hampshire tested positive for rabies after a brief illness. As a result of potential exposure to the kitten or to other potentially rabid animals in the store, at least 665 persons received post-exposure rabies vaccinations at a total cost of more than $1.1 million (Noah et al. 1995). Total costs for this specific incident, including investigation, laboratory testing, and rabies immunoglobulin and vaccines was more than $1.5 million (American Veterinary Medical Association (AVMA) 2004).

Raccoons have been associated with the spread of rabies in states throughout the eastern U.S., including Georgia (USDA 2005). Rabies in raccoons was virtually unknown prior to the 1950s. It was first described in Florida and spread slowly during the next three decades into Georgia, Alabama, and South Carolina. It was unintentionally introduced into the Mid-Atlantic States, probably by translocation of infected animals (Krebs et al. 1998). The first cases appeared in West Virginia and Virginia in 1977 and 1978, respectively. Since then, raccoon rabies in the area expanded to form the most intensive rabies outbreak in the U.S. The strain is now enzootic in all of the eastern coastal states, as well as Alabama, Pennsylvania, Vermont, West Virginia, and most recently, parts of Ohio (Krebs et al. 2000). The raccoon rabies epizootic front reached Maine in 1994, reflecting a movement rate of about 30-35 miles per year. The westward movement of the raccoon rabies front has slowed, probably in response to both natural geographic and man-made barriers. The Appalachian Mountains and perhaps river systems flowing eastward have helped confine the raccoon variant to the eastern U.S. If the barrier is breached by raccoon rabies, research suggests that raccoon populations are sufficient for rabies to spread westward along a front at a rate similar to or greater than the rate at which this rabies strain has spread in the eastern U.S. (Sanderson and Huber 1982, Glueck et al. 1988, Hasbrouck et al. 1992, Mosillo et al. 1999).

Raccoon rabies presents a human health threat through potential direct exposure to rabid raccoons, or indirectly through the exposure of pets that had an encounter with rabid raccoons. Additionally, the number of pets and livestock examined and vaccinated for rabies, the number of diagnostic tests requested, and the number of post exposure treatments are all greater when raccoon rabies is present in the area. Human and financial resources allocated to rabies-related human and animal health needs also increase, often at the expense of other important activities and services.

Skunks are also an important wildlife host for rabies virus in North America and are second only to raccoons in being the most commonly reported rabid wildlife species in the U.S. (Majumdar et al. 2005). The skunk strain of rabies may be found in the Midwest and California, however skunks found throughout North America may be infected with different strains of rabies such as the raccoon strain. The distribution of rabies in skunks therefore extends from Georgia to Maine east of the Appalachians, Texas to the Canadian border, and throughout the northern two thirds of California (Majumdar et al. 2005). The fox is one of the four major maintenance hosts for rabies in North America. In the 1950s, rabies in red fox spread throughout Canada, parts of New England, and Alaska. The range has since decreased, but fox rabies still persists in Alaska. Clinical signs of rabies in fox are often manifested as the "furious" form of rabies (Majumdar et al. 2005).

In an effort to halt the westward spread of the raccoon variant of the rabies virus and to limit the spread of the canine variant from Texas, WS began participating in the distribution of oral rabies vaccine (ORV) baits (fishmeal polymer containing Raboral V-RG® vaccine [Merial, Athens, Georgia, USA]). Currently, WS participates in the distribution ORV baits and the surveillance of wildlife rabies vectors in 26 states, including Georgia. ORV baits were first distributed by WS in Georgia during the fall of 2003. A total of 98,629 baits were distributed (69,317 by air and 29,312 by hand) across a 1,202 km^2 area which included portions of Catoosa, Chattooga, and Walker Counties, and all of Dade County, in the northwest corner of Georgia. Georgia expanded its baiting program in 2004 by 302 km^2 to include larger portions of Walker and Catoosa Counties. Since the inception of the program in the fall of 2003 a total of 385,644 ORV baits have been distributed in Georgia. In 2004, as part of a surveillance of rabies vectors in Georgia, WS collected 224 samples for rabies testing. Of those 224 samples, 9 samples tested positive to the southeast raccoon rabies variant and one sample tested positive for the big brown bat (*Eptesicus fuscus*) rabies variant (USDA 2005). For

more detailed analysis of the ORV program, please see the 2004 supplemental EA[6,7] entitled *"Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Fox, and Coyotes in the US"* (USDA 2005).

The Georgia Department of Human Resources, Public Health Division and the Georgia Department of Agriculture (GDA) have provided the state leadership for the baiting effort. WS provided wildlife management leadership and contributed considerable funding to prevent the spread of rabies. Georgia's baiting effort is part of the larger Georgia-Alabama-Tennessee barrier zone.

Increased 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 humans 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 and dogs 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 develop 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 indoors at all times but are allowed to range outside the home 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 humans 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, including rabies, have been found in feral cats and dogs that are infectious to humans. A common zoonosis 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, and numerous parasitic diseases, including roundworms, tapeworms and toxoplasmosis.

Most of the zoonoses known to infect cats and dogs that are infectious to humans are not life threatening if diagnosed and treated early. However, certain societal segments are at higher risks if

[6] The supplemental EA addressing WS' participation in an ORV distribution and surveillance program contains the analyses for distribution of ORV baits and for surveillance activities conducted in Georgia. The analyses contained in this EA do not reflect WS' actions for capturing and releasing target animals during surveillance activities associated with the ORV program since those actions are addressed in the referenced ORV EA.

[7] Copies of the ORV EA can be found at the APHIS website http://www.aphis.usda.gov/wildlife_damage/nepa.shtml or by mailing a request to USDA/APHIS/WS, Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

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 toxoplamosis (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 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 (*Ctenocephalides felis*) 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 dog 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 U.S. 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 document 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 carries of diseases infectious to humans which increases 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.

As stated previously, a common concern among those requesting assistance is the threat to human health and safety from disease transmission which has only been heightened from recent, widely publicized zoonoses events like the spread of rabies, West Nile Virus, and Avian Influenza. However, 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 humans toward many species of wildlife, especially around urban areas, has led to a decline in the fear wildlife have toward humans. When wildlife species begin to habituate to the presence of humans and human activity, a loss of apprehension occurs that can lead to threatening behavior toward humans. 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 humans, or abnormal behavior. Though wildlife attacking humans occurs rarely, the number of attacks is on the increase. Timm et al. (2004) reported that coyotes attacking people have increased in California and the recent, highly publicized coyote attacks on children in New Jersey (J. Bucknall, USDA/APHIS/WS, pers. comm. 2007) have only heightened people's awareness of the threat of such encounters. Though none of those species addressed in this EA have attacked people in Georgia, requests for assistance to lessen the threat of possible attack do occur from people in Georgia. Often, wildlife exhibiting threatening behavior or a loss of apprehensiveness to the presence of humans 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.

The primary request for assistance to reduce threats to human safety received by WS is to lessen the threat of diseases transmission from exposure to wildlife. Since 2002, the two wildlife species of most concern to the public based on requests for assistance are skunks and raccoons. Public concerns are due to the high prevalence of rabies in the populations of those two species. To a lesser extent is a concern for threats caused by feral cats.

As part of the proposed program, WS could provide mammal damage management (MDM[8]) assistance, upon request, involving those mammal species addressed in this EA that pose a threat to human health and safety to any requester experiencing such a threat throughout Georgia.

1.3.2 Need for Mammal Damage Management at Airports

The risk that mammals pose to aircraft is well documented (FAA 1997). Data kept by the Federal Aviation Administration (FAA) shows 1,429 strikes were reported between civil aircraft and terrestrial mammals between 1990 and 2005 (FAA 2006). 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). Civil and military aircraft have collided with a reported 33 species of mammals since 1990, including raccoons, gray fox, red fox, cats, coyotes, opossums, and striped skunks. Of the terrestrial mammals reported struck by aircraft, 29% were coyotes with an estimated $2.6 million in damages (FAA 2006). Costs of those collisions vary, but FAA data reveals that mammal strikes in the U.S. cost the civil aviation industry approximately 235,100 hours of down time and $34.8 million in direct monetary losses between 1990 and 2005 (FAA 2006). Data also indicates that a much higher percentage of mammal strikes resulted in aircraft damage compared to bird strikes.

About 68% of mammal strikes resulted in damage compared to 19% for birds (FAA 2000). In addition to damages caused by mammal strikes to aircraft, those incidents can pose serious threats to

[8] For the purposes of this document, the phrase mammal damage management and the acronym MDM will refer to the management of damage and threats to human safety caused by those mammal species specifically addressed in this EA.

human safety. Nearly 66% of the reported mammal strikes since 1990 occurred at night, with 89% occurring during the landing roll or during the takeoff run causing damage to the landing gear of the aircraft (FAA 2006). 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.

Since 1990, aircraft have struck two fox, one coyote, and one opossum in Georgia according to reports filed with the FAA (FAA 2007). The number of mammals struck is likely slightly higher given that nearly 80% of all wildlife strikes go unreported to the FAA. Airports in Georgia have requested assistance to manage the threat to human safety and damage to property caused by mammals present inside the area of operations of the airport. In Fiscal Year (FY)[9] 2001, WS responded to one request for assistance and in FY 2004 responded to three incidents to manage threats to aviation from the presence of coyotes on an airfield. The infrequency of mammal strikes does not lessen the need to prevent threats to human safety and the prevention of damage to property. Preventing damage and reducing threats to human safety is the goal of those cooperators requesting assistance at airports in Georgia 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 will 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.

1.3.3 Need for Mammal Damage Management to Protect Agricultural Resources

During 2001, crop and livestock losses from wildlife in the U.S. totaled $944 million, with field crop losses totaling $619 million, livestock and poultry losses totaling $178 million, and losses of vegetables, fruits and nuts totaling $146 million. Those losses include destruction of or damage to crops in the field and death or injury to livestock. In 2001, it was reported that raccoons were responsible for 6%, 3%, and 6% of the total damage to field crops; livestock and poultry; and vegetables, fruits, and nuts, respectively, in the U.S. (NASS 2002).

In 2005, NASS (2006) reported cattle and calf losses from wildlife predation totaled 190,000 head in the U.S. according to livestock producers. Wildlife predation represented 4.7% of the total cattle and calf losses reported by livestock producers in 2005 totaling $92.7 million in economic losses. Coyotes were indicated as the primary predator of livestock with 51.1% of cattle and calf losses attributed to coyotes. Producers spent nearly $199.1 million dollars on non-lethal methods to reduce cattle and calf losses from predation by wildlife in 2005 (NASS 2006). The primary non-lethal method employed by livestock producers was the use of guard animals with a reported 38% of producers using guard animals. Producers also reported using exclusion fencing, frequent checking, and culling as additional employed methods for reducing predation (NASS 2006).

In Georgia, NASS (2006) reported a total of 1,700 cattle and 5,900 calves were killed in 2005 by wildlife predators. The economic loss from wildlife predators in Georgia was estimated at nearly $3.6 million in 2005 (NASS 2006). Coyotes were attributed to 70.6% of the reported cattle losses and 57.6% of the calf losses in Georgia. Georgia cattle producers reported using a number of non-

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

lethal methods to reduce losses due to predators. The use of exclusion fencing is being employed by 57.7% of Georgia livestock producers along with 42.3% reporting the use of guard animals (NASS 2006).

NASS (2006) reported no losses to cattle from bobcat predation in Georgia. However, U.S. cattle producers indicated mountain lions and bobcats[10] caused 7.7% of the cattle and calf losses attributed to wildlife predators in 2005 (NASS 2006). Bobcats are also known to predate on other livestock.

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 *Toxoplasma 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.

Examples of requests for assistance to resolve or alleviate damage to agricultural resources that the WS' program in Georgia has responded to since 2002 include:

- Coyotes attacking and killing calves, lambs, chickens, and emus
- Raccoons digging up grass and sod while foraging for insects
- Gray squirrels feeding on strawberries, peaches, and pecans
- Gray fox killing chickens and domestic waterfowl
- Striped skunks killing chickens

1.3.4 Need for Mammal Damage Management to Protect Natural Resources Including Threatened and Endangered Species

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 in Georgia are historic structures and places; 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 also 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

[10] The 2006 NASS cattle loss report groups mountain lion and bobcat predation into one category and does not separate losses attributed to the two species. Mountain lions, given their preference for larger prey, are likely the cause of most of the losses attributed to this category, especially to adult cattle. However, bobcats are known to prey upon calves though infrequently.

natural resource. An example of this would be a local ground-nesting game bird population which is being decimated by the presence of mammalian carnivores, such as raccoons, armadillos, opossum, feral cats, or fox.

In 2001, on Cumberland Island National Seashore (CINS) in Georgia, loggerhead sea turtles experienced a 60% nest loss, most of which was attributed to raccoons. Armadillos are also present on most of the Georgia barrier islands. In 2006, the first documented cases (four total) of destruction of sea turtle nests in Georgia by armadillos occurred on CINS. Coyotes are now present on both Cumberland and Ossabaw Islands and pose a significant threat to sea turtle nests due to their ability to dig under screening material that has been used to deter raccoon damage to nests (D. Hoffman, National Park Service, pers. comm. 2007). T&E species, such as the green sea turtle and loggerhead sea turtle, have the potential to be adversely impacted by mammals, mainly raccoons and armadillos, in Georgia.

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 plover, Florida scrub-jay, and California least tern (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 reach 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 1 year. The authors estimated that 30% to 50% of a cat's catch were birds and that the cats had significantly affected house sparrow populations within the village. Based on information acquired in this study, it was 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.

The diet of feral and free-ranging cats varies depending on availability, abundance, and geographic location. In a survey of New Zealand scientific literature, Fitzgerald (1990) concluded that prey selection of feral and free-ranging cats is dependent on availability. The author found that cats on the mainland fed most heavily on mammals; where as, cats on islands fed almost exclusively on birds (particularly seabirds). Feral and free-ranging cats are known to prey on birds as large as mallard ducks (Figley and VanDruff 1982) and young brown pelicans (Anderson et al. 1989) along with mammals as large as hares and rabbits. Many cat populations rely heavily on humans, either for handouts and/or garbage. Pearson (1971) found that cats were serious predators of California voles and that the greatest pressure on voles occurred when vole numbers were lowest. Liberg (1984) found that cats in southern Sweden fed predominantly on native mammals. Prey use was based more on availability than abundance. Langham (1990) found that mammals made up 74% of diets of New Zealand farmland feral cats, while 24% were birds. Cats fed most heavily on the most abundant species and groups. A study on a southern Illinois farmstead concluded that well fed cats preferred microtine rodents; however, they also consumed birds (George 1974). Microtine rodents are particularly susceptible to over harvest by cats and other predators (Pearson 1964). Coman and Brunner (1972) found that small mammals were the primary food item for feral cats in Victoria, Australia. Prey selection was directly related to proximity of cats to human habitation. Pearson (1964) found rodents composed a large portion of a cat’s diet. Some people view cat predation of rodents as beneficial, but native small mammals are important to maintaining biologically diverse

ecosystems. Field mice and shrews are also important prey for birds such as great horned owls and red-tailed hawks (ABC 2005).

Reptiles are thought to provide an important food source to cats when birds and mammals are less abundant, and in some situations cats have been observed to prey on threatened species of reptiles. Domesticated cats have been identified as significant nest and/or hatchling predators of sea turtles. A study on the Aldabra Atoll, Seychelles, found feral cats had a significant impact on green turtle hatchlings. Seabrook (1989) found a positive correlation in cat activity and green turtle nesting at Aldabra Atoll ($r=646$, $d.f.=21$, $P<0.001$). Cats are known to have contributed to the near extirpation of the West Indian rock iguana (*Cyclura carinata*) on Pine Cay in the Caicos Islands (Iverson 1978).

Cats can have significant impacts on local wildlife populations, especially in habitat "islands" such as suburban and urban parks, wildlife refuges, and other areas surrounded by human development. The loss of bird species from habitat islands is well documented and nest predation is an important cause of the decline of neotropical migrants (ABC 2005). A two year study was conducted in two parks with grassland habitat. One park had no cats but more than 25 cats were being fed daily in the other park. There were almost twice as many birds seen in the park with no cats as in the park with cats. California thrasher and California quail, both ground-nesting birds, were seen during surveys in the no-cat area, whereas they were never seen in the cat area. In addition, more than 85% of the native seer mice and harvest mice trapped were in the no-cat area, whereas 79% of the house mice, an exotic pest species, were trapped in the cat area. The researchers concluded, "Cats at artificially high densities, sustained by supplemental feeding, reduce abundance of native rodent and bird populations, change the rodent species composition, and may facilitate the expansion of the house mouse into new areas" (Hawkins et al. 1999).

Childs (1991) and Childs (1986) found that urban cats use of rats is size limiting. Few rats of reproductive size or age were preyed on by domesticated cats. In rural areas, rats were more vulnerable to cat predation for longer periods of time. The duration of susceptibility of rats to predation is attributed to abundance of garbage and artificial food sources in the urban environment. Artificial feeding of cats also reduces predation to non-native rodents because of size differences in urban rats. In rural setting, cats can control rat populations for longer durations but ultimate suppression of population growth is achieved via chemicals (poisons). Jackson (1951) found feral and free-ranging cats in Baltimore, Maryland urban areas were insignificant predators of Norway rats (*Rattus norvegicus*). The largest percentage of ingested food was comprised of garbage. It was estimated that a cat in the study area would consume roughly 28 rats per year.

Impacts from cat predation are not always direct, but indirect in the form of competition for food resources. George (1974) speculated that domestic cats were not a direct limiting factor on bird populations. However, the author did find evidence indicating cats indirectly could affect some birds-of-prey by competing for a limited resource (primarily microtine rodents).

WS has received requests in the past for assistance in resolving mammal damage and conflicts caused to natural resources in Georgia. As part of the proposed program, WS could provide MDM assistance, upon request, involving target mammal species to any requester experiencing such damage throughout Georgia.

1.3.5 Need for Mammal Damage Management to Protect Property

Mammals cause damage to a variety of property types in Georgia each year. Raccoons, skunks, and armadillos can cause damage to property by digging under porches, buildings, homes, and many other places. Armadillos often cause damage to lawns and turf while digging for grubs and insects.

As examples, in 2002, WS responded to coyote, fox, and raccoon attacks or safety threats to companion animals in Georgia. Also in 2002, WS responded to 22 incidences of raccoons causing damage to residential buildings along with 16 incidents of gray squirrels causing damage to buildings. As part of the proposed program, WS could provide MDM assistance, upon request, involving target mammal species to any requester experiencing such damage throughout Georgia.

1.4 SUMMARY OF CURRENT AND PROPOSED ACTION

WS proposes to continue to administer an adaptive IWDM program to manage damage and reduce threats associated with mammal species in Georgia. Table 1.2 shows the number of people that requested information from Georgia WS regarding wildlife damage, the species that were involved in the damage, and the resource category being damaged.

Table 1.2 - Technical Assistance Projects Conducted by WS in Georgia from FY 2002-2006

	Resource Category Damaged				
SPECIES	**Agriculture**	**Health & Safety**	**Property**	**Natural Resources**	**TOTAL**
Armadillo	0	0	19	2	21
Bobcat	0	1	0	2	3
Coyote	16	12	6	2	36
Gray Fox	1	3	1	1	6
Red Fox	0	8	4	2	14
Raccoon	36	50	91	2	179
Opossum	3	1	12	2	18
Striped Skunk	4	20	14	0	38
Feral Cat	0	16	20	7	43
Feral Dog	5	0	0	0	5
Gray Squirrel	2	2	57	0	61
Woodchuck	1	0	4	0	5
River Otter	9	0	0	3	12

The adaptive integrated damage management approach would be implemented to reduce damage when the resource owner (property owner) or manager requests assistance. The adaptive damage management strategy would encompass the use of practical and effective methods to prevent or reduce damage while minimizing harmful effects of damage management measures on humans and the environment. Under the proposed action, WS could provide technical assistance and operational damage management, including the use of non-lethal and lethal management methods after applying WS' Decision Model (Slate et al. 1992). When appropriate, preference would be given to non-lethal methods, however, non-lethal methods would not always be applied as a first response to each damage problem. In other situations, the most appropriate response could be a combination of non-lethal and lethal methods. All damage management in Georgia would be conducted in compliance with applicable federal, state, and local laws, regulations, policies, orders and procedures and closely coordinated with officials and agencies in Georgia.

WS' objective would be to attempt to respond to all requests for assistance with, at a minimum, technical assistance or self-help advice, or, where appropriate and when cooperative or congressional funding is available, direct damage management assistance in which professional WS' personnel conduct damage management actions. An IWDM approach would be implemented which would allow use of any legal technique or method, used singly or in combination, to meet requester needs for resolving conflicts with mammals. Lethal methods include shooting, trapping, snaring, and Food and Drug Administration (FDA)

or EPA approved chemicals. Non-lethal methods include fencing, netting, deterrents/repellents, exclusion, harassment, habitat alteration, or live-capture and translocation. In many situations, the implementation of non-lethal methods such as exclusion-type barriers would be the responsibility of the requester which means that, in those situations, WS' only function would be to implement lethal methods if determined to be necessary. Definitive objectives of the WS' MDM program in Georgia are discussed in Chapter 3 of this document. Appendix B provides a more detailed description of the methods that could be used or recommended by WS under the proposed action.

1.5 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

1.5.1 WS' Programmatic FEIS

WS has developed a programmatic FEIS that analyzes and addresses potential environmental impacts from programmatic activities and various WDM methods employed by WS (USDA 1997). Pertinent information available in the FEIS has been incorporated by reference into this EA.

1.5.2 Supplemental 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 Georgia) and gray fox and coyote rabies in Texas. The EA has been supplemented to analyze changes in the scope and analysis area of the ORV program. The most recent Decision/FONSI was signed on September 9, 2004. WS determined the action would not have any significant impact on the quality of the human environment. The EA, supplements, and associated Decision documents can be viewed by visiting the APHIS website at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml. Pertinent information from this document has been incorporated by reference into this EA.

1.6 DECISIONS TO BE MADE

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

- Should MDM, as currently implemented by the WS' program, be continued in Georgia?
- If not, how should mammal damage in Georgia be managed and what role should WS play in this management?
- Will continuing WS' current program of MDM have significant impacts requiring preparation of an Environmental Impact Statement (EIS)?

1.7 SCOPE OF ANALYSIS

1.7.1 Actions Analyzed

This EA evaluates MDM activities conducted by WS to protect agriculture; human health and safety; natural resources, including T&E species and other wildlife; and property on private or public lands within Georgia wherever such management is requested of the WS program.

1.7.2 Period for Which This EA is Valid

If the analyses in this EA indicates an EIS is not warranted, this EA will remain valid until WS determines that new needs for action, changed conditions, or new alternatives having different environmental impacts must be analyzed. At that time, this analysis and document will be reviewed

and supplemented pursuant to NEPA. Review of the EA will be conducted each year to ensure that the EA is sufficient. This process ensures the EA is complete and still appropriate to the scope of MDM activities conducted by WS in Georgia.

1.7.3 Site Specificity

This EA analyzes the potential impacts of MDM and addresses activities on all lands in Georgia under MOUs, cooperative service agreements and in cooperation with the appropriate public land management agencies. The EA also addresses the impacts of MDM on areas where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional MDM efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

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

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

1.7.4 Native American Lands and Tribes

Currently, WS in Georgia has no MOUs with any Native American tribe. If WS enters into an agreement with a tribe for MDM, this EA would be reviewed and supplemented if appropriate to insure compliance with NEPA. MOUs, agreements, and NEPA compliance would be conducted as appropriate before conducting MDM on tribal lands.

1.7.5 Summary of Public Involvement

Issues related to the MDM program were initially developed by WS. 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 Georgia, and by posting the pre-decisional EA on the APHIS website at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml.

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

2.0 CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

Chapter 2 contains a discussion of the issues, including the issues that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences). Those issues were also used to develop minimization measures and standard operating procedures (SOP) in Chapter 3. Issues that were identified but were not considered in detail are also discussed in Chapter 2 with rationale. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop minimization measures. Additional affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4.

Issues are concerns of the public and/or professional community about potential environmental effects that might occur from a proposed action. Such issues must be considered in the NEPA decision process. Issues relating to the management of wildlife damage were raised during the scoping process for WS' programmatic FEIS (USDA 1997) and were considered in the preparation of this EA. Those issues are fully evaluated within the FEIS which analyzed specific data relevant to WS' programmatic activities.

2.1 AFFECTED ENVIRONMENT

Upon request for assistance, MDM could be conducted on private, federal, state, county, and municipal lands in Georgia to protect agricultural and natural resources, property, and public health and safety. Areas of the proposed action could include, but are not limited to, state, county, municipal and federal 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 of the proposed action 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.

2.1.1 The Environmental Status Quo

As defined by 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 will 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 state-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 MDM in Georgia, the Georgia Department of Natural Resources (GDNR) has the authority to manage and authorize the taking of mammals for damage management purposes (see Appendix D).

Therefore, based on the discussion above, it is clear that in those situations where a non-federal entity has obtained the appropriate permit or authority, and has already made the decision to remove or otherwise manage mammals to stop damage with or without WS' assistance, WS' participation in carrying out the action will not affect the environmental status quo. In some situations, however, certain aspects of the human environment may actually benefit more from WS' involvement than from a decision not to assist. For example, if a cooperator believes WS has greater expertise to selectively remove a target species than a non-WS entity; WS' management activities may have less of an impact on target and non-target species than if the non-federal entity conducted the action alone. Thus, in those situations, WS' involvement may actually have a *beneficial* effect on the human environment when compared to the environmental status quo in the absence of such involvement.

2.2 SUMMARY OF ISSUES

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

- Effects on Target and Non-target Wildlife
- Effects on Threatened and Endangered Species
- Effects on Human Health and Safety
- Effects on Socio-cultural Elements and Economics of The Human Environment
- Humaneness of Methods Used

2.3 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

2.3.1 Effects on Target and Non-target Wildlife

2.3.1.1 Effects on Target Wildlife

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on the population of a 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. Under the proposed action, WS would incorporate non-lethal and lethal methods described in Appendix B in an integrated approach in which all or a combination of methods may be employed to resolve a request for assistance. WS would recommend both non-lethal and lethal methods to interested individuals, as governed by federal, state, and local laws and regulations. Non-lethal methods can disperse or otherwise make an area unattractive to target species thereby, reducing the presence of those species 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. However, non-lethal methods would not necessarily be employed to resolve every request for assistance if deem appropriate by WS' personnel using WS' Decision Model. WS' Decision Model is discussed in section 3.2.3 of this EA.

Lethal methods available for use under this alternative are described in Appendix B and in WS' programmatic FEIS (USDA 1997). Lethal methods would be employed to an individual or those individuals responsible for causing damage or 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 this alternative 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 target species selected for analysis in this EA are the primary species which WS' has received requests for assistance previously and may be affected by WS' MDM activities to reduce associated damage in Georgia. Mammal species addressed in this EA include: armadillos, bobcats, coyotes, gray fox, red fox, opossums, raccoons, striped skunks, gray squirrels, river otters, woodchucks, feral dogs, and feral cats.

2.3.1.2 Effects on Non-target Wildlife

Similar to the issue with potential impacts to target wildlife populations, a commonly raised issue is the potential impacts from damage management activities on non-target populations. The issue on non-target species effects arises from the use of non-lethal and lethal methods available for use under the alternatives. The use of non-lethal and lethal methods has the potential to inadvertently disperse, capture, or kill non-target wildlife. WS' minimization measures and SOPs are designed to reduce the effects on non-target species' populations and are discussed in Chapter 3. To reduce the risks of adverse affects to non-target wildlife, WS would select damage management methods that are as target-selective as possible or apply such methods in ways to reduce the likelihood of capturing non-target species. Before initiating management activities, WS would select locations which are extensively used by the target species and use baits or lures which are preferred by those species.

2.3.2 Effects on Threatened and Endangered Species

The Endangered Species Act (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 under the ESA with the U.S. Fish and Wildlife Service (USFWS) to unsure compliance 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 minimization measures. WS has consulted with the USFWS under Section 7 of the ESA concerning potential impacts of methods available for use by WS on T&E species. The USFWS issued a BO on WS' programmatic activities in 1992 (USDA 1997).

T&E species listed by the USFWS and the State of Georgia were reviewed to identify potential effects on T&E species. 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. As stated is Section 1.3.4, WS' activities often help to enhance or maintain populations of T&E species that are adversely affected by mammalian predators. For a complete list federal and state listed T&E species, please see Appendix C.

2.3.3 Effects on Human Health and Safety

2.3.3.1 Safety of Chemical Methods Used in MDM

Another common issue is the use of methods involving chemicals to resolve damage or threats to human safety. The issue of using chemicals in WDM programs 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 be limited to the use of immobilizing and euthanizing drugs. 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 and are further described in WS' programmatic FEIS (1997).

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 as described in Appendix B.

The issue of the potential for drugs used in animal capture, handling, and euthanasia to cause adverse health effects in humans that hunt and consume the species involved has been raised. Among the species to be captured and handled under the proposed action, this issue is expected to only be of concern for wildlife which are hunted and sometimes consumed by people as food. Euthanized animals would be disposed of as described in Appendix B and therefore, would not be available for harvest and consumption. If mammals were immobilized for sampling or relocated and released, risks could occur to human safety if harvest and consumption occurred. Mitigation measures employed by WS to minimize risks are discussed in Chapter 4 and in Appendix B.

Chemicals posed for use under the relevant alternatives are regulated by the EPA through FIFRA, by Georgia State Pesticide Control Laws, by DEA, by FDA, and by WS' Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS' program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997).

2.3.3.2 Effects on Human Health and Safety from Non-Chemical MDM Methods

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, and pyrotechnic scaring devices. A formal risk assessment of WS' operational management methods found that risks to human safety were low (USDA 1997).

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 biannually (WS Directive 2.615). WS' employees who carry and use firearms as a condition of employment, are required to sign a form certifying that they meet the criteria of the *Lautenberg Amendment*, which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence. Additionally, USDA conducts a thorough background check on all new employees entering the agency. A thorough safety assessment will be conducted before firearms are deemed appropriate to alleviate or reduce damage and threats to human safety when conducting activities in Georgia. WS' employees will work closely with cooperators requesting assistance to ensure all safety issues are considered

before the use of firearms are deemed appropriate for use. As stated previously, all methods, including firearms, must be agreed upon with the cooperator to ensure the safe use of methods.

The use of restraining devices such as foot-hold traps or live-capture traps have also been identified as a potential issue. Restraining devices are typically set in situations where human activity is minimal to ensure public safety. Restraining devices rarely cause serious injury and are triggered through direct activation of the device. Therefore, human safety concerns associated with restraining devices 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 WDM 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.

As stated previously, the cooperator requesting assistance is also made aware through the *Cooperative Service Field Agreement* or a similar document that those devices agreed upon could potentially be used on property owned or managed by the cooperator. The risk assessment in WS' programmatic FEIS (USDA 1997) concluded that threats to human safety from the use of devices to restrain wildlife were low.

2.3.3.3 Effects on Human Health and Safety from not Conducting MDM

The concern stated here is that the absence of adequate MDM would result in adverse effects on human health and safety associated with the transmission of mammal-borne diseases and mammal strikes to aircraft would not be reduced to acceptable levels. The potential impacts of not conducting such work could lead to increased incidence of injuries, illness, or loss of human lives. A discussion of those potential human health and safety risks are discussed in section 1.3.2.

WS frequently assists airports in Georgia to resolve wildlife hazards to aviation. Airport managers and air safety officials are concerned that the absence of a WS' MDM could lead to failure to adequately address the complex wildlife hazard problems faced by those facilities. Hence, potential effects of not conducting such work could lead to an increased incidence of injuries or loss of human lives from mammal strikes to aircraft.

2.3.4 Effects on the Socio-cultural Elements and Economics of the Human Environment

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

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

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

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

Public attitudes toward wildlife vary considerable. Some people believe that all wildlife should be captured and relocated to another area to alleviate damage or threats to protected resources. Some people directly affected by the problems caused by wildlife strongly support removal. Individuals not directly affected by the harm or damage may be supportive, neutral, or totally opposed to any removal of wildlife from specific locations or sites. Some people totally opposed to WDM want WS to teach tolerance for damage and threats caused by wildlife, and that wildlife should never be killed. Some people who oppose removal of wildlife do so because of human-affectionate bonds with individual wildlife. Those human-affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment.

Some individuals are offended by the presence of overabundant mammal species, such as raccoons, armadillos, gray squirrels, coyotes, or feral species, such as cats or dogs. To such people those species represent pests which are nuisances and which upset the natural order in ecosystems, and that are carriers of diseases transmissible to humans or other wildlife. Their overall enjoyment of other animals is diminished by what they view as a destructive presence of such species. They are offended because they feel that those mammal species proliferate in such numbers and appear to remain unbalanced.

2.3.5 Humaneness of Methods Used by WS

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 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 (CDFG) 1991).

Defining pain as a component in humaneness appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would *"…probably be causes for pain in*

other animals…" (AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to considerable pain (CDFG 1991).

Pain and suffering, as it relates to methods available for use to manage mammals has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since *"…neither medical nor veterinary curricula explicitly address suffering or its relief"* (CDFG 1991). Research suggests that some methods, such as restraint in foot-hold traps or changes in the blood chemistry of trapped animals, indicate "*stress*" (USDA 1997). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness.

The AVMA states "*...euthanasia is the act of inducing humane death in an animal*" and "*... the technique should minimize any stress and anxiety experienced by the animal prior to unconsciousness*" (Beaver et al. 2001). Some people would prefer AVMA accepted methods of euthanasia to be used when killing all animals, including wild and invasive animals. The AVMA states that "*For wild and feral animals, many of the recommended means of euthanasia for captive animals are not feasible. In field circumstances, wildlife biologists generally do not use the term euthanasia, but terms such as killing, collecting, or harvesting, recognizing that a distress- free death may not be possible*" (Beaver et al. 2001).

The decision-making process involves tradeoffs between the above aspects of pain and humaneness. Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and funding.

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 methods are used in situations where non-lethal damage management methods are not practical or effective.

WS' personnel in Georgia are experienced and professional in their use of management methods. Consequently, management methods are implemented in the most humane manner possible under the constraints of current technology. Minimization measures and SOPs used to maximize humaneness are listed in Chapter 3.

2.4 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.4.1 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 NEPA analyses (Kleppe v Sierra Club, 427 U.S. 390, 414 (1976), CEQ 1508.25). Ordinarily, according to APHIS procedures implementing the NEPA, individual WDM actions may be categorically excluded (7 CFR 372.5(c), 60 Fed. Reg. 6000-6003, 1995). The intent in developing this EA is to determine if the proposed action would potentially have significant individual and 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 caused by certain mammals in Georgia to analyze individual and cumulative impacts to provide thorough analyses.

In terms of considering cumulative effects, one EA analyzing impacts for the entire State of Georgia will provide a more comprehensive and less redundant analysis than multiple EAs covering smaller areas. If a determination is made through this EA that the proposed action would have a significant impact on the quality of the human environment, then an EIS would be prepared.

2.4.2 Effects on Public Use of Mammals

Many people enjoy consumptive and non-consumptive use of wildlife resources in Georgia. During 2006, over 1.9 million people participated in wildlife-associated recreation in Georgia, including hunting, trapping, and wildlife viewing (USFWS 2007). In pursuit of wildlife-associated recreation, participants contributed more than $1 billion to the economy of Georgia for expenses related to travel, equipment, food, licenses, wildlife club memberships and other associated costs. Because mammals are such a substantial economic and recreational resource, there may be concerns that WS' MDM actions related to managing damage by mammals might negatively affect those factors.

WS' removal activities would primarily target an individual animal or a small group of animals in a localized area. Overall populations of target mammals will be unaffected by the number of animals lethally removed by WS. Densities of target mammals may be reduced temporarily in a localized area after removal projects but would not limit the ability of individuals to hunt, trap, or view target mammals in an area around the site where removal occurred.

WS' does not condone or conduct projects in Georgia to eradicate native wildlife populations. The number of target and non-target animals taken during MDM operations has not and will not adversely impact statewide populations of these animals and therefore, will remain common and abundant for consumptive and non-consumptive use throughout Georgia. See Section 4.1 for specific information on target and non-target species population impacts.

2.4.3 WS' Effect on Biodiversity

The WS' program does not attempt to eradicate any species of native wildlife in Georgia. WS operates in accordance with international, federal and state laws, and regulations enacted to ensure species viability. Effects on target and non-target species populations are shown in Section 4.1. The effects of the current WS' MDM program on biodiversity are not significant nationwide or statewide (USDA 1997).

2.4.4 A Loss Threshold Should Be Established Before Allowing Lethal Methods

One issued identified through WS' scoping processes is a concern that a threshold of loss should be establish 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. Establishing a threshold would be difficult or inappropriate to apply to human health and safety situations.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie National Forest, et al., the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part, the court found that a forest supervisor needs only show that damage from wildlife is threatened, to establish a need for WDM (Civil No. 92-C-0052A January 20, 1993). Thus, there is judicial precedence indicating that it is not necessary to establish a criterion such as a percentage of loss of a particular resource to justify the need for WDM actions.

2.4.5 Wildlife Damage Management should not occur at Taxpayer Expense

An issue identified through the scoping process is that WDM should not be provided at the expense of the taxpayer or that it should be fee-based. Federal, state, and local officials have decided that WDM should be conducted by appropriating funds. WS was established by Congress as the agency responsible for providing WDM to the people of the U.S. Funding for WS comes from a variety of sources in addition to federal appropriations. Such non-federal sources include state general appropriations, local government funds (county or city), and private funds which are all applied toward program operations. Additionally, WDM is appropriate for government programs, since wildlife management is a government responsibility. A commonly voiced argument for publicly funded WDM is that the public should bear responsibility for damage to private property caused by public wildlife.

A federal appropriation is allotted for the maintenance of a WS' program in Georgia. This allocation does not cover the costs of the entire program. The remainder of the WS' program is entirely fee-based. Technical assistance is provided to requesters as part of the federally-funded activities, but all direct assistance in which WS' employees perform damage management activities is funded through cooperative agreements between the requester and WS. Thus, MDM by WS in Georgia is fee-based to a high degree.

2.4.6 Cost Effectiveness of MDM

The CEQ does not require a formal, monetized cost benefit analysis to comply with NEPA. Consideration of this issue is not essential to making a reasoned choice among the alternative being considered. However, the methods determined to be most effective in alleviating damage and reducing threats to human safety caused by certain mammal species and prove to be the most cost effective will receive the greatest application. Additionally, management operations may be constrained by cooperator funding and/or objectives and needs.

2.4.7 Effectiveness of Mammal Damage Management Methods

The effectiveness of any damage management program could be defined in terms of losses or risks potentially reduced or prevented, how accurately practitioners' diagnosis the problem and the species responsible for the damage, and then how actions are implemented to correct or mitigate risks or damages. To determine that effectiveness, WS must be able to complete management actions expeditiously to minimize harm to non-target animals and the environment, while at the same time, using methods as humanely as possible within the limitations of current technology, funding and workforce. The most effective approach to resolving any damage problem is to use an adaptive integrated approach which may call for the use of several management methods simultaneously or sequentially (USDA 1997, Courchamp et al. 2003).

The purpose behind integrated damage management is to implement methods in the most effective manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment[11]. Efficacy is based on the types of methods employed, the application of the method, restrictions on the use of the method(s), the skill of the personnel using the method and, for WS' personnel, the guidance provided by WS' directives and policies.

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

The goal of WS' program is to reduce damage, risks, and conflicts with wildlife as requested and not to necessarily reduce/eliminate populations. WS recognizes that localized population reduction could be short-term and that new individuals may immigrate, be released at the site, or be born to animals remaining at the site (Courchamp et al. 2003). The ability of an animal population to sustain a certain level of removal and to eventually return to pre-management levels, however, does not mean individual management actions are unsuccessful, but that periodic management may be necessary. Even though a reduction in local populations may not last, timed properly, the management result can last long enough for the protected resources to reach a size or level of maturity where risk of damage is lessened.

3.0 CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

Chapter 3 contains a discussion of the project alternatives, including those that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), alternatives considered but not analyzed in detail, with rationale, and SOPs for WDM techniques. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Evaluation of the affected environments will be addressed in more detail in Chapter 4.

Alternatives were developed for consideration using WS' Decision Model (Slate et al. 1992) as described in Chapter 2 (pages 20-35), Appendix J (Methods of Control), Appendix N (Examples of WS' Decision Model), and Appendix P (Risk Assessment of Wildlife Damage Control Methods Used by WS' Program) of WS' FEIS (USDA 1997).

The No Action alternative is a procedural NEPA requirement (40 CFR 1502), and is a viable and reasonable alternative that could be selected. This alternative serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with the CEQ definition (CEQ 1981).

3.1 DESCRIPTION OF THE ALTERNATIVES

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

This alternative, the proposed action, would continue an IWDM program utilizing non-lethal and lethal techniques, as deemed appropriate by applying WS' Decision Model (Slate et al. 1992), to reduce damage and threats caused by certain mammal species in Georgia. A major goal of the program would be to minimize damage and threats to human safety caused by certain mammal species. To meet this goal, WS' personnel would continue to respond to requests for assistance[12] with, at a minimum, technical assistance, or when cooperative funding is available, operational damage management. The IWDM would encompass the use of the most practical and effective methods to resolve a problem and methods would be selected based on efficiency and efficacy to reduce damage or threats to human safety for each request (*see* Appendix B for a description of potential methods). City managers, agricultural producers, property owners and others requesting assistance would be provided information regarding the use of non-lethal and lethal techniques, as appropriate.

Lethal methods include shooting, trapping, snaring, and approved chemicals. Non-lethal methods include fencing, netting, deterrents/repellents, exclusion, harassment, habitat alteration, or live-capture and translocation. The most appropriate response would often be a combination of non-lethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy.

In many situations, the implementation of non-lethal methods such as exclusion-type barriers would be the responsibility of the requester which means that, in those situations, WS only function would be to implement lethal methods if determined to be necessary. MDM by WS would be conducted in Georgia, when requested on private property or public facilities where a need has been documented upon the completion of an *Agreement for Control*. All management actions would comply with

[12] Mammal damage management would only be conducted when requested where a need has been demonstrated and an *Agreement for Control* or other comparable document has been completed.

appropriate federal, state, and local laws. Appendix B provides a more detailed description of the methods that could be used under the proposed action.

3.1.2 Alternative 2 - Technical Assistance Only

Under this alternative WS would provide technical assistance to those requesting information on managing damage and threats caused by mammals in Georgia. However, WS would not be directly involved with managing mammal damage in Georgia. Technical assistance would occur through the dissemination of information and providing guidance on methodologies used to manage damage and threats from mammals in Georgia.

Those experiencing damage or are concerned with threats posed by mammals could seek assistance from other governmental agencies, private entities, or conducted damage managements on their own. This alternative would place the immediate burden of operational damage management work on the resource owner and other governmental agencies. Those entities could implement a damage management program using those methods legally available listed in Appendix B or could take no action.

3.1.3 Alternative 3 - No WS' MDM Program

This alternative precludes any and all activities by WS to protect human health and safety, protect agricultural resources, alleviate damage to property, and protect native wildlife species from impacts of mammals. WS would not provide operational or technical assistance. WS would not respond to requests for assistance and would direct all inquiries to appropriate federal, state, and/or local agencies or private business. This alternative would not deny other federal, state, and local agencies, including private entities from conducting management activities directed at alleviating damage and threats associated with mammals in Georgia. Many of the methods listed in Appendix B would be available for use by other agencies and private entities, unless otherwise noted in the Appendix, to manage damage and threats associated with mammals in Georgia.

3.2 MDM STRATEGIES AND METHODOLOGIES AVAILABLE TO WS IN GEORGIA

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1and 2 described above. Alternative 3 would terminate both WS' technical assistance and operational MDM. Appendix B provides a more thorough description of the methods that could be used or recommended by WS.

3.2.1 Integrated Wildlife Damage Management

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. IWDM is the implementation and application of safe and practical methods for the prevention and control of damage caused by wildlife based on local problem analyses, and the informed judgment of trained personnel. The WS' program applies IWDM to reduce damage through WS' Decision Model (Slate et. al. 1992) described in WS' FEIS (USDA 1997).

The philosophy behind IWDM is to implement functional damage management techniques in the most cost-effective[13] manner, while minimizing the potentially harmful effects on humans, target and

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

non-target species, and the environment. IWDM draws from the largest possible array of options to create a combination of techniques appropriate for the specific circumstances. IWDM may incorporate cultural practices (i.e. animal husbandry), habitat modification (i.e. barriers, exclusionary methods), animal behavior modification (i.e. scaring), removal of individual offending animals, local population management (i.e. local population reduction, redistribution of animal populations through live-capture and translocation), or any combination of those, depending on the characteristics of the specific damage problems and other criteria, such as management objectives of state wildlife agencies. In selecting management techniques for specific damage situations consideration is given to the:

- Species responsible,
- Magnitude and geographic extent of damage,
- Duration and frequency of the damage,
- Prevention of future damage (lethal and non-lethal techniques), and
- Environmental concerns such as T&E species in the area.

In certain situations, WS may provide cooperators with the information necessary to resolve the problem themselves (technical assistance). In others, WS may directly resolve the problem (direct assistance). However, the most common

3.2.2 The IWDM Strategies Employed by WS

3.2.2.1 Technical Assistance Recommendations

Technical assistance as used herein is information, demonstrations, and advice on available and appropriate WDM methods. The implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for non-WS entities to use. Technical assistance may be provided through a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems. Those strategies are based on the level of risk, need, and the strategy to resolve wildlife damage is to use a combination of those approaches. WS considers the biology and behavior of the damaging species and other factors using the WS' Decision Model (Slate et al 1992). The recommended strategy(ies) may include any combination of preventive and corrective actions that could be implemented by the requester, WS, or other agency personnel, as appropriate. Two strategies available are:

1. Preventive Damage Management is applying WDM strategies before damage occurs, based on historical problems and data. Methodologies, whether applied by WS or resource owners, are employed to prevent damage from occurring and therefore, fall under this heading. When requested, WS' personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. An example would be a cooperator installing and maintaining a woven wire fence with an underground skirt to reduce potential access of raccoons and fox to domestic waterfowl and poultry rearing facilities.

2. Corrective Damage Management is applying WDM to stop or reduce current losses. As requested and appropriate, WS' personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. An example would be in areas where armadillos are damaging lawns or landscaping, WS may provide information about trapping, or conduct operational damage management to stop the losses.

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

3.2.2.2 Operational Damage Management Assistance

Operational assistance is the conduct or supervision of damage management activities by WS' personnel. Operational damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone, and when *Agreements for Control* or other comparable agreements provide for direct damage management by WS. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of WS' personnel are often required to effectively resolve problems, especially if restricted use pesticides are necessary, or if the problems are complex.

3.2.2.3 Education and Outreach Programs

Education/outreach is an important element of WS' program activities, because WDM is about finding "balance" or co-existence between the needs of people and wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, lectures and demonstrations are provided to farmers, homeowners, and other interested groups. WS frequently cooperates with other agencies in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that WS' personnel, other wildlife professionals, and the public are updated on recent developments in damage management technology, laws and regulations, and agency policies. WS provides informational leaflets about MDM, biology, and ecology. This information is disseminated by means of school programs, exhibits, and calls from requesters.

3.2.2.4 Research and Development

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

3.2.2.5 Examples of WS' Operational Assistance with MDM in Georgia

The following examples serve as illustrations of WS' operational MDM projects. They are intended to present realistic examples of on-going MDM projects only and are not an inclusive or all encompassing list of all MDM projects conducted by WS in Georgia.

Management of Wildlife Hazards to Aircraft and Air Passengers in Georgia

WS provides information and/or services regarding MDM with several airports in Georgia. Upon request for assistance, WS evaluates wildlife hazards at the airport, prepares a Wildlife Hazard Assessment which identifies wildlife hazards, and assists the airport in developing a Wildlife Hazard Management Plan to address those hazards and threats.

WS' current program in Georgia utilizes an IWDM approach, including technical and operational damage management assistance. Direct operational activities consist of various harassment techniques, and live capture and lethal removal techniques aimed at removing potentially injurious wildlife. WS' personnel also provide ongoing technical advice to airport managers regarding methodologies to reduce the presence of wildlife in airport environments, including providing technical advice on various habitat management projects implemented by airport personnel. In addition, WS promotes improved mammal strike record keeping, maintains a program of mammal identification, and monitors mammal numbers at participating airports to assist in developing an effective damage management program.

WS may receive requests for assistance from any airport in Georgia in resolving wildlife hazards to aviation. As appropriate, WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA based upon the WS' Decision Model (Slate et al. 1992).

Management of Human Health and Safety Threats caused by Feral Cats and Red Fox

The Georgia WS' program provides operational assistance at state parks and military facilities where local populations of feral cats are extremely high. Operational methods used consist of trapping and euthanasia or shooting. Those parks have a high visitor use rate including small children and the military facilities have locations such as schools, family areas and hangars where feral cats come in direct contact with people on a daily basis. WS' operational activities are directed towards reducing the risk for injury/illness due to bite potential and general disease transmission through direct contact and contact with fecal remains. High populations of feral cats may also predate on native bird populations resulting in a detrimental impact to the local passerine songbird population residing within those locations. Additionally, Georgia WS was asked to remove red fox from a state park because of the nuisance and potential health threat they posed to park patrons and domestic animals due to a severe case of sarcoptic mange.

Management of Damage to Property caused by Gray Squirrels

The Georgia WS' program provides operational assistance at Georgia State Parks to reduce gray squirrel damage to buildings. Operational methods employed include use of cage traps and firearms (pellet rifles). Those parks are often overpopulated with gray squirrels and contain older buildings, such as cottages, for public usage. This combination sometimes results in the squirrels chewing holes and taking refuge in those buildings. Once a nest is established within those buildings, an array of damage may occur including chewing of electrical wires and destroying insulation.

WS also provides operational assistance to the municipalities to reduce gray squirrel damage to buildings, powerlines, electrical transformers, and fiber optic wiring. Operational methods primarily consist of cage trap and firearm usage. Due to city ordinances that restrict discharging firearms and tree removal, the overall squirrel population within the city is extremely high. Squirrels chewing on powerlines, electrical transformers, and fiber optics often cause power outages and high maintenance costs.

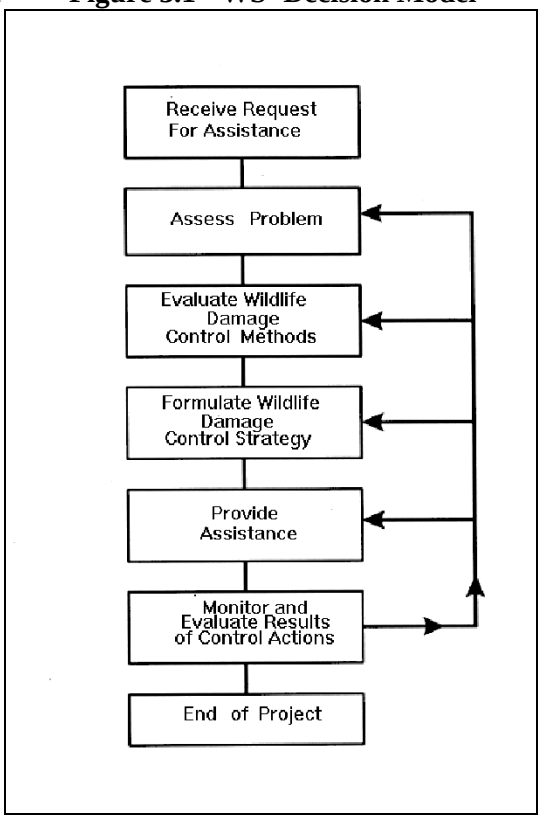
Additionally, WS provides operational assistance to utility service stations to reduce gray squirrel damage to buildings. Operational methods used consist of trapping (body-gripping traps and cage traps) and use of firearms. The chewing of the squirrels can cause damage to insulation and

powerlines. Associated repair cost of related damage is extremely high and beyond the economic threshold for maintenance.

3.2.3 WS' Decision Making

WS' personnel use a thought process for evaluating and responding to damage complaints that are depicted by the WS' Decision Model described by Slate et al., in 1992 (Figure 3.1). WS' personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, to costly, or inadequate for acceptably reducing damage. WS' personnel assess the problem; evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, methods deemed to be practical for the situation are incorporated into a management strategy. After this strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS' Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all professions.

Figure 3.1 - WS' Decision Model



3.2.4 Mammal Damage Management Methods Available for Use

3.2.4.1 Non-chemical Methods

Agricultural producer and property owner practices consist primarily of non-lethal preventive methods such as cultural methods[14] and habitat modification**.**

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

- Propane exploders
- Pyrotechnics
- Visual repellents and scaring tactics
- Electronic guards

Habitat modification is used whenever practical to attract or repel certain wildlife species.

[14] Generally involves modifications to the management of protected resources to reduce their vulnerability to wildlife damage.

Live capture can be conducted to reduce damage caused by certain mammals. Various capture devices such as box or cage traps, and nets can be used to live capture mammals.

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

Sport hunting/trapping can be part of a MDM strategy to enhance the effectiveness of harassment techniques or used to reduce local populations of mammals.

Shooting is selective for the target species and may involve the use of spotlights and rifles or shotguns. Calls and decoys may also be utilized with shooting. WS' personnel using firearms receive firearms safety training as specified by appropriate WS' directives.

Foot-hold Traps can be effectively used to capture a variety of mammals. Placement of traps is contingent upon habits of the respective target species, habitat conditions, and presence of non-target animals.

Snares are capture devices comprised of a cable formed in a loop with a locking device. Snares are usually placed in travel ways. Snares may be used as either a lethal or non-lethal method. Snares are generally easier to keep operational than foothold traps during inclement weather.

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

Body grip (Conibear type) traps are designed to cause the quick death of the animal that activates the trap. Body grip traps usually range in size from #110 to #330. Safety hazards and risks to humans are usually related to setting, placing, checking, or removing traps.

3.2.4.2 Chemical Methods

Repellents are available that are designed to repel certain mammals. Most of those are taste repellants used on trees, shrubs, garbage, fences and other objects. Some of the trade names for repellents include:

- Hinder®
- Ropel® Animal, Rodent, and Bird Repellent
- Ropel® Garbage Protector

As with most repellents, frequent reapplication is often necessary to obtain continued results.

Carbon dioxide (CO_2) gas is an AVMA approved euthanasia method which is sometimes used to euthanize mammals which are live captured when relocation is not a feasible option (Beaver et al. 2001). Live animals are placed in a container or chamber into which CO_2 gas is released. The animal quickly expires after inhaling the gas.

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 allays anxiety.

Xylazine is a sedative that calms nervousness, irritability, and excitement, usually by depressing the central nervous system. Xylazine is commonly used with ketamine to produce a relaxed anesthesia.

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. Certified WS' personnel are authorized to use sodium pentobarbital and dilutions for euthanasia in accordance with DEA and state regulations.

3.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

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

3.3.1 Lethal MDM Only by WS

Under this alternative, WS would not conduct any non-lethal control of mammals for MDM purposes in Georgia, but would only conduct lethal MDM. This alternative was eliminated from further analysis because some mammal damage problems can be resolved effectively through non-lethal means. For example, a number of damage problems involving the encroachment of smaller mammals such as raccoons, opossum, and armadillos under buildings can be resolved by installing barriers or repairing of structural damage to the buildings, thus excluding the animal. Further, such damage situations as immediately shooting an animal on a runway might not be possible, where as scaring them away through noise harassment might resolve the air passengers' threat at once.

3.3.2 Non-lethal Required Before Lethal Control 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 addressed in the EA. 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. 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. WS' proposed action described in section 3.1.1 is similar to a non-lethal before lethal alternative because WS considers the use of non-lethal methods before lethal methods (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.

3.3.3 Compensation for Mammal Damage Losses

The compensation alternative would require the establishment of a system to reimburse persons impacted by mammal damage. This alternative was eliminated from further analysis because no federal or state laws currently exist to authorize such action. Under such an alternative, WS would not provide any direct management or technical assistance. Aside from lack of legal authority, analysis of this alternative in the FEIS indicated that the concept has many drawbacks (USDA 1997):

- It would require larger expenditures of money and labor to investigate and validate all damage claims, and to determine and administer appropriate compensation. A compensation program would likely be significantly more costly than the current program.

- Compensation would most likely be below full market value.
- It would be difficult, if not impossible, to assess and confirm losses in a timely manner for all requests, and, therefore, many losses could not be verified and would remain uncompensated.
- Compensation would give little incentive to resource owners to limit damage through improved cultural, husbandry, or other practices and management strategies.
- Not all resource owners would rely completely on a compensation program and unregulated lethal control would most likely continue as permitted by State law.
- Compensation would not be practical for reducing threats to human health and safety.

3.3.4 Short Term Eradication and Long Term Population Suppression

An eradication alternative would direct all WS' program efforts toward total long term elimination of mammal populations on private, State, Local and Federal government lands wherever a cooperative program was initiated in Georgia. In Georgia, eradication of native mammal species is not a desired population management goal of State agencies or WS'. Eradication as a general strategy for managing mammal damage will not be considered in detail because:

- All state and federal agencies with interest in, or jurisdiction over, wildlife oppose eradication of any native wildlife species.
- Eradication is not acceptable to most people.

Suppression would direct WS' program efforts toward managed reduction of certain problem populations or groups. In areas where damage can be attributed to localized populations of mammals, WS can decide to implement local population suppression as a result of using the WS' Decision Model. It is not realistic or practical to consider large-scale population suppression as the basis of the WS' program. Problems with the concept of suppression are similar to those described above for eradication. Typically, WS' activities in Georgia would be conducted on a very small portion of the sites or areas inhabited or frequented by problem species.

3.3.5 Bounties

Payment of funds (bounties) for killing some mammals suspected of causing economic losses have not been supported by Georgia state agencies, such as GDNR, 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, including

- Bounties are generally ineffective at controlling damage, especially over a wide area such as Georgia,
- Circumstances surrounding the take of animals are typically arbitrary and completely unregulated,
- It is difficult or impossible to assure animals claimed for bounty were not taken from outside the damage management area, and
- WS does not have the authority to establish a bounty program.

3.3.6 Reproduction Control

Reproductive control is 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 (longevity, age at onset of reproduction, population size and

biological/cultural carrying capacity, etc.), habitat and environmental factors (isolation of target population, cover types and access to target individuals, etc.), socioeconomic and other factors. Population modeling indicates that reproductive control is more efficient than lethal control only for some rodent and small bird species with high reproductive rates and low survival rates (Dolbeer 1998). Additionally, the need to treat a sufficiently large number of target animals, 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. Research into reproductive control technologies, however, has been ongoing, and the approach will probably be considered in an increasing variety of wildlife management situations.

Reproductive control for wildlife could be accomplished either through sterilization (permanent) or contraception (reversible, initial treatment usually followed by a booster and annual follow-up treatments).

Sterilization could be accomplished through:

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

Contraception could be accomplished through:

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

Research into the use of these techniques would consist of laboratory/pen experimentation to determine and develop the sterilization or contraceptive material or procedure, field trials to develop the delivery system, and field experimentation to determine the effectiveness of the technique in achieving population reduction.

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

- No chemical or biological agent to accomplish reproductive control for free-ranging mammals has been approved by federal and Georgia authorities.
- If an effective tool was legally available, and if the project area was fenced, it would take many years for some mammal populations to stabilize at a lower level, and ongoing damage would continue to occur at unacceptably high levels, and
- There are considerable logistic, economic and socio-cultural limitations to trapping, capturing and chemical treatment of the hundreds or thousands of mammals that would be necessary to affect an eventual decline in the population. Because there is no tool currently available for field application, and due to considerable logistic, economic, and socio-cultural limitations to the use of fertility control on free-ranging mammals, this approach is not considered for further analysis in this EA.

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

The Trap-Neuter-Release (TNR) program for feral and free ranging cats has undergone considerable debate in animal welfare and scientific communities for a number of years. Two main questions or

viewpoints dominate this debate: 1) Do TNR programs achieve controlling cat populations and 2) do TNR programs address or alleviate problems (i.e., diseases) created by cat colonies?

Trap, neuter, and release programs have been going on for decades in Britain and Europe. Today, feral and free-ranging cats are causing the same problems they were causing ten years ago. Cat colonies have not died out or reduced in size, many continue to increase. Common consensus is that some cat colonies stabilize, but never come close to extinction. Many of these colonies would not survive if it were not for the supplemental feeding by humans in some areas (Smith and Shane 1986). So the problems with wildlife and human health issues have not been resolved by the TNR philosophy.

The National Association of State Public Health Veterinarians and the American Veterinarians Medical Association oppose TNR programs based on health concerns and threats (AVMA 1996). First, diseases and parasites transmitted by cats to humans including ringworm, bartonellosis, larval migrans, cat scratch fever, toxoplasmosis, and vector-borne zoonotic diseases are not controlled in colony situations. Second, rabies is a major concern because cats are the number one domesticated species testing positive for rabies in the U.S. and other species commonly infected by the disease are also attracted to feeding stations in cat colonies.

The Wildlife Society (TWS), founded in 1937, is the wildlife manager's professional equivalent of the AVMA. Their special expertise is the health of the environment and maintenance of our nation's wildlife resources. TWS has spent more than 2 years developing its policy No. 25 on feral and free-ranging cats, and this policy clearly identifies the problems associated with these non-native predators. The society's policy includes support for "passage and enforcement of local and state ordinances prohibiting the public feeding of feral cats, especially on public lands, and release of unwanted pet or feral cats into the wild." It also indicates opposition to "passage of any local or state ordinances that legalize the maintenance of the 'managed' (i.e., TNR) free-ranging cat colonies." (AVMA 2004).

Many other organizations have developed similar policies, including the following: the International Association of Fish and Wildlife Agencies, the Association of Avian Veterinarians, the American Association of Wildlife Veterinarians, the Council of State and Territorial Epidemiologists/National Association of State Public Health Veterinarians, the ABC, The Humane Society of the United States, the American Ornithologists' Union, People for the Ethical Treatment of Animals (PETA), the National Audubon Society, and various state wildlife federations and commissions. The Perspective of PETA is, "because of the huge number of feral cats and the severe shortage of good homes, the difficulty of socialization, and the dangers lurking where most feral cats live, it may be necessary and the most compassionate choice to euthanize feral cats. A painless injection is far kinder than the fate that feral cats will meet if left to survive on their own." (AVMA 2004).

As a result of the prevalent and perpetual threat to human health and safety created by TNR programs (cat colonies) and the continued threat to T&E wildlife and native wildlife in general, WS will not consider this issue further or be a participant of TNR programs in Georgia.

3.3.8 Non-lethal MDM Only by WS

Under this alternative, WS would not conduct any lethal control of mammals for MDM purposes in Georgia, but would only conduct non-lethal MDM. This alternative was eliminated from further analysis because some mammal damage problems can not be resolved effectively through non-lethal means. If non-lethal methods were determined to be ineffective at reducing damage and conflicts, WS would not be able to use or recommend any other method to rectify the problem. Non-lethal

methods are an important component of any program using an IWDM approach. For example, in situations where feral cats are at risk of transmitting disease to humans and/or domestic animals or are negatively impacting native bird populations, the use of only non-lethal methods would likely not be effective. In these types of situations, it is often necessary to remove/euthanize these feral animals to rectify the problem.

3.4 STANDARD OPERATING PROCEDURES FOR MAMMAL DAMAGE MANAGEMENT TECHNIQUES

The current WS' program, nationwide and in Georgia, uses many SOPs and these are discussed in detail in Chapter 5 of WS' FEIS (USDA 1997).

3.4.1 Standard Operating Procedures (SOPs)

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

- The WS' Decision Model thought process is used to identify effective WDM strategies and their effects.
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid effects to T&E species.
- EPA-approved label directions are followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects to the environment when chemicals are used in accordance with label directions.
- Drugs are used according to the Drug Enforcement Administration (DEA), FDA, and WS' program policies and directives and procedures are followed that minimizes pain.
- All controlled substances are registered with DEA or FDA.
- WS' employees would follow approved procedures outlined WS' Field Manual for the Operational Use of Immobilizing and Euthanizing Drugs (Johnson et al. 2001).
- WS' employees that use controlled substances are trained to use each material and are certified to use controlled substances under Agency certification program.
- WS' employees who use pesticides and controlled substances participate in State approved continuing education to keep abreast of developments and maintain their certifications.
- Pesticide and controlled substance use, storage, and disposal conform to label instruction and other applicable laws and regulations, and Executive Order 12898.
- Material Safety Data Sheets for pesticides and controlled substances are provided to all WS' personnel involved with specific WDM activities.
- All WS' personnel in the State who use restricted chemicals are trained and certified by, or else operate under the direct supervision of, program personnel or others who are experts in the safe and effective use of chemical MDM materials.
- Research is being conducted to improve MDM methods and strategies so as to increase selectivity for target species, to develop effective non-lethal control methods, and to evaluate non-target hazards and environmental effects.
- Management actions would be directed toward localized populations or groups of target species and/or individual offending members of those species. Generalized population suppression across Georgia, or even across major portions of Georgia, would not be conducted.
- WS uses MDM devices and conducts activities for which the risk of hazards to public safety and hazard to the environment have been determined to be low according to a formal risk assessment (USDA 1997). Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazards to the public is even further reduced.

3.4.2 Additional Standard Operating Procedures Specific to the Issues

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

3.4.2.1 Effects on Target Wildlife

- MDM activities are directed to resolving mammal damage problems by taking action against individual problem mammals, or local populations or groups, not by attempting to eradicate populations in the entire area or region.
- WS' take is monitored by comparing numbers of mammals killed by species or species group (e.g., carnivore) with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause significant adverse effects to the viability of native species populations (See Chapter 4).

3.4.2.2 Effects on Non-target Wildlife, Including T&E Species

- WS' personnel are trained and experienced to select the most appropriate method for taking problem animals and excluding non-targets. For example, WS' personnel utilize pan tension devices or alter trap triggers in order to exclude or reduce the capture of non-target species.
- WS has consulted with the USFWS regarding potential effects of control methods on T&E species, and abides by reasonable and prudent alternatives and/or reasonable and prudent measures established as a result of that consultation. For the full context of the BO see WS' FEIS, Appendix F (USDA 1997).
- WS uses chemical methods for MDM that have undergone rigorous research to prove their safety and lack of serious effects on non-target animals and the environment.

3.4.2.3 Effects on Human Health and Safety

- WS' personnel are trained and supervised in the use of MDM methods, including firearms, watercraft, traps, immobilization drugs, and vertebrate pesticides to ensure that they are used properly and according to policy. Furthermore, WS' personnel using restricted-use vertebrate pesticides will be certified according to EPA and Georgia state laws. WS' personnel using firearms will routinely receive firearms safety training according to WS' policy.

3.4.2.4 Effects on Socio-cultural Elements and Economics of the Human Environment

- Whenever practicable, WS' personnel perform components of mammal removal activities, such as shooting and euthanizing, away from public view.
- In addition, animals which are transported after being killed are concealed from public view when they must be transported in areas of human habitation, in an effort to reduce adverse effects on the aesthetic quality of the environment.

3.4.2.5 Humaneness of Methods Used by Wildlife Services

- WS' personnel kill captured target animals that are slated for lethal removal as quickly and humanely as possible. In most field situations, a shot to the brain with a small caliber firearm is performed which causes rapid unconsciousness followed by cessation of heart function and respiration. This is in concert with the AVMA definition of euthanasia (Beaver et al. 2000).

- Research continues with the goal of improving the selectivity and humaneness of management devices.
- WS' personnel recommend the use of various non-lethal methods such as exclusion, habitat and animal behavior modification, where these are applicable.
- WS' personnel use trap lures and set traps in locations that are conducive to capturing the target animal, but minimize potential effect on non-target species. Further, all damage management methods would be used in a manner that minimizes pain and suffering of individual animals, to the extent that the method is effective and its use is practical.

4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2. This section analyzes the environmental consequences of each alternative in comparison with the No Action Alternative to determine if the real or potential effects would be greater, lesser, or the same. Therefore, the proposed action or current program alternative serves as the baseline for the analysis and the comparison of expected effects among the alternatives. The background and baseline information presented in the analysis of the current program alternative thus also applies to the analysis of each of the other alternatives.

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

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

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

Effects on sites or resources protected under the National Historic Preservation Act (NHPA): WS' MDM actions are not undertakings that could adversely affect historic resources (See Appendix D).

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

As described in section 2.1.1, in those situations where a non-federal cooperator has obtained the appropriate GDNR permit or authority, and has already made the decision to remove or otherwise manage mammals to stop damage with or without WS' assistance, WS' participation in carrying out the action will not affect the environmental status quo. In some situations, however, certain aspects of the human environment may actually benefit more from WS' involvement than from a decision not to assist. For example, if a cooperator believes WS has greater expertise to selectively remove a target species than a non-WS entity; WS' management activities may have less of an impact on target and non-target species than if the non-federal entity conducted the action alone. Thus, in those situations, WS' involvement may actually have a *beneficial* effect on the human environment when compared to the environmental status quo in the absence of such involvement.

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

4.1.1.1 Effects on Target and Non-target Wildlife

4.1.1.1.1 Effects on Target Species

In those situations where a non-federal cooperator has obtained the appropriate GDNR permit or authority and has already made the decision to remove or otherwise manage mammals to stop damage with or without WS' assistance, WS' participation in carrying out the action will not affect the environmental status quo.

The authority for management of resident wildlife species has traditionally been a responsibility left to the states. The GDNR is the state agency with management responsibility over animals classified by state law as protected. The GDNR was unable to provide any definitive estimates of population sizes for species discussed in this EA.

The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997). Magnitude is described in USDA (1997) as *"...a measure of the number of animals killed in relation to their abundance*." Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population densities are high and usually only after they have caused damage. Table 4.1 shows the numbers of mammals killed by species and method as a result of WS' MDM activities in Georgia from FY 2002 through FY 2006.

NEPA requires federal agencies to determine whether their actions have a "significant impact on the quality of the human environment." A declining population of a resident wildlife species does not necessarily equate to a "significant impact" as defined by NEPA if the decline is collectively condoned or desired by the people that live in the affected human population. It is reasonable and proper to rely on the representative form of government within a state as the established mechanism for determining the "collective" desires or endorsements of the people of a state. WS abides by this philosophy and defers to the collective desires of the people of the State of Georgia by complying with State laws and regulations that govern the take or removal of resident wildlife. Although the analysis herein indicates mammal populations are not being affected to the point of causing a decline, if at some point in the future they are, then such a decline would not constitute a "significant" impact as defined by NEPA so long as the actions that cause the decline are in accordance with state law, and concomitantly, with the collective desires of the people of Georgia.

Table 4.1 - Number of Mammals Killed by WS in Georgia during FY 2002 – 2006

SPECIES	2002	2003	2004	2005	2006	Total*
Armadillo	139	116	270	205	222	952
Bobcat	123	56	55	44	60	338
Coyote	77	15	30	34	52	208
Gray Fox	64	39	24	39	28	194
Red Fox	2	0	0	0	2	4
Raccoon	775	366	410	394	423	2,368
Opossum	716	604	785	420	520	3,045
Striped Skunk	0	0	0	2	5	7
Feral Cat	45	42	77	43	40	247
Feral Dog	11	14	1	4	4	34
Gray Squirrel	48	43	27	4	900	1,022
Woodchucks	0	0	0	153	0	153
River Otter	14	15	4	14	13	60

***Total includes target and non-target mammals taken**

Table 4.2 - Georgia Furbearer Harvest for the 2001 to 2006 Seasons (GADNR 2006)*

SPECIES	2001-02	2002-03	2003-04	2004-05	2005-06
Bobcat	1,493	1,303	1,501	1,772	2,026
Coyote	2,075	1,810	2,224	2,966	3,138
Gray Fox	3,239	3,475	3,140	3,049	3,142
Red Fox	709	869	732	989	863
Raccoon	7,089	5,068	5,403	5,191	6,191
Opossum	4,113	3,765	4,256	5,274	6,383
Striped Skunk	271	217	215	247	333
# Licensed Trappers	491	453	500	501	571

*Estimated based on trapping license sales and trapper survey information

4.1.1.1.1.1 Nine-banded Armadillo Population Information and Effects Analysis

The nine-banded armadillo is easily recognized due to its unique appearance. An opossum sized animal, the armadillo has a "shell", which is composed of ossified dermal plates covered by a leathery epidermis (Whitaker, Jr. and Hamilton, Jr. 1998). It is the only North American mammal which has heavy bony plates (National Audubon Society 2000). Armadillos have prominent claws which are used for digging. Female armadillos produce one litter of young per year, which are identical quadruplets (National Audubon Society 2000).

Armadillos were first observed in Georgia in the 1950s. Today, armadillos can be found throughout central and southern Georgia with populations slowly expanding northward. Armadillos are considered common in Georgia, where they exist. Armadillos in Georgia are showing a general increasing trend (G. Waters, GDNR, pers. comm. 2007). Current population estimates for armadillos in the U.S. is between 30-50 million (Gilbert 1995). However, population estimates for nine-banded armadillos in Georgia are not well defined. To estimate the armadillo population in Georgia, the best information available will be used to estimate statewide populations.

Armadillo expansion in the U.S. appears to be limited by climate and soil types. Armadillos do not tolerate extended periods of cold weather which may limit their expansion northward. Armadillos are primarily carnivorous, though they will feed on some plant matter when available. The main sources of food are invertebrates. Armadillos do not hibernate and must feed every couple of days during winter months since they do not store food nor accumulate efficient amounts of body fat to survive through the winter. The presence of snow or frozen soils limits the availability of food sources, primarily the availability of insects, during winter months. The lack of food available often causes armadillos to starve during winter months. However, in Georgia, winter temperatures are relatively sufficient to maintain armadillo populations though, periods of extreme cold or prolonged periods of cold temperatures may temporarily impact populations.

The other limiting factor in armadillo expansion and for maintaining populations is the presence of sandy or clay soils. Armadillos are prolific diggers, not only for creating shelters but for digging and rooting for invertebrates. This digging and rooting behavior

are the most common complaints from resource owners in Georgia. Sandy soils are conducive to digging and armadillos can be found in those areas in Georgia where sandy soils are present. Damage to landscaping is the most common resource being damaged by armadillos in Georgia (USDA 2007).

There are eight major land resource areas in Georgia as defined by the USDA-Natural Resources Conservation Service (NRCS). Each land resource area is characterized by differing combinations of soil types, climate, water resources, land use, and types of agricultural use. Of the eight land resource areas, four are characterized by soil types preferred by armadillos. The Atlantic Coast Flatwoods resource area occurs along the coastal areas of Georgia which covers approximately 7 million acres. Marine sands comprise the main soil characteristics of the Flatwoods resource area. The Southern Coastal Plain can be found north and west of the Atlantic Coast Flatwoods area and reaches north to the sand hills and totals approximately 14.5 million acres. Soils of the Coastal Plain resource are characterized by loamy or sandy surface layer. The Sand Hill resource area is characterized by deep sandy soils extending from Augusta to Columbus and comprises nearly 1.5 million acres of Georgia. The Southern Piedmont resource area stretches from the Sand Hills of Georgia to the Appalachian Mountains which covers approximately 10.5 million acres. Soils of the Piedmont resource area are mostly clay-based soils. Those four resource areas in Georgia where soil types are conducive to the presence of armadillos totals nearly 33.5 million acres. The total land area of Georgia is slightly over 37 million acres. Thus, 90.5% of Georgia contains suitable habitat for armadillos.

Population densities for armadillos are reported to be from 0.004 to 1.4 per acre in Georgia with an average of 0.25 armadillos per acre (Mengak 2005). Using the total acres of the four resource areas suitable for armadillo habitation of 33.5 million acres, an estimated population for Georgia could range from 134,000 to 46.9 million armadillos. Using the average armadillos per acre of 0.25, a population could be estimated at 8.4 million armadillos. However, the likelihood of all 33.5 million acres being suitable habitat for armadillos is unlikely. If only 25% of the 33.5 million acres was suitable for armadillos, or approximately 8.4 million acres, the population range for armadillos in Georgia could be estimated to be 33,500 using the lowest density estimates to as high as 11.8 million animals. Using the average armadillos per acre, the population in Georgia could be estimated at nearly 2.1 million armadillos. The available habitat in Georgia is likely greater than 8.4 million acres but those figures were used to represent a worse case scenario.

WS killed 952 armadillos in Georgia during FY 2002-2006 while responding to requests from resource owners to alleviate damage caused by armadillos. Since FY 2002, the number of armadillos taken by WS has averaged approximately 191 individuals per year. In future programs, WS may be requested to address damage being caused by armadillos anywhere in Georgia to protect any resource being damaged or threatened. Based upon current and an anticipated increase in armadillo damage management activities in the future, it is possible that WS could kill 500 armadillos per year in all MDM programs in Georgia (USDA 2007).

If 500 armadillos were taken annually using the estimated population at the lowest densities, WS' take would be 1.5% of the estimated armadillo population in Georgia under a worse case scenario. However, WS impact on armadillo populations are expect to be much lower than 1.5% given that the statewide population of armadillos is likely

greater than 33,500 armadillos. Using the average armadillos per acre estimate of 0.25, WS would impact approximately 0.02% of the population annually. Armadillos are considered a nuisance animal in Georgia and there is no closed season and no take limit (GDNR 2006a). Based on this information, WS' limited lethal take of armadillos would have no adverse impacts on overall populations of the species in the state.

4.1.1.1.1.2 Bobcat Population Information and Effects Analysis

The bobcat, also called "wildcat," is a medium-sized member of the North American cat family, and may be mistaken for a large bob-tailed domestic cat by some people. This species is actually 2-3 times larger than most domestic cats and appears more muscular and fuller in body. Bobcats are capable of hunting and killing prey that range from the size of a mouse to that of a deer. Rabbits, tree squirrels, ground squirrels, woodrats, porcupines, pocket gophers, and ground hogs comprise most of their diet. Opossums, raccoon, grouse, wild turkey, and other ground nesting birds are also eaten. Occasionally, insects and reptiles can be part of a bobcat's diet. They also resort to scavenging. They are opportunistic predators, and may feed on livestock and domestic animals such as poultry, sheep, goats, house cats, small dogs, exotic birds and game animals, and rarely, calves (Virchow and Hogeland 1994). McCord and Cardoza (1982) reported the cottontail rabbit to be the principal prey of bobcats throughout their range.

Bobcats reach densities of about 1 per 0.7 km^2 (1 per ¼ mi^2) on some islands in the Gulf Coast of the southeastern U.S. Densities vary from about 1 per 1.3 km^2 (1 per ½ mi^2) in coastal plains to about 1 cat per 10.7 km^2 (1 per 4 mi^2) in portions of the Appalachian foothills. Mid-Atlantic and mid-western states usually have scarce populations of bobcats (Virchow and Hogeland 1994). Populations are stable in many northern states and reviving in other states where intensive trapping formerly decimated the species (National Audubon Society 2000). Rates of natural mortality reported for adult bobcats in protected populations appear to be quite low. Crowe (1975) estimated a 3% mortality rate in a protected population, based on Bailey's (1972) study of bobcats in southeastern Idaho. Causes of natural mortality for adult bobcats include starvation (Hamilton 1982), disease and predation (Lembeck 1978), and injuries inflicted by prey (Fuller et al. 1985).

Population estimates for bobcats in Georgia are not readily available. Population trend estimates provided by the GDNR indicate a stable population in Georgia with local populations showing cyclic increases and decreases every few years (G. Waters, GDNR, pers. comm. 2007). Since population estimates are not available for bobcats, the best available data will be used to estimate a population size to analyze impacts.

Bobcats are classified as furbearers in Georgia, with a regulated hunting and trapping season with unlimited take (GDNR 2006a). Based on trapper surveys, the yearly estimates for bobcats harvested by trappers in Georgia averaged over 1,600 per year for the past five years (GDNR 2006b). As mandated through the Convention on International Trade in Endangered Species, the GDNR requires that all bobcats pelts to be sold must be tagged. However, bobcats can be found statewide in Georgia, where suitable habitat occurs and are not considered an endangered species.

Habitat preferred by bobcats is quite diverse in Georgia ranging from upland forests to coastal wetlands. Using the major land resource areas in Georgia as defined by the USDA-NRCS, at least six resources areas in the State contain suitable habitat for bobcats. The Atlantic Coast Flatwoods, Southern Coastal Plain, Sand Hill, Southern Piedmont,

Blue Ridge, and Southern Appalachian resource areas are primarily woodland habitats intermixed with agricultural cropland.

Using the estimated acres contained in the six resource areas, Georgia contains approximately 33.5 million acres of habitat that could be used by bobcats. Using bobcat densities for the Appalachian foothills of 1 bobcat per 4 mi^2, a statewide population could be estimated to be approximately 13,100 bobcats. However, this estimate could be considered low given that where quality habitat and prey are available densities tend to be much higher. A recent study where bobcats were reintroduced to an island off the coast of Georgia, bobcat densities stabilized at 1 bobcat per 1.2 mi^2 (Diefenbach et al. 2006). A total bobcat population could be estimated at 44,000 using a density of 1 bobcat per 1.2 mi^2. Under a worse case scenario, if only 50% of the estimated 33.5 million acres were suitable for bobcat populations, a population could be estimated at 22,000 bobcats using densities found by Diefenbach et al. (2006).

WS killed 338 bobcats in all MDM programs in Georgia during FY 2002-2006. WS yearly annual take since FY 2002 is approximately 68 bobcats. In future programs, WS may be requested to address damage being caused by bobcats anywhere in Georgia to protect any resource being damaged or threatened. Based upon current and an anticipated increase in bobcat damage management activities in the future, it is possible that WS could kill 200 bobcats per year in all MDM programs in Georgia. Under the worst case scenario outlined above, if 200 bobcats were removed, WS' actions would impact 0.9% of the bobcat population in Georgia.

Based upon the above information, WS' limited lethal take of bobcats would have no adverse impacts on overall bobcat populations in the state.

4.1.1.1.1.3 Coyote Population Information and Effects Analysis

Coyotes are a familiar mammal to most people. Their coloration is blended, primarily gray mixed with a reddish tint. The belly and throat are a paler color than the rest of the body (Beckoff 1982). Coyotes have long, rusty or yellowish legs with dark vertical lines on the lower foreleg. They are similar in appearance to gray and red wolves (National Audubon Society 2000). Color varies greatly, however, from nearly black to red or nearly white in some individuals and local populations. Most have dark or black guard hairs over their back and tail (Green et al. 1994). They sometimes breed with domestic dogs producing hybrids called "coydogs" (National Audubon Society 2000). The size of coyotes varies from about 20 to 40 lbs (9 – 18 kg) (Novak et al. 1987).

Coyotes range throughout the U.S. with the highest densities occurring on the Plains and in the south-central U.S., including Texas. The distribution of coyotes in eastern North America began to expand beginning around 1900 to 1920. Now, all eastern states and Canadian provinces have at least a small population of coyotes (Voigt and Berg 1987).

Coyotes often include many items in their diet. Rabbits are one of the most common prey. Other items in the coyote's diet include carrion, rodents, ungulates (usually fawns), insects (such as grasshoppers), as well as livestock and poultry. Coyotes readily eat fruits such as watermelons, berries, persimmons and other vegetative matter when it is available. In some areas, coyotes feed on human refuse at dump sites and take small domestic pets such as cats and dogs (Voigt and Berg 1987).

Coyotes breed between January and March and are able to breed before their first birthday (Kennely and Johns 1976), but the percentage of yearlings having litters varies from 0-80% in different populations (Gier 1968). This variation is influenced by a number of factors, but causes large annual variation in total number of coyotes breeding. In a study in Texas, the percentage of females having litters varied from 48-81% (Knowlton 1972). Pups are born after a gestation period of 60-63 days, with litter sizes varying primarily with prey availability. Gier (1968) reported average litter sizes of 4.8-5.1 in years with low rodent numbers, but litters of 5.8-6.2 during years with high rodent numbers. Litter sizes of 1-19 pups have been reported (National Audubon Society 2000).

Many references indicate that coyotes were originally found in relatively open habitats, particularly grasslands and sparsely wooded areas of the western U.S. Today, coyotes have adapted to, and now exist in, virtually every type of habitat, arctic to tropic, in North America. Coyotes live in deserts, swamps, tundra, grasslands, brush, dense forests, from below sea level to high mountain ranges, and at all intermediate altitudes. High densities of coyotes also appear in the suburbs of major cities (Green and Gipson 1994).

The coyote is probably the most extensively studied carnivore (Bekoff 1982), 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 mi^2 would likely be applicable to coyote densities across much of their range.

Actual population estimates for coyotes in Georgia are not well defined. Coyotes are common throughout Georgia and inhabit a variety of habitats. The GDNR has indicated the coyote population in the state is generally stable with local populations showing increases and decrease every few years (G. Waters, GDNR, pers. comm. 2007). Coyotes are considered a nuisance species in Georgia and there are no limits set on the take of this species, and they may be taken year-round (GDNR 2006a). Information regarding the total number of coyotes killed in Georgia annually is not available. However, furbearer harvest estimates average greater than 2,400 per year with a trend toward increasing numbers being caught yearly (GDNR 2006b).

WS killed 208 coyotes in all MDM programs in Georgia during FY 2002-2006 (USDA 2007). In future programs, WS may be requested to address damage being caused by coyotes anywhere in Georgia to protect any resource being damaged or threatened. Based upon current and an anticipated increase in coyote damage management activities in the future, it is possible that WS could take 200 coyotes per year in all MDM programs in Georgia. Some of those would be removed in projects aimed at protecting air passenger safety and aircraft, while a substantial number might be killed to reduce human safety threats in residential areas and to protect livestock, agriculture, pets, and natural resources. Few if any coyotes in residential areas and airports are hunted and few are trapped by fur trappers. This number would have no effect on overall coyote populations in the state. Some local populations may be temporarily reduced as a result of MDM projects aimed at reducing damage at a local site.

Coyotes can be found throughout Georgia in various urban and rural habitats. If coyotes only inhabited farmland habitats in Georgia, there would be approximately 11 million acres of potential habitat. Under a worse case scenario, if coyotes only occurred in farmland habitat at 0.5 to 1.0 coyotes per mi^2, population estimates would range from 8,600 coyotes to approximately 17,200 coyotes in Georgia. This population estimate would represent a worse case scenario for population estimates in Georgia but, would likely be considered low, since coyotes can be found throughout all habitat types in Georgia. Under this worse case scenario, if WS removed 200 coyotes annually, the coyote population would be reduced 1.2% to 2.3% annually. WS anticipates this take percentage to the overall coyote population in Georgia to be much smaller. Based on the total area of Georgia (59,411 mi^2) and using the generalized coyote density estimate of 0.5 to 1.0 coyotes per mi^2 , the statewide population could be estimated at approximately 30,000 to 60,000 coyotes. Under this scenario, WS take of 200 coyotes annually would represent 0.3% to 0.7% of the estimated statewide total.

Based upon the above information, WS' limited lethal take of coyotes would neither have an adverse impact on overall coyote populations in Georgia nor limit the ability of persons to harvest coyotes.

4.1.1.1.1.4 Gray Fox Population Information and Effects Analysis

The gray fox is common in many parts of the U.S. where deciduous woodlands provide habitat. Yet this secretive carnivore is seldom seen. This species is somewhat smaller in stature than the red fox, having shorter legs and extremities. Gray fox exhibit striking pelage which has grizzled upper parts resulting from individual guard hairs being banded with white, gray, and black. A predominance of black-tipped hairs in the middle of the back forms a dark longitudinal stripe that extends into a conspicuous black mane of coarse hair at the top of the black -tipped tail. Portions of the neck, sides, and limbs are cinnamon-colored. The ventral areas of a gray fox are buff colored. White shows on the ears, throat, chest, belly, and back legs, and the black, white, and reddish facial markings provide distinctive accents (Fritzell 1987).

Gray fox adults weigh about 3 - 7 kg (6.5 - 15 lbs), with males being slightly larger than females. Generally, adult gray fox measure 80 - 113 cm (31.5 - 44 inches) from the tip of the nose to the tip of the tail. They inhabit wooded, brushy, and rocky habitats from extreme southern Canada to northern Venezuela and Colombia, excluding portions of the mountainous northwestern U.S., the Great Plains, and eastern Central America. Gray fox occur over most of North America, north and east from southern California, Arizona, and central Texas (Fritzell 1987).

Gray fox prefer habitat with dense cover such as thickets, riparian areas, swamp land, or rocky pinyon-cedar ridges. In eastern North America, this species is closely associated with edges of deciduous forest. They can also be found in urban areas where suitable habitat exists (Phillips and Schmidt 1994).

Gray fox mate from January - March and produce litters of 1-7 kits after a gestation period of 53 days (National Audubon Society 2000). They rear young in a maternity den, commonly located in wood piles, rocky outcrops, hollow trees, or brush piles (Phillips and Schmidt 1994). The male parent helps tend to the young but does not den with them. The young are weaned at 3 months and hunt for themselves at 4 months, when they

weigh about 3.2kg (7 lbs). Rabies and distemper are associated with this species (National Audubon Society 2000).

Accurate estimates of carnivore populations are rare and those for gray fox populations are no exception. Estimates based on knowledge of the species, experience, and intuition may be as accurate as those based on recognized methods such as mark-recapture studies. Published estimates of gray fox density vary from 1.2 - 2.1 / km^2 (3.1 - 5.4 / mi^2) depending on location, season, and method of estimation (Errington 1933, Gier 1948, Lord 1961, Trapp 1978). Over areas larger than 5,000 km^2 (1,930 mi^2) in which habitat quality varies, densities are likely lower. Exceptionally high fox densities have been recorded in some situations, however (Grinnell et al. 1937, Hallberg and Trapp 1984).

Home ranges for gray fox vary throughout the year. Both males and females travel over larger areas during fall and winter, probably in response to increased energy demands and a declining food base (Follmann 1973, Nicholson 1982). During April, when young fox require regular feeding, a female's home range is less extensive than it is without the demands of those young (Follman 1973). Although exceptions exist, eastern gray fox generally have larger home ranges than western animals (Fritzell 1987). For instance, 16 adult fox were tracked for more than 1 month in Alabama (Nicholson 1982) and Missouri (Haroldson and Fritzell 1984) and it was determined that they all had home ranges larger than 200 ha (500 acres), and many exceeded 500 ha (1,235 acres).

Gray fox feed on a wide variety of plant and animal matter and are considered to be more omnivorous than other North American canids (Fritzell 1987). Although active primarily at twilight and at night, the gray fox is sometimes seen foraging by day in brush, thick foliage, or timber. The only American canid with true climbing ability, gray fox occasionally forage in trees and often takes refuge in them, especially leaning or thickly branched trees. The gray fox feeds heavily on cottontail rabbits, mice, voles, other small mammals, birds, insect, and plant material, including corn, apples, persimmons, nuts, cherries, grapes, pokeweed fruit, grass, and blackberries. Grasshoppers and crickets are often a very important part of the diet in late summer and autumn (National Audubon Society 2000).

Gray fox are classified as furbearers in Georgia, with a regulated hunting and trapping season with unlimited take (GDNR 2006a). Based on trappers surveys the yearly estimates for gray fox harvested by trappers in Georgia averaged over 3200 per year for the past five years (GDNR 2006b). Gray fox can be found throughout Georgia. The GDNR indicates gray fox populations are stable with local populations showing cyclic trends on a local scale (G. Waters, GDNR, pers. comm. 2007).

WS killed 194 gray fox in all MDM programs in Georgia during FY 2002-2006 (USDA 2007). In future programs, WS may be requested to address damage being caused by gray fox anywhere within the state to protect any resource being damaged or threatened. Based upon an anticipated increase for requests for WS' assistance, it is possible that WS could kill as many as 500 gray fox each year in MDM programs in Georgia. Gray fox 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 MDM projects aimed at reducing damage at a local site.

Population data for gray fox in Georgia is currently not available. Therefore, the best available information will be used to estimate statewide populations. Gray fox are also known as forest fox for their preference for woodland habitats. All six of the major land resource areas in Georgia, contain forested areas suitable for gray fox. The six resource areas are the Atlantic Coast Flatwoods, Southern Costal Plain, Sand Hill, Southern Piedmont, Blue Ridge, and the Southern Appalachian. Forested acres in those six areas comprise nearly 23.5 million acres. If only 25% of the forested acres in Georgia were suitable habitat for gray fox, under a worst case scenario, with a population density of 3.1 gray fox per mi^2, the gray fox population could be estimated to be approximately 29,000 in Georgia. This would be considered a worse case scenario since the gray fox population is likely to inhabit a much larger portion of the forested landscape in Georgia. If WS took 500 gray fox annually, using the figures arrived at under the worse case scenario; gray fox would be reduced by 1.7% annually. However, WS anticipates the impact of taking 500 gray fox annually on the statewide population to be much less than 1.7% given the population estimates derived represents a worse case scenario. Based upon the above information, WS' limited lethal take of gray fox would have no adverse impacts on overall populations of the species in Georgia. Similarly, WS' take will not negatively impact the ability of those persons interested to harvest gray fox in Georgia.

4.1.1.1.1.5 Red Fox Population Information and Effects Analysis

The red fox is a typically proportioned member of the dog family. The bushy and unusually long tail, pointed ears, slender muzzle, and slanted eyes coupled with its small dog size and typical reddish coloration, make the red fox instantly recognizable to most people. This species is also the most common and well-known species in the genus Vulpes, which includes about 10 other species worldwide (Honacki et al. 1982). Typically, black-tipped ears, black cheek patches, white throat parts, a lighter underside, and black "leg stockings" are found on most red fox. The white tip of the tail (which is much more prominent in North American fox than elsewhere) can be used to distinguish brownish fox pups from similarly colored coyote pups, which lack a white tail tip (Voigt 1987).

In North America, the red fox weighs about 3.5 - 7 kg (7.7 - 15.4 lbs.), with males averaging about 1 kg (2.2 lbs) which is heavier than females. Generally, adult fox measure 100 - 110 cm (39 - 43 inches) from the tip of the nose to the tip of the tail. Juveniles in their first autumn are as large as adults (Voigt 1987). They occur over most of North America, north and east from southern California, Arizona, and central Texas. They are found throughout most of the U.S. with the exception of a few isolated areas. Prehistoric fossil records suggest that the red fox may not have inhabited much of the U.S., but were plentiful in many parts of Canada. However, it has been suggested that climatic factors, interbreeding with the introduced European red fox, extirpation of the gray and red wolf, and clearing of land for agriculture has possibly contributed to the present-day expansion and range of this species in North America (Voigt 1987).

Red fox are adaptable to most habitats within their range, but usually prefer open country with moderate cover. Some of the highest fox densities reported are in the north-central U.S. occurs where woodlands are interspersed with farmlands. The range of the species has expanded in recent years to fill habitats formerly occupied by coyotes. The reduction of coyotes in many sagebrush/grassland areas of Montana and Wyoming has resulted in increased fox numbers. Red fox have also demonstrated their adaptability by establishing breeding populations in many urban areas of the U.S., Canada, and Europe (Phillips and

Schmidt 1994). In many areas, competition with other canids and the availability of suitable year-round food resources limit fox survival. Habitat determines the availability of year-round food resources and the presence or absence of other canids. Because those two factors strongly influence red fox survival, habitat limits fox numbers but seldom limits distribution (Voigt 1987).

Red fox mate from January - March and produce litters of 1-10 kits after a gestation period of 51-53 days. They rear young in a maternity den, commonly an enlarged woodchuck or badger den, usually in sparse ground cover on a slight rise, with a good view of all approaches (National Audubon Society 2000). Juvenile fox are able to breed before reaching a year old, but in areas of high red fox densities, most yearlings do not produce pups (Harris 1979, Voigt and MacDonald 1984, Voigt 1987). Gier (1968) reported average litter sizes of 4.8-5.1 in years with low rodent numbers, but litters of 5.8-6.2 during years with high rodent numbers. Litter sizes of 1-19 pups have been reported (National Audubon Society 2000). Offspring disperse from the denning area during the fall and establish breeding areas in vacant territories, sometimes dispersing considerable distances. Red fox are generally solitary animals as adults, except when mating (Phillips and Schmidt 1994). Rabies and distemper are associated with this species.

The red fox is a skilled nonspecific predator, foraging on a variety of prey. It is also an efficient scavenger, and in parts of the world garbage and carrion are extremely important to its diet (Voigt 1987). They are opportunists, feeding mostly on rabbits, mice, bird eggs, insects, and native fruit. They usually kill animals smaller than a rabbit, although fawns, pigs, kids, lambs, and poultry are sometimes taken (Phillips and Schmidt 1994). They also feed on squirrels, woodchucks, crayfish, and even grasses (National Audubon Society 2000).

The density of red fox populations is difficult to determine because of the animals secretive and elusive nature. Estimates are prone to error even in open areas with good visibility. Methods used to estimate numbers have included aerial surveys, questionnaires to rural residents and mail carriers, scent post surveys, intensive ground searches, and indices derived from hunting and trapping harvest (Voigt 1987). In Great Britain, where food is abundant in many urban areas, densities as high as 30 fox/km^2 (78/mi^2) have been reported (Harris 1977, MacDonald and Newdick 1982, Harris and Rayner 1986), while in southern Ontario, densities of about 1 fox km^2 (2.6/mi^2) occur during spring. This includes both pups and adults. In small areas of the best habitat, 3 times as many fox have been observed (Voigt 1987). However, those densities rarely occur extensively because of the dispersion of unsuitable habitat, high mortality, or from competition with coyotes (Voigt and Earle 1983). Cyclical changes in fox numbers occur routinely and complicate density estimates as well as management. Those cycles can occur because of changes in prey availability, or disease outbreaks, especially rabies, among red fox. For fox populations to remain relatively stable, mortality and reproduction must balance approximately.

Home ranges for red fox in the eastern U.S. are usually from 500 - 2,000 ha. (1,235 - 4,940 acres) in rural settings such as farmland (Voigt and Tinline 1980), but such sizes may not apply among fox populations in urban settings.

Red fox are classified as furbearers in Georgia, with a regulated hunting and trapping season with unlimited take (GDNR 2006a). Based on trapper surveys, the yearly harvest

estimates for red fox in Georgia averaged over 830 per year for the past five years (GDNR 2006b). Red fox populations are considered to be stable with cyclic population changes occurring in local populations (G. Waters, GDNR, pers. comm. 2007).

WS killed 4 red fox in all MDM programs in Georgia during FY 2002-2006 (USDA 2007). In future programs, WS may be requested to address damage being caused by red fox anywhere within the state to protect any resource being damaged or threatened. Based upon an anticipated increase for requests for WS' assistance, it is possible that WS could kill as many as 100 red fox each year in MDM programs in Georgia. Red fox 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 MDM projects aimed at reducing damage at a local site.

Red fox can be found throughout Georgia in a variety of habitats. Using the assumption that red fox can only be found in areas of farmland, approximately 11.2 million acres of habitat are available for red fox. If only 25% of the farmland acres provide suitable habitat for red fox, the available habitat would be 2.8 million acres. Using a density estimate of 2.6 red fox per mi^2, a worse case scenario population could be estimated at 11,400 red fox in Georgia. If WS took 100 red fox annually under this scenario, WS' impacts to the Georgia red fox population would be 0.9%. However, those assumptions are based on a worse case scenario. The statewide red fox population is likely much larger than 11,400 individuals. Thus, the impacts on the red fox population from WS removing 100 fox annually would be much less than 0.9%.

Based upon the above information, WS' limited lethal take of red fox would have no adverse impacts on overall populations of the species in Georgia. WS' activities will not limit the ability of those persons interested in harvesting red fox in Georgia.

4.1.1.1.1.6 Raccoon Population Information and Effects Analysis

The raccoon is a stocky mammal about 61-91 cm (2-3 feet) long, weighing 4.5-13.5 kg (10 - 30 lbs). It is distinctly marked, with a prominent black mask over the eyes and a heavily furred, ringed tail. The animal is a grizzled salt-and-pepper gray and black above, although some individuals are strongly washed with yellow (Boggess 1994).

The raccoon is one of the most omnivorous of animals. It will eat carrion, garbage, birds, mammals, insects, crayfish, mussels, other invertebrates, and a wide variety of grains, various fruits, other plant materials and most or all foods prepared for human or animal consumption (Sanderson 1987). They occasionally kill poultry (Boggess 1994).

The raccoon is found throughout most of the U.S., with the exception of the higher elevations of mountainous regions and some areas of the arid southwest (Boggess 1994, National Audubon Society 2000). Raccoons are more common in the wooded eastern portions of the U.S. then in the more arid western plains (Boggess 1994), and are frequently found in cities or suburbs as well as rural areas (National Audubon Society 2000). Movements and home ranges of raccoons vary according to sex, age, habitat, food sources, season, and other factors. In general males have larger home ranges then females. Home range diameters of raccoons have been reported as being 1-3 km (0.6 -

2.9 mi) maximum, with some home range diameters of dense suburban populations to be 0.3-0.7 km (0.2 - 0.4 mi).

Absolute raccoon population densities are difficult or impossible to determine because of the difficulty in knowing what percentage of the population has been counted or estimated and the additional difficulty of knowing how large an area the raccoons are using (Sanderson 1987). Due to their adaptability, raccoon densities reach higher levels in urban areas than that of rural areas. Relative raccoon population densities have been variously inferred by take of animals per unit area. For instance, Twichell and Dill (1949) reported removing 100 raccoons from tree dens in a 41 ha (101 acres) waterfowl refuge area, while Yeager and Rennels (1943) studied raccoons on 881 ha (2,177 acres) in Illinois and reported trapping 35-40 raccoons in 1938-39, 170 in 1939-40, and 60 in 1940-41. Slate (1980) estimated one raccoon/7.8 ha (19.3 acres) in New Jersey in predominantly agricultural land on the inner coastal plain. Raccoon densities of 100 per sq. mile (1 raccoon per 6.4 acres) have been attained around abundant food sources (Kern 2002). Riley et al. (1998) summarized rural raccoon densities based on published literature which ranged from 2 to 650 per sq. mile in rural habitats with an average of 10 to 80 raccoons per sq. mile.

In Georgia, raccoons cause damage to gardens, residential and non-residential buildings, fish, domestic fowl, and pets, as well as general property damage. Results of their feeding may be the total loss of ripened sweet corn in a garden. Damage to buildings generally occurs when they seek to gain entry or begin denning in those structures. Raccoons may den in uncapped chimneys, or may tear off shingles or fascia boards to gain access to attics or wall spaces. They may also damage or destroy sod by rolling it up in search of earthworms and other invertebrates (Boggess 1994).

The public are also concerned about health and safety issues associated with raccoons. Those diseases include, but are not limited to, canine distemper and rabies, and the roundworm *Baylisascaris procyonis*, the eggs of which survive for extremely long periods in raccoon feces and soil contaminated by them. Ingestion of those eggs can result in serious or fatal infections in other animals as well as humans (Davidson and Nettles 1997, see Table 1.1).

WS provides assistance in combating the spread of raccoon rabies in Georgia. Those activities are part of the national rabies barrier program covered under separate environmental analyses (USDA 2005). Other rabies monitoring or control activities may occur as part of this program. Raccoons killed under the ORV program are covered by the EA and FONSI – Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Fox, and Coyotes in the United States (USDA 2005) but are include in this EA for cumulative impact analysis.

Raccoons are classified as furbearers in Georgia with a regulated hunting and trapping season with unlimited take (GDNR 2006a). Based on trappers surveys the yearly estimates for opossums harvested by trappers in Georgia averaged over 5,700 per year for the past five years (GDNR 2006b).

No population estimates were available for raccoons in Georgia. Therefore, the best available information was used to estimate statewide populations.

Raccoons can be found throughout Georgia in various urban and rural habitats. Under a worse case scenario, if raccoons only occupied 50% of the habitat available in Georgia, at 2 raccoons per sq. mile, the Georgia raccoon population could be estimated at 60,000 individuals. This population estimate would represent a worse case scenario for population estimates in Georgia and would likely be considered low, since raccoons can be found throughout Georgia. In future programs, WS may be requested to address damage being caused by raccoons anywhere within the state to protect any resource being damaged or threatened. Based upon an anticipated increase for requests for WS' assistance, it is possible that WS could kill as many as 1,500 raccoons each year in MDM programs in Georgia. Under this worse case scenario, if WS removed 1,500 raccoons annually, the raccoon population would be reduced 2.5% annually. WS anticipates this take percentage to the overall raccoon population in Georgia to be much smaller. Raccoon populations can remain relatively abundant if annual harvest levels are below 49% (Sanderson 1987, USDA 1997).

WS killed 2,368 raccoons in all MDM programs in Georgia during FY 2002-2006 (USDA 2007) with an annual average of 474 raccoons. Potential impacts to the raccoon population and to non-targets from the ORV program are discussed in the ORV distribution EA (see section 1.5.2) (USDA 2005). WS' activities addressed in this EA and as part of the ORV program are not expected to have any accumulative impacts on raccoon populations since activities conducted under the ORV program are primarily non-lethal and do not involved the lethal take of raccoons for monitoring purposes.

Raccoon 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. Removing this number of raccoons will have no adverse affect, individually or cumulatively, on overall populations of the species in Georgia. Some local populations may be temporarily reduced as a result of MDM projects aimed at reducing damage at a local site.

Based upon the above information, WS' limited lethal take of raccoons would have no adverse impacts on overall populations of the species in Georgia.

4.1.1.1.1.7 Virginia Opossum Population Information and Effects Analysis

Opossums are the only marsupials (possess a pouch in which young are reared) found north of Mexico (Seidensticker et al. 1987). They frequent most of the eastern and central U.S., except Minnesota, northern Michigan and New England, extending west to Wyoming, Colorado, and central New Mexico (National Audubon Society 2000). They are also found in parts of the southwestern U.S., California, Oregon, and Washington (Jackson 1994a). Adults range in size from less than 1 kg (2.2 lbs) to about 6 kg (13 lbs), depending on sex and time of year. They grow throughout life (Seidensticker et al. 1987). They have a fairly broad range of pelage colors, but are usually considered as "gray" or "black" phase. Their fur is grizzled white above; long white hairs cover black tipped fur below. They climb well and feed on a variety of foods, including carrion which forms much of its diet. In addition, opossum eat insects, frogs, birds, snakes, small mammals, earthworms, and berries and other fruits; persimmons, apples, and corn are favorite foods (National Audubon Society 2000). They use a home range of 4-20 ha (10-50 acres), foraging throughout this area frequently (Jackson 1994a), but concentrating on a few sites where fruits abound, when they are in season (Seidensticker et al. 1987).

The reproductive season of the Virginia opossum typically occurs from December to February, depending on latitude (Gardner 1982). Gestation is short (average of 12.8 days) with 1-17 young born in an embryonic state which climb up the mothers belly to the marsupium (pouch) attach to teats and begin to suckle (Gardner 1982, National Audubon Society 2000). Those young remain in the pouch for about 2 months at which time they will begin to explore and may be found traveling on their mother's back with their tails grasping hers (Whitaker, Jr., and Hamilton, Jr. 1998). Opossums live for only 1-2 years, with as few as 8% of a population of those animals surviving into the second year in a study in Virginia conducted by Seidensticker et al. (1987). In that 5 year study, it was also observed that there was a wide variation in opossum numbers, in what was considered excellent habitat for the species. Those variations were observed seasonally and in different years. However, the mean density during the study was 3.9/km^2 (2.4/mi^2). This was comparable to other opossum population densities in similar habitats in Virginia.

Opossum are common throughout Georgia. Population trends show a stable to slightly increasing population especially in urban areas (G. Waters, GDNR, pers. comm. 2007). Population estimates for opossum in Georgia are not available. To determine an estimated population in Georgia, the best available data will be used. There are over 33 million acres of forested and cropland in Georgia (USDA 2006). Using the assumption that only 75% of the rural lands throughout Georgia have sufficient habitat to support opossum, opossum are only found in rural habitat, and opossum densities average 2.4 opossum per mi^2, a conservative statewide opossum population could be estimated at approximately 93,000 opossum. Considering opossum inhabit a large variety of habitats and occupy more than 75% of the forested and cropland habitat available, an estimate of 93,000 opossum is likely low.

Opossums are classified as a furbearer in Georgia with a regulated trapping season with no take limit (GDNR 2006a). Based on trapper surveys, the yearly estimates for opossums harvested by trappers in Georgia averaged over 4,700 per year for the past five years (GDNR 2006b).

WS killed 3,045 opossums in all MDM programs in Georgia during FY 2002-2006 (USDA 2007) with a yearly average of 609 opossums. In future programs, WS may be requested to address damage being caused by opossums anywhere within the state to protect any resource being damaged or threatened. Based upon an anticipated increase for requests for WS' assistance, it is possible that WS could kill as many as 1,000 opossums each year in MDM programs in Georgia. If the opossum population was 93,000 under a worst case scenario, as described above, WS' removal of 1,000 would reduce statewide population by 1% annually. The annually impact of removing 1,000 opossum is likely to be less than 1% annually given that the statewide opossum population is likely greater than 93,000 individuals.

Opossum 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. Removing this number of opossums will have no adverse affect on overall populations of the species in Georgia. Some local populations may be temporarily reduced as a result of MDM projects aimed at reducing damage at a local site.

Based upon the above information, WS' limited lethal take of opossums would have no adverse impacts on overall populations of the species in Georgia.

4.1.1.1.1.8 Striped Skunk Population Information and Effects Analysis

Although easily recognized by their black and white fur, the striped skunk may be most readily recognized by the odiferous smell of their musk. They are common throughout the U.S. and Canada (Rosatte 1987). Striped skunks are primarily nocturnal and do not have a true hibernation period, although during extremely cold weather it may become temporarily dormant. The striped skunk is an omnivore, feeding heavily on insects such as grasshoppers, crickets, beetles, bees and wasp (Chapman and Feldhamer 1982). The striped skunk's diet also includes small mammals, the eggs of ground-nesting birds and amphibians. Striped skunks are typically non-aggressive and will attempt to flee when approached by humans (Rosatte 1987). However, when provoked, skunks will give a warning and assume a defensive posture prior to discharging their foul-smelling musk. This musk is comprised of sulfur-alcohol compounds known as butylmercaptan (Chapman and Feldhamer 1982).

Adult skunks begin breeding in late February. Yearling females (born in the preceding year) mate in late March. Gestation usually lasts about 7-10 weeks. Litters commonly consist of 5-9 young with two litters per year possible (Hall and Kelson 1959). The home range of striped skunks is usually not consistent. It appears to be in relation to life history requirements such as winter denning, feeding activities, dispersal and parturition (Rosatte 1987). According to Chamberlain and Leopold (2001) very little information regarding striped skunk densities in the southeast exists other than those based on harvest numbers and trapper/hunter observations. During the breeding season, males may travel larger areas in search of females. Skunk densities vary widely according to season, food sources and geographic area. Densities have been reported to range from 1 skunk per 77/acres to 1 per 10/acres (Rosatte 1987).

Population estimates for striped skunks in Georgia are currently not available. Striped skunks can be found in a variety of habitats across Georgia. Populations of striped skunks are thought to be stable to decreasing in some areas and increasing in other areas, primarily urban areas (G. Waters, GDNR, pers. comm. 2007). To analyze impacts of WS' activities on striped skunk populations in Georgia, the best available information will be used. There are over 11 million acres of farmland in Georgia (USDA 2006). Using the assumption that only 75% of the farmland throughout Georgia has sufficient habitat to support stripped skunks, skunks are only found in farmland habitat, and skunk densities average 1 skunk per 77/acre (lowest estimate available), a conservative statewide stripped skunk population could be estimated at approximately 107,000 skunks. Considering skunks inhabit urban areas as well as farmland, an estimate of 107,000 skunks is likely very low.

Striped skunks are classified as a furbearer in Georgia with regulated trapping and no take limit (GDNR 2006a). Based on trappers surveys the yearly estimates for striped skunks harvested by trappers in Georgia averaged over 250 per year during 2002-2006 (GDNR 2006b).

WS killed 7 striped skunks in all MDM programs in Georgia during FY 2002-2006 (USDA 2007). In future programs, WS may be requested to address damage being

caused by striped skunks anywhere within the state to protect any resource being damaged or threatened. Based upon an anticipated increase for requests for WS' assistance, it is possible that WS could kill as many as 200 striped skunks each year in MDM programs in Georgia. Under a worse case scenario, the Georgia striped skunk population could be estimated at 107,000 skunks. WS' removal of 200 skunks annually would reduce the statewide population by 0.2%. The skunk population in Georgia is likely much higher than 107,000 skunks which would reduce WS' impacts to skunk populations annually.

Striped skunks 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. Removing this number of striped skunks will have no adverse affect on overall populations of the species in Georgia. Some local populations may be temporarily reduced as a result of MDM projects aimed at reducing damage at a local site.

Based upon the above information, WS' limited lethal take of striped skunks would have no adverse impacts on overall populations of the species in Georgia.

4.1.1.1.1.9 Feral Cat Population Information and Effects Analysis

Feral cats are domesticated cats living in the wild. They are small in stature, weighing from 3 to 8 pounds (1.4 to 3.6 kg), standing 8 to 12 inches (20 to 30.5 cm) high at the shoulder, and 14 to 24 inches (35.5 to 61 cm) long. The tail adds another 20 - 30.5 cm (8 - 12 inches) to their length. Colors range from black to white to orange, and a variety of combinations of those colors. Other hair characteristics also vary greatly (Fitzwater 1994).

Feral cats are found in commensal relationships wherever people are found. In some urban and suburban areas, cat populations equal human populations. In many suburban and eastern rural areas, feral cats are the most abundant predators. They are opportunistic predators and scavengers that feed on rodents, rabbits, shrews, moles, birds, insects, reptiles, amphibians, fish, carrion, garbage, vegetation, and leftover pet food (Fitzwater 1994).

Feral cats produce 2 - 10 kittens during any month of the year. An adult female may produce 3 litters per year where food and habitat are sufficient. Cats may be active during the day but typically are more active during twilight or night. House cats have been reported to live up to 27 years, but feral cats probably average only 3 - 5 years. They are territorial and move within a home range of roughly 4 km^2 (1.5 mi^2). After several generations, feral cats can be considered to be totally wild in habits and temperament (Fitzwater 1994).

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

WS killed 247 feral cats in all MDM programs in Georgia during FY 2002-2006 (USDA 2007). The number of feral cats in Georgia is unknown. The lowest estimate of the U.S. feral cat population is 20 million (Cummings 2003). Feral cats are considered by many wildlife biologists and ornithologists to be a detriment to native wildlife species. Feral cats prey upon native wildlife species and compete with native predators for prey. Thus, removing feral cats could be considered to have beneficial affects on the environment by elimination of predation and competition from an introduction species in the environment.

In future programs, WS may be requested to address damage being caused by feral cats anywhere in Georgia to protect any resource being damaged or threatened. It is possible that WS could kill as many as 500 feral cats each year in MDM programs in Georgia. Feral cats would be removed in projects aimed at protecting human safety, valuable wildlife, or captive wildlife. Feral cats are not viewed as furbearers in Georgia.

Based upon the above information, WS' limited lethal removal of feral cats would have minimal effects on local or statewide populations of this species in Georgia. Any MDM involving lethal control actions by WS would be restricted to isolated individual sites. Some local populations may be temporarily reduced as a result of MDM projects aimed at reducing damage 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 a beneficial impact on the human environment since these species are not considered part of the native ecosystem.

4.1.1.1.1.10 Feral Dog Population Information and Effects Analysis

Like domestic dogs, feral dogs (sometimes referred to as wild or free-ranging dogs) manifest themselves in a variety of shapes, sizes, colors, and even breeds. McKnight (1964) noted German shepherds, Doberman pinschers, and collies as breeds that often become feral. Most feral dogs today are descendants of domestic dogs that appear similar to dog breeds that are locally common (Green and Gipson 1994). The primary feature that distinguishes feral from domestic dogs is the degree of reliance or dependence on humans, and in some respect, their behavior toward people. Feral dogs survive and reproduce independently of human intervention or assistance. While it is true that some feral dogs use human garbage for food, others acquire their primary subsistence by hunting and scavenging like other wild canids.

Feral and domestic dogs often differ markedly in their behavior toward people. Scott and Causey (1973) based their classification of those two types by observing the behavior of dogs while confined in cage traps. Domestic dogs usually wagged their tails or exhibited a calm disposition when a human approached, whereas most feral dogs showed highly aggressive behavior, growling, barking, and attempting to bite. Some dogs were intermediate in their behavior and couldn't be classified as either feral or domestic based solely on their reaction to humans. Since many feral dogs have been pursued, shot at, or trapped by people, their aggressive behavior toward humans is not surprising. Gipson (1983) described the numerous lead pellets imbedded under the skin of a feral dog caught in Arkansas as a testament to its relationship with people (Green and Gipson 1994).

Feral dogs are usually secretive and wary of people. Thus, they are active during dawn, dusk, and at night, much like other wild canids. They often travel in packs or groups and may have rendezvous sites, similar to wolves. Travel routes to and from the gathering or

den sites may be well defined. Food scraps and other evidence of concentrated activity may be observed at gathering sites.

The appearance of tracks left by feral dogs varies with the size and weight of the animal. Generally, dog tracks are more round and show more prominent nail marks than those of coyotes, and they are usually larger than those of fox. Since a pack of feral dogs likely consists of animals in a variety of sizes and shapes, the tracks from a pack of dogs will be correspondingly varied, unlike the tracks of a group of coyotes (Green and Gipson 1994).

Feral dogs may occur wherever people are present and permit dogs to roam free, or where people abandon unwanted dogs. Feral dogs probably occur in all of the 50 states, Canada, and Central and South America. They are also common in Europe, Australia, Africa, and on several remote ocean islands, such as the Galapagos. Home ranges of feral dogs vary considerably in size and are probably influenced by the availability of food. Dog packs that are primarily dependent on garbage may remain in the immediate vicinity of a landfill, while other packs that depend on livestock or wild game may forage over an area of 130 km^2 (50 mi^2) or more (Green and Gipson 1994).

Feral dogs are often found in forested areas or shrublands in the vicinity of human habitation. Some people will not tolerate feral dogs in close proximity to human activity; thus they take considerable effort to eliminate them in such areas. Feral dogs may be found on lands where human access is limited, such as military reservations and large airports. They may also live in remote sites, where they feed on wildlife and native fruits. The only areas that do not appear to be suitable for feral dogs are places where food and escape cover are not available, or where large native carnivores, particularly wolves, are common and prey on dogs (Green and Gipson 1994).

Like coyotes, feral dogs are best described as opportunistic feeders. They can be efficient predators, preying on small and large animals, including domestic livestock. Many rely on carrion, particularly road-killed animals, crippled waterfowl, green vegetation, berries and other fruits, and refuse at garbage dumps (Green and Gipson 1994).

Feral dogs are highly adaptable, social carnivores. Gipson (1983) suggested that family groups of feral dogs are more highly organized than previously believed. Pup-rearing may be shared by several members of a pack. Survival of pups born during autumn and winter has been documented, even in areas with harsh winter weather. Gipson found that only one female in a pack of feral dogs studied in Alaska gave birth during two years of study, even though other adult females were present in the pack. The breeding female gave birth during late September or early October during both years. It is noteworthy that all pups from both litters had similar color markings, suggesting that the pups had the same father. Adult males of different colors were present in the pack.

Nesbitt (1975) commented on the rigid social organization of a pack of feral dogs where nonresident dogs were excluded, including females in estrus. In one instance, Nesbitt used three separate female dogs in estrus as bait (dogs were chained in the back of a corral-type trap) over a 59-day period and captured no feral dogs. He then baited the same trap with carrion, and a pack of feral dogs, including four adult males, entered the trap within one week (Green and Gipson 1994).

Hybridization between feral dogs and other wild canids can occur, but non-synchronous estrus periods and pack behavior (that is, excluding non-resident canids from membership

in the pack) may preclude much interbreeding. Dens may be burrows dug in the ground or sheltered spots under abandoned buildings or farm machinery. Feral dogs commonly use former fox or coyote dens (Green and Gipson 1994).

Feral dogs can cause damage by preying on livestock, poultry, house cats, or domestic dogs. They may also feed on fruit crops including melons, berries, grapes, and native fruit. They may also attack people, especially children. This is especially true where they feed at and live around landfills near human dwellings (Green and Gipson 1994). In some locales, they may present a serious threat to deer (Lowry 1978) and other valuable wildlife (Green and Gipson 1994).

WS provided technical assistance for 5 feral dog complaints related to human health and safety from FY 2002 to FY 2006. Most complaints regarding dogs are referred to local animal control agencies since requesters are usually unable to determine whether the dog is feral or a pet. A record is only generated when some kind of technical assistance is provided by WS as a result of the contact.

WS killed 34 feral dogs in all MDM programs in Georgia from FY 2002 through FY 2006 (USDA 2007). This number is insignificant to the total population of this species in the state. In future programs, WS may be requested to address damage being caused by feral dogs anywhere in Georgia to protect any resource being damaged or threatened. It is possible that WS could kill as many as 50 feral dogs each year in MDM programs in the State. Many of those would be removed in projects aimed at protecting human health and safety, valuable wildlife or other natural resources, livestock, or other agriculture. Feral dogs are not viewed as furbearers in Georgia.

Based upon the above information, WS' limited lethal removal of feral dogs should have no adverse effects on overall populations of the species in Georgia. Any MDM involving lethal control actions by WS would be restricted to isolated individual sites. Some local populations may be temporarily reduced as a result of MDM projects aimed at reducing damage at a local site. In those cases where feral dogs are causing damage or are a nuisance and complete removal of the local population could be achieved, this would be considered a beneficial impact on the human environment since those species are not considered part of the native ecosystem.

4.1.1.1.1.11 Gray Squirrel Population Information and Effects Analysis

Eastern gray squirrels are variable in color with a distinct reddish cast to their gray coat. The black color phase is common in some northern parts of their range. Eastern gray squirrels measure 41 - 51 cm (16 - 20 inches). They weigh from 567 - 794g (1 ¼ -1 ¾ lbs) (National Audubon Society 2000).

Gray squirrels are found throughout most of the eastern U.S., including Georgia. They inhabit mixed hardwood forests, especially those containing nut trees such as oak/hickory mix. While this species are referred to as tree squirrels, they spend quite a bit of time on the ground foraging. Squirrels feed on a wide variety of foods and adapt quickly to unusual food sources. Typically they feed on wild tree fruits and nuts in fall and early winter. Acorns, hickory nuts, walnuts, and Osage orange fruits are favorite fall foods. Nuts are often cached for later use. In late winter and early spring they prefer tree buds. In summer they eat fruits, berries, and succulent plant materials. Fungi, corn, and cultivated fruits are taken when available. They may also chew bark during high

population peaks, when food is scarce and may eat insects and other animal matter (Jackson 1994b).

Gray squirrels produce young during early spring but may actually produce at any time until early September (National Audubon Society 2000). Older adults may produce two litters per year (Burt and Grossenheider 1976, Jackson 1994b). The gestation period is 42-45 days, and about three young comprise a litter. Young begin to explore outside the nest at about 10-12 weeks of age (Jackson 1994b). Home ranges of squirrels range from 1.2 to over 40 acres in size (Flyger and Gates 1982).

Gray squirrel populations periodically rise and fall, and during periods of high populations they may go on mass emigrations, during which time many animals die. Squirrels are vulnerable to numerous parasites and diseases such as ticks, mange mites, fleas, and internal parasites. Squirrel hunters often notice bot fly larvae, called "wolves" or "warbles," protruding from the skin of animals killed. Larvae do not impair the quality of the meat for eating. In addition to being a food source for some people, squirrels are also prey for hawks, owls, snakes, and several mammalian predators. Predation seems to have little effect on squirrel populations. Typically about half the squirrels in a population die each year and wild squirrels over 4 years old are rare, while captive individuals may live 10 years or more (Jackson 1994b).

Grey squirrel populations in Georgia are not well documented. However, grey squirrel populations are generally considered stable to increasing, especially around urban areas (G. Waters, GDNR, pers. comm. 2007). Grey squirrel densities fluctuate based on available food sources but long-term densities tend to be stable (Gurnell 1987). In continuous areas of woodlands in North Carolina, grey squirrel densities were typically less than 1.2 squirrels per acre. In urban parks, grey squirrel densities can be more than 8.4 squirrels per acre (Manski et al. 1981). All six of the major land resource areas in Georgia, contain forested areas suitable for gray squirrels. The six resource areas are the Atlantic Coast Flatwoods, Southern Costal Plain, Sand Hill, Southern Piedmont, Blue Ridge, and the Southern Appalachian. Forested acres in those six areas comprise nearly 23.5 million acres. If only 25% of the forested acres in Georgia were suitable habitat for gray squirrels, under a worst case scenario, with a population density of 1.2 gray squirrels per acre, the gray squirrel population could be estimated to be approximately 6 million in Georgia.

Gray squirrels are considered small game by the GDNR in Georgia with a regulated hunting season with a daily bag limit of 12. Information regarding the total number of squirrels killed in Georgia annually is not available.

WS killed 1,022 squirrels in all MDM programs in Georgia during FY 2002-2006 (USDA 2007). In future programs, WS may be requested to address damage being caused by squirrels anywhere in Georgia to protect any resource being damaged or threatened. Based upon an anticipated increase for requests for WS' assistance, it is possible that WS could kill as many as 1,500 squirrels each year in MDM programs in the state. Squirrels would almost always be removed from urban and suburban populations which are not hunted. Removing this number of squirrels will have no adverse effect on overall populations of the species in Georgia. Some local populations may be temporarily reduced as a result of MDM projects aimed at reducing damage at a local project site.

Based upon the above information, WS' limited lethal take of squirrels would have no adverse impacts on overall populations of the species in Georgia.

4.1.1.1.1.12 Woodchuck Population Information and Effects Analysis

The woodchuck, also known as the "groundhog," is a large rodent, often seen in pastures, meadows, and fields in Georgia. They dig large burrows, generally 8-12 inches at the opening, sometimes 5 feet deep and 30 feet long with more than 1 entrance to a spacious grass-filled chamber. Green vegetation such as grasses, clover, and alfalfa forms its diet; at times it will feed heavily on corn and can cause extensive damage in a garden to other crops (National Audubon Society 2000). Woodchucks may also jeopardize the integrity of earthen dams, present hazards to livestock and farm equipment as a result of burrowing; gnaw electrical cables, and damage hoses and other accessories on automobiles by gnawing (Bollengier 1994, USDA 2007).

The breeding season for woodchucks is usually from March through April (Bollengier 1994). Female woodchucks usually produce from 4-6 young (Chapman and Feldhamer 1982). The offspring breed at age 1 and live 4-5 years. Mammal species with high mortality rates, such as rodents (i.e. woodchucks) and lagomorphs (i.e. rabbits), typically possess high reproductive rates and produce large and frequent litters of young (Smith 1996). For example, if a pair of woodchucks and their offspring all survived to breed as soon as possible, with an average litter size of 4 with a 1:1 sex ratio; they could produce over 645 woodchucks through their life time. Woodchuck ranges in the U.S. extend throughout the East, northern Idaho, northeastern North Dakota, southeastern Nebraska, eastern Kansas, northeastern Oklahoma, and south to Virginia and Alabama.

Woodchuck populations in Georgia are not monitored by GDNR or WS. This species is classified as an unprotected non-game species in the state. No limits or seasons are set for the take of this species. A total of 153 woodchucks were killed in MDM activities conducted by WS in Georgia during FY 2005. It is possible that WS could be requested to provide MDM to address woodchuck damage at any location in the State. Based upon current and an anticipated increase in woodchuck damage management activities in the future, it is possible that WS could kill 200 woodchucks per year in all MDM programs in Georgia. 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 MDM projects aimed at reducing damage at a local site. Based upon the above information, WS' limited lethal take of woodchucks would have no adverse impacts on overall woodchuck populations in the State.

4.1.1.1.1.13 River Otter Population Information and Effects Analysis

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

Human encroachment, habitat destruction, and overharvest have eliminated river otters from marginal portions of their range. However, present distribution spans the North American continent from east to west and extends from southern Florida to northern Alaska (Melquist and Dronkert 1987). River otters remained relatively abundant in Georgia despite declines in other parts of the country. River otter are known to occur throughout Georgia where habitat exists.

River otters are a state-regulated furbearer in Georgia with a regulated harvest season with no limit on take. GDNR does not estimate river otter populations. Melquist and Dronkert (1987) summarized studies estimating river otter densities, which showed that densities were about 1 per 175-262 acres in Texas coastal marshes, and ranged from 1 per 1.8 miles to 1 per 3.6 miles of waterway (stream or river). There are approximately 70,150 stream miles in Georgia with nearly 65% considered perennial miles (Methier 2002). Using the conservative estimate of one otter per 2.4 stream miles provided by Novak (1987), and assuming river otters occur in half of the perennial stream habitat in Georgia, the minimum statewide river otter population estimate for Georgia could be estimated at over 10,000 river otters.

WS killed 60 river otters (average = 12/yr) in Georgia while conducting MDM activities during FY 2002 -2006 (USDA 2007). Of those otter taken during MDM activities, 32 were taken as unintentional non-targets during aquatic rodent damage management activities with an annual average take of approximately 7 otter. Non-target take during aquatic rodent damage management activities are discussed and analyzed in WS' aquatic rodent EA for Georgia (see section 1.5.3).

Since FY 2002, requests for assistance to manage damage caused by otter are for the protection of agricultural and natural resources, primarily from aquaculture farms and fish hatcheries in Georgia. Based on previous requests for assistance and anticipating future requests, WS reasonable expects the take of otter will not exceed 25 annually in Georgia to resolve requests to manage damage to resources.

Based upon the aforementioned population estimate, WS' limited lethal take of 25 river otter annually would represent 0.25% of the otter population in Georgia. WS' limited take based on the best available information indications the removal of 25 river otters annually will not adversely impact overall populations in Georgia. Similarly, WS' annual take will not inhibit the ability of those interested to harvest otter during the regulated harvest season.

4.1.1.1.2 Effects on Non-target Species

Direct impacts to non-target species could occur if WS' program personnel were to inadvertently kill, injure, or harass animals that are not target species. In general, those impacts result from the use of methods that are not completely selective for target species. WS' take of non-target species during MDM activities is expected to be extremely low to non-existent. While every precaution is taken to safeguard against taking non-target species, at times changes in local animal movement patterns and other unanticipated events could result in the incidental take of unintended species. Those occurrences are rare and should not affect the overall populations of any species under the current program. Mitigation measures designed and implemented to avoid adverse effects on non-target species are described in Chapter 3.

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. Non-target species are usually not affected by WS' non-lethal management methods, except for the occasional scaring from harassment devices. In those cases, affected non-target wildlife may temporarily leave the immediate vicinity of harassment, but would most likely return after conclusion of the action. Shooting is virtually 100% selective for the target species; therefore no adverse impacts are anticipated from use of this method. WS' personnel use animal lures and set traps and snares in locations that are conducive to capturing target animals while minimizing potential impacts to non-target species. Any non-target species captured unharmed in a live trap would be subsequently released on site, if the WS' personnel determined the animal was capable of surviving once released.

Any operational uses of MDM chemicals would be in accordance with labeling requirements under FIFRA and Georgia pesticide laws and regulations that are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on non-target species populations. No adverse impacts from the use of chemical methods are anticipated. Based on a thorough Risk Assessment, APHIS concluded that, when the WS program uses chemical methods in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997).

Non-target species taken in Georgia are recorded as Target - Unintentional (i.e., they were listed on the agreement as target species but were taken unintentionally during efforts to take other target species) or Non-target (i.e., they were not listed as target species on the agreement and were taken unintentionally during efforts to take target species). With this type of data recording, some species were targets in some situations and non-targets in others. Non-target mammals killed by WS during MDM activities in Georgia during FY 2002-2006 included armadillo (5), coyote (6), feral cat (1), gray fox (2), gray squirrel (1), opossum (12) and raccoons (9) (USDA 2007). The levels of non-target take for each of those species is insignificant and had no adverse affect on their populations in the Georgia. WS does not anticipate the level of non-target take to increase substantially above current levels of take. Any other non-target species that may incidentally be taken by WS is expected to be minimal and should have no adverse effect on statewide populations.

This alternative has the greatest possibility of having beneficial effects on non-target species by successfully reducing mammal damage and conflicts to wildlife species since all MDM methods could possibly be implemented or recommended by WS.

4.1.1.2 Effects on Threatened and Endangered Species

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has reviewed the USFWS' and the GDNR list of federal and state T&E species for Georgia to determine whether any T&E species might be affected by the proposed action. Mitigation measures designed and implemented to avoid adverse effects on T&E species were described in Chapter 3 (subsection 3.4).

4.1.1.2.1 Federally Listed Threatened and Endangered Species

WS has consulted with the USFWS under Section 7 of the ESA concerning potential impacts of WS' MDM methods on T&E species, and has obtained a Biological Opinion (BO). For the full context of the BO, see Appendix F of the WS' FEIS (USDA 1997). WS is also in the process of reinitiating Section 7 consultation at the national level to assure that potential effects on T&E species have been adequately addressed.

WS has reviewed the USFWS list of T&E species for the state of Georgia and has determined the proposed MDM program will not adversely affect those T&E species included in the USFWS 1992 BO. This determination is based on an evaluation of MDM methods used by the WS' program, including those used in Georgia. In addition, WS has determined that the proposed MDM program will have no effect on those species not included in the BO and on any new T&E species or critical habitat listed since completion of the 1992 BO. Furthermore, if WS' MDM assistance is requested at a location where T&E species are known to be present, and this species and/or specific method(s) are not included in the 1992 BO, WS will consult with the USFWS prior to taking any management actions.

4.1.1.2.2 State Listed Threatened and Endangered Species

WS has obtained and reviewed the list of Georgia State listed T&E species (Appendix C) and has determined that the proposed MDM program is not likely to adversely impact any state listed endangered or threatened species

4.1.1.3 Effects on Human Health and Safety

When used improperly or by untrained individuals, various methods used in MDM projects could pose risks to humans. Methods analyzed that could pose risks to human health and safety include the use of chemicals, firearms, snares, foothold traps, conibear traps, and harassment with pyrotechnics. No accidents resulting in harm to any persons have occurred under the current MDM program in Georgia. A formal risk assessment of WS' operational management methods found that risks to human safety were low (USDA 1997). WS' SOP include measures intended to mitigate or reduce the effects on human health and safety and are presented in Chapter 3. Risk to members of the public from WS' use of pyrotechnics to harass offending animals, or from use of chemicals, firearms, snares, foothold traps or body-gripping traps to take mammals would remain low due to adherence to WS' policies, required safety precautions, and training.

4.1.1.3.1 Safety and Efficacy of Chemical Control Methods Used in MDM

Non-lethal MDM chemicals that might be used or recommended by WS include repellents. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before EPA or FDA would register them. Any operational uses of chemical repellents would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations that are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health and safety.

Drugs used in capturing, handling, and euthanizing wildlife for wildlife hazard management purposes include ketamine, a mixture of ketamine/xylazine, sodium pentobarbital, potassium chloride, and Beuthanasia-D. Meeting the requirements of the Animal Medicinal Drug Use Clarification Act (AMDUCA) should prevent any significant adverse impacts on human

health with regard to this issue (see Appendix D). Mitigation measures that would be part of the standard operating procedures 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 AMDUCA), wildlife hazard management programs may choose to avoid capture and handling activities that utilize immobilizing drugs within a specified number of days prior to the hunting or trapping season for the target species to avoid release of animals that may be consumed by hunters prior to the end of established withdrawal periods for the particular drugs 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 Georgia 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 AMDUCA, wildlife management programs would avoid any significant impacts on human health with regard to this issue.

4.1.1.3.2 Effects on Human Health and Safety from Non-Chemical MDM Methods

Non-chemical MDM methods that might raise safety concerns include shooting with firearms; use of traps and snares; and harassment with pyrotechnics. No adverse affects on human safety from WS' use of these methods is expected.

Firearms, traps, snares and pyrotechnics are only used by WS' personnel who are experienced in handling and using them. WS' personnel use firearms to shoot mammals and euthanize animals caught in traps. WS' personnel are trained and given refresher courses to maintain awareness of firearm and pyrotechnic safety and handling as prescribed by WS' policy. Snares and traps are strategically placed to minimize non-target take and minimize exposure to the public. Signs are used to post properties where traps are set to alert the public of their presence.

4.1.1.3.3 Effects on Human Health and Safety from not Conducting MDM

People are concerned with potential disease threats; and injury and loss of human life as a result of mammal/aircraft collisions. An IWDM strategy, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing this risk. All WDM methods could possibly be implemented and recommended by WS.

4.1.1.4 Effects on Socio-cultural Elements and Economics of the Human Environment

4.1.1.4.1 Effects on Human Affectionate-Bonds and Aesthetic Values of Wild Mammals

Some members of the public have expressed opposition to the killing of any mammals during MDM activities. Under this Proposed Action alternative, some lethal control of mammals would occur and those persons would be opposed. However, many persons who voice opposition have no direct connection or opportunity to view or enjoy the particular animals that would be killed by WS' lethal control activities. Lethal control actions would generally be restricted to local sites and to small, unsubstantial percentages of overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would, therefore, continue to remain available for viewing by persons with that interest. Lethal removal of mammals from airports should not affect the public's enjoyment of the aesthetics of the environment since airport properties are closed to public access. The ability to view and interact with animals at those sites is usually either restricted to viewing from a location outside boundary fences or is forbidden.

As discussed in Subsection 2.3.3.1, some people form human affectionate-bonds with individual wild or feral mammals. For some, removal of these individual animals is considered objectionable because these animals may be considered pets, or the relationship which exists may be similar to that experienced with domestic pets. A number of professionals in the field of psychology have studied human behavior in response to attachment to pet animals (Gerwolls and Labbott 1994, Marks and Koepke 1994, Zasloff 1996, Archer 1997, Ross and Baron-Sorensen 1998, Meyers 2000). Similar observations are probably applicable to close bonds which could exist between people and wild animals. For some, humans experience affection for pet animals is similar in scope and meaning to human-human affections (Stephens and Hill 1996, Boyce 1998). Loss of this relationship may cause a sense of loss, the experiences of grief, and the need for healing and acceptance of the loss and rebuilding, which can include establishing new bonds with other animals or engaging in other activities (Lefrancois 1999).

If humans establish affectionate relationships with wild animals, removal of those individual animals from certain sites by WS' MDM actions may result in a loss of those established bonds. However, as affected individuals follow the usual human pattern related to the experience of loss, they will experience recovery and may establish new bonds with other animals. WS' MDM actions rarely remove all mammals or even all mammals of one species from a locale where actions occur. Individuals wishing to establish bonds with wild animals will still be able to interact with them. Therefore, WS' MDM programs are not expected to markedly affect this element of the human environment.

Some individuals obtain aesthetic benefit from viewing animals in the wild and may feel that removal of such animals from a locale by WS' MDM programs could affect their aesthetic enjoyment. In addition, some people do not believe that mammals should even be harassed to stop or reduce damage problems. They are concerned that their ability to view mammals is lessened by WS' non-lethal harassment efforts. The public's ability to view wild mammals in a particular area would be more limited if the mammals are removed or relocated. However, immigration of mammals from other areas could possibly replace the animals removed or relocated during a damage management action. The opportunity to view or feed other wildlife would also be available if an individual makes the effort to visit other areas with adequate habitat and local populations of the species of interest. The live capture and translocation or killing of some mammals may result in complete, but usually temporary,

removal of all of those mammals from one property. However, adjacent properties in nearby neighborhoods would likely contain mammals of the same species.

Some individuals are offended by the presence of overabundant mammal species, and feel that their overall enjoyment of wildlife is diminished by the presence of such species. In cases where WS' MDM actions reduce the numbers of overabundant mammal species, the removal or relocation of those animals may actually enhance the aesthetic value of wildlife for these affected individuals.

4.1.1.4.2 Effects on Aesthetics and Value of Property Damaged by Mammals

Damage to property would be expected to decrease under this alternative since all available damage management methods and strategies would be available for WS' use and consideration which could result in a more timely and efficient resolution of the damage request. A more timely resolution would allow for the restoration of the aesthetic value of property to begin quicker compared to the displeasing aesthetic value of ongoing damage that could occur if methods available to resolve the damage were limited and ineffective.

4.1.1.5 Humaneness of Methods Used by WS

MDM methods viewed by some persons as inhumane would be employed by WS under this alternative. Despite SOP designed to maximize humaneness, the perceived stress and trauma associated with being held in foothold traps or snares 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 take 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. Those methods however, are also considered inhumane by some individuals.

WS' personnel are experienced and professional in their use of management methods, and methods are applied as humanely as possible. Under this Alternative, mammals would be trapped as humanely as possible or euthanized by experienced WS' personnel using the best and most appropriate method(s) available.

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.

4.1.2 Alternative 2 - Technical Assistance Only

4.1.2.1 Effects on Target and Non-target Wildlife

4.1.2.1.1 Effects on Target Species

Under this alternative, WS would have no impact on target mammal populations in Georgia because the program would not provide any operational MDM activities. The program would be limited to providing advice or demonstrations only. Some resource owners experiencing damage may implement their own damage management strategies, assistance from private businesses, or take no action. Some mammal populations would continue to increase where

trapping and shooting pressure was low and may decline or stabilize where trapping and shooting pressure was adequate.

Since affected resource owners would likely lethally remove the damaging mammal that would no longer be removed by WS, private efforts to reduce or prevent mammal damage and perceived disease transmission risks could increase, which could result in similar or even greater effects on those populations than the Proposed Action. However, for the same reasons shown 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. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target mammal populations (USDA 1997, White et al. 1989, USFWS 2001, FDA 2003).

4.1.2.1.2 Effects on Non-target Species

This Alternative would not allow any WS' direct operational MDM in Georgia. Non-target species would not be impacted by WS' activities from this alternative. Technical assistance or self-help information would be provided at the request of cooperators. Although technical support might lead to more selective use of control methods by private parties than that which might occur under Alternative 3, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods, leading to greater take of non-target wildlife than under the proposed action. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including some T&E species (USDA 1997, White et al. 1989, USFWS 2001, FDA 2003).

The ability to reduce negative impacts caused by mammals to wildlife species would be variable based upon the skills and abilities of the person implementing control actions. It would be expected that this alternative would have a greater chance of reducing damage than Alternative 3 since WS would be available to provide information and advice.

4.1.2.2 Effects on Threatened and Endangered Species

Under this alternative, WS would have no direct impact to T&E species in Georgia. All requests for assistance would be addressed using technical assistance and demonstration of methods available. Both non-lethal and lethal methods could be recommended and demonstrated based on those legally available for use by the requestor. Based on WS' technical assistance, those experiencing damage could implement WS' recommendations, employ other methodologies, seek assistance from private business, or take no action. Potential impacts from WS' recommendations would be based on the requestor's knowledge, skill, and abilities in implementing those recommendations and an understanding of the species responsible for doing the damage.

Therefore, WS' involvement could reduce any potential risks to T&E species since if WS' recommendations and guidance are followed by the requestor, then potential impacts to T&E species will be lessened compared to a person who implements damage management methods will little to no knowledge of the methods employed, the species responsible for the damage, or potential T&E species in the vicinity of the action. However, requestors may be more inclined to conducted damage management based on WS' recommendations, which could lead to an

increased risk to T&E species that might inhabit the damage management area. As part of WS' recommendation and demonstration, T&E impacts could be discussed with those requesting assistance which would facilitate implementation of those methods to avoid T&E impacts if WS recommendations are followed.

Compared to Alternative 1, the potential effects to T&E species under this Alternative would likely be greater since WS is aware of and coordinates activities with federal and state agencies to ensure T&E species are not jeopardized by WS' activities. However, compared to Alternative 3, the potential impacts of this alternative could be lower since under Alternative 3, WS' would refer all those requesting assistance to other agencies and private business with no exchange of potential impacts to T&E species from methods available for use to resolve damage. If WS' recommendation are not followed by those requesting assistance then T&E impacts would likely be similar to Alternative 3.

4.1.2.3 Effects on Human Health and Safety

4.1.2.3.1 Safety and Efficacy of Chemical Control Methods Used in MDM

Concerns about human health and safety risks from WS' use of chemical MDM methods would be alleviated because no such use would occur. WS would provide technical assistance to those persons requesting assistance. Resource owners could use information provided by WS or implement their own damage reduction program without WS' technical assistance. Resource owners could use any legal MDM chemical available for use. Negative impacts to human health and safety resulting from the improper use of chemical control methods should be less than Alternative 3 when WS' technical advice is followed.

4.1.2.3.2 Effects on Human Health and Safety from Non-Chemical MDM Methods

Under this alternative, WS would not be directly involved in the use of non-chemical methods to alleviate damage caused by mammals in Georgia. Those requesting assistance could receive information from WS to implement to resolve damage. The potential impacts to human safety would be based on the knowledge, skill, and abilities of those requestors employing those methods to resolve damage. Requestors may be more inclined to employ methods that are recommended or demonstrated by WS to resolve damage which could increase the risks to human safety if WS' recommendations are not followed correctly. However, the potential impacts to human safety would be lower if WS' recommendations are followed and methods are employed according to WS' recommendations. Therefore, the risks to human safety are likely greater under this alternative compared to Alternative 3 but are lower when compared to Alternative 1.

4.1.2.3.3 Effects on Human Health and Safety from not Conducting MDM

Resource owners could use the information provided by WS or implement their own damage reduction program without WS' technical assistance. When WS' technical advice is requested and followed, disease and mammal aircraft strike threats to human health and safety should be less than Alternative 4. However, resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods. Therefore, adverse impacts to human health and safety could be greater under this alternative than the proposed action alternative dependent upon the skills and abilities of the person implementing MDM control methods.

4.1.2.4 Effects on the Socio-cultural Elements and Economics of the Human Environment

4.1.2.4.1 Effects on Human Affectionate-Bonds and Aesthetic Values of Wild Mammals

Under the technical assistance only alternative, WS would not be directly involved in the take of mammals to resolve associated damage resulting in no direct impacts to affectionate-bonds. However, similar to other issues related to this alternative, WS would recommend and demonstrate the use of non-lethal and lethal methods legally available to requestors. Therefore, requestors may be more inclined to implement methods recommended by WS. However, the potential impacts to people's relationship with individual or groups of mammals would be lower if WS' recommendations are followed and methods are employed according to WS' recommendations. Therefore, similar to other issues under this alternative, the effects are likely greater under this alternative compared to Alternative 3 but are lower when compared to Alternative 1.

4.1.2.4.2 Effects on Aesthetics and Value of Property Damaged by Mammals

Like other issues addressed under this alternative, WS would have no direct impact on the aesthetic value of property damaged by mammals since WS' involvement would be limited to providing guidance on the use and availability of methods to resolve damage. However, as addressed with other issues under this alternative, the knowledge, skills, and abilities of the requestor in following and implementing WS' recommendation would affect the timeliness and efficacy of resolving damage which would result in a reduction or restoration of the aesthetic and monetary value of resources damaged. The effects on the aesthetics and value of resources damage would likely be largely positive under this alternative if WS' recommendation are followed and implemented. Therefore, the effects of this issue would likely be similar to or lower when compared to Alternative 1 but greater compared to Alternative 3.

4.1.2.5 Humaneness of Methods Used by WS

The issue of humaneness of methods under this alternative would be similar to those addressed under the proposed action in section 4.1.1.5. WS would not be directly involved in the use of methods to resolve mammal damage. However, WS would be indirectly involved since methods recommended to resolve damage would be those available to WS that are also legally available to the requestor. Therefore, the issue of humanness would be based on whether the requestor implements the methods recommended by WS and whether recommendations to ensure humane use of those methods are followed by the requestor. If requestors employ methods recommended by WS in a humane manner then this issue would be similar to the proposed action. If WS recommendation are not followed or are followed but not correctly, then the potential issue of the humane use of methods would be higher when compared to Alternative 1 and similar to Alternative 3.

4.1.3 Alternative 3 - No WS' MDM Program

4.1.3.1 Effects on Target and Non-target Wildlife

4.1.3.1.1 Effects on Target Species

Under this alternative, WS would not be involved in responding to requests for assistance to manage damage or reduce threats caused by mammals in Georgia. WS would not be directly

involved with any damage management program to resolve damage. Those individuals interested in the use of non-lethal and lethal methods could continue to use those methods to manage damage and threats to safety as deemed appropriate by the individual and as regulated by federal, state, and local laws and regulations. WS would have no impact on mammals in Georgia under this alternative given that no direct operational activities or technical assistance would occur. Impacts to mammal populations under this alternative would not change the environmental status quo since activities to manage damage and threats caused by mammals are likely to occur in the absence of WS' involvement, including the use of non-lethal and lethal methods, as governed by federal, state, or local laws and regulations.

Since affected resource owners would likely lethally remove the mammal that would no longer be removed by WS, private efforts to reduce or prevent mammal damage and perceived disease transmission risks could increase, which could result in similar or even greater effects on those populations than the proposed action. However, for the same reasons shown 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. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target mammal populations (USDA 1997, White et al. 1989, USFWS 2001, FDA 2003).

4.1.3.1.2 Effects on Non-target Species

There would be no impact on other wildlife species by WS from this alternative. Management actions taken by non-federal entities would be considered the environmental status quo.

There would be no involvement in MDM by WS under alternative 3 resulting in no impact on non-target species. Private efforts to reduce or prevent damage could result in less experienced persons implementing control methods, leading to greater take of non-target wildlife than under the proposed action. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including some T&E species (USDA 1997, White et al. 1989, USFWS 2001, FDA 2003).

4.1.3.2 Effects on Threatened and Endangered Species

Under the no WS' involvement alternative, WS would have no impact on T&E species since all requests for assistance would be referred to other entities. Assistance from those entities may or may not be available to requestors. The lack of availability of assistance could lead to frustration of resource owners experiencing damage leading to the employment of illegal or inappropriate methods to resolve damage. This behavior could lead to greater risks to T&E species that may be present in the area where damage is occurring.

4.1.3.3 Effects on Human Health and Safety

4.1.3.3.1 Safety and Efficacy of Chemical Methods Used in MDM

WS would have no impact on this issue. Management actions taken by non-federal entities would be considered the environmental status quo.

Concerns about human health and safety risks from WS' use of chemical MDM methods would be alleviated because no such use would occur. Resource owners could use any legal MDM chemical available to them, including EPA registered chemicals. Without professional assistance or proper training in the use of chemical MDM methods, there is the potential for increased risks to public safety. Resource owners inexperienced in the safe and proper use of chemical MDM methods may attempt to resolve mammal damage problems.

The potential for illegal use of chemical toxicants under this alternative might pose threats to human health and safety if such chemicals were used indiscriminately in areas used by humans, or where such chemicals might be transported into the human food chain.

4.1.3.3.2 Effects on Human Health and Safety from Non-Chemical MDM Methods

WS would have no impact on this issue. Management actions taken by non-federal entities would be considered the environmental status quo.

Concerns about human health and safety risks from WS' use of non-chemical MDM methods would be alleviated because no such use would occur. Resource owners could use any legal MDM non-chemical available to them, including pyrotechnics, traps, snares, and firearms. Without professional assistance or proper training in the use of non-chemical MDM methods, there is the potential for increased risks to public safety. Resource owners inexperienced in the safe and proper use of non-chemical MDM methods may attempt to resolve mammal damage problems. These increased risks are associated with the improper or inexperienced use of damage management methods such as trapping and shooting.

4.1.3.3.3 Effects on Human Health and Safety from not Conducting MDM

WS would have no impact on this issue. Management actions taken by non-federal entities would be considered the environmental status quo.

Mammal damage would likely continue to increase unless resource owners implemented an effective MDM program in the absence of WS. Resource owners could implement their own damage reduction program without WS' assistance. Resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods. Therefore, adverse impacts to human health and safety could be greater under this alternative than the proposed action alternative dependent upon the skills and abilities of the person implementing MDM control methods.

4.1.3.4 Effects on the Socio-cultural Elements and Economics of the Human Environment

4.1.3.4.1 Effects on Human Affectionate-Bonds and Aesthetic Values of Mammals

Under the no program alternative, WS' actions would have no impact on the aesthetic value of mammals in Georgia. Methods for managing damage or threats associated with mammals could still be employed or recommended by other agencies, entities, or the public. The impacts to the aesthetic value of mammals in the absence of a WS' program would be considered the environmental status quo.

4.1.3.4.2 Effects on Aesthetics and Value of Property Damaged by Mammals

WS would have no impact on this issue. Management actions taken by other entities would be considered the environmental status quo.

Mammal damage would likely continue to increase unless resource owners implemented an effective MDM program in the absence of WS. Resource owners could implement their own damage reduction program without WS' assistance. Resource owners' efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods. Therefore, adverse impacts could be greater under this alternative than the proposed action alternative dependent upon the skills and abilities of the person implementing MDM control methods.

4.1.3.5 Humaneness of Methods Used by WS

Under this alternative, the issues of the humanness of methods would not be considered by WS. WS would have no involvement in any aspect of MDM in Georgia. Those experiencing damage or are threatened by mammals could use those methods legally available to them. 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.

Similar to the technical assistance alternative, the efficacy and therefore, 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 WS' involvement 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.

4.2 SUMMARY OF POTENTIAL IMPACTS

Table 4.2 summarizes the expected impact of each of the alternatives on each of the issues.

Table 4.2 Alternative Effects on Issues Compared

Issues/Alternatives	Alternative 1. Continue Current IWDM Program	Alternative 2. Technical Assistance Only	Alternative 3. No WS' MDM Program
Effects on Wildlife	*Low effect.* Reductions in local target mammal numbers by WS; would have minimal effects on local and state populations. *Low effect.* No adverse affect on non-target species by WS. Methods used by WS	No direct effect by WS on target mammal populations and non-target species. *Low to moderate effect.* If resource owners conduct their own MDM, impacts on target mammal populations could be similar or greater than	No effect by WS on target mammal populations and non-target species. *Low to moderate effect.* If resource owners conduct their own MDM, impacts on target mammal populations could be similar or greater than Alternative 1; increased possibility that non-targets

Issues/Alternatives	Alternative 1. Continue Current IWDM Program	Alternative 2. Technical Assistance Only	Alternative 3. No WS' MDM Program
	would be highly selective with very little risk to non-target species. Some species could be affected positively by WS' MDM actions.	Alternative 1; increased possibility that non-targets species maybe taken, less likely than Alternative 3. Beneficial impacts would be variable.	species maybe taken. Beneficial impacts would be variable.
Effects on T&E Species	WS has consulted with the USFWS to ensure WS actions will not jeopardize T&E species	No direct impact from WS. Potential impacts highly variable based on skill, knowledge, and ability of person employing methods. Potential impacts similar to Alternative 1 if WS recommendations are followed. Slightly higher if recommendations are not followed compared to Alternative 1. Similar to or slightly lower compared to Alternative 3.	No impact from WS. Potential impacts highly variable depending on knowledge, skill, and ability of target species and employment of damage management methods to resolve damage. Potential impacts are likely similar to Alternative 2 but risks are greater compared to Alternative 1.
Effects on Human Health and Safety	***(Methods)*** *- Low effect.* Methods used by WS would be safe with no probable risk to human health and safety. ***(Mammal Threats)*** *- Moderate to high effect.* The proposed action has the greatest potential of successfully reducing this risk.	***(Methods)*** *– Low to moderate effect.* No effect by WS. Resource owner's impacts would be variable dependent upon experience and knowledge of person implementing methods. Negative impacts resulting from the improper use of control methods should be less than Alternative 3. ***(Mammal Threats)*** *- Low to high effect.* Impacts would be variable dependent upon experience and knowledge	***(Methods)*** *– Low to moderate effect.* No effect by WS. Resource owner's impacts would be variable dependent upon experience and knowledge of person implementing methods. ***(Mammal Threats)*** *- Low to high effect.* Impacts would be variable dependent upon experience and knowledge of person implementing methods.

Issues/Alternatives	Alternative 1. Continue Current IWDM Program	Alternative 2. Technical Assistance Only	Alternative 3. No WS' MDM Program
		of person implementing methods.	
Effects on Socio-Cultural Elements And Economics Of the Human Environment	*Variable effects.* Some would oppose this alternative, others would support it. Those people adversely affected by wildlife damage would likely favor this alternative.	*Variable effects.* Some would oppose this alternative, others would support it. No effect by WS. Resource owners would likely conduct MDM activities no longer conducted by WS resulting in impacts similar to Alternative 1; Damage may not be reduced in a timely and effective manner for some projects.	*Variable effects.* Some would oppose this alternative, others would support it. No effect by WS. Resource owners would likely conduct MDM activities no longer conducted by WS resulting in impacts similar to the proposed program. Damage may not be reduced in a timely and effective manner for some projects.
Humaneness Of Methods Used by WS	*Variable effect.* Methods viewed by some people as inhumane would be used by WS.	*Variable effect.* No effect by WS. Resource owner's impacts would be variable dependent upon experience and knowledge of person implementing methods.	*Variable effect.* No effect by WS. Resource owner's impacts would be variable dependent upon experience and knowledge of person implementing methods.

4.3 CUMULATIVE IMPACTS OF THE PROPOSED ALTERNATIVE BY ISSUE

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

Under Alternatives 1, 2, and 3 WS would address damage associated with mammals in a number of situations throughout Georgia. The WS' MDM program would be the primary federal program with MDM responsibilities; however, some state and local government agencies may conduct MDM activities in Georgia as well. Through ongoing coordination with those agencies, WS is aware of such MDM activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with such agencies in the same area, but may conduct MDM activities at adjacent sites within the same time frame. In addition, commercial pest control companies

may conduct MDM activities in the same area. The potential cumulative impacts analyzed below could occur either as a result of WS' MDM program activities over time, or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

4.3.1 Cumulative Impacts on Wildlife

Evaluation of MDM program activities relative to target, non-target and T&E species indicated that program activities will likely have no cumulative adverse effects on wildlife populations in Georgia. MDM program 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 target, non-target, and T&E species
- Human-induced mortality of target and non-target species through hunting, MDM, and other activities
- Human and naturally induced alterations of wildlife habitat
- Annual and perennial cycles in wildlife population densities

All these factors play a role in the dynamics of wildlife populations. In many circumstances, MDM is necessary to reduce damage 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, non-target, and T&E species.

No cumulative adverse impacts on target and non-target wildlife are expected from WS' MDM actions based on the following considerations:

1. Historical outcomes of WS' MDM programs on wildlife

No cumulative adverse affects have been identified for target, non-target, and T&E species identified in this EA as a result of MDM program activities implemented over time.

2. SOP and mitigation strategies built into WS' MDM program

SOPs and mitigation measures are designed to reduce the potential negative effects of WS' MDM actions on wildlife, and are tailored to respond to changes in wildlife populations which could result from unforeseen environmental changes. This would include those changes occurring from sources other than WS. Alterations in MDM programs are defined through SOP and mitigation measures, and implementation is insured through monitoring, in accordance with the WS' Decision Model (Slate et al. 1992).

3. Current status of potentially affected wildlife species

Natural and human-induced mortality patterns for target, non-target, and T&E species are expected to remain essentially unchanged in Georgia. This is true of elements outside WS' MDM conducted programs and the programs themselves. As a result, no cumulative adverse affects are

expected from repetitive MDM programs over time in the fairly static set of conditions currently affecting wildlife in Georgia.

4.3.2 Cumulative Impacts on Human Health and Safety

Non-Chemical Methods

All non-chemical MDM methods, such as trapping, snaring, shooting, harassment methods, etc. are used within a limited time frame, are not residual, and do not possess properties capable of inducing cumulative adverse impacts on human health and safety.

Chemical Methods

Non-lethal chemicals may be used or recommended by the WS' program in Georgia. Characteristics of these chemicals and use patterns indicate that no cumulative adverse impacts related to environmental fate are expected from their use in MDM programs in Georgia.

4.3.3 Cumulative Impacts on Socio-cultural Elements and Economics of the Human Environment

Five aspects of this issue have been identified in the EA:

- possible disruption of human affectionate-bonds which some people develop with individual wild or feral mammals,
- possible decrease in aesthetic enjoyment which some people gain by feeding, and viewing wild or feral mammals,
- decrease in aesthetic enjoyment of feral or wild mammals experienced by some people as a result of overabundant species present, and
- degradation or loss of value of properties by some people as a result of the presence of too many individuals of a species.

This Subsection evaluates possible cumulative effects of each of those elements.

4.3.3.1 Cumulative Impacts on Human Affectionate-bonds

In the wild, few animals in the United States have life spans approaching that of humans. Mortality is high among wildlife populations and specific individuals among a species may experience death early in life. This is a natural occurrence and humans who form affectionate bonds with animals experience loss of those animals over time in most instances. A number of professionals in the field of psychology have studied human behavior in response to attachment to pet animals (Gerwolls and Labott 1994, Marks and Koepke 1994, Zasloff 1996, Archer 1999, Ross and Baron-Sorensen 1998, Meyers, 2000). Similar observations are probably applicable to close bonds which could exist between people and wild animals. As observed by researchers in human behavior, normal human responses to loss of loved ones proceed through phases of shock or emotional numbness, sense of loss, grief, acceptance of the loss or what cannot be changed, healing, and acceptance and rebuilding which leads to resumption of normal lives (Lefrancois 1999). Those who lose companion animals, or animals for which they may have developed a bond and affection, are observed to proceed through the same phases as with the loss of human companions (Gerwolls 1994, Boyce 1998, Meyers 2000). However, they usually establish a bond with other individual animals after such losses. Although they may lose the sense of enjoyment and meaning from the association with those animals which die or are no longer accessible, they

usually find a similar meaningfulness by establishing an association with new individual animals or through other relational activities (Weisman 1991). Through this process of coping with the loss and establishing new affectionate bonds, people may avoid compounding emotional effects resulting from such losses (Parkes 1979, Lefrancois 1999).

Some mammals with which humans have established affectionate bonds may be removed from some project sites by WS. However, other individuals of the same species would likely continue to be present in the affected area and people would tend to establish new bonds with those remaining animals. In addition, human behavior processes usually result in individuals ultimately returning to normalcy after experiencing the loss of association with a wild animal which might be removed from a specific location. Other activities that may impact human affection bonds on wildlife include those activities identified in section 4.3.1

WS' activities are not expected to have any cumulative adverse affects on this element of the human environment.

4.3.3.2 Cumulative Impacts on Aesthetic Enjoyment of Wildlife

Those who enjoy viewing wildlife may experience a temporary reduction in being able to view wildlife at some sites where WS' program activities are implemented. However, other individuals of the same species would likely continue to be present in the affected area, and would also likely be available for viewing and enjoyment at adjacent locations. Other activities that may impact the aesthetic enjoyment of wildlife include those activities identified in section 4.3.1.

Some people experience a decrease in aesthetic enjoyment of wildlife because they feel that overabundant species are objectionable and interfere with their enjoyment of wildlife in general. Continued increases in numbers of individuals or the continued presence of an overabundant species may lead to further degradation of some people's enjoyment of any wildlife. WS' MDM actions could positively affect the aesthetic enjoyment of wildlife for those people that are being adversely affected by the target species identified in this EA.

WS' activities are not expected to have any cumulative adverse affects on this element of the human environment.

4.3.3.3 Cumulative Impacts on Economic Loss Resulting From Overabundant Wildlife

Landowners, business owners, and managers of land in public trust are concerned with economic losses that may occur as a result of excessive populations of a species. Over time, large populations of target mammal species have the ability to greatly affect the quality of protected resources and also increase anxiety and frustration among affected individuals. Cumulative damage can occur over time, if no remedy is found. The implementation of a MDM program could positively affect economic elements at affected sites and reduce the likelihood of recurrent damage.

WS' activities are not expected to have any cumulative adverse affects on this element of the human environment.

4.3.4 Cumulative Impacts on Concerns about Humaneness of MDM Methods

WS continues to seek new methods and ways to improve current technology to improve humaneness of methods used to manage damage caused by mammals. Cooperation with individuals and organizations involved in animal welfare continues to be an agency priority for the purpose of evaluating strategies and defining research aimed at developing MDM methods. Because WS continues to develop and implement more humane methods as technology advances, and also makes this information available to non-WS entities, no cumulative adverse affects from WS' activities are expected in relation to this element of the human environment.

4.4 SUMMARY OF CUMULATIVE IMPACTS

No significant cumulative environmental impacts are expected from any of the 3 alternatives including the Proposed Action. WS' management activities will not adversely impact protected flora and fauna in Georgia, including T&E species. Under the Proposed Action, the lethal removal of target mammal species by WS would not have a significant impact on overall mammal populations in Georgia, but some local reductions may occur.

No risk to human health and safety is expected when services are provided and accepted by requesting individuals in Alternatives 1 and 2, since only trained and experienced wildlife biologists and wildlife specialists would conduct and recommend MDM methods. There is a slight increased risk to human safety when persons who reject WS' assistance and recommendations in Alternatives 1 and Alternative 2 and conduct their own MDM activities, and when no WS' assistance is provided in Alternative 3. In all 3 Alternatives, however, it would not be to the point that the impacts would be significant.

Under Alternative 3, management actions taken by non-federal entities would be considered the environmental status quo. In those situations where a non-federal cooperator has already made the decision to remove or otherwise manage mammals to stop damage with or without WS' assistance in Alternatives 1 and 2, WS' participation in carrying out the action will not affect the environmental status quo. In some situations, dependent upon the skills and abilities of the non-federal entity, WS' involvement may actually have a *beneficial* effect on the human environment when compared to the environmental status quo in the absence of such involvement.

Although some persons will likely be opposed to WS' participation in management activities to reduce mammal damage, the analysis in this EA indicates that WS' MDM program will not result in significant cumulative adverse impacts on the quality of the human environment.

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APPENDIX B

MAMMAL DAMAGE MANAGEMENT METHODS AVAILABLE FOR USE OR RECOMMENDED BY THE GEORGIA WILDLIFE SERVICES PROGRAM

Resource owners and government agencies have used a variety of techniques to reduce mammal damage. However, all lethal and non-lethal methods developed to date have limitations based on costs, logistics, or effectiveness. Below is a discussion of MDM methods currently available to the Georgia WS program. If other methods are proven effective and legal to use in Georgia, they could be incorporated into the GA WS program, based upon NEPA compliance.

Nonchemical 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, snares, and foothold traps to capture some species of mammals for the purpose of translocating them for release to wild sites. WS does not usually use this method to conduct MDM programs in Georgia because the GDNR opposes relocation of rabies vector species in Georgia. Live capture and handling of wild mammals poses an additional level of human health and safety threat if target animals are aggressive, large, or extremely sensitive to the close proximity of humans. For that reason, WS may limit this method to specific situations and certain species. Excessive populations may make this a poor wildlife management strategy for some species. In addition, moving damage-causing individuals to other locations can typically result in damage at the new location, or the translocated individuals can move from the relocation site to areas where they are unwanted. The AVMA, the National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists all oppose the relocation of mammals because of the risk of disease transmission, particularly for small mammals such as raccoons or skunks (CDC 1990). Although relocation is not necessarily precluded in all cases, it would in many cases be logistically impractical and biologically unwise in Georgia, and is evaluated by WS on a case-by-case basis.

Trapping can utilize a number of devices, including footholds, cage-type traps, and body gripping (conibear) traps, foot snares, and neck/body snares. For a description of these methods the reader is referred to the FEIS, Appendix J (USDA 1997). 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.

Snares are capture devices comprised of a cable formed in a loop with a locking device and placed in travel ways. Most snares are also equipped with a swivel to minimize cable twisting and breakage. Snares are also easier than foothold traps to keep operational during periods of inclement weather. Snares set to catch an animal around the body or legs are usually a live-capture method.

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 burrow entrances created or used by the target species. The animal 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.

Shooting is selective for target species and may involve the use of spotlights and either a handgun, shotgun or rifle. Shooting is an effective method to remove a small number of mammals in damage situations, 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.

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 GDA. All WS personnel in Georgia who apply restricted-use pesticides are certified pesticide applicators by GDA and have specific training by WS for WDM pesticide application. The EPA and GDA 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 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

FEDERAL AND STATE THREATENED AND ENDANGERED SPECIES

State Listed Threatened and Endangered Species in Georgia (http://www.dnr.state.ga.us)

State Listed Threatened and Endangered Species in Georgia

Amphibians

Ambystoma cingulatum	Flatwoods Salamander	T
Amphiuma pholeter	One-toed Amphiuma	R
Aneides aeneus	Green Salamander	R
Cryptobranchus alleganiensis	Hellbender	T
Gyrinophilus palleucus	Tennessee Cave Salamander	T
Haideotriton wallacei	Georgia Blind Salamander	T
Notophthalmus perstriatus	Striped Newt	T
Plethodon petraeus	Pigeon Mountain Salamander	R
Rana capito	Gopher Frog	R

Fishes

Acipenser brevirostrum	Shortnose Sturgeon	E
Alosa alabamae	Alabama Shad	T
Ameiurus serracanthus	Spotted Bullhead	R
Cyprinella caerulea	Blue Shiner	E
Cyprinella callitaenia	Bluestripe Shiner	T
Cyprinella xaenura	Altamaha Shiner	T
Ellasoma okatie	Bluebarred Pygmy Sunfish	E
Enneacanthus chaetodon	Blackbanded Sunfish	E
Erimystax insignis	Blotched Chub	E
Etheostoma brevirostrum	Holiday Darter	E
Etheostoma chlorobranchium	Greenfin Darter	T
Etheostoma chuckwachatte	Lipstick Darter	E
Etheostoma ditrema	Coldwater Darter	E
Etheostoma duryi	Black Darter	R
Etheostoma etowahae	Etowah Darter	E
Etheostoma parvipinne	Goldstripe Darter	R
Etheostoma rupestre	Rock Darter	R
Etheostoma scotti	Cherokee Darter	T
Etheostoma tallapoosae	Tallapoosa Darter	R
Etheostoma trisella	Trispot Darter	E
Etheostoma vulneratum	Wounded Darter	E
Fundulus bifax	Stippled Studfish	E

Fundulus catenatus	Northern Studfish	R
Hemitremia flammea	Flame Chub	E
Hybopsis lineapunctata	Lined Chub	R
Ichthyomyzon bdellium	Ohio Lamprey	R
Lucania goodei	Bluefin Killifish	R
Macrhybopsis sp.	Coosa Chub	E
Micropterus notius	Suwannee Bass	R
Moxostoma carinatum	River Redhorse	R
Moxostoma robustum	Robust Redhorse	E
Moxostoma sp.	Sicklefin Redhorse	E
Notropis ariommus	Popeye Shiner	E
Notropis asperifrons	Burrhead Shiner	T
Notropis hypsilepis	Highscale Shiner	R
Notropis photogenis	Silver Shiner	E
Notropis scepticus	Sandbar Shiner	R
Noturus eleutherus	Mountain Madtom	E
Noturus munitus	Frecklebelly Madtom	E
Percina antesella	Amber Darter	E
Percina aurantiaca	Tangerine Darter	E
Percina aurolineata	Goldline Darter	E
Percina jenkinsi	Conasauga Logperch	E
Percina lenticula	Freckled Darter	E
Percina sciera	Dusky Darter	R
Percina shumardi	River Darter	E
Percina sp	Halloween Darter	T
Percina sp. cf. macrocephela	Muscadine Darter	R
Percina sp.	Upland Bridled Darter	E
Percina squamata	Olive Darter	E
Percina tanasi	Snail Darter	E
Phenacobius crassilabrum	Fatlips Minnow	E
Phenacobius uranops	Stargazing Minnow	T
Phoxinus tennesseensis	Tennessee Dace	E
Pteronotropis euryzonus	Broadstripe Shiner	R
Pteronotropis welaka	Bluenose Shiner	T
Typhlichthys subterraneus	Southern Cavefish	E
Birds		
Aimophila aestivalis	Bachman's Sparrow	R
Ammodramus henslowii	Henslow’s Sparrow	R
Calidris canutus	Red Knot	R

Campephilus principalis	Ivory-billed Woodpecker	E
Charadrius melodus	Piping Plover	T
Charadrius wilsonia	Wilson's Plover	T
Corvus corax	Common Raven	R
Dendroica cerulean	Cerulean Warbler	R
Dendroica kirtlandii	Kirtland's Warbler	E
Elanoides forficatus	Swallow-tailed Kite	R
Falco peregrinus	Peregrine Falcon	R
Falco sparverius paulus	Southeastern Kestrel	R
Haematopus palliatus	American Oystercatcher	R
Haliaeetus leucocephalus	Bald Eagle	T
Mycteria americana	Wood Stork	E
Picoides borealis	Red-cockaded Woodpecker	E
Rynchops niger	Black Skimmer	R
Sterna antillarum	Least Tern	R
Sterna nilotica	Gull-billed Tern	T
Vermivora chrysoptera	Golden-winged Warbler	E
Invertebrates		
Alasmindonta arcula	Altamaha Arcmussel	T
Alasmindonta triangulate	Southern Elktoe	E
Amblema neislerii	Fat Threeridge	E
Anodonta heardi	Apalachicola Floater	R
Anodontoides radiatus	Rayed Creekshell	T
Cambarus coosawattae	Coosawattee Crayfish	E
Cambarus cryptodytes	Dougherty Plain Cave Crayfish	T
Cambarus cymatilis	Conasauga Blue Burrower	E
Cambarus doughertyensis	Dougherty Burrowing Crayfish	E
Cambarus englishi	Tallapoosa Crayfish	R
Cambarus extraneus	Chickamauga Crayfish	T
Cambarus fasciatus	Etowah Crayfish	T
Cambarus georgiae	Little Tennessee Crayfish	E
Cambarus harti	Piedmont Blue Burrower	E
Cambarus howardi	Chattahoochee Crayfish	T
Cambarus parrishi	Hiwassee Headwaters Crayfish	E
Cambarus scotti	Chattooga River Crayfish	T
Cambarus speciosius	Beautiful Crayfish	E
Cambarus strigosus	Lean Crayfish	T
Cambarus truncatus	Oconee Burrowing Crayfish	T
Cambarus unestami	Blackbarred Crayfish	T

Cordulegaster sayi	Say's Spiketail	T
Distocambarus devexus	Broad River Burrowing Crayfish	T
Elliptio arca	Alabama Spike	E
Elliptio arctata	Delicate Spike	E
Elliptio purpurella	Inflated Spike	T
Elliptio spinosa	Altamaha Spinymussel	E
Elliptoideus sloatianus	Purple Bankclimber	T
Epioblasma metastriata	Upland Combshell	E
Epioblasma othcaloogensis	Southern Acornshell	E
Fusconaia masoni	Atlantic Pigtoe Mussel	E
Gomphus cansanguis	Cherokee Clubtail	T
Hamiota altilis	Fine-lined Pocketbook	T
Hamiota subangulata	Shinyrayed Pocketbook	E
Leptoxis foremani	Interrupted Rocksnail	E
Medionidus acutissimus	Alabama Moccasinshell	T
Medionidus parvulus	Coosa Moccasinshell	E
Medionidus penicillatus	Gulf Moccasinshell	E
Medionidus simpsonianus	Ochlockonee Moccasinshell	E
Ophiogomphus edmundo	Edmund's Snaketail	E
Pleurobema decisum	Southern Clubshell	E
Pleurobema georgianum	Southern Pigtoe	E
Pleurobema hanleyianum	Georgia Pigtoe	E
Pleurobema pyriforme	Oval Pigtoe	E
Procambarus gibbus	Muckalee Crayfish	T
Procambarus verrucosus	Grainy Crayfish	R
Procambarus versutus	Sly Crayfish	R
Ptychobranchus greenii	Triangular Kidneyshell	E
Strophitus connasaugaensis	Alabama Creekmussel	E
Strophitus subvexus	Southern Creekmussel	E
Toxolasma pullus	Savannah Lilliput	T
Mammals		
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	R
Eubalaena glacialis	Northern Atlantic Right Whale	E
Geomys pinetis	Southeastern Pocket Gopher	T
Megaptera novaeangliae	Humpback Whale	E
Myotis grisescens	Gray Bat	E
Myotis sodalis	Indiana Bat	E
Neofiber alleni	Round-tailed Muskrat	T
Puma concolor coryi	Florida Panther	E

Sylvilagus obscurus	Appalachian Cottontail	R
Trichechus manatus	West Indian Manatee	E
Plants		
Allium speculae	Flatrock Onion	T
Alnus maritime subsp. georgiansis	Georgia Alder	T
Amorpha georgiana	Georgia Indigo-bush	E
Amphianthus pusillus	Pool Sprite	T
Arabis georgiana	Georgia Rockcress	T
Arnoglossum diversifolium	Variable-leaf Indian-plantain	T
Asclepias purpurascens	Purple Milkweed	R
Asplenium heteroresiliens	Marl Spleenwort	T
Astragalus michauxii	Sandhill Milk-vetch	T
Aureolaria patula	Spreading Yellow Foxglove	T
Balduina atropurpurea	Purple Honeycomb Head	R
Baptisia arachnifera	Hairy Rattleweed	E
Berberis Canadensis	American Barberry	E
Brickellia cordifolia	Heartleaf Brickellia	T
Calamagrostis porteri	Porter's Reed-grass	R
Calamintha ashei	Ohoopee Dunes Wild Basil	T
Carex baltzellii	Baltzell Sedge	E
Carex biltmoreana	Granite Dome Sedge	T
Carex dasycarpa	Velvet Sedge	R
Carex misera	Wretched Sedge	T
Carex rodfordii	Radford's Sedge	T
Carya myristiciformis	Nutmeg Hickory	R
Ceratiola ericoides	Sandhill Rosemary	T
Chamaecyparis thyoides	Atlantic White-cedar	R
Chelone cuthbertii	Cuthbert's Turtlehead	T
Clematis fremontii	Fremont's Leatherflower	E
Clematis socialis	Alabama Leatherflower	E
Convallaria majuscule	American Lily-of-the-valley	R
Coreopsis integrifolia	Floodplain Tickseed	T
Coreopsis latifolia	Broadleaf Tickseed	R
Coreopsis triflora	Three-flowered Hawthorn	T
Croomia pauciflora	Croomia	T
Cuscuta harperi	Harper Dodder	E
Cymophyllus fraserianus	Fraser Sedge	T
Cypripedium acaule	Pink Ladyslipper	U
Cyripedium kentuckiense	Kentucky Ladyslipper	E

Cypripedium parviflorum	Yellow Ladyslipper	R
Desmodium ochroleucum	Cream-flowered Trick-trefoil	T
Dicanthelium hirstii	Hirst's Witch Grass	E
Dicerandera radfordiana	Radford's Mint	E
Draba aprica	Sun-loving Draba	E
Echinacea laevigata	Smooth Purple Coneflower	E
Elliottia racemosa	Georgia Plume	T
Epidendrum conopseum	Greenfly Orchid	U
Eriocaulon koernickianum	Dwarf Hatpins	E
Evolvulus sericeus	Silky Morning-glory	E
Fimbristylis perpusilla	Harper Fimbry	E
Forestiera godfreyi	Godfrey's Wild Privet	E
Foresteria segregate	Florida Wild Privet	R
Fothergilla gardenii	Dwarf Witch-alder	T
Fothergilla major	Mountain Witch-alder	T
Gentianopsis crinita	Fringed Gentian	T
Gymnoderma lineare	Rock Gnome Lichen	E
Habenaria quinquesea	Michaux's Spider Orchid	T
Hartwrightia floridana	Hartwrightia	T
Helianthus verticillatus	Whorled Sunflower	E
Gymnoderma lineare	Rock Gnome Lichen	E
Hydrastis canadensis	Goldenseal	E
Hymenocallis coronaria	Shoals Spiderlily	T
Illicium floridanum	Florida Anise	E
Isoetes melanospora	Black-spored Quillwort	E
Isoetes tegetiformans	Mat-forming Quillwort	E
Isotria medeoloides	Small Whorled Pogonia	T
Jamesianthus alabamensis	Alabama Warbonnet	E
Jeffersonia diphylla	Twinleaf	R
Kalmia carolina	Carolina Bog Laurel	T
Leavenworthia exigua var. exigua	Least Gladecress	T
Leiophyllum buxifolium	Sand-myrtle	T
Leitneria floridana	Corkwood	T
Lilium michiganense	Michigan Lily	R
Lilium philadelphicum	Wood Lily	E
Lindera melissifolia	Pondspicebush	E
Litsea aestivalis	Pondspice	R
Lotus helleri	Carolina Trefoil	E
Lysimachia fraseri	Fraser Loosestrife	R

Lythrum curtissii	Curtiss Loosestrife	T
Macbridea caroliniana	Carolina Bogmint	R
Macranthera flammea	Hummingbird Flower	T
Marshallia mohrii	Coosa Barbara Buttons	T
Marshallia ramosa	Pineland Barbara Buttons	R
Matelea alabamensis	Alabama Milkvine	T
Matelea pubiflora	Trailing Milkvine	R
Megaceros aenigmaticus	Bighorn Hornwort	T
Monotropis odorata	Sweet Pinesap	T
Morella inodora	Odorless Bayberry	T
Myriophyllum laxum	Lax Water Milfoil	R
Naja filifolia	Narrowleaf Naiad	E
Nestronia umbellula	Indian Olive	R
Neviusia alabamensis	Alabama Snow-wreath	T
Oxypolis canbyi	Canby Dropwort	E
Pachysandra procumbens	Allegheny-spurge	R
Packera millefolia	Blue Ridge Golden Ragwort	T
Paronychia virginica	Yellow Nailwort	T
Pedicularis lanceolata	Swamp Louswort	E
Pediomelum peidmontanum	Dixie Mountain Breadroot	E
Penstemon dissectus	Cutleaf Beardtongue	R
Pinguicula primuliflora	Clearwater Butterwort	T
Pityopsis pinifolia	Sandhill Golden-aster	R
Platanthera integrilabia	Monkeyface Orchid	T
Prenanthes barbata	Barbed Rattlesnake Root	R
Pteroglossaspis ecristata	Crestless Plume Orchid	T
Ptilimnium nodosum	Harperella	E
Quercus oglethorpensis	Oglethorpe Oak	T
Rhododendron prunifolium	Plumleaf Azalea	T
Rhus michauxii	Dwarf Sumac	E
Rhynchospora solitaria	Solitary Breakrush	E
Rudbeckia auriculata	Swamp Black-eyed Susan	E
Rudbeckia heliopsidis	Little River Black-eyed Susan	T
Sabatia capitata	Cumberland Rose Gentian	R
Sageretia minutiflora	Climbing Buckthorn	T
Sagittaria secundifolia	Kral's Water-plantain	T
Salix floridana	Florida Willow	E
Sanguisorba canadensis	Canada Burnet	T
Sapindus marginatus	Soapberry	R

Sarracenia flava	Yellow Flytrap	U
Sarracenia leucophylla	Whitetop Pitcherplant	E
Sarracenia minor	Hooded Pitcherplant	U
Sarracenia oreophila	Green Pitcherplant	E
Sarracenia psittacina	Parrot Pitcherplant	T
Sarracenia purpurea	Purple Pitcherplant	E
Sarracenia rubra	Sweet Pitcherplant	T
Schisandra glabra	Bay Starvine	T
Schwalbea americana	Chaffseed	E
Scutellaria montana	Large-flowered Skullcap	T
Scutellaria ocmulgee	Ocmulgee Skullcap	T
Sedum nevii	Nevius Stonecrop	T
Sedum pusillum	Granite Stonecrop	T
Shortia galacifolia	Oconee Bells	E
Sibbaldiopsis tridentata	Mountain Cinquefoil	E
Sideroxulon macrocarpum	Ohoopee Bumelia	R
Sideroxylon thornei	Swamp Buckthorn	E
Silene ovata	Ovate Catchfly	R
Silene polypetala	Fringed Campion	E
Silene regia	Royal Catchfly	E
Solidago simulans	Cliffside Goldenrod	E
Spiraea virginiana	Virginia Spirea	T
Spiranthes magnicamporum	Great Plains Ladies-tresses	E
Stewartia malacodendron	Silky Camellia	R
Streptopus lanceolatus	Rosy Twisted Stalk	T
Stylisma pickeringii var. pickeringii	Pickering Morning-glory	T
Symphyotrichum georgianum	Georgia Aster	T
Thalictrum cooleyi	Cooley Meadowrue	E
Thalictrum debile	Trailing Meadowrue	T
Thaspium pinnatifidum	Glade Meadowparsnip	E
Torreya taxifolia	Florida Torreya	E
Trientalis borealis	Starflower	E
Trillium persistens	Persistent Trillium	E
Trillium pusillum	Dwarf Trillium	E
Trillium reliquum	Relict Trillium	E
Tsuga caroliniana	Carolina Hemlock	E
Veratrum woodii	Ozark Bunchflower	R
Viburnum bracteatum	Limerock Arrow-wood	E
Waldsteinia lobata	Barren Strawberry	R

Xerophyllum asphodeloides	Eastern Turkeybeard	R
Xyris tennesseensis	Tennessee Yellow-eyed Grass	E
Reptiles		
Caretta caretta	Loggerhead Sea Turtle	E
Chelonia mydas	Green Sea Turtle	T
Clemmys guttata	Spotted Turtle	U
Dermochelys coriacea	Leatherback Sea Turtle	E
Drymarchon couperi	Eastern Indigo Snake	T
Eretmochelys imbricata	Hawksbill Sea Turtle	E
Glyptemys muhlenbergii	Bog Turtle	E
Gopherus polyphemus	Gopher Tortoise	T
Graptemys barbouri	Barbour's Map Turtle	T
Graptemys geographica	Common Map Turtle	R
Graptemys pulchra	Alabama Map Turtle	R
Heterodom simus	Southern Hognose Snake	T
Lepidochelys kempii	Kemp's Ridley Sea Turtle	E
Macrochelys temminckii	Alligator Snapping Turtle	T
Malaclemys terrapin	Diamondback Terrapin	U
Ophisaurus mimicus	Mimic Glass Lizard	R

T=Threatened R=Rare E=Endangered U=Unusual

FEDERALLY LISTED SPECIES IN GEORGIA BY THE USFWS

Listed species (based on published population data) -- 70 listings

Animals -- 48

Status	*Species/Listing Name*
E	Acornshell, southern (*Epioblasma othcaloogensis*)
T	Bankclimber, purple (mussel) (*Elliptoideus sloatianus*)
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
T	Chub, spotfin Entire (*Erimonax monachus*)
E	Clubshell, ovate (*Pleurobema perovatum*)
E	Clubshell, southern (*Pleurobema decisum*)
E	Combshell, upland (*Epioblasma metastriata*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Darter, amber (*Percina antesella*)
T	Darter, Cherokee (*Etheostoma scotti*)
E	Darter, Etowah (*Etheostoma etowahae*)
T	Darter, goldline (*Percina aurolineata*)
T	Darter, snail (*Percina tanasi*)
E	Kidneyshell, triangular (*Ptychobranchus greenii*)
E	Lioplax, cylindrical (snail) (*Lioplax cyclostomaformis*)
E	Logperch, Conasauga (*Percina jenkinsi*)
E	Manatee, West Indian (*Trichechus manatus*)
T	Moccasinshell, Alabama (*Medionidus acutissimus*)
E	Moccasinshell, Coosa (*Medionidus parvulus*)
E	Moccasinshell, Gulf (*Medionidus penicillatus*)
E	Moccasinshell, Ochlockonee (*Medionidus simpsonianus*)
E	Mussel, oyster Entire Range; Except where listed as Experimental Populations (*Epioblasma capsaeformis*)

E	Panther, Florida (*Puma (=Felis) concolor coryi*)
E	Pigtoe, oval (*Pleurobema pyriforme*)
E	Pigtoe, southern (*Pleurobema georgianum*)
T	Plover, piping except Great Lakes watershed (*Charadrius melodus*)
T	Pocketbook, finelined (*Lampsilis altilis*)
E	Pocketbook, shinyrayed (*Lampsilis subangulata*)
E	Riversnail, Anthony's Entire Range; Except where listed as Experimental Populations (*Athearnia anthonyi*)
T	Salamander, flatwoods (*Ambystoma cingulatum*)
T	Sea turtle, green except where endangered (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
T	Shiner, blue (*Cyprinella caerulea*)
T	Snake, eastern indigo (*Drymarchon corais couperi*)
E	Stork, wood AL, FL, GA, SC (*Mycteria americana*)
T	Sturgeon, gulf (*Acipenser oxyrinchus desotoi*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Three-ridge, fat (mussel) (*Amblema neislerii*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Wolf, gray Lower 48 States, except where delisted; where XN; and Mexico. (*Canis lupus*)
E	Woodpecker, red-cockaded (*Picoides borealis*)

Plants -- 22

Status	***Species/Listing Name***
T	Amphianthus, little (*Amphianthus pusillus*)
T	Button, Mohr's Barbara (*Marshallia mohrii*)
E	Campion, fringed (*Silene polypetala*)

E Chaffseed, American (*Schwalbea americana*)

E Coneflower, smooth (*Echinacea laevigata*)

E Dropwort, Canby's (*Oxypolis canbyi*)

E Grass, Tennessee yellow-eyed (*Xyris tennesseensis*)

E Harperella (*Ptilimnium nodosum*)

T Pink, swamp (*Helonias bullata*)

E Pitcher-plant, green (*Sarracenia oreophila*)

T Pogonia, small whorled (*Isotria medeoloides*)

E Pondberry (*Lindera melissifolia*)

E Quillwort, black spored (*Isoetes melanospora*)

E Quillwort, mat-forming (*Isoetes tegetiformans*)

E Rattleweed, hairy (*Baptisia arachnifera*)

T Skullcap, large-flowered (*Scutellaria montana*)

T Spiraea, Virginia (*Spiraea virginiana*)

E Sumac, Michaux's (*Rhus michauxii*)

E Torreya, Florida (*Torreya taxifolia*)

E Trillium, persistent (*Trillium persistens*)

E Trillium, relict (*Trillium reliquum*)

T Water-plantain, Kral's (*Sagittaria secundifolia*)

T=Threatened
E=Endangered

Appendix D

AUTHORITY AND COMPLIANCE

I. AUTHORITIES

WS' Legislative Authorities

The primary statutory authority for the Wildlife Services 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), which provides that:

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

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

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

Georgia Department of Natural Resources (GDNR)

The GDNR authority in wildlife management is given under Title 27, Chapters 1 - 5 of the Official Code of Georgia Annotated. This legislation covers general provisions; licenses, permits and stamps generally; wildlife generally; fish; and wild animals.

Georgia Department of Agriculture

The Pesticide Division of GDA enforces state laws pertaining to the use and application of pesticides. Under the Georgia Pesticide Use and Application Act this section monitors the use of pesticides in a variety of pest management situations. It also licenses private and commercial pesticide applicators and pesticide contractors. Under the Georgia Pesticide Control Act, the division licenses restricted use pesticide dealers and registers all pesticides for sale and distribution in the state of Georgia.

The GDA currently has a Memorandum of Understanding (MOU) with WS, which establishes a cooperative relationship between WS and the GDA outlines responsibilities, and sets forth annual objectives and goals of each agency for resolving WDM conflicts in Georgia.

U.S. Fish and Wildlife Service (USFWS)

The USFWS is the primary federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife resources ant their habitats. The USFWS mission is to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. Responsibilities are shared with other federal, state, tribal, and local entities; however, the USFWS has specific responsibilities for the T&E species protection under the ESA, migratory birds, inter-jurisdictional fish, and certain marine mammals, as well as for lands and waters that the USFWS administers for the management and protection of those resources.

CFR 50 Subchapter C - The National Wildlife Refuge System - Part 30 - Feral Animals
Subpart B-30.11 - Control of feral animals states: (a) Feral animals, including horses, burros, cattle, swine, sheep, goats, reindeer, dogs, and cats, without ownership that have reverted to the wild from a domestic state may be taken by authorized Federal or state personnel or by private persons operating under permit in accordance with applicable provisions of Federal or State law or regulation.

The USFWS is also responsible for the protection and management of those populations, species, and subspecies that are considered threatened or endangered under the ESA.

U.S. 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. The EPA is also responsible for administering and enforcing the Section 404 program of the Clean Water Act with the Corps; this established a permit program for the review and approval of water quality standards that directly impact wetlands.

II. COMPLIANCE

Several Federal laws authorize, regulate, or otherwise affect WS' WDM activities. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act

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

Pursuant to NEPA and CEQ regulations, this EA documents the analyses of a proposed impact resulting from federal actions, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse impacts, and serves as a decision-aiding mechanism to ensure that the policies and goals of NEPA are infused into federal agency actions. This EA was prepared by integrating as many of the natural and social sciences as warranted, based on the

potential effects of the proposed actions. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

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 USFWS to use the expertise of the USFWS to ensure that "*any action authorized., funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency will use the best scientific and commercial data available*" (Sec.7 (a) (2)). WS obtained a BO from USFWS in 1992 describing potential effects on T&E species, and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F). In addition, WS is in the process of initiating formal consultation at the programmatic level to re-evaluate the 1992 BO and to fully evaluate potential effects on T&E species listed or proposed for listing since the 1992 FWS BO

Federal Insecticide, Fungicide, and Rodenticide Act

FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The EPA is responsible for implementing and enforcing FIFRA. All chemical methods used or recommended by the WS' program in Georgia are registered with and regulated by the EPA and PDA and are used by WS in compliance with labeling procedures and requirements.

National Historic Preservation Act of 1966, as Amended

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

Noise-making methods, such as firearms, that are used at or in close proximity to historic or cultural sites for the purposes of hazing or removing nuisance wildlife have the potential for audible effects on the use and enjoyment of historic property. However, such methods would only be used at a historic site at the request of the owner or manager of the site to resolve a damage problem, which means such use, would be to the benefit of the historic property. A built-in mitigating 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.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act require 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 had been made to protect the items and the proper authority had been notified.

Invasive Species - Executive Order 13112

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

Environmental Justice - Executive Order 12898

Environmental Justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statues and regulations without discrimination based on race, ethnicity, or socioeconomic status. Executive Order 12898 requires federal agencies to make Environmental Justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies and activities on minority and low-income persons or populations. A critical goal of the Order is to improve the scientific basis for decision-making by conducting assessments that identify and prioritize environmental health risks and procedures for risk reduction. Environmental Justice is a priority within USDA, APHIS, and WS. APHIS plans to implement the order principally through compliance with the provisions of NEPA.

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

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

Children may suffer disproportionately from environmental health and safety risks, including the development of their physical and mental status. Because WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, WS has considered the impacts that alternative analyzed might have on children. A Risk Assessment (USDA 1997) concluded that when non-chemical and chemical methods are used according to label directions and in compliance with normally accepted safety practices and WS' SOPs, such use has

negligible impacts on the environment or on human health and safety, including the health and safety of children.

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 federal DEA to possess controlled substances, including those that are used in wildlife capture and handling.

Animal Medicinal Drug Use Clarification Act of 1994

The AMDUCA and its implementing regulations (21 CFR Part 530) establish several requirements for the use of animal drugs, including those used to capture and handle wildlife in rabies 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 the proposed action. 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; the Western Wildlife Health Committee of the Western Association of Fish and Wildlife Agencies has recommended that suitable identification markers include durable ear tags, neck collars, or other external markers that provide unique identification (WWHC *undated*). WS establishes procedures in each state for administering drugs used in wildlife capture and handling that must be approved by state veterinary authorities in order to comply with this law.

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.