ENVIRONMENTAL ASSESSMENT
(Pre-Decisional)

White-tailed Deer Damage Management at Federal Facilities and Airports in West Virginia and Statewide Disease Surveillance Activities

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Draft

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ACRONYMS

AMDUCA	Animal Medicinal Drug Use Clarification Act
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BO	Biological Opinion
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWD	Chronic Wasting Disease
DEA	Drug Enforcement Administration
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDA	United States Food and Drug Administration
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, Rodenticide Act
FY	Federal Fiscal Year
GnRH	Gonadotropin-releasing hormone
HGE	Human granulocytic ehrlichsis
HME	Human monocytic ehrlichiosis
MOU	Memorandums of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWRC	National Wildlife Research Center
PZP	Porcine Zona Pellucida
SOP	Standard Operating Procedures
T&E	Threatened and Endangered
USC	United States Code
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WS	Wildlife Services
WVCSR	West Virginia Code of State Rules
WVDA	West Virginia Department of Agriculture
WVDNR	West Virginia Division of Natural Resources
WWHC	Western Wildlife Health Committee

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CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 PURPOSE

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS)[1] program in West Virginia continues to receive requests for assistance to resolve or prevent damage occurring to agricultural resources, natural resources, and property, including threats to human safety, associated with white-tailed deer (*Odocoileus virginianus*). Normally, individual wildlife damage management actions conducted by the WS program could be categorically excluded from further National Environmental Policy Act (NEPA) analysis, in accordance with APHIS implementing regulations for NEPA (7 CFR 372.5(c), 60 FR 6000-6003).

The purpose of this Environmental Assessment (EA) is to evaluate activities conducted by WS to manage damage and threats to agricultural resources, property, natural resources, and threats to humans caused by deer on fenced federal properties and at airports. The EA will also evaluate the potential participation of WS in the surveillance and monitoring of disease outbreaks in the deer population that may occur. This EA will assist in determining if the proposed management of deer damage could have a significant impact on the environment for both humans and other organisms, analyze alternatives, coordinate efforts with other federal, state, and local agencies, inform the public, and to comply with the NEPA. This EA analyzes the potential effects of deer damage management when requested, as coordinated between WS and the West Virginia Division of Natural Resources (WVDNR).

WS is preparing this EA to: 1) facilitate planning, 2) promote interagency coordination, 3) streamline program management, 4) clearly communicate to the public the analysis of individual and cumulative impacts of program activities; and 5) evaluate and determine if there are any potentially significant or cumulative adverse affects from the proposed program. The analyses contained in this EA are based on information derived from WS' Management Information System, published documents (Appendix A), interagency consultations, public involvement, and the analyses in WS' programmatic Final Environmental Impact Statement (FEIS)[2] (USDA 1997) which will be incorporated into this document by reference.

The EA evaluates the need for action to manage damage associated with deer in the State, the potential issues associated with deer damage management, and the environmental consequences of conducting different alternatives to address the need for action and the identified issues. Issues relating to the reduction of wildlife damage were raised during the scoping process for WS' programmatic FEIS (USDA 1997) and were considered in the preparation of the EA. The issues and alternatives associated with deer damage management were initially developed by WS in consultation with the WVDNR. The WVDNR has regulatory authority to manage populations of resident wildlife species, including deer in the State. To assist with the identification of additional issues and alternatives to managing damage associated with deer in West Virginia, the pre-decisional EA will be available to the public for review and comment prior to a Decision[3].

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[1]The WS program is authorized to protect agriculture and other resources from damage caused by wildlife through 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).

[2]WS' has prepared a programmatic FEIS that further addresses WS' activities to manage damage associated with wildlife, including detailed discussion of program activities, risk assessment of methods, and discussion of issues (USDA 1997). Information from WS' programmatic FEIS has been incorporated by reference into this EA. WS' FEIS may be obtained by contacting USDA/APHIS/WS, Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

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

1.2 NEED FOR ACTION

Some species of wildlife have adapted to and thrive in human altered habitats. These species, in particular, are often responsible for the majority of conflicts between humans and wildlife that lead to requests for assistance to reduce damage to resources and to reduce threats to human safety. WS' programmatic Final Environmental Impact Statement summarizes the relationship 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 is generally regarded as providing economic, recreational and aesthetic benefits...and the mere knowledge that wildlife exists is a positive benefit to many people. However... the activities of some wildlife may result in economic losses to agriculture and damage to property...Sensitivity to varying perspectives and values are 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 resolve wildlife damage problems. The wildlife acceptance capacity, or cultural carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations. Biological carrying capacity is the land or habitat's ability to support healthy populations of wildlife without degradation to the species' health or their environment during an extended period of time (Decker and Purdy 1988). These phenomena are especially important because they define the sensitivity of a 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 determines the wildlife acceptance capacity. While the habitat may have a biological carrying capacity to support higher populations of wildlife, in many cases the wildlife acceptance capacity is lower or has been met. Once the wildlife acceptance capacity is met or exceeded, people begin to implement population or damage management, including lethal methods, to alleviate damage or address threats to human health and safety.

The alleviation of damage or other problems caused by or related to the behavior of wildlife is termed wildlife damage management and is recognized as an integral component of wildlife management (The Wildlife Society 1992). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated and the need for damage management is derived from the specific threats to resources. These 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 lost economic value of resources or threaten human safety, people characterize this as damage. When damage exceeds or threatens to exceed an economic threshold and/or pose a threat to human safety, people seek assistance with resolving damage or reducing threats to human safety.

The need for action to manage damage and threats associated with deer in West Virginia arises from requests for assistance[4] received by WS to reduce and prevent damage associated with deer from occurring to four major categories: agricultural resources, natural resources, property, and threats to human safety. Damage caused by deer occurs primarily from the consumption of resources that can lead to economic losses in West Virginia. Deer can also pose threats to human safety and property

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

from being struck by airplanes and by vehicles. Table 1.1 lists WS' technical assistance projects conducted by the four major resource types in West Virginia from the 2001 federal fiscal year[5] (FY 2001) through FY 2006. Technical assistance is provided by WS to those requesting assistance with resolving damage or the threat of damage by providing information and recommendations on deer damage management activities that can be conducted by the requestor without WS' direct involvement in managing or prevent the damage. WS' technical assistance activities will be discussed further in Chapter 3 of this EA.

The technical assistance projects conducted by WS are representative of the damage and threats that are caused by deer in West Virginia. Since 2001, WS has conducted 651 technical assistance projects in West Virginia that addressed damage and threats associated with deer. The resource category with the highest number of total requests for WS' technical assistance was the property category. Deer can cause damage to property when struck by aircraft and other motor vehicles. Deer can also damage property by consuming valuable landscaping plants that results in economic losses from replacing those plants or from a decrease in the aesthetic value of a property. Over 94% of the total requests received for technical assistance addressing damage or threats to property occurred during FY 2005 and FY 2006.

WS has conducted 312 technical assistance projects with those requesting assistance with deer damage or threats of damage to agricultural resources in West Virginia since 2001. Damage to agricultural resources occurs from deer directly consuming crops or damages that occurring from the result of consuming the crop (e.g., trampling of standing plants, disease introduction to damaged areas of the plant). When deer densities are high, the consumption of agricultural crops can lead to economic losses to agricultural damage. When economic losses occur, agricultural producers often seek assistance with resolving damage or the threat of damage.

When combined, the total number of technical assistance projects conducted in the State to address property and agricultural resources damages accounted for over 98% of the technical assistance projects conducted by WS. In addition to projects conducted to provide assistance with damage and threats to property and agricultural resources, WS also conducted 11 projects to address threats to human safety associated with deer and one project in FY 2007 to address damages and threats to natural resources.

Table 1.1 - WS' technical assistance projects in West Virginia from FY 2001-FY 2007

Fiscal Year	Agriculture	Human Safety	Property	Natural Resources	Total
2001	54	0	1	0	**55**
2002	58	3	4	0	**65**
2003	76	2	1	0	**79**
2004	119	4	2	0	**125**
2005	0	0	137	0	**137**
2006	0	0	168	0	**168**
2007	5	2	14	1	22
Total	**312**	**11**	**327**	**1**	**651**

Although monetary damages to natural resources and human safety have been reported and verified by WS, requests for assistance often address threats that deer can pose to human safety and natural resources which monetary losses are difficult to determine. For human safety, requests for assistance from WS are often received to reduce the threat of aircraft striking deer at airports. Aircraft striking

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

deer can cause catastrophic failure of the aircraft which has the potential to threaten passenger safety if the aircraft is unable to make a safe landing. Similar to the difficulties with placing a monetary value of reducing threats to human safety is reducing threats to natural resources. WS has and likely will continue to receive requests to reduce threats to natural resources such as overgrazing on trees and shrubs.

WS' activities would only be conducted on fenced federal properties and airports when requested by those entities when damage is occurring to agricultural resources, natural resources, property, or posing a threat to human safety. WS' may also be requested to participate in disease surveillance and monitoring in the event of a disease outbreak or potential outbreak in the deer population. More specific information regarding deer damage to the main categories is discussed in the following subsections of the EA:

1.2.1 Need for Managing Deer Damage to Agricultural Resources

Deer have been estimated to cause over $100 million in damages to agricultural productivity in the United States annually (Conover 1997). During a 1987 wildlife damage survey, white-tailed deer were identified as the primary source of wildlife damage by state farm bureaus, wildlife extension specialists, state agricultural agencies, and state wildlife agencies (Conover and Decker 1991). According to information reported in 1994, 67% of all agricultural producers reported problems with deer (Conover 1994).

The primary form of damage caused by deer is from foraging, but can occur from trampling of plants and damage to trees from antler rubbing. In areas where deer densities are high and forage is scarce, deer can cause extensive economic damage to agricultural resources from over-browsing. Foraging by deer on agricultural crops can result in improper growth of the plant, can lead to the introduction of diseases, and when excessive browsing occurs, can lead to the death of the plant. Thus, foraging by deer can lead to a reduction in the productivity of the plant and when foraging is extensive, can result in a substantial reduction in yield leading to economic losses to agricultural producers. Yield losses can also occur from foraging directly on the desired seed-producing body of the plant (e.g., ear of corn, soybean pods, fruits).

Hall and Stout (1999) found that foraging by deer significantly reduced the yield of alfalfa and alfalfa-grass mixtures resulting in substantial economic losses. Deer can also selectively forage for the alfalfa in alfalfa-grass mixtures reducing the economic value of the forage (Hall and Stout 1999). Deer have caused economic losses to corn through excessive browsing. In the ten largest corn growing states, Wywialowski (1996) estimated damage to corn caused by deer exceeded $30 million in 1993. Corn is most susceptible to deer damage during the silking-tassling stage of growth which occurs in late June to early July (Hygnstrom et al. 1992). Ears of corn damaged during the silking-tassling stage are not replaced and often become infected with fungus which can reduce yield (Eldredge 1935, Shapiro et al. 1986, Vorst 1986).

In West Virginia, the value of corn production total $12.6 million in 2007 while the value of soybeans produced in the State was valued at $4.6 million (USDA 2008). Wheat and forage for hay are also important economic agricultural commodities in the State valued at $2 million and $72.8 million in 2007, respectively (USDA 2008). West Virginia produced 80 million pounds of commercial apples and 4,200 tons of peaches in 2007 (USDA 2008). Deer damage in West Virginia has been reported to occur to corn, forage, small grains, tree fruits, commercial trees, nursery stock, landscape plantings, and garden vegetables (Evans et al. 2003).

To assist agricultural producers in West Virginia experiencing deer damage to agricultural resources, the WVDNR issues permits for the taking of deer to alleviate agricultural damage as part of an integrated damage management approach (Evans et al. 1999).

1.2.2 Need to Reduce Deer-Vehicle Collisions

Deer-vehicle collisions are a serious concern nationwide because of losses to property and the potential for human injury and death (Conover et al. 1995, Romin and Bissonette 1996, Conover 1997). The economic costs associated with deer-vehicle collisions include vehicle repairs, human injuries and fatalities, and picking up and disposing of deer (Drake et al. 2005). The Insurance Institute for Highway Safety (2005) estimates that 1.5 million deer-vehicle collisions occur annually in the United States causing approximately 150 fatalities and $1.1 billion in damage to property. In West Virginia, white-tailed deer vehicle collisions result in approximately $19 million in damage annually (Romin and Bissonette 1996). The West Virginia Insurance Commission (2007) estimates that 22,000 deer are struck by vehicles annually and that 1 in ever 47 licensed drivers will be involved in a deer vehicle collision annually.

Often, deer-vehicle collisions in which a deer carcass was not recovered or little vehicle damage occurred go unreported. A Cornell University study estimates that the actual number of deer-vehicle collisions could be as high as six times the reported number (Decker et al. 1990).

1.2.3 Need to Reduce Deer Hazards at Airports

Airports provide ideal conditions for feeding and bedding sites for deer due to the large grassy areas adjacent to brushy, forested habitat used as noise barriers. Deer living within airport boundaries are usually protected from hunting and many other human disturbances.

Deer-aircraft strikes can result in loss of human life, injury to passengers or people on the ground, damage or malfunction of aircraft, aircraft navigational aids, or airport facilities. Mammals colliding with aircraft during the most vulnerable phases of flight, takeoff or landing, can cause the aircraft to crash or sustain physical damage (USDA 1998). Mammals are characteristically unpredictable in their initial response to approaching aircraft. Deer may wander onto runway surfaces and be startled into the path of oncoming aircraft, and at night, they may freeze when caught in the beams of landing lights, resulting in a strike. The majority of deer-aircraft strikes occur at night and in the fall during the mating season (Dolbeer and Wright 2008).

White-tailed deer are a commonly encountered problem at airfields in West Virginia, threatening the safe operation of aircraft at those facilities. Collisions between deer and aircraft can cause major damage to the aircraft, and potentially cause injury and loss of human life. Serious consequences are also possible if pilots loose control of the aircraft while attempting to avert a collision with deer. From 1990 through 2007, there were 712 reported deer-aircraft strikes to civil aircraft in the United States resulting in 180,887 hours in aircraft down time and over $28 million in reported repair costs (Dolbeer and Wright 2008). From January 1990 through June 2008, there were 48 reported deer-aircraft strikes involving civil aircraft in West Virginia (FAA 2008). Reporting of wildlife strikes is not mandatory and it is estimated that less than 20% of aircraft strikes are reported (USDA 1998).

The risk that deer pose to aircraft is well documented; the following are examples of deer/aircraft strikes:

- On December 6, 2000, an Embraer 120 in West Virginia collided with two deer just after landing. The tip of a propeller blade separated and punctured the fuselage, injuring a passenger, who later died (Cleary et. al 2002).
- On July 6, 2003, a Lear Jet-60 in West Virginia struck a white-tailed deer during landing. No injuries occurred however approximately $108,000 in damage resulted (Federal Aviation Administration (FAA) 2008).

- On January 31, 2005, a C-414 in West Virginia collided with one deer while landing. Damage to the prop and the nose of the aircraft resulted in approximately $40,000 in damage (FAA 2008).

1.2.4 Need to Manage Deer Damage to Urban Landscaping and Natural Resources, including Threatened and Endangered (T&E) Species

Deer are considered a "keystone species," one that can have a profound impact on vegetation by altering species composition through overgrazing associated with high deer densities. Deer browsing damages and destroys landscaping and ornamental trees, shrubs, and flowers. As rural areas are developed, deer habitat may actually be enhanced because fertilized lawns, gardens, and landscape plants serve as high quality sources of food (Swihart et al. 1995). Furthermore, deer are prolific and adaptable, characteristics that allow them to exploit and prosper in most suitable habitat near urban areas, including residential areas (Jones and Witham 1990). The succulent nature of many ornamental landscape plants, coupled with high nutrient contents of forage plants, offers an attractive food source for deer. In addition to browsing pressure, male white-tailed deer damage ornamental trees and shrubs by antler rubbing which results in broken limbs and bark removal. While large trees may survive antler-rubbing damage, smaller saplings often die or become scarred to the point that they are not aesthetically acceptable for landscaping.

Deer overabundance can affect native vegetation and natural ecosystems in addition to ornamental landscape plantings. White-tailed deer selectively forage on vegetation (Strole and Anderson 1992), and thus can have substantial impacts on certain herbaceous and woody species and on overall plant community structure (Waller and Alverson 1997). These changes can lead to adverse impacts on other wildlife species, which depend on these plants for food and/or shelter. Numerous studies have shown that over browsing by deer can decrease tree reproduction, understory vegetation cover, plant density and diversity (Warren 1991). By one count, 98 species of threatened and endangered plants, many of them orchids and lilies, are disturbed by deer browsing (Ness 2003).

The alteration and degradation of habitat from over-browsing by deer can have a detrimental effect on deer herd health and may displace other wildlife communities (e.g., neotropical migrant songbirds and small mammals) that depend upon the understory vegetative habitat destroyed by deer browsing (Virginia Department of Game and Inland Fisheries 1999). Similarly, DeCalesta (1997) reported that deer browsing affected vegetation that songbirds need for foraging surfaces, escape cover, and nesting. Species richness and abundance of intermediate canopy nesting songbirds was reduced in areas with higher deer densities (DeCalesta 1997). Intermediate canopy-nesting birds declined 37% in abundance and 27% in species diversity at higher deer densities. Five species of birds were found to disappear at densities of 38.1 deer per square mile and another two disappeared at 63.7 deer per square mile. Casey and Hein (1983) found that three species of birds could no longer be found in a research preserve stocked with high densities

of ungulates and that the densities of several other species of birds were lower than in an adjacent area with lower deer density. Waller and Alverson (1997) hypothesize that by competing with squirrels and other fruit-eating animals for oak mast, deer may further affect many other species of animals and insects.

1.2.5 Threats to Wildlife, Humans, and Livestock Safety from Disease Transmission

Wild and captive deer can carry a wide variety of diseases that can impact humans, pets, and livestock. WS' involvement in the management of disease risks associated with deer in the State may include capturing wild and captive deer for disease and parasite surveillance programs. WS could also assist landowners and/or property managers reduce threats associated with disease and parasite transmission. Although deer removal for disease management occurs rarely, WS could be requested by the WVDNR to assist with reducing threats of disease transmission through the use of deer removal.

The following two diseases are known to occur in deer within West Virginia:

Lyme Disease: Currently, the most common zoonosis involving deer is Lyme disease, caused by the spirochete *Borrelia burgdorferi* and vectored to humans by the deer tick (*Ixodes dammini* in the eastern United States) (Conover 1997). Initial symptoms of Lyme disease include a flu-like illness with headache, fever, muscle or joint pain, neck stiffness, swollen glands, jaw discomfort, and inflammation of the eye membranes (McLean 1994). If left untreated, heart, nervous system, and joint manifestations may develop (McLean 1994).

Research has shown a correlation between infected ticks, deer numbers, and Lyme disease cases (Magnarelli et al. 1984, Deblinger et al. 1993). Deer are an important reservoir for Lyme disease and are the primary host for the adult deer tick (Conover 1997).

Chronic Wasting Disease: Chronic wasting disease (CWD) is a neurological disease found only in cervids (members of the deer family) in North America. The disease belongs to a family of diseases known as transmissible spongiform encephalopathies. The disease attacks the brain of infected animals and produces small lesions that result in death.

CWD in West Virginia was first detected in Hampshire County during August 2005. Efforts to control the spread of CWD have been ongoing by the WVDNR. CWD has been detected in a total of 37 deer within Hampshire County since the disease was first detected (WVDNR 2008).

Other diseases associated with deer that are currently not known to occur in West Virginia include human ehrlichiosis, bovine tuberculosis, and foot and mouth disease. Although those diseases are not known to occur in the State, WS may receive requests to assist with collection of samples to be tested for those diseases and/or be requested to participate in a response to an outbreak of those diseases in deer.

Human Ehrlichiosis: In 1986, another serious tick-borne zoonosis, human ehrlichiosis, was discovered in the United States (McQuiston et al. 1999). Two distinct forms of the illness may affect humans: human monocytic ehrlichiosis (HME) and human granulocytic ehrlichiosis (HGE) (Lockhart et al. 1997, McQuiston et al. 1999). The bacterial agents that cause ehrlichiosis are transmitted to humans by infected ticks that acquire the agents from feeding on infected animal reservoirs (McQuiston et al. 1999). Ehrlichiosis in humans may result in fever, headache, myalgia, nausea, and occasionally death (Little et al. 1998, McQuiston et al. 1999). HME is the type of ehrlichiosis predominantly found in the southeastern, south-central, and mid-Atlantic

United States. White-tailed deer are major hosts for *Amblyomma americanum*, the tick that transmits HME, and deer have been identified as a reservoir for HME (Lockhart et al. 1997, Little et al. 1998).

Bovine Tuberculosis: Tuberculosis is a contagious disease of both animals and humans and can be caused by three specific types of the Mycobacterium bacteria. Bovine tuberculosis, caused by *Mycobacterium bovis*, primarily affects cattle and other bovine-like animals (e.g., bison, deer, and goats) but can be transmitted to humans and other animals (Davidson and Nettles 1997). The transmission of *M. bovis* between cattle and other organisms occurs from inhalation or ingestion of Mycobacterium bacteria. A likely interface between cattle and deer occurs at established feeding sites where cattle are continually fed. Deer will often visit areas where cattle are fed, especially during the winter, and consume cattle feed (e.g., hay bales).

Bovine tuberculosis can affect and also be transmitted by white-tailed deer. The *M. bovis* bacilli commonly invade the tonsil first, later spreading to other cranial lymph nodes. If the infection is contained, it spreads no further. In some animals the infection spreads to the thorax where it may disseminate throughout the lungs; these animals may then shed the bacteria by aerosol or oral secretions. The most susceptible animals develop disseminated infections throughout their abdominal organs, and can even shed bacilli through their feces or through their milk to their fawns.

West Virginia is currently considered free of bovine tuberculosis (9 CFR 77.7). The loss of accreditation as a bovine tuberculosis-free state results in the imposition of quarantines and testing procedures which have negative economic impact on the livestock industry in the affected area. In addition to deer and cattle, other mammalian wildlife species are also known to contract bovine tuberculosis. The prevalence of bovine tuberculosis in wildlife populations can complicate and delay efforts to eradicate bovine tuberculosis in livestock (Davidson and Nettles 1997).

Foot and Mouth Disease: There are no known cases of Foot and Mouth Disease in the United States. Foot and Mouth Disease is a highly contagious viral disease that affects domestic cattle, sheep, pigs, and goats. White-tailed deer are a known vector of this disease and as such, WS is a member of the Foot and Mouth Emergency Response Task Force. The disease causes blisters which produces chronic lameness, weight loss, and decreased production, and can cause abortions and sterility. The incubation period for foot and mouth is 2 to 16 days. It is rarely fatal; however, it can cause severe economic losses from reduced production and the ability to export products (Center for Disease Control 2003).

1.3 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

WS' Programmatic Final Environmental Impact Statement - WS has developed a programmatic FEIS that addresses the need for wildlife damage management in the United States (USDA 1997). The FEIS contains detailed discussions of potential impacts to the human environment from wildlife damage management methods used by WS. Pertinent information available in the FEIS has been incorporated by reference into the EA and this Decision.

1.4 DECISIONS TO BE MADE

Based on agency relationships, Memorandum of Understanding (MOU), and legislative authorities, WS is the lead agency for this EA, and therefore, responsible for the scope, content, and decisions made. Management of the white-tailed deer herd in West Virginia is the responsibility of the

WVDNR. The WVDNR establishes population objectives for the statewide deer herd, considering all forms of take when setting objectives. As the authority for the management of the deer population in the State, the WVDNR was involved in the development of the EA and provided input throughout the EA preparation process to ensure an interdisciplinary approach according to NEPA and agency mandates, policies, and regulations. WS' activities to reduce and/or prevent deer damage in the State will be coordinated and approved by the WVDNR which ensure WS' actions are incorporated into population objectives for deer in West Virginia.

Based on the scope of this EA, the decisions to be made are: 1) should WS conduct white-tailed deer damage management at fenced federal facilities and airports to alleviate damage to agriculture, property, natural resources, and human health and safety, 2) should WS conduct disease surveillance and monitoring in the deer population when requested by the WVDNR, 3) should WS implement an integrated wildlife damage management strategy, including technical assistance and direct control, to meet the need for white-tailed deer damage management in West Virginia, 4) if not, should WS attempt to implement one of the alternatives to an integrated damage management strategy as described in the EA, and 5) would the proposed action result in adverse impacts to the environment requiring the preparation of an Environmental Impact Statement (EIS).

1.5 SCOPE OF ANALYSIS

1.5.1 Actions Analyzed

This EA evaluates white-tailed deer damage management as conducted by WS to reduce threats to human safety and to resolve damage to property, natural resources, and agricultural resources on federal, state, tribal, municipal, and private land within the State of West Virginia wherever such management is requested by a cooperator. Due to State law, WS' activities will be limited to requests for assistance received from fenced, federal facilities and airports. At the request of the WVDNR, WS may participate as authorized agents of the WVDNR in activities involving surveillance and sampling of deer for the purposes of studying, containing, and curtailing disease outbreaks.

1.5.2 Native American Lands and Tribes

Currently, WS does not have a MOU or signed agreements with any Native American tribe in West Virginia. If WS enters into an agreement with a tribe for white-tailed deer damage management, this EA would be reviewed and supplemented if appropriate to insure compliance with NEPA.

1.5.3 Period for which this EA is Valid

If the analyses in this EA indicates an EIS is not required, 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 deer damage management activities conducted by WS in West Virginia.

1.5.4 Site Specificity

This EA analyzes the potential impacts of white-tailed deer damage management and addresses activities on all private and public lands in West Virginia under MOU, cooperative service

agreement, and in cooperation with the appropriate public land management agencies. It also addresses the impacts of deer damage management on areas where additional agreements may be signed in the future. WS' activities will only occur at the request of fenced federal properties and airports. However, at the request of the WVDNR, WS may participate in disease monitoring and surveillance wherever a disease outbreak has occurred or potentially could occur. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional wildlife damage management efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program, particularly during disease monitoring and surveillance activities.

Planning for the management of deer damage must be viewed as being conceptually similar to federal or other agency actions 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 and police departments, emergency clean-up organizations, and insurance companies. Although some of the sites where deer damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible; however, many issues apply wherever deer damage and resulting management occurs, and are treated as such. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in West Virginia (See Section 3.1.3.6).

The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* within West Virginia. 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.

1.5.5 Summary of Public Involvement

Issues related to the deer damage management as conducted by WS in West Virginia were initially developed by WS in consultation with the WVDNR. 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 deer in West Virginia, 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 minimum of a 30-day comment period for the public and interested parties to provide new issues, concerns and/or alternatives. Through the public involvement process, WS will clearly communicate to the public and interested parties the analyses of potential environmental impacts on the quality of the human environment. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA should be revisited and, if appropriate, revised prior to issuance of a final Decision or publication of a notice of intent to prepare an EIS. New issues or alternatives identified from the public involvement process will be fully considered.

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1.6 AUTHORITY AND COMPLIANCE

1.6.1 WS' Legislative Authority

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)

1.6.2 Mission of the West Virginia Division of Natural Resources

It is declared to be the public policy of the State of West Virginia that the wildlife resources of the State shall be protected for the use and enjoyment of all the citizens of this State. All species of wildlife shall be maintained for values which may be either intrinsic or ecological or of benefit to man. Such benefits shall include (1) hunting, fishing, and other diversified recreational uses; (2) economic contributions in the best interests of the people of this State; and (3) scientific and educational uses (WVCSR §20-2-1).

The authority for management of resident wildlife species is the responsibility of the WVDNR. The WVDNR collects and compiles information on white-tailed deer population trends and take, and uses this information to manage deer populations. This information has been provided to WS to assist in the analysis of potential impacts of WS' activities on the white-tailed deer herd in West Virginia.

The WVDNR currently has a MOU with WS which established a cooperative relationship between WS and the WVDNR, outlines responsibilities, and sets forth annual objectives and goals of each agency.

1.6.3 Mission of the West Virginia Department of Agriculture (WVDA)

The mission of the WVDA is to promulgate, uphold and implement legislative enactments designed to advance the interests of agriculture industries of West Virginia; to guide and nurture the development and maintenance of agriculture and agriculture-related industries in West Virginia; and to ensure the safety and wholesomeness of the food supply and the safety of agriculture workers and practices in West Virginia.

The WVDA currently has a MOU with WS which established a cooperative relationship between WS and the WVDA, outlines responsibilities, and sets forth annual objectives and goals of each agency.

1.6.4 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 APHIS regarding the NEPA process.

Pursuant to NEPA and CEQ regulations, this EA documents the analyses 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.

1.6.5 Endangered Species Act (ESA)

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

WS obtained a Biological Opinion (BO) on programmatic activities from the USFWS in 1992 describing potential effects on T&E species, and prescribing reasonable and prudent measures for avoiding jeopardy (see Appendix F in USDA 1997).

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

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

1.6.7 Environmental Justice - Executive Order 12898

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

1.6.8 Protection of Children - Executive Order 13045

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

1.6.9 The Native American Graves and Repatriation Act of 1990

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

1.6.10 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 United States Food and Drug Administration (FDA).

1.6.11 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 Drug Enforcement Administration (DEA) to possess controlled substances, including those that are used in wildlife capture and handling.

1.6.12 Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA)

The AMDUCA and its implementing regulations (21 CFR Part 530) establish several requirements for the use of animal drugs. 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 (WWHC) 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 2008). 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.

1.6.13 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods integrated into the WS' program in West Virginia, including the use of or recommendation of repellents are registered with and regulated by the EPA and the WVDA, and used or recommended by WS in compliance with labeling procedures and requirements.

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CHAPTER 2: AFFECTED ENVIRONMENT AND ISSUES

Chapter 2 contains a discussion of the affected environment and 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.

2.1 AFFECTED ENVIRONMENT

The existing crop damage permit system in the State allows the Law Enforcement Section of the WVDNR to regulate deer take for damage management purpose. Under the existing permitting system, WS would conduct deer damage management activities on fenced federal properties and airports when requested by those entities. WS would conduct deer damage management activities as authorized agents of the WVDNR on those properties to alleviate damage and threats. At the request of the WVDNR, WS could also participate in disease surveillance and monitoring for the purposes of studying, containing, and curtailing disease outbreaks in the deer population throughout the State, wherever those outbreaks or potential outbreaks occur.

2.1.1 Airports

Of all mammal species, deer are ranked as the most hazardous to aircraft, especially to smaller general aviation aircraft (Dolbeer et al. 2000) which represent a serious threat to human health and safety. Airports are often secured areas with chain-link security fencing. Sometimes deer gain entrance into these airports where there is adequate cover and food, and they live there for all or part of the year. Because deer are ubiquitous throughout West Virginia, it is possible for deer to be present at nearly any airport or military airbase. WS may be requested to remove deer from airport properties at any of the airports or airbases in West Virginia where deer pose a threat to aircraft and passenger safety. Deer confined inside a perimeter fence on airport property originate from free-ranging deer populations outside the perimeter fence. Therefore, deer confined on airport property will not be considered a unique population.

2.1.2 Fenced Federal Facilities and Enclosures

Many federal properties are controlled access areas with security fencing. These same properties often are unconcerned with the presence of deer until the herd is large enough to negatively impact vegetation on the facility and the growth of the confined deer population exceeds the biological and social carrying capacity of the facility. Examples of these types of fenced federal facilities include, but are not limited to, military bases and research facilities. WS may be requested to assist facilities managers in the management of deer damage at such facilities.

Similar to deer found on airport properties, deer confined inside a perimeter fence at federal facilities originate from free-ranging deer populations and thus, are not considered a unique population.

2.1.3 Disease Surveillance and Monitoring

Upon receiving a request for assistance from the WVDNR, deer damage management activities could be conducted on private, federal, state, county, and municipal lands in West Virginia for the

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purposes of studying, containing, and curtailing disease outbreaks in the deer population. 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; public and private properties in rural/urban/suburban areas where deer are a threat to human safety through deer-vehicle collisions and the spread of disease. The area of the proposed action would also include airports and military airbases where deer are a threat to human safety and to property; areas where deer negatively impact wildlife, including T&E species; and public property where deer are negatively impacting historic structures, cultural landscapes and natural resources.

2.1.4 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. This concept is applicable to situations involving federal assistance in managing damage associated with resident wildlife species managed by the State or unprotected wildlife species.

Most resident wildlife species are managed under State authority or law without any federal oversight or protection. In some states, with the possible exception of restrictions on methods (e.g., firearms restrictions, pesticide regulations), unprotected wildlife species and certain resident wildlife species are managed with little or no restrictions allowing them to be killed or taken by anyone at any time. For white-tailed deer damage management in West Virginia, the WVDNR has the authority to manage and authorize the taking of white-tailed deer for damage management purposes (see section 1.6.2). The WVDNR currently issues depredation permits for the take of deer to alleviate damage.

When a non-federal entity (i.e. State wildlife agencies, State agriculture agencies, State health agencies, municipalities, counties, private companies, individuals) takes a management action on a resident wildlife species or unprotected wildlife species, the action is not subject to NEPA compliance due to the lack of federal involvement in the action. Under such circumstances, the environmental *baseline* or *status quo* must be viewed as an environment that includes those species *as they are managed or impacted by non-federal entities in the absence of the federal action being proposed*. Therefore, in those situations in which a non-federal entity has decided that a management action directed towards a state protected or unprotected wildlife species will occur and even the particular methods that will be used, WS' involvement in the action will not affect the *environmental status quo*. WS' decision-making ability is restricted to one of two alternatives - either taking the action using the specific methods as decided upon by the non-federal entity, or taking no action at all at which point the non-federal entity will take the same action anyway.

Therefore, based on the discussion above, it is clear that in those situations where a non-federal cooperator has obtained the appropriate WVDNR permit or authority, and has already made the decision to remove or otherwise manage white-tailed deer 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 certain aspects of the human environment may actually benefit more from WS' involvement then from a decision not to assist with resolving or preventing damage.

2.2 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

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 WS' FEIS which analyzed specific data relevant to WS' programmatic activities. Issues specific to managing damage caused by deer in West Virginia were initially developed by WS in consultation with the WVDNR and the WVDA.

The following issues have been identified as areas of concern requiring consideration in this environmental assessment:

2.2.1 Issue 1 - Effects of WS' Activities on White-tailed Deer Populations

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on the population of a species. The white-tailed deer is one of the most ubiquitous and well-known wild animals in West Virginia, and its large population has a huge effect on other kinds of wildlife and on the natural environment as a whole. In West Virginia, the average new-born male (buck) weighs from 5 - 15 pounds. A new-born female (doe) will weigh, on average, 15 percent less than a new-born male (Allen 1977). A typical doe will reach full adult weight in 3 ½ to 4 ½ years, while a typical buck will reach its adult weight in 5 ½ years (Allen 1977).

Male deer have antlers that are made of bone and are connected to the skull. Antlers begin developing in March or April due to the stimulation of testosterone production. Initially, the antlers are covered by a soft layer of skin (velvet) during the growth and development stage. Blood vessels are located beneath the velvet and carry nutrients to form new antlers. By September, antler growth stops, the velvet is shed, and the buck carries his antlers throughout the fall breeding season. As the buck's testosterone levels dwindle, a separation layer forms between the antlers and skull. Between mid-December and February the antlers fall off and the buck grows new antlers each year (Allen 1977).

Deer are strictly plant eaters. A Pennsylvania study of food items in the rumens (stomachs) of road-killed deer identified ninety-eight different plant species. Deer eat leaves and twigs from a vast assortment of woody plants, including aspen, ash, beech, birch, dogwood, maple, oak, willow, witch hazel, pine, and hemlock (Fergus 2000). Deer grub out the corms of ferns, nibble on lichens, strip bark from trees, and consume lily pads and pond plants. Deer eat garden vegetables, wild mushrooms, fruits such as apples and pears, and crops, including soybeans, corn, and alfalfa. Acorns are a favorite food, and deer consume them in great quantities when putting on fat for winter. A deer will eat 5 to 9 pounds of food daily (Fergus 2000).

Does can breed when they are six to seven months old when quality food is available. Deer breed from October to January, and the rut peaks in mid- to late November. Most does bear their fawns by mid-June, after approximately two hundred days of gestation. Year-old does may have one fawn, and older does generally have twins and, sometimes, triplets (Allen 1977).

An ideal habitat is brush-stage forest with a wide variety of tree and plant species. White-tailed deer are highly adaptable and live in many habitats, including woodlots in farming country, suburbs, and deep woods. Deer live out their entire lives in the same home range, about 40 acres

in good habitat to over 300 acres in marginal habitat. Mature bucks usually have larger home ranges than those of does and younger deer (Fergus 2000).

In West Virginia, game wardens began enforcing the deer harvest law in 1921 and the WVDNR began stocking deer in 1923. In 1923, West Virginia recorded its first official buck season (Allen 1977). During the next 80 years a buck only hunting season has continued. The first official antlerless deer season was held in 1946. A one day season was held at Watoga State Park and 262 deer were taken. A hunter's choice season was held in 1951 resulting in the take of 21,951 white-tailed deer. The first archery season began in 1942 at Watoga State Park. Since 1958, archery season has opened in early October and closed in late December. This trend continued through the 1960's. Legislation was passed in 1969 to permit one deer be taken during buck season and one to be taken during archery season (Allen 1977). During the 1970's, the deer herd continued to increase in all but a few counties (Allen 1977).

As deer populations continued to increase in the State, damage associated with deer also increased. 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 causing damage 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 (WS Directive 2.101). However, non-lethal methods would not necessarily be employed to resolve every request for assistance if deemed appropriate by WS' personnel.

Lethal methods available for use under this alternative are described in Appendix B. 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 deer involved with the associated damage or threat, the efficacy of methods employed, and the permitting of the take by the WVDNR.

The analysis for magnitude of impact on populations from the use of lethal methods generally follows the process described in WS' programmatic FEIS (USDA 1997). Magnitude is described in WS' programmatic FEIS 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. WS' take is monitored by comparing numbers of animals killed with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause significant adverse impacts to the viability of native species populations (USDA 1997). All lethal take (killing) of deer by WS would occur at the requests of a cooperator seeking assistance and only after the take of deer has been approved and permitted by the WVDNR.

2.2.2 Issue 2 - Effects on Non-target Species' Populations, including T&E Species

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 identified in 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 selects damage management methods that are as target-selective as possible or applies 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.

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

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or 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 federally listed by the USFWS and state listed by West Virginia were reviewed to identify potential effects on T&E species. As stated is Section 1.2.4, WS' activities often help to enhance or maintain populations of T&E species that are adversely affected by deer. Appendix C contains a list of federal and state listed T&E species in West Virginia.

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

Another common issue is the use of methods to resolve damage or threats to human safety that would be available under the alternatives. Not all methods would be available under each of the alternatives and will be further discussed in Chapter 3. Of primary concern are the use of chemical methods and shooting. The issue of using chemicals in wildlife damage management 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 repellents and immobilizing and euthanizing drugs. A common concern with shooting is the misuse or unsafe use of firearms.

Only those repellents registered for use in West Virginia to alleviate or prevent deer damage would be recommend to those requesting assistance or used by WS. When repellents are used by WS, all label requirements would be adhered to.

The use of immobilizing drugs under the identified alternatives would only be administered to deer 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 deer is likely to occur on site with close monitoring of the animal to ensure proper care of the animal. Immobilizing drugs are fully reversible with a full recovery of sedated animals occurring. A list and description of immobilizing drugs available for use under the identified alternatives can be found in Appendix B.

Euthanizing drugs would be administered under similar circumstances to immobilizing drugs under the relevant proposed alternatives. Euthanizing drugs would be administered to animals live-captured using other methods. Disposal of deer carcasses euthanized with euthanizing drugs would occur by deep burial or by incineration (WS Directive 2.515).

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. Deer can be harvested in the State during a regulated hunting season in which consumption is also likely to occur. Chemicals posed for use under the relevant alternatives are regulated by West Virginia state pesticide laws, by the DEA, and by the FDA. WS' use of chemical methods adheres to WS' Directives for the use of immobilizing and euthanasia drugs (WS Directive 2.430) as well as the use of pesticides by WS (WS Directive 2.401).

Non-chemical methods employed to reduce damage and threats to safety caused by deer, if misused, could potentially be hazardous to human safety. Non-chemical methods may include firearms, live-traps, exclusion, and pyrotechnic scaring devices. Of primary concern to the public is the unsafe or misuse of firearms.

Safety issues related to the misuse of firearms and the potential human hazards associated with firearms use are issues identified when firearms are 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 as stated in 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 West Virginia. 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 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 deer, require direct contact to cause bodily harm. Again, restraining devices are not located in high-use areas to ensure the safety of the public and pets. Signs warning of the use of those methods 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.

The cooperator requesting assistance is also made aware through a 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. A risk assessment of methods evaluated in WS' programmatic FEIS concluded that threats to human safety from the use of devices to restrain wildlife were low (USDA 1997).

Additional concerns are raised that the absence of adequate deer damage management would result in adverse effects on human health and safety associated with the transmission of deer-borne diseases and strikes with 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 1.2.3 and section 1.2.5.

WS frequently assists airports in West Virginia to resolve wildlife hazards to aviation. Airport managers and air safety officials are concerned that the absence of deer damage management 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 deer strikes to aircraft.

2.2.4 Issue 4 - Humaneness of Damage Management Methods

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate damage management for societal benefits could be compatible with animal welfare concerns, if *"…the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process."*

According to the American Veterinary Medical Association (AVMA) (1987), suffering is described as a *"…highly unpleasant emotional response usually associated with pain and distress."* However, suffering *"…can occur without pain…,"* and *"…pain can occur without suffering…"* Because suffering carries with it the implication of a time frame, a case could be made for *"…little or no suffering where death comes immediately…"* (California Department of Fish and Game (CDFG) 1991). Pain and physical restraint can cause stress in animals and the inability of animals to effectively deal with those stressors can lead to distress. Suffering occurs when action is not taken to alleviate conditions that cause pain or distress in animals.

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

The 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 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).

Pain and suffering, as it relates to methods available for use to manage invasive patas and rhesus monkeys 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 can cause "*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 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. The issue of humanness will be further discussed as it relates to the methods available for use under the alternatives in Chapter 4. Minimization and SOPs to alleviate pain and suffering are discussed in Chapter 3.

2.2.5 Issue 5 - Effects on the Aesthetic Values of Target Species

One issue is the concern that the proposed action or the alternatives would result in the loss of aesthetic benefits of deer to the public, resource owners, or neighboring residents where damage management activities occurs. 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 wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to manage conflicts/problems between humans and wildlife.

Wildlife populations provide a wide range of social and economic benefits (Decker and Goff 1987). 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 considerably. 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 wildlife damage management 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 deer. To such people an overabundance of deer are considered nuisances 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 deer proliferate in such numbers and appear to remain unchecked.

2.2.6 Issue 6 - Effects on Regulated White-tailed Deer Hunting

Another issue commonly identified is a concern that deer damage management activities conducted by WS would affect regulated deer hunting by significantly reducing local deer populations. Potential impacts could arise from the use of non-lethal or lethal damage management methods. Non-lethal methods used to reduce or alleviate damage caused by deer are used to disperse deer which would reduce the deer densities in damage management areas. Similarly, lethal methods used to reduce damage associated with deer could lower deer densities in areas where damage is occurring resulting in a reduction in the availability of deer during the regulated harvest season. WS' deer removal activities would primarily be conducted on populations and in areas where hunting access is restricted (e.g., airports) or has been ineffective (e.g., urban areas). The use of non-lethal or lethal methods often disperses deer from areas where damage is occurring to areas outside the damage area which could serve to move deer from those less accessible areas to places accessible to hunters.

Under those alternatives where WS is directly involved with reducing damage or threats caused by deer, WS' activities will occur through a permit issued by the WVDNR and/or through a permit issued to a separate entity by the WVDNR. Therefore, WS' activities to alleviate damage or threats with deer in the State that involves the lethal take of deer will only occur after a permit has been issued by the WVDNR.

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.3.1 WS' Impact on Biodiversity

The WS program does not attempt to eradicate any species of native wildlife in West Virginia. WS operates in accordance with international, federal and state laws, and regulations enacted to ensure species viability. Any reduction of a local population or group is frequently temporary because immigration from adjacent areas or reproduction replaces the animals removed. Effects on target and non-target species populations are shown in Section 4.1. WS operates on a small percentage of the land area of West Virginia, and the maximum take of any wildlife species by WS analyzed in this EA is expected to be of low magnitude when compared to the number of deer harvest annually in the State and the overall deer population. The effects of the current WS' deer damage management program on biodiversity are not significant nationwide (USDA 1997).

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2.3.2 Appropriateness of Preparing an EA 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 wildlife damage management 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 or cumulative impacts on the quality of the human environment that would warrant the preparation of an EIS or a finding of no significant impact (FONSI). This EA addresses impacts for managing damage and threats to human safety caused by deer in West Virginia 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 West Virginia 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.

2.3.3 Effectiveness of Deer 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. 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 an 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[6]. 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.

The goal of the WS program is to reduce damage, risks, and conflicts with wildlife as requested and not to necessarily reduce/eliminate local populations. WS recognizes that localized population reduction could be short-term and that new individuals may immigrate 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 be effective at resolving or preventing further damage until the resource is no longer vulnerable or until other methods can be employed to alleviate future damage.

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

2.3.4 A Loss Threshold Should Be Established Before Allowing Lethal Methods

WS is aware that some people feel federal wildlife damage management should not be allowed until economic losses reach some arbitrary predetermined threshold level. Such policy, however, would be difficult or inappropriate to apply to human health and safety situations. Although some damage can be tolerated by most resource owners, WS has the legal direction to respond to requests for assistance, and it is program policy to aid each requester to minimize losses. WS uses the WS Decision Model thought process discussed in Chapter 3 to determine appropriate strategies.

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 wildlife damage management (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 percentage of loss of a particular resource to justify the need for wildlife damage management actions.

2.3.5 Wildlife Damage Management Should Not Occur At Taxpayer Expense

Funding for WS comes from a variety of sources in addition to federal appropriations. Cooperative funding sources could occur under an agreement for service from the State, county, municipal, private, and other federal agencies. Federal, state, and local officials have decided that wildlife damage management should be conducted by appropriating funds. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Wildlife damage management is an appropriate sphere of activity for government programs, since aspects of wildlife damage management are a government responsibility and authorized and directed by law.

A minimal federal appropriation is allotted for the maintenance of a WS program in West Virginia. The remainder of the WS program is entirely fee-based. Technical assistance is provided to requesters as part of the federally-funded activities, but all direct assistance in which WS' employees perform damage management activities is funded through cooperative service agreements between the requester and WS. Thus, deer damage management by WS in West Virginia is fee-based to a high degree.

2.3.6 Cost Effectiveness of Deer Damage Management

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 to reduce damage and threats to human safety caused by deer 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.

2.3.7 Deer Damage Should Be Managed By Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce deer damage for property owners or property owners when deemed appropriate by the resource owner. Some property owners would prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity and thus could provide the service at less expense, or because

they prefer to use a private business rather than a government agency. However, some property owners would prefer to contract with a government agency. In particular, large industrial businesses and cities and towns may prefer to use WS because of security and safety issues and reduced administrative burden.

2.3.8 Effects on Human Health from Consumption of Donated Deer Meat

Of concern under this issue is the consumption of deer meat donated to charitable organization after being lethally taken by WS. Of recent concern is the potential for lead bullet fragments to be present in deer meat that has been processed for human consumption. In addition, the potential for the spreading of zoonotic diseases in deer processed and donated for human consumption is also a concern, especially from those areas of West Virginia where CWD is present.

Deer immobilized and/or euthanized using appropriate drugs would not be donated for human consumption with disposal of carcasses occurring by deep burial or incineration. Deer taken by any method for disease sampling or in an area where zoonotic diseases of concern are known to be prevalent and of concern to human health after consuming processed deer meat would also not be donated for consumption and would be disposed of by deep burial or incineration.

WS' activities to alleviate damage or threats associated with deer in the State will only occur after receiving a request for direct operational assistance and only after a depredation permit has been issued by the WVDNR to WS or the entity requesting assistance. Since WS' activities will only occur after receiving a request and only after a depredation permit has been issued by the WVDNR to the requesting entity, deer taken by WS would become the property of the entity requesting assistance and/or the property of the WVDNR.

Therefore, the decision to process deer for human consumption that were taken by WS would be the sole responsibility of the entity requesting assistance and/or the WVDNR. WS will not process and/or donate processed deer meat to charitable organizations and would not be involved with the processing and/or donation of the meat to charitable organizations.

2.3.9 Effects from the Use of Lead Ammunition in Firearms

Questions have arisen about the deposition of lead into the environment from ammunition used in firearms to lethally remove deer. As described in Appendix B, the lethal removal of deer with firearms by WS to alleviate damage or threats would occur using a rifle or shotgun. In an ecological risk assessment of lead shot exposure in non-waterfowl birds, ingestion of lead shot was identified as the concern rather than just contact with lead shot or lead leaching from shot in the environment (Kendall et al. 1996). Hunt et al. (2009) also found that deer killed with rifles using lead bullets may pose a risk of lead exposure to scavengers from ingestion of lead fragments in the carcass.

Take of deer by WS in West Virginia occurs primarily from the use of rifles. To reduce risks to human safety and property damage from bullets passing through deer, the use of firearms is applied in such a way (*e.g.*, caliber, bullet weight, distance) to ensure the bullet does not pass through deer. Since deer that are removed using firearms will occur within restricted areas that are fenced, retrieval of all deer carcasses for proper disposal is highly likely. With risks of lead exposure occurring primarily from ingestion of shot and bullet fragments, the retrieval and proper disposal of deer carcasses will greatly reduce the risk of scavengers ingesting or being exposed to lead.

However, deposition of lead into soil could occur if, during the use of firearms, the projectile(s) pass through a deer, if misses occur, or if the deer carcass is not retrieved. In general, hunting tends to spread lead over wide areas and at low concentrations (Craig et al. 1999). Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil is generally retained within the top 20 cm (about 8 inches). In addition, concerns occur that lead from bullets or shot deposited in soil from shooting activities could lead to contamination of water, either ground water or surface water, from runoff. Stansley et al. (1992) studied lead levels in water that was subjected directly to high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Lead did not appear to "transport" readily in surface water when soils were neutral or slightly alkaline in pH (*i.e.*, not acidic), but lead did transport more readily under slightly acidic conditions. Although Stansley et al. (1992) detected elevated lead levels in water in a stream and a marsh that were in the shot "fall zones", the study did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot where it was believed the lead contamination was due to runoff from the parking lot, and not from the shooting range areas. The study also indicated that even when lead shot is highly accumulated in areas with permanent water bodies present, the lead does not necessarily cause elevated lead contamination of water further downstream. Muscle samples from two species of fish collected in the water bodies with high lead shot accumulations had lead levels that were well below the accepted threshold standard of safety for human consumption (Stansley et al. 1992).

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

Since depredation permits that include the allowed method of lethal removal are issued by the WVDNR directly to entities experiencing damage or threats of damage, WS' assistance with removing deer would not be additive to the environmental status quo since those deer removed by WS using firearms could be lethally removed by the entities receiving the depredation permit using the same method in the absence of WS' involvement. The amount of lead deposited into the environment may be lowered by WS' involvement in deer damage management activities due to efforts by WS to ensure projectiles do no pass through but are contained within the deer carcass which limits the amount of lead potentially deposited into soil from projectiles passing through the carcass. The proficiency training received by WS' employees in firearm use and accuracy increases the likelihood that deer are lethally removed humanely in situations that ensure accuracy and that misses occur infrequently which further reduces the potential for lead to be deposited in the soil from misses or from projectiles passing through carcasses. In addition, WS' involvement ensures deer carcasses lethally removed using firearms will be retrieved and disposed of properly to limit the availability of lead in the environment and ensures deer carcass are removed from the environment to prevent the ingestion of lead in carcasses by scavengers. Based on current information, the risks associated with lead bullets or shot that are deposited into

the environment from WS' activities due to misses, the bullet or shot passing through the carcass, or from deer carcasses that may be irretrievable would be below any level that would pose any risk from exposure or significant contamination of water.

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CHAPTER 3: ALTERNATIVES

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 deer damage management 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 initially developed for consideration using WS' Decision Model (Slate et al. 1992) as described in WS' programmatic 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: No Deer Damage Management by WS

This alternative precludes any and all activities by WS to protect human health and safety, protect agricultural resources, alleviate damage to property, and protect natural resources from impacts of deer on fenced federal properties and airports. In addition, WS would not participate in the surveillance and monitoring of disease outbreaks in the deer population. WS would not provide operational or technical assistance to those seeking assistance. WS would not respond to requests for assistance and would direct all inquiries to the WVDNR. The WVDNR could continue to issue depredation permits for the take of deer to alleviate damage to those requesting assistance. Many of the methods listed in Appendix B would be available for use by other agencies and private entities with approval by the WVDNR to manage damage and threats associated with deer.

3.1.2 Alternative 2: Non-lethal Deer Damage Management only by WS

This alternative would require WS to use and recommend non-lethal methods only to resolve all deer damage problems at fenced federal facilities and airports. In addition, WS would only employ non-lethal methods during participation with the WVDNR on any disease surveillance or monitoring project. Requests for information regarding lethal management approaches would be referred to the WVDNR. Persons incurring deer damage could still resort to legal lethal methods or other methods not recommended by WS, use contractual services of private businesses that were available to them, or take no action. Appendix B describes a number of non-lethal methods available for recommendation and use by WS under this alternative.

3.1.3 Alternative 3: Integrated Deer Damage Management Program (No Action/Proposed Action)

This alternative, the proposed action, would continue an integrated approach 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 deer at fenced federal facilities and airports. A major objective of the program would be to minimize damage and threats to human safety caused by deer on those facilities. To meet this objective, WS' personnel would continue to respond to

requests for assistance[7] with, at a minimum, technical assistance, or when cooperative funding is available, operational damage management. The integration of methods 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). 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. All management actions would comply with appropriate federal, state, and local laws. Appendix B provides a more detailed description of the methods that could be used under the proposed action.

Habitat modification, harassment, repellents, physical exclusion, and public hunting could be recommended and utilized to reduce deer damage. When all non-lethal techniques and public hunting have proven ineffective, deer would be removed as humanely as possible by sharp shooting and live-capture followed by euthanasia as authorized through the issuance of permits by the WVDNR. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy. Deer damage management would be conducted on fenced federal properties and airports throughout West Virginia, when approved by the WVDNR and when requested by the WVDNR for disease monitoring and surveillance. All deer damage management would be consistent with WVDNR deer management objectives, with other uses of the area where damage is occurring, and would comply with appropriate federal, state, and local laws.

Integrated Wildlife Damage Management

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. Integrated wildlife damage management 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 methods in an integrated approach to reduce damage through WS' Decision Model (Slate et. al. 1992) described in WS' programmatic FEIS (USDA 1997).

The philosophy behind integration of methods is to implement functional damage management techniques in the most cost-effective[8] manner, while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. An integrated approach draws from the largest possible array of options to create a combination of techniques appropriate for the specific circumstances. The integration of methods may incorporate cultural practices (i.e. changing crop types), habitat modification (i.e. barriers, exclusionary methods), animal behavior modification (i.e. scaring), removal of individual offending animals, local population

[7] Deer damage management would only be conducted when requested where a need has been demonstrated and an agreement or other comparable document has been completed.

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

management (i.e. local population reduction), 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 approach is to conduct both technical assistance and direct assistance to resolve requests for assistance with reducing damage caused by deer.

Technical Assistance Recommendations

Under the proposed action, WS' technical assistance activities would only occur on fenced federal facilities and airports. Requests for technical assistance received by WS from other entities would be referred to the appropriate district office of the WVDNR. Through technical assistance, WS would provide recommendations and information on deer damage management activities that could be employed by those seeking assistance without WS direct involvement.

Direct Operational Damage Management Assistance

This is the implementation or supervision of damage management activities by WS' personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone, and when a Cooperative Service Agreement or other comparable instruments provide for WS' direct damage management. 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, if the problem is complex.

Education and Outreach Programs

Education and outreach programs are an important element of WS' program activities because wildlife damage management is about finding balance or co-existence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, 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.

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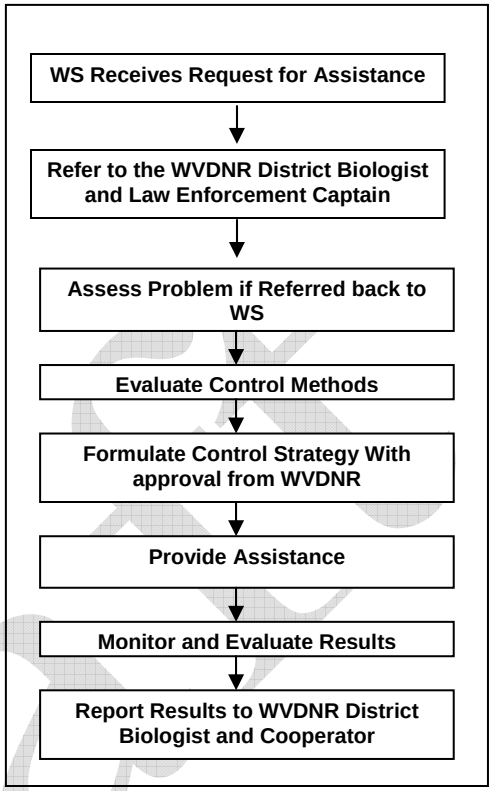
Research and Development

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

Figure 3-1. WS' Decision Model



WS' Decision Making Model

The procedures used by WS' personnel to determine management strategies or methods applied to specific damage problems can be found in WS' programmatic FEIS (USDA 1997).

WS' personnel use a methodical process for evaluating and responding to damage complaints and requests for assistance that are depicted by the West Virginia White-tailed Deer Decision Model (Figure 3-1). WS' personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for reducing damage to an acceptable level. WS' personnel assess the problem and evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are developed into a management strategy. After the management 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 may be ended. In some cases, continual conduct of effective wildlife damage management activities is necessary to relieve damage. The Decision Model is not necessarily a written process, but a mental problem-solving process common to most, if not all professions.

3.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

3.2.1 Live Trapping and Relocation

Under this alternative, the only method available to WS for resolving deer damage would be trap deer and relocate them to suitable habitat. No other methods would be used by WS to resolve deer damage. WS would capture deer using live traps or capture drugs administrated by dart gun and then relocate the captured deer to another area.

Translocation of wildlife is discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, potential for disease transfer, and difficulties in adapting to new locations or habitats. Also, capture and relocation of white-tailed deer is prohibited in

West Virginia by the WVDNR due to recent concerns of chronic wasting disease outbreaks (see section 1.2.5).

3.2.2 Population Management through Reproductive Inhibitors

Under the West Virginia Code of State Rules the use of reproductive inhibitors on free-roaming or non-captive wildlife is prohibited in West Virginia (Title 58 CSR 66).

Under this alternative, the only method available to resolve requests for assistance would be the recommendation and the use of reproductive inhibitors to reduce or prevent reproduction on deer responsible for causing damage. Reproductive inhibitors are often considered for use where wildlife populations are overabundant and where traditional hunting or lethal control programs are not publicly acceptable (Muller et. al. 1997). Use and effectiveness of reproductive control as a wildlife population management tool is limited by population dynamic characteristics (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.

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: 1) Surgical sterilization (vasectomy, castration, and tubal ligation), 2) chemosterilization, and 3) through gene therapy. Contraception could be accomplished through: 1) hormone implantation (synthetic steroids such as progestins), 2) immunocontraception (contraceptive vaccines), and 3) 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 hormones was investigated and eventually rejected as an effective and efficient reproductive control technique for deer due to the limited duration of the hormones effectiveness (Matschke 1976, Matschke 1977a, Matschke 1977b, Matschke 1977c, Roughton 1979, Matschke 1980). Additionally, concerns related to costs and logistics of widespread distribution of drugged baits, dosage control and ingestion of baits by children and non-target animals make oral contraception (by steroids) largely impractical (Lowery et al. 1993). More recently, Immunocontraception has been studied in various situations and locations, but its potential use appears limited due to considerable constraints regarding treatment and follow-up treatment of a sufficiently large number of target animals, varying immunogenecity of vaccines, genetic backgrounds of individual animals, age, nutritional status, stress and other factors (Becker et al. 1997, Becker et al. 1999). The use of porcine zona pellucida (PZP) as a contraceptive agent in wildlife management has been investigated recently (Kirkpatrick et al. 1990, Turner and Kirkpatrick 1991, Turner et al. 1992, Turner et al. 1996), but to date, there is no published documentation that immunocontraceptive vaccines have successfully reduced any free-ranging white-tailed deer herd or population.

Scientists with the NWRC have developed GonaCon™, a new single dose immunocontraceptive vaccine that shows great promise as a wildlife infertility agent. Recent studies have demonstrated the efficacy of this single-shot Gonadotropin-releasing hormone (GnRH) vaccine on California ground squirrels, Norway rats, feral cats and dogs, feral swine, wild horses and white-tailed deer. Infertility among treated female swine and white-tailed deer lasted up to 2 years without requiring a booster vaccination (Miller et al. 2000). This vaccine overcomes one of the major obstacles of

previous two dose vaccines, the need to only capture animals once to vaccinate them. A single-injection vaccine is much more practical as a field delivery system for use on free-ranging animals.

Ongoing studies initiated by NWRC in 2004, are examining the practicality of administrating GonaCon™ to free-ranging white-tailed deer as well as the efficacy, toxicity and safety of the vaccine. No fertility control agents have been approved by FDA for non-investigational use on wildlife populations in the U.S. Several materials, however, including GnRH and PZP vaccines, have been classified as investigational drugs that may be used only in rigidly controlled research studies. NWRC studies that are underway at several locations are being conducted as pivotal studies that are required as part of the FDA approval process for a new animal drug.

The single-shot, multiyear vaccine could be a useful technique for the management of enclosed or urban/suburban deer populations. However, GonaCon™ still has limitations, especially the need to capture and inject each animal. Scientists are hopeful that the GnRH vaccine will soon be approved for wildlife fertility control. If and when this vaccine is proven effective and safe to use for free-ranging white-tailed deer in West Virginia, this EA and its analysis would be supplemented pursuant to NEPA at that time.

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

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.

3.2.3 Non-lethal Methods Required Before Lethal Methods

This alternative would require that all non-lethal methods or techniques described in Appendix B be applied to all requests for assistance to reduce damage and threats to safety from deer 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 and/or the WVDNR. 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 3.1.4 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.

3.2.4 Compensation for Deer Damage

The compensation alternative would require the establishment of a system to reimburse persons impacted by deer 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 WS' programmatic FEIS indicated that the concept has many drawbacks (USDA 1997).

A compensation alternative 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 since the cost of the program would include not only the cost of compensation but the cost of hiring personnel to assess damage. Compensation for deer damages would most likely be below full market value due to the high cost of such a program. Assessing and confirming losses in a timely manner for all requests would be difficult which could lead to damage not being verified and uncompensated. A compensation program would give little incentive to resource owners to limit damage through improved cultural or other practices and management strategies unless such practices were required to be employed prior to compensation. Resource owners would likely rely completely on a compensation program and lethal control would most likely continue as permitted by State law (58 CSR 15). A compensation program would not be practical for reducing threats to human health and safety.

3.2.5 Lethal Deer Damage Management only by WS

Under an alternative using only lethal methods, WS would be required to provide only lethal direct control services with the approval of the WVDNR. Requests for information regarding non-lethal management approaches would be referred to the WVDNR. Individuals might choose to implement WS' lethal recommendations, implement non-lethal methods or other methods not recommended by WS, contract for WS' lethal direct control services, use contractual services of private businesses, or take no action.

However, exclusionary devices can be effective in preventing damage in certain confined instances. Under WS Directive 2.101, WS must consider the use of non-lethal methods before lethal methods. In those situations where damage could be alleviated using exclusionary devices or other non-lethal methods deemed effective, those methods would be employed or recommended as determined by the decision models of the cooperating agencies. Therefore, this alternative was not considered in detail.

3.3 MINIMIZATION MEASURES AND STANDARD OPERATING PROCEDURES

3.3.1 Minimization Measures

Minimization measures are any features of an action that serves to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current WS' program, nationwide and in West Virginia, uses many such minimization measures and these are discussed in detail in Chapter 5 of WS' programmatic FEIS (USDA 1997). These minimization measures will be incorporated into activities conducted by WS when addressing deer damage and threats in West Virginia.

Some key minimizing measures pertinent to the proposed action and the other alternatives considered include the following:

- The WS' Decision Model and the comparable decision-making processes of cooperating agencies, which are designed to identify effective wildlife damage management strategies and their impacts, are consistently used and applied when addressing deer in West Virginia (See figure 3-1).

- Non-target animals captured in live-traps are released unless it is determined by an employee of WS or consulting agencies that the animal will not survive and/or that the animal can not be released safely.

- Conspicuous, bilingual warning signs alerting people to the presence of traps may be placed at major access points to areas where active deer damage management operations are occurring, when appropriate. Signs will be placed when the presence of the signs would not impact the efficacy of the management activities occurring in an area by alerting people to the presence of deer or the presence of equipment used for damage management purposes. The efficacy of activities could be lessened or compromised if people are alerted to the presence of activities in the area and choose to ignore the warning signs by trying to locate equipment or deer. The use of signs will be based on human activity in the area and the ability of the property owner or manager to control access to the property by the public.

- Reasonable and prudent alternatives and measures are established through consultation with the USFWS and implemented to avoid adverse impacts to T&E species. Consultation with the WVDNR will also ensure WS' activities do not adversely impact State listed T&E species.

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

- Management actions are directed toward specific individual animals posing a threat to human health and safety, causing agricultural damage, damaging natural resources, or causing damage to property.

- Although hazards to the public from methods and activities to manage deer damage are low according to a formal risk assessment conducted in WS' programmatic FEIS (USDA 1997), hazards to the public and their pets are even further reduced by the fact that control activities are primarily conducted by trained wildlife damage management personnel away from areas of human activity in areas where the public is restricted. Management activities could be conducted in rural agricultural areas where human activity in areas where deer frequent is minimal. If requests for assistance are received in urban areas, the methods employed by WS will be evaluated to minimize risks to human safety.

3.4 ADDITIONAL MINIMIZATION MEASURES SPECIFIC TO THE ISSUES

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

3.4.1 Issue 1 - Effects of WS' Activities on White-tailed Deer Populations

- WS' activities to manage damage and threats caused by deer will be coordinated with and approved by the WVDNR.
- The WS' Decision Model, designed to identify the most appropriate damage management strategies and their impacts, will be used to determine deer damage management strategies (See figure 3-1).
- WS will only target those deer identified as responsible for causing damage, posing a threat of damage, and/or posing a threat to human safety.
- WS' lethal take (killing) of deer will be reported to and monitored by the WVDNR to ensure WS' take is considered as part of management objectives for deer in the State.
- WS will annually monitor deer damage management activities to ensure activities do not adversely affect deer populations in West Virginia.

3.4.2 Issue 2 - Effects on Non-target Species' Populations, including T&E Species

- When conducting removal operations via shooting, identification of the target will occur prior to application.
- As appropriate, suppressed firearms will be used to minimize noise impacts.
- When conducting nighttime activities, potential impacts associated with spotlights would be minimized by the use of night vision equipment, infrared devices, or red filtered spotlights.
- Human presence at control sites would be kept to the minimal time needed to accomplish the management action.
- Personnel will use lures, trap placement, and capture devices that are strategically placed at locations likely to capture a target animal and minimize the potential of non-target animal captures.
- As appropriate, capture devices will be equipped in such a manner to reduce the potential of capturing non-target animals.
- Any non-target animals captured in cage traps, nets, or any other restraining device will be released whenever it is possible and safe to do so.
- WS has consulted with the USFWS and the WVDNR to evaluate activities to resolve deer damage and threats to ensure the protection of T&E species.
- WS will annually monitor activities conducted under the selected alternative, if activities are determined to have no significant impact on the environment and an EIS is not required, to ensure those activities do no negatively impact non-target species.

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

- Damage management activities will be conducted professionally and in the safest manner possible. Most trapping will be conducted away from areas of high human activity and when determined necessary, signs will be placed to warn the public of any potential hazards. See section 3.5.1 for additional minimization measures relating to human safety.

- If deer damage management is resolved via shooting, the use of firearms will be conducted professionally and in the safest manner possible. Shooting will be conducted during time periods when public activity and access to the control areas are restricted (e.g., at night). Personnel involved in shooting operations will be fully trained in the proper and safe application of this method.

- All immobilizing and euthanasia methods used by WS will be registered with the DEA or the FDA.

- All repellents used by WS or recommend for use through technical assistance will be registered with EPA in accordance with FIFRA.

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

- WS' employees who use controlled substances participate in approved continuing education to maintain certified to use immobilizing and euthanasia drugs.

- WS would adhere to all established withdrawal times for deer when using immobilizing drugs for the capture of deer that are agreed upon by WS, the WVDNR, and veterinarian authorities. Although unlikely, in the event that WS is requested to immobilize deer either during a period of time when harvest of deer is occurring or during a period of time where the withdrawal period could overlap with the start of a harvest season, WS would euthanize the animal.

- The carcasses of deer euthanized with euthanasia drugs will be disposed of by deep burial or by incineration (WS Directive 2.515).

3.4.4 Issue 4 - Humaneness of Damage Management Methods

- Personnel will be well trained in the latest and most humane devices/methods for removing problem wildlife.

- WS' use of euthanasia methods will follow those recommended by WS' directives (WS Directive 2.430) and the AVMA (AVMA 2007).

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

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3.4.5 Issue 5 - Effects on the Aesthetic Values of Target Species

- Management actions to reduce or prevent damage caused by deer in West Virginia would be directed toward specific individuals identified as responsible for the damage, identified as posing a threat to human safety, or identified as posing a threat of damage.

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

3.4.6 Issue 6 – Effects on Regulated White-tailed Deer Hunting

- Management actions to reduce or prevent damage caused by deer in West Virginia would be directed toward specific individuals identified as responsible for the damage, identified as posing a threat to human safety, or identified as posing a threat of damage.

- WS' activities to manage damage and threats caused by deer will be coordinated with and approved by the WVDNR.

- WS' lethal take (killing) of deer will be reported to and monitored by the WVDNR to ensure WS' take is considered as part of management objectives for deer in the State.

- WS will annually monitor deer damage management activities to ensure activities do not adversely affect deer populations in West Virginia.

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CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

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

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

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

4.1.1 Issue 1 - Effects of WS' Activities on White-tailed Deer Populations

Alternative 1: No Deer Damage Management by WS

WS would not conduct deer damage management activities under this alternative. Management actions taken by non-federal entities would be considered the *environmental status quo* (See section 2.1.4). Deer could continue to be lethally taken to resolve damage and/or threats occurring at the discretion of the WVDNR through the issuance of depredation permits.

Local deer populations could decline, stay the same, or increase depending on actions taken by the WVDNR and those persons receiving permits. Some resource/property owners may hunt deer or allow other hunters access to hunt deer during the hunting season. The WVDNR would continue to issue depredation permits for the take of deer to alleviate damage in the State. Resource/property owners may obtain depredation permits from the WVDNR that allows them to shoot deer outside of the hunting season and in those areas where hunting is not allowed. Deer populations could continue to increase where hunting pressure was low or when an insufficient number of deer are removed under special permits issued by the WVDNR. Some local populations of deer would temporarily decline or stabilize where hunting pressure and permitted removal activities were adequate. Some resource/property owners may take illegal, unsafe, or environmentally harmful action against local populations of deer out of frustration or ignorance. While WS would provide no assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in impacts similar to the proposed action.

Since depredation permits would continue to be issued to allow the take of deer by those experiencing deer damage and deer would continue to be harvested during the regulated season at the discretion of the WVDNR, the potential effects on the deer population in the State would be similar among all the alternatives for this issue. Since WS' involvement in deer damage management would only occur after the WVDNR has issued a permit for such action, WS' involvement would not be additive to take that could occur since the cooperator requesting WS' assistance could conduct deer damage management activities without WS'

direct involvement if permitted by the WVDNR. Therefore, any actions to resolve damage or reduce threats associated with deer could occur by other entities despite WS' lack of involvement under this alternative.

Alternative 2: Non-lethal Deer Damage Management only by WS

WS would not be involved with the take of deer under this alternative. To resolve requests for assistance, WS' would be required to employ only non-lethal methods. Therefore, WS' activities would have no effect on statewide deer populations in West Virginia. Although some harassment and dispersal of deer would occur under this alternative, those action would not adversely affect deer populations as the deer are dispersed to other areas. Similar to the other alternatives, the lethal take of deer could continue to occur under permits issued by the WVDNR. Deer would also continue to be lethally taken during the regulated harvest season. Although non-lethal methods can be effective at reducing deer damage, the use of non-lethal methods only may not be practical in all situations (e.g., placing fencing around entire agricultural fields to exclude deer would be cost prohibitive).

The goal in using reproductive inhibitors, though often considered a non-lethal method, is to reduce local wildlife populations. Therefore, the use of reproductive inhibitors could result in a localized reduction in deer populations. The use of reproductive inhibitors statewide would be impracticable with current technology and delivery systems due to the cost of application. In addition, any use of reproductive inhibitors would have to be coordinated with and approved by the WVDNR (58 CSR 66). Therefore, any use of a reproductive inhibitor that would result in a population reduction, either localized or over larger areas, would be at the direction of the WVDNR as part of an overall population objective for the State. The WVDNR has management authority of all resident wildlife species, including deer, in the State (see section 1.6.2). Since WS' activities are coordinated with and approved by the WVDNR which regulates take of deer through the issuance of depredation permits and the through the regulated harvest season, any reduction in the deer population from the use of reproductive inhibitors by WS would be at the direction of the WVDNR.

As discussed previously in section 3.4.2, reproductive inhibitors are currently not available for non-investigational uses (i.e., research-purposes only)[9]. If reproductive inhibitors are registered with the EPA under the FIFRA and were registered for use in West Virginia by the WVDA, the use of those products by WS for the management of deer populations in West Virginia (after the approval of the WVDNR) would be re-evaluated pursuant to NEPA.

Therefore, in the absence of reproductive inhibitors as a method under this alternative, WS' activities would not directly affect deer populations in the State. Deer could still be lethally taken by those experiencing damage as permitted by the WVDNR (58 CSR 15) and deer will continue to be taken during the regulated harvest season. Potential impacts to the deer population in the State under this alternative are likely to be similar to the other alternatives since depredation permits are issued by the WVDNR for the lethal take of deer causing damage and those deer authorized for take under permit are likely to be taken by the person experiencing damage whether WS is directly involved in the take. Therefore, any effects on statewide deer populations in West Virginia under the alternative would occur at the discretion of the WVDNR despite WS' involvement in deer damage management through the use of non-lethal methods only.

[9] The regulatory authority of contraceptives for free-ranging wildlife was recently given to the EPA by the FDA (Eisemann et al. 2006). Current evaluation and research of reproductive inhibitors occurs under an INAD (see section 1.7.12).

Alternative 3: Integrated Deer Damage Management Program (No Action/Proposed Action)

Under this alternative, WS would continue to incorporate non-lethal and lethal methods described in Appendix B in an integrated approach in which a combination of methods may be employed to resolve a request for assistance. WS would only conduct damage management actions after receiving a request from a property owner or property manager and would target those deer identified as causing damage on property owned or managed by the requestor after a cooperative service agreement, MOU, or comparable document has been signed. WS' activities would also only occur after the WVDNR has issued a permit for those activities either to WS, to the property owner, and/or the property manager.

Non-lethal methods can disperse or otherwise make an area unattractive to deer causing damage thereby, reducing the presence of deer at the site and potentially the immediate area around the site where non-lethal methods are employed. Non-lethal methods would be given priority when addressing requests for assistance (WS Directive 2.101). However, non-lethal methods would not necessarily be employed to resolve every request for assistance if deemed inappropriate by WS' personnel using the WS Decision Model. Non-lethal methods are used to excluded, harass, and disperse target wildlife from areas where damage or threats are occurring. When effective, non-lethal methods would disperse deer from the area resulting in a reduction in the presence of deer at the site where those methods were employed. However, deer responsible for causing damage or threats are moved to other areas with minimal impact on deer populations. Non-lethal methods are generally regarded as having minimal impacts on overall populations of wildlife since those species are unharmed. The use of non-lethal methods would have no adverse impacts on deer populations in the State.

Lethal methods would be employed to resolve damage associated with those deer identified by WS as responsible for causing damage or threats to human safety only after receiving a request and only after a permit has been issued by the WVDNR. The use of lethal methods would therefore result in local population reductions in the area where damage or threats were occurring since deer would be removed from the population.

The authority for management of resident wildlife species is the responsibility of the WVDNR (see section 1.6.2). The WVDNR collects and compiles information on white-tailed deer population trends and take, and uses this information to manage deer populations. The primary tool for the management of deer populations in West Virginia is through adjusting the allowed lethal take during the deer harvest season in the State which is determined and regulated by the WVDNR. Where deer damage is severe, the WVDNR also issues depredation permits for the take of deer outside of the regulated season to reduce damage (58 CSR 15).

Since the establishment of a deer harvest season in West Virginia, the highest level of take of deer occurred in 2002 when 255,356 deer were harvested (see Table 4.1). In 2007, the WVDNR estimated the number of deer killed during the regulated season to be 145,937 deer. West Virginia hunters have harvested nearly 1.5 million deer between 2000 and 2007 during the regulated harvest season. In addition to take occurring during the regulated season, deer populations are also regulated by other factors. Mortality also occurs from vehicle collisions, dogs, illegal take, tangling in fences, depredation permits, disease, and other causes (Crum 2003). Similar to the peak harvest, the highest mortality from sources other than hunting occurred in 2002 when an estimated 27,069 deer were killed.

Since FY 2000, WS has used lethal methods to take a total of 180 deer as targets in West Virginia to alleviate damage and threats with the highest level of take occurring in FY 2004 when 90 deer were taken (See Table 4.1). All take by WS has occurred after receiving a request for assistance with resolving damage caused by deer and after a permit and approval was issued by the WVDNR. WS in West Virginia has also conducted a total of 651 technical assistance projects involving deer damage management since FY 2001 as shown in Table 1-1.

Table 4.1 - Total known deer mortality in West Virginia by year and WS' total take compared to all known take.

Year	WV Deer Harvest[a]	Other Mortality[b]	WS' Intentional Take[c]	WS' Non-target Take[c]	Total Deer Mortality	WS' % of Total Take
2000	192,944	18,509	7	2	211,462	**0.004%**
2001	217,415	25,597	30	1	243,043	**0.01%**
2002	255,356	27,069	0	0	282,425	**0.0%**
2003	208,255	21,794	0	0	230,049	**0.0%**
2004	179,043	23,243	90	0	202,376	**0.04%**
2005	134,557	23,243	0	9	157,809	**0.006%**
2006	136,289	23,243	0	0	159,532	**0.0%**
2007	145,937	23,243	53	0	169,233	**0.03%**
Total	**1,469,796**	**185,941**	**180**	**12**	**1,655,929**	**0.01%**

[a]Data from 2000 through 2003 adapted from WVDNR (2003), data from 2004 through 2007 adapted from WVDNR (2008).
[b]Data from 2000 through 2003 adapted from WVDNR (2003), data from 2004 through 2007 is an average of mortality from 2000 through 2003 since data is currently unavailable from 2004 through 2007.
[c]Data reported by federal fiscal year.

As shown in table 4.1, the highest level of take by WS occurred in FY 2004 when 90 deer were removed using lethal methods which accounted for 0.04% of the total known mortality of deer in West Virginia. Since 2000, a total of 192 deer have been taken by WS as targets and non-targets, which represents 0.01% of the total mortality of deer in the State. Based on previous requests for assistance, the magnitude of WS' take of deer to resolve damage or threats has been low in West Virginia. When take of deer has occurred by WS, the magnitude of take compared to the total known mortality has ranged from 0.004% to 0.04% since 2000. Based on the limited take by WS from 2000 through 2007, WS' activities to resolve or prevent damage have not adversely impacted the deer population.

After review of the number of requests for assistance to resolve and prevent deer damage in West Virginia received by WS since FY 2000 and in consultation with the WVDNR, WS' anticipates the number of requests for assistance to increase in the future. Based on consultation with WVDNR, a review of previous requests for assistance, and in anticipation of an increasing number of requests for assistance, WS anticipates the use of non-lethal and lethal methods to resolve deer damage and threats to increase.

Non-lethal methods are generally regarded as having minimal impacts on wildlife populations since no lethal take occurs and wildlife are dispersed to other areas. No population reduction is likely from the use of non-lethal methods, except for reproductive inhibitors which are currently not available for use in West Virginia. Therefore, the increased use of non-lethal methods to resolve and prevent damage will not adversely affect deer populations in West Virginia.

An increasing number of requests for assistance will likely result in the escalated use of lethal and non-lethal methods to resolve damage and threats associated with deer as permitted by

the WVDNR. After review of previous activities conducted by WS and in anticipation of gradual increase in requests for lethal take, WS anticipates that future lethal take will not exceed 1,000 deer annually. In addition, WS may be requested by the WVDNR and/or the WVDA to assist with sampling and managing the spread of diseases found in free-ranging and/or captive deer populations. In the case of a disease outbreak, WS could lethally take up to 1,500 additional white-deer for sampling and/or to prevent further spread of diseases. Therefore, WS' total annual take would not exceed 2,500 deer annually under the proposed action. Any take of deer by WS in West Virginia must be authorized and permitted by the WVDNR.

If requested, WS could also assist with sampling and removing deer from captive facilities where deer are confined inside a perimeter fence. The detection of a disease at a captive facility often raises concerns of the potential spread of diseases to free-ranging herds. The spread of diseases among deer inside these facilities is often increased due to their close contact with one another. Often, once a disease is detected in a confined deer herd, the entire herd is destroyed to ensure the containment of the disease. Any involvement with the depopulation of deer confined inside a perimeter fence by WS would be at the request of the WVDNR. As proposed in this alternative, in those cases where WS is requested to assist with the removal of a captive deer herd in West Virginia, the take would not exceed 1,500 for purposes of disease monitoring or surveillance. Deer confined inside perimeters fences for the purposes of non-traditional farming, including confined for hunting, are not included in statewide deer population estimates. However, since take of deer by WS for disease surveillance or monitoring could occur in free-ranging or captive herds, the potential take of up to 1,500 deer for disease surveillance and monitoring by WS will be considered as part of the impact analysis on the statewide free-ranging deer population. Therefore, the analyses will evaluate the lethal take (killing) of up to 2,500 deer annually by WS at the request of cooperators and approved by the WVDNR.

In addition to WS' intentional take of deer to resolve or prevent damage, WS also conducts other wildlife damage management activities that pose a risk for the unintentional lethal take of deer, primarily projects that target coyotes (*Canis latrans*), red fox (*Vulpes vulpes*), feral dogs (*Canis familiaris*), wolf-hybrids (*Canis spp*.), and exotic carnivores to resolve damage to livestock (USDA 2002). WS' unintentional take of deer during other wildlife damage management projects is shown in Table 4.1. From FY 2000 through FY 2007, a total of 12 deer were unintentionally taken by WS, with the highest take occurring in FY 2005 when nine deer were taken. Minimization measures and SOPs discussed in the EA evaluating WS' activities to reduce and resolve damage caused by coyotes, red fox, feral dogs, wolf-hybrids, and exotic carnivores are designed to minimize non-target take, including deer (USDA 2002). Based on the limited unintentional take that occurred from FY 2000 through FY 2007 during other program activities in West Virginia and after the review of program activities, the unintentional take of deer by WS during other activities is not expected to increase to any appreciable extent. The unintentional take of deer by WS will continue to be nominal when compared to the number of deer harvest annually. All take, including unintentional take, is reported to the WVDNR annually and evaluated annually by WS to ensure WS' take, whether intentional or unintentional, does not adversely affect deer populations in the State.

Since deer harvest levels and other mortality events fluctuate annually in the State (See Table 4.1), the analysis of impacts of WS' take on the statewide deer population under this alternative will be evaluated using several scenarios. WS' proposed take in response to an anticipated increase in requests for assistance will not exceed 1,000 deer annually. In the event of a disease threat, the take of deer by WS for disease monitoring and surveillance

would not exceed 1,500 deer when requested by the WVDNR. Under a worst case scenario, a total of 2,500 deer could be taken by WS annually under this alternative. Since the worst case scenario would represent the highest level of annual take, the analyses will evaluate a take of 2,500 deer to determine the maximum possible potential impact although take of 2,500 deer annually is unlikely and will likely be less than 250 deer.

From 2000 through 2007, the highest deer harvest (255,356) in West Virginia and the highest level of mortality from other sources (27,069) occurred in 2003 for a total of 282,425 deer killed. During the same period, the lowest deer harvest (134,557) in West Virginia occurred in 2005. An estimate of mortality from other sources in 2005 was unavailable so an average of other mortality from 2000 through 2003 was used and estimated at 23,243 deer for a total of 157,800 deer. Trends in mortality from other sources mirrored harvest trends from 2000 through 2003, so the lowest level of mortality from other sources also likely occurred in 2005. If WS' take reached 2,500 deer during the highest known mortality of deer in the State that occurred in 2003, WS' take of 2,500 deer would represent 0.6% of the total known mortality in the State. If WS' take reached 2,500 deer during the lowest known mortality of deer in the State that occurred in 2005, WS' take of 2,500 deer would represent 1.2% of the total statewide mortality.

Under good habitat conditions, the population of deer in the State is expected to increase 30 to 40 percent annually in the absence of management through a harvest season (Evans et al. 1999). The deer population in West Virginia in 2006 was estimated at 784,000 deer (J. Crum, WVDNR, pers. comm. 2007). The total deer mortality in the State in 2006 was estimated at 159,532 (see Table 4.1). If the deer population estimate provided by the WVDNR included recruitment of deer born that year, then the take of deer from all known sources in 2006 would represent 20.3% of the deer population. If WS had taken 2,500 deer in 2006, the total mortality of deer would have been estimated at 162,032 deer. WS' take of up to 2,500 when combined with the total known mortality in the State during 2006, estimated at 162,032 deer, would have represented 20.7% of the population which is an increase of 0.4% when compared to the total mortality in 2006 if no take by WS had occurred (i.e., 20.3% without take by WS compared to 20.7% if WS' take had been 2,500 deer in 2006). When compared to the estimated statewide deer population in 2006, take of 2,500 deer by WS would have represented 0.3% of the deer population in West Virginia under a worst case scenario.

The take of deer unintentionally during other WS' wildlife damage management activities is not expected to greatly increase the potential impacts on the deer population in West Virginia even under the worst case scenario. With oversight of the WVDNR, the magnitude of take of deer by WS annually to resolve damage and threats will be low. All take by WS will continue to be reported to the WVDNR to ensure WS' activities are incorporated into deer population objectives for the State. Since deer can be taken to alleviate damage through the issuance of depredation permits by the WVDNR (58 CSR 15), those deer taken by WS would likely be removed by those experiencing damage or threats since they could obtain permits for the lethal take of deer. WS' deer damage management activities are carried out under a depredation permit issued by the WVDNR to a property owner and/or manager or directly to WS to conducted deer damage management activities for a property owner and/or manager. Therefore, WS' activities are removing deer that the property owner and/or manager could remove themselves under depredation permits but has chosen to request assistance from WS. Even in the event of a disease threat, those deer that would be taken by WS would likely be taken whether WS was directly involved or not. Therefore, WS' activities under the proposed action would not likely be additive to the mortality that already occurs under

depredation permits and that could occur during disease threats. The potential impacts to the statewide deer population under the proposed action would likely be similar to the other alternatives given that WS' activities would not substantial increase the take that could occur in the absence of WS' direct involvement since take could occur when permitted by the WVDNR. The deer that could be taken by WS under the proposed action are likely those deer that would be taken by other entities when permitted by the WVDNR in the absence of WS' direct involvement in the activities.

The magnitude of WS' activities to alleviate damage and threats associated with deer in the State will be low with the oversight and permitting of WS' activities occurring by the WVDNR. If take by WS had reached 2,500 deer during 2005 when the lowest known deer mortality occurred in the State, WS' take would have represented 1.2% of the total known mortality. In 2006, if WS' take had reached 2,500, the total known mortality would have increased only 0.4% when compared to total known mortality if 2,500 deer had not be taken by WS. Based on the 2006 deer population estimate, a take of up to 2,500 by WS would have represented 0.3% of the estimated population. Based on those worst case scenarios, WS' take of up to 2,500 deer under the proposed action would be insignificant when compared to the estimated population and the total known mortality. WS will annually report to the WVDNR and annually monitor take to ensure WS' activities do not adversely affect deer. The permitting of all WS' take by the WVDNR ensures WS' will meet the objectives of the State's operational deer plan.

4.1.2 Issue 2 - Effects on Non-target Species' Populations, including T&E Species

Alternative 1: No Deer Damage Management by WS

Under this alternative, WS would not be directly involved with deer damage management activities in West Virginia. Therefore, no direct impacts to non-targets and T&E species would occur by WS under this alternative. Deer would continue to be taken during the regulated harvest season and through depredation permits issued by the WVDNR. Risks to non-targets and T&E species would continue to occur from those who implement deer damage management activities on their own or through recommendations by the other federal, state, and private entities. Although some risk occurs from those that implement deer damage management in the absence of any involvement by WS, those risks are likely low and are similar to those under the other alternatives.

Alternative 2: Non-lethal Deer Damage Management only by WS

A non-lethal deer damage management alternative would require WS to only recommend and use non-lethal methods to manage and prevent damage associated with deer. WS would provide technical assistance and direct operational assistance under this alternative recommending and using only non-lethal methods. Non-lethal methods have the potential to cause adverse affects to non-targets primarily through exclusion, harassment, and dispersal. Any exclusionary device erected to prevent access of target species also potentially excludes species that are not the primary reason the exclusion was erected, therefore; non-target species excluded from areas may potentially be adversely impacted if the area excluded is large enough. The use of auditory and visual dispersal methods used to reduce damage or threats caused by target species are also likely to disperse non-targets in the immediate area the methods are employed. Therefore, non-targets may be permanently dispersed from an area while employing non-lethal dispersal techniques. However, like target species, the

potential impacts on non-target species are expected to be temporary with target and non-target species often returning after the cessation of dispersal methods.

Other non-lethal methods available for use under this alternative include drop nets, cannon nets, live traps, repellents, and immobilizing drugs. The use of drop nets and cannon nets are virtually selective for target individuals since activation occurs by attending personnel with handling of wildlife occurring after deployment of the net. Therefore, any non-targets captured using drop nets or cannon nets can be immediately released on site. Any potential non-targets captured using non-lethal methods would be handled in such a manner as to ensure the survivability of the animal if released. Even though live-capture does occur from those methods, the potential for death of a target or non-target animal while being restrained or released does exist, the risks arise primarily from being stuck by the net during net deployment upon activation. The likelihood of non-targets being struck is extremely low and is based on being present when the net is activated and in a position to be struck. Nets are positioned to envelop wildlife upon deployment and to minimize striking hazards. Baiting of the areas to attract target species often occurs when using nets. Therefore, sites can be abandoned if non-target use of the area is high.

Live traps (e.g., cage traps, walk-in traps, corral traps) restrain wildlife once captured and are considered live-capture methods. Live traps have the potential to capture non-target species. Trap placement in areas where target species are active and the use of target-specific attractants possibly will minimize the capture of non-targets. If traps are attended to appropriately, any non-targets captured can be released on site unharmed.

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

Immobilizing and euthanasia drugs would not be available for use by the general public under this alternative and would not be recommended through technical assistance. Immobilizing and euthanasia drugs would only be available for direct operational use by WS' personnel when permitted by the WVDNR. Immobilizing drugs are applied either after live-capture occurs through injection or are applied through direct application to target individuals from a dart gun, blow gun, or jabstick. Therefore, immobilizing drugs are only applied after identification of the target occurs prior to application. No direct affects to non-targets will occur from the use of immobilizing drugs.

Some secondary risks to non-targets would occur from the use of immobilizing drugs if deer are consumed by non-targets shortly after being immobilized. Coyotes, black bear, and bobcats are the only known carnivores in West Virginia that are likely to kill deer. Risks also occur from scavengers, including raptors, that may consume deer that have died from predation, that have died from injuries suffered during capture, that have died from capture myopathy, or that have died from other causes. Immobilizing drugs are typically metabolized quickly which allows for recovery without the need for an antagonist. Wildlife immobilized and released are generally not considered toxic to other wildlife when consumed (Johnson et al. 2001). Deer immobilized and then euthanized using euthanasia drugs would be disposed of by deep burial or by incineration which would make the carcasses unavailable to non-targets.

Reproductive inhibitors are generally regarded as a non-lethal method despite the goal of reducing populations. Currently, reproductive inhibitors being evaluated for deer must be administered through injection which requires the live-capture of deer. Since reproductive inhibitors must currently be injected into target animals, the risks to non-targets arise from the capture methods. Non-targets could be captured in live-traps during attempts to capture deer but would likely be released unharmed if deemed appropriate to ensure the survival of the captured non-target. Of concern with the use of reproductive inhibitors is the cost required to live-capture individual deer to administer the inhibitor and the cost of re-application once the effectiveness of the inhibitor declines. To address the cost effectiveness of reproductive inhibitors, methods need to be developed to administer the inhibitor to a large number of deer during a single application and/or that makes the inhibitor available to deer over a long period over time that does not require the re-occurring presence of personnel. To achieve this effectiveness, a bait formulation is a likely candidate. With any bait, a concern arises from the consumption of the bait by non-targets. Since a bait delivery system has not yet been developed for deer, the risks and potential adverse affects to non-targets is currently unknown. If a reproductive inhibitor is registered for use in West Virginia formulated to be delivered as a bait or that could potentially increase the risks to non-targets, this EA will be reviewed and the method evaluated as required by NEPA.

Deer could still be lethally taken during the regulated harvest season and as permitted by the WVDNR under this alternative. Impacts to non-targets from the use of non-lethal methods would be similar to the use of non-lethal methods under any of the alternatives. Non-targets would generally be unharmed from the use of non-lethal methods under any of the alternatives since no lethal take would occur. Non-lethal methods would be available under all the alternatives analyzed. WS' involvement in the use of or recommendation of non-lethal methods would ensure non-target impacts are considered under WS' Decision Model. Impacts to non-targets under this alternative are likely to be low.

Alternative 3: Integrated Deer Damage Management Program (No Action/Proposed Action)

The potential adverse affects to non-targets occurs from the employment of methods to address deer damage. Under the proposed action, WS could provide both technical assistance and direct operational assistance to those requesting assistance. The use of non-lethal methods as part of an integrated direct operational assistance program would be similar to those risks to non-targets discussed in Alternative 3. Therefore, the discussion of potential risks to non-targets will focus primarily on lethal methods that could be employed by WS as part of an integrated approach to manage damage and threats since non-lethal risks and risks associated with technical assistance were discussed previously.

Personnel from WS are experienced and trained in wildlife identification and to select the most appropriate methods for taking targeted animals and excluding non-target species. To reduce the likelihood of capturing non-target wildlife, WS would employ the most selective methods for the target species, would employ the use of attractants that are as specific to target species as possible, and determine placement of methods to avoid exposure to non-targets. Minimization methods and SOPs to prevent and reduce any potential adverse impacts on non-targets are discussed in section 3.4 of this EA. Despite the best efforts to minimize non-target take during program activities, the potential for adverse impacts to non-target exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety.

Non-lethal methods have the potential to cause adverse affects to non-targets primarily through exclusion, harassment, and dispersal. The potential impacts from the use of non-lethal methods would be similar under this alternative and the other alternatives.

The use of firearms is essentially selective for target species since animals are identified prior to application; therefore, no adverse impacts are anticipated from use of this method. Euthanasia drugs are applied directly to the target individual through injection only after that individual is properly restrained and immobilized. Therefore, euthanizing drugs will have no direct adverse impact on non-targets. Carcasses of deer euthanized with euthanasia drugs will be disposed of by deep burial or by incineration to prevent consumption of the carcasses by non-targets.

While every precaution is taken to safeguard against taking non-targets during operational use of methods and techniques for resolving damage and reducing threats caused by wildlife, the use of such methods can result in the incidental take of unintended species. These occurrences are rare and should not affect the overall populations of any species under the current program. WS' take of non-target species during activities to reduce damage or threats to human safety associated with deer in West Virginia is expected to be extremely low to non-existent. No non-targets have been taken by WS during prior deer damage management activities in West Virginia. WS will monitor annually the take of non-target species to ensure program activities or methodologies used in deer damage management do not adversely impact non-targets. Methods available to resolve and prevent deer damage or threats when employed by trained, knowledgeable personnel are selective for target species. WS will annually report to the WVDNR any non-target take to ensure take by WS is considered as part of management objectives established by the WVDNR. The potential impacts to non-targets are similar to the other alternatives and are considered to be minimal to non-existent.

T&E Species Effects

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. Mitigation measures and SOPs to avoid T&E effects are described in section 3.4 of this EA.

Federally Listed Species - The current list of species designated as threatened and endangered in West Virginia as determined by the USFWS was obtained and reviewed during the development of this EA. Appendix C contains the list of species currently listed in the State along with common and scientific names. Consultation with the USFWS under Section 7 of the ESA concerning potential impacts of WS' programmatic activities on T&E species was conducted as part of the development of WS' programmatic FEIS (USDA 1997). WS obtained a BO from the USFWS addressing WS' programmatic activities. For the full context of the BO, see Appendix F of WS' programmatic FEIS (USDA 1997).

After review of program activities and methods currently available for use to manage damage and threats associated with deer, WS' deer damage management activities in West Virginia would not adversely affect the Virginia big-eared bat (*Plecotus townsendii virginianus*), Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), eastern cougar (*felis concolor cougar*), pink mucket (*Lampsilis abrupta*), tubercled blossom (*Epioblasma torulosa torulosa*), Eskimo curlew (*Numenius boralis*), running buffalo clover (*Trifolium stoloniferum*), and small whorled pogonia (*Isotria medeoloides*). This determination is based on the conclusions made by the USFWS during the 1992 consultation on WS' programmatic activities and subsequent BO (USDA 1997). The gray wolf (*Canis lupus*) was addressed in

the 1992 BO issued by the USFWS and is listed in West Virginia but is not currently known to occur in the State. WS will abide by all reasonable and prudent measures identified in the BO for the gray wolf when conducting deer damage management.

Additional species listed in West Virginia include the clubshell (*Pleurobema clava*), fanshell (*Cyprogenia stegaria*), Madison Cave isopod (*Antrolana lira*), northern riffleshell (*Epioblasma torulosa rangiana*), Cheat Mountain salamander (*Plethodon nettingi*), flat-spired three-toothed snail (*Triodopsis platysayoides*), James spinymussel (*Pleurobema collina*), American burying beetle (*Nicrophorus americanus*), pink ring (*Obovaria retusa*), Northeastern bulrush (*Scirpus ancistrochaetus*), harperella (*Ptilimnium nodosum*), shale barren rock-cress (*Arabis serotina*), and Virginia spiraea (*Spiraea virginiana*). After review of the activities proposed under this alternative, WS has determined that WS' deer damage management methods and activities in West Virginia will have no effect on those T&E species and critical habitat not included in the 1992 BO.

State Listed Species - WS has obtained and reviewed the list of West Virginia State listed T&E species and Special Concern species, and has determined that the proposed deer damage management program will not adversely affect any of the species listed in West Virginia.

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

Alternative 1: No Deer Damage Management by WS

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

Similar to the technical assistance only alternative, immobilizing and euthanizing drugs and cannon nets would not be available under this alternative to those experiencing damage or threats from deer, except for the WVDNR. Since most methods available to resolve or prevent deer damage or threats are available to anyone, the threats to human safety from the use of those methods are similar between the alternatives. However, methods employed by those not experienced in the use of methods or are not trained in their proper use, could increase threats to human safety. Overall, the methods available to the public, when applied correctly and appropriately, pose minimal risks to human safety.

Alternative 2: Non-lethal Deer Damage Management only by WS

Under a non-lethal only alternative, WS would be restricted to the use and recommendation of non-lethal methods only to resolve damage. WS would continue to provide technical assistance and direct operational assistance to those requesting assistance with deer damage and threats. Although hazards to human safety from non-lethal methods exist, those methods are generally regarded as safe when used by personnel trained and experienced in their use. Risks to human safety from the use of non-lethal methods were considered low when evaluated in a formal risk assessment in WS' programmatic FEIS (USDA 1997). Risks to human safety associated with non-chemical methods such as resource management methods (e.g., crop selection, habitat modification, modification of human behavior), exclusion

devices, frightening devices, and cage traps were considered low based on their use profile for alleviating damage associated with wildlife (USDA 1997). Although some risk of fire and bodily harm exists from the use of pyrotechnics and propane cannons, when used appropriately and in consideration of those risks, they can be used with a high degree of safety.

Under a non-lethal alternative, the use of nets (e.g., rocket nets, cannon nets) would not be available to the general public but could be employed by WS under direct operational assistance. Nets could also be employed by other entities when permitted by the WVDNR. Personnel employing nets are present at the site during application to ensure the safety of the public and operators. Although some fire and explosive hazards exist with rockets nets during ignition and storage of the explosive charges, safety precautions associated with the use of the method, when adhered to, pose minimal risks to human safety and primarily occur to the handler. Nets would not be employed in areas where public activity in high which further reduces the risks to the general public. Nets would be employed in areas where public access is restricted whenever possible to reduce risks to human safety. Overall, nets would pose minimal risks to the public.

The use of chemical methods that are considered non-lethal would also be available under this alternative. Chemical methods available would include repellents, immobilizing drugs, and reproductive inhibitors.

There is a wide-variety of chemical repellents with several active ingredients available to discourage deer from foraging on plants and to disperse deer from areas where the repellents are applied. The active ingredients of many repellents are naturally occurring (e.g., garlic, capsaicin, citrus, whole egg solids). Repellents, when used according to label directions, are generally regarded as safe especially when the ingredients are considered naturally occurring. Some risk of exposure to the chemical occurs to the applicator and to others from the potential for drift as the product is sprayed. Some repellents also have restrictions on whether application can occur on edible plants with some restricting harvest for a designated period after application. All restriction on harvest and required personal protective equipment would be included on the label and if followed, would minimize risks to human safety associated with the use of those products.

Immobilizing drugs could be used as non-lethal methods of capture under this alternative. Euthanasia drugs would not be available under this alternative. Ketamine, telazol, and xylazine could be used to immobilize deer under this alternative. The primary application of immobilizing drugs occurs once a target species has been live-captured. Therefore, outside of transport and storage, the primary concern to human safety occurs to the handler and support staff during handling, drawing, and administering the drug. Immobilization of live-captured deer would occur to minimize stress and the likelihood of injury to the individual deer and for the safety of personnel handling the deer. Since the WVDNR restricts the relocation of deer due to disease threats, deer would be immobilized primarily for disease sampling under this alternative. Immobilizing drugs will be administered according to recommended methods and doses from published sources (See Appendix B).

All personnel who handle and administered drugs will be properly trained. For WS' personnel, all employees handling and administering immobilizing and euthanizing drugs are required to be trained according to WS Directive 2.430. Training and adherence to agency directives will ensure the safety of employees administering any drugs. All immobilizing of

deer using drugs will occur in the absence of the public to further minimize risks. Minimization measures and SOPs are further described in section 3.4 of this EA.

Of additional concern with the use of immobilizing drugs is the potential for human consumption of meat from wildlife that have been immobilized. Since deer are harvested during a regulated harvest season and consumed, the use of immobilizing drugs is of concern. To mitigate this risk, withdrawal times are often established. A withdrawal time is the period of time established between when the animal was immobilized to when it is safe to consume the meat of the animal by humans. Since withdrawal periods are not well defined for free-ranging wildlife species for all drugs, the WWHC has established suggested withdrawal time for specific drugs that are intended to be applicable to most free-ranging wildlife. WS would adhere to all established withdrawal times for deer when using immobilizing drugs for the capture of deer. Although unlikely, in the event that WS is requested to immobilize deer either during a period of time when harvest of deer is occurring or during a period of time where the withdrawal period could overlap with the start of a harvest season, WS would adhere to the federal regulations requiring that wildlife given drugs that might be consumed by humans be identified. The adherence to federal regulations on withdrawal periods and identification of immobilized wildlife will greatly minimize the risks to human safety from WS' use of immobilizing drugs. Risks from the use of immobilizing drugs are expected to be low. For more information on withdrawal periods, please see section 1.6.12 and Appendix B.

Reproductive inhibitors for deer are still being evaluated and are not available for use except through evaluation under research protocols (see section 3.2.2). Like immobilizing drugs, inhibitors are currently being evaluated as a direct injection into the deer after a deer has been live-captured. Therefore, the current concern, outside of transport and storage, is the risks directly to the handler and support staff during the handling, drawing, and administering the inhibitor to the deer. Information is currently unavailable on the risks to human safety from the consumption of deer treated with reproductive inhibitors. Therefore, risks to human safety are currently unknown. Current evaluations of immunocontraceptives in deer are being conducted on populations of deer in isolated areas where the harvest of deer does not occur. The use of immunocontraceptives for the management of statewide deer populations or populations over a large geographical area is impracticable given the costs of administering the inhibitor. If reproductive inhibitors become available for use in West Virginia, their use will likely occur on deer populations that are isolated and inaccessible for hunting during the harvest season (e.g., deer herds isolated inside perimeter fences or in urban areas where harvest does not occur). If a reproductive inhibitor becomes available for use in West Virginia and the use of the inhibitor is determined to be applicable using WS' Decision Model and allowed to be used by the WVDNR, this EA will be reviewed and additional analysis will occur pursuant to NEPA.

Given the use profile of non-lethal methods to manage damage and threats associated with deer, the risks to human safety from the use of those methods are low (USDA 1997). The cooperator requesting assistance is also made aware through a MOU, cooperative service agreement, or a similar document that those devices agreed upon could potentially be used on property owned or managed by the cooperator. Minimization measures and SOPs for methods are discussed in section 3.4 of this EA.

Alternative 3: Integrated Deer Damage Management Program (No Action/Proposed Action)

Under the proposed action, those methods discussed in Appendix B, would be integrated to resolve and prevent damage associated with deer in the State. WS' would use the Decision Model to determine the appropriate method or methods that would effectively resolve the request for assistance. Those methods would be continually evaluated for effectiveness and if necessary, additional methods could be employed. Non-lethal and lethal methods could be used under the proposed action. WS would continue to provide technical assistance and/or direct operational assistance to those persons seeking assistance with managing damage or threats from deer at fenced federal facilities and airports. Risks to human safety from technical assistance conducted by WS would be similar to those risks addressed under Alternative 2. The use of non-lethal methods as part of an integrated approach to managing damage that would be employed as part of direct operational assistance by WS would be similar to those risks addressed under Alternative 3. Since risks to human safety from technical assistance and the direct operational use of non-lethal methods have been previously addressed in Alternative 2 and are similar to risks addressed under those alternatives, discussion here will focus on lethal methods that could be used as part of an integrated approach.

Lethal methods available under the proposed action would include the use of firearms, live-capture followed by euthanasia, and the recommendation that deer be harvested during the regulated hunting season established by the WVDNR.

Safety issues due arise related to misusing firearms and the potential human hazards associated with firearms use when employed to reduce damage and threats. To help ensure safe use and awareness, WS' employees who use firearms to conduct official duties are required to attend an approved firearm safety training course and to remain certified for firearm use 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 have not been convicted of a misdemeanor crime of domestic violence. 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. WS will work closely with cooperators requesting assistance to ensure all safety issues are considered before the use of firearms are deemed appropriate for use. All methods, including firearms, must be agreed upon with the cooperator to ensure the safe use of methods. A risk assessment conducted during the development of WS' programmatic FEIS, determined the risks to human safety from the use of firearms was low based on the use profile of the method (USDA 1997).

Similar to immobilizing drugs discussed under the non-lethal methods only alternative (Alternative 3), the application of euthanizing drugs occurs directly to live-captured wildlife that are immobilized. Therefore, the risks to human safety, besides transport and storage, occur primarily to the handler and support staff during the handling, drawing, and administering the drug. Exposure could occur from spills and/or accidently injection of the drug. All WS' personnel who handle and administered drugs will be properly trained. WS' employees handling and administering euthanizing drugs are required to be trained according to WS Directive 2.430. Training and adherence to agency directives will ensure the safety of employees administering any drugs. Deer euthanized by WS will be disposed of by deep burial or incinerated to ensure the risks to human safety from euthanized deer are minimal (WS Directive 2.515). All euthanasia will occur in the absence of the public to further

minimize risks. Minimization measures and SOPs are further described in section 3.4 of this EA.

The recommendation by WS that deer be harvested during the regulated hunting season which is established by the WVDNR would not increase risks to human safety above those risks already inherent with hunting deer. Recommendations of allowing hunting on property owned or managed by a cooperator to reduce deer populations which could then reduce deer damage or threats would not increase risks to human safety. Safety requirements established by the WVDNR for the regulated hunting season, such as requiring hunters to wear blaze orange during the firearm portion of the deer hunting season, will further minimize risks associated with hunting. Although hunting accidents do occur, the recommendation of allowing hunting to reduce localized deer populations will not increase those risks.

No adverse affects to human safety have occurred from WS' use of methods to alleviate deer damage in West Virginia from FY 2000 through FY 2007. The risks to human safety from the use of non-lethal and lethal methods, when used appropriately and by trained personnel, is considered low.

4.1.4 Issue 4 - Humaneness of Damage Management Methods

Alternative 1: No Deer Damage Management by WS

Under this alternative, WS would have no involvement in any aspect of deer damage management in West Virginia. Those experiencing damage or threats associated with deer could continue to use those methods legally available when permitted by the WVDNR. 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.

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

Alternative 2: Non-lethal Deer Damage Management only by WS

Under this alternative, only non-lethal methods would be used by WS which are generally regarded as humane. Non-lethal methods would include resource management methods (e.g., crop selection, habitat modification, modification of human behavior), exclusion devices, frightening devices, cage traps, nets, repellents, immobilizing drugs, and reproductive inhibitors.

Although some issues of humaneness could occur from the use of cage traps, nets, repellents, immobilizing drugs, and reproductive inhibitors, those methods, when used appropriately and by trained personnel, would not result in the inhumane treatment of wildlife. Concerns from the use of those non-lethal methods are from injuries to animals while restrained and from the stress of the animal while being restrained or during the application of the method. Pain and

physical restraint can cause stress in animals and the inability of animals to effectively deal with those stressors can lead to distress. Suffering occurs when action is not taken to alleviate conditions that cause pain or distress in animals.

The applicability of cage traps, cannon nets, drops nets, and immobilizing drugs for resolving deer damage or threats would be limited under this alternative. Due to disease threats, relocation of deer is not permitted by the WVDNR. Therefore, without the ability to relocate deer causing damage, very little need would arise to live-capture deer using cage traps, nets, and immobilizing drugs.

Since relocation of deer is restricted by the WVDNR due to disease threats and since WS would be restricted to non-lethal methods only, the use of live-capture methods by WS would likely only occur for purposes of sampling deer for diseases where deer would be released on-site after sampling occurred. If deer are to be live-captured by WS, traps would be checked at least once a day to minimize the amount of time an animal is restrained. Deer live-captured would be immobilized to minimize stress and injury. While immobilized, efforts will be made to minimize auditory, visual, and tactile stimulation to further minimize stress to the animal. Although stress could occur from being restrained, timely attention to live-captured wildlife would alleviate suffering. Stress would likely be temporary and would likely cease once the animal was released.

Overall, the use of resource management methods, harassment methods, and exclusion devices are regarded as humane when used appropriately. Although some concern arises from the use of live-capture methods and immobilizing drugs, the stress of animals is likely temporary and would cease once the animal was released.

Alternative 3: Integrated Deer Damage Management Program (No Action/Proposed Action)

Under the proposed action, WS would integrate methods using WS' Decision Model as part of technical assistance and direct operational assistance. Methods available under the proposed action could include non-lethal and lethal methods integrated into direct operational assistance conducted by WS. Those non-lethal methods available under the non-lethal methods only alternative (Alternative 2) would also be available under this alternative. The issue of method humaneness from the use of non-lethal methods under the proposed action would be similar to those discussed in the non-lethal methods only alternative (Alternative 3).

However, under the proposed action, lethal methods could also be employed to resolve requests for assistance to resolve or prevent deer damage and threats. Lethal methods would include shooting and euthanizing drugs. The only euthanizing drug being considered for use under the proposed action is sodium pentobarbital which is a barbiturate. The AVMA guideline on euthanasia lists barbiturates as an acceptable method for euthanizing free-ranging wildlife which can lead to a humane death (AVMA 2007). The use of sodium pentobarbital for euthanasia would occur after the animal has been live-captured and properly immobilized to allow for direct application of the drug through injection.

Although the AVMA guideline also lists gunshot as a conditionally acceptable method of euthanasia for free-ranging wildlife, there is greater potential the method may not consistently produce a humane death (AVMA 2007).

As discussed in section 2.2.4, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal. 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.

Some individuals believe any use of lethal methods to resolve damage associated with wildlife is inhumane because the resulting fate is the death of the animal. Others believe that certain lethal methods can lead to a humane death. Others believe most non-lethal methods of capturing wildlife to be humane because the animal is generally unharmed and alive. Still others believe that any disruption in the behavior of wildlife is inhumane. With the multitude of attitudes on the meaning of humaneness and the varying perspectives on the most effective way to address damage and threats in a humane manner, agencies are challenged with conducting activities and employing methods that are perceived to be humane while assisting those persons requesting assistance to manage damage and threats associated with wildlife. The goal of WS is to use methods as humanely as possible to effectively resolve requests for assistance to reduce damage and threats to human safety. WS and the WVDNR continue to evaluate methods and activities to minimize the pain and suffering of methods addressed when attempting to resolve requests for assistance.

As mentioned previously, some methods have been stereotyped as "humane" or "inhumane". However, many "humane" methods can be inhumane if not used appropriately. For instance, a cage trap is generally considered by most members of the public as "humane". Yet, without proper care, live-captured wildlife in a cage trap can be treated inhumanely if not attended to appropriately.

Therefore, the goal is to effectively address requests for assistance using methods in the most humane way possible that minimizes the stress and pain to the animal. All trapping efforts that do not require direct application (e.g., drops nets, cannon nets) will be monitored daily to ensure live-captured wildlife are recovered quickly to ensure a minimal amount of pain and suffering occurs. WS' use of euthanasia methods will follow those required by WS' directives (WS Directive 2.430) and recommended by the AVMA for use on free-ranging wildlife under field conditions (AVMA 2007). WS' personnel that employ firearms to address deer damage or threats to human safety will be trained in the proper placement of shots to ensure a timely and quick death.

Research and development by WS has improved the selectivity and humaneness of management techniques. 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. Personnel from WS 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. The use of firearms to alleviate deer damage and/or threats in the State could under any of the alternatives by those experiencing damage regardless of WS' direct involvement. Therefore, the issue of humanness associated with shooting would be similar across any of the alternatives since firearms could be employed when permitted by the WVDNR to alleviate deer damage and threats. Those persons who view a particular method as humane or inhumane would likely continue to view those methods as humane or inhumane under any of the alternatives. Minimization measures and SOPs that would be incorporated into WS' activities to ensure methods are used by WS as humanely as possible are listed in Chapter 3.

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4.1.5 Issue 5 - Effects on the Aesthetic Values of Target Species

Alternative 1: No Deer Damage Management by WS

Under the no deer damage management by WS alternative, the actions of WS would have no impact on the aesthetic value of deer in West Virginia. Those experiencing damage or threats from deer would be responsible for researching, obtaining, and using all methods as permitted by federal, state, and local laws and regulations. Deer would continue to be dispersed and lethally taken under this alternative in the State. Lethal take would continue to occur during the regulated harvest season and through the issuance of depredation permits from the WVDNR.

Since deer will continue to be taken under this alternative, despite WS' lack of involvement, the ability to view and enjoy deer would likely be similar to the other alternatives. The lack of WS' involvement would not lead to a reduction in the number of deer dispersed or taken since WS' has no authority to regulate take or the harassment of deer in the State. The WVDNR with management authority over resident wildlife species, including deer, would continue to adjust all take levels based on population objectives for deer in the State. Therefore, the number of deer lethally taken annually through hunting and depredation permits are regulated and adjusted by the WVDNR.

Those experiencing damage or threats would continue to use those methods they feel appropriate to resolve deer damage or threats, including lethal take. WS' involvement in deer damage management is therefore, not additive to the deer already taken in the State. The impacts to the aesthetic value of deer would be similar to the other alternatives.

Alternative 2: Non-lethal Deer Damage Management only by WS

Under this alternative, WS would only use methods that would result in the exclusion, harassment, and dispersal of deer from areas where damage was occurring. The use of non-lethal methods would result in the dispersal or exclusion of deer from damage areas. The number of deer present in those areas would be reduced and those deer dispersed or excluded would no longer be available for viewing in the area where damage was occurring.

Those methods would also be available to the person experiencing damage or threats in the absence of WS' direct involvement. The WVDNR could continue to allow take during the regulated harvest season and could continue to issue depredation permits to allow for the take of deer to alleviate damage. The take of deer would continue despite WS' use of only non-lethal methods. Therefore, the number of deer taken annually would be similar under all the alternatives despite the use of non-lethal methods by WS.

Although deer would be dispersed or excluded under this alternative, deer could still be viewed and enjoyed under this alternative if a reasonable effort if made to find deer outside the damage management area. The impacts to the aesthetic value of deer from the use of non-lethal methods by WS under this alternative would be low.

Alternative 3: Integrated Deer Damage Management Program (No Action/Proposed Action)

Under the proposed action, methods would be employed that would result in the dispersal, exclusion, or removal of individuals or small groups of deer to resolve damage and threats.

In some instances where deer are dispersed or removed, the ability of interested persons to observe and enjoy deer will likely temporarily decline. The deer populations in those areas will likely increase upon cessation of damage management activities.

Even the use of exclusionary devices can lead to dispersal of wildlife if the resource being damaged was acting as an attractant. Thus, once the attractant has been removed or made unavailable, the wildlife will likely disperse to other areas where resources are more vulnerable.

The use of lethal methods would result in temporary declines in local populations resulting from the removal of deer to address or prevent damage and threats. The goal under the proposed action is to respond to requests for assistance and to manage those deer responsible for the resulting damage. Therefore, the ability to view and enjoy deer will still remain if a reasonable effort is made to locate deer outside the area in which damage management activities occurred. Those deer removed by WS are those that could be removed by the person experiencing damage with the appropriate depredation permit issued by the WVDNR.

All activities are conducted where a request for assistance has been received and only after agreement for such services have been agreed upon by the cooperator. Some aesthetic value would be gained by the removal of deer and the return of a more natural environment, including the return of native wildlife and plant species that may be suppressed or displaced by high deer densities. Any removal of deer by WS using lethal methods in the State would occur after the approval of the WVDNR.

Since those deer removed by WS under this alternative could be removed through a depredation permit issued to the property owner or manager, WS' involvement in taking deer would not likely be additive to the number of deer that could be taken in the absence of WS' involvement. In many cases, WS acts as the agent of the property owner or manager under a depredation permit issued to the owner or manager. In those cases, the take of deer could occur by the property owner or manager and WS' actions would not be additive to the number of deer that could be taken in the absence of WS' involvement.

WS' take of deer from FY 2000 through FY 2007 has been of low magnitude compared to the total mortality. WS' activities are not likely additive to the deer that would be taken in the absence of WS' involvement. Although deer removed by WS are no longer present for viewing or enjoying, those deer would likely be taken by the property owner or manager under the depredation permit issued to the owner or manager by the WVDNR. Given the limited take proposed by WS under this alternative when compared to the known sources of mortality of deer, WS' deer damage management activities conducted pursuant to the proposed action would not adversely affect the aesthetic value of deer. The impact on the aesthetic value of deer and the ability of the public to view and enjoy deer under the proposed action would be similar to the other alternatives and is likely low.

4.1.6 Issue 6 - Effects on Regulated White-tailed Deer Hunting

Alternative 1: No Deer Damage Management by WS

WS would have no impact on regulated deer hunting under this alternative. WS would not be involved with any aspect of deer damage management. The WVDNR would continue to regulate deer populations through adjustments in allowed take during the regulated harvest season and through depredation permits.

Alternative 2: Non-lethal Deer Damage Management only by WS

WS would have no impact on regulated deer hunting since WS would not lethally remove deer under this alternative. However, resource/property owners may remove deer under special permits issued by the WVDNR resulting in impacts similar to the proposed action and the other alternatives. WS' use of non-lethal methods could disperse or exclude deer from areas under this alternative which could limit the ability of those interested to harvest deer in the damage management area. However, the deer population would be unaffected by WS under this alternative.

Alternative 3: Integrated Deer Damage Management Program (No Action/Proposed Action)

The magnitude of take of deer addressed in the proposed action would be low when compared to the deer mortality from all known sources. When WS' proposed take of 2,500 deer under a worst case scenario was included as part of the known mortality of deer in 2006 and compared to the estimated deer population, the impact on the deer population was below the level of removal required to lower population levels. The WVDNR will determine the number of deer taken annually by WS through the issuance of depredation permits.

Deer damage management activities conducted by WS will occur after consultation and approval by the WVDNR. With oversight by the WVDNR, the number of deer allowed to be taken by WS will not limit the ability of those interested to harvest deer during the regulated season. All take by WS will be reported to the WVDNR annually to ensure take by WS is incorporated into population management objectives established for the deer population. Based on the limited take proposed by WS and the oversight of the WVDNR, WS' take of up to 2,500 deer total under a worse case scenario will have no effect on the ability of those interested to harvest deer during the regulated harvest season.

4.2 CUMULATIVE IMPACTS OF THE PROPOSED ACTION 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. No significant or cumulative adverse environmental consequences resulting from the proposed action are anticipated.

WS will continue to coordinate deer damage management activities and will report all take of deer to the WVDNR annually. WS will also annually monitor program activities to ensure those activities are within the scope analyzed in this EA.

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4.2.1 Issue 1 - Effects of WS' Activities on White-tailed Deer Populations

Evaluation of activities relative to target species indicated that program activities will likely have no cumulative adverse affects on deer populations when targeting those species responsible for damage. WS' actions would be occurring simultaneously, over time, with other natural processes and human generated changes that are currently taking place. These activities include, but are not limited to:

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

All those factors play a role in the dynamics of deer populations. In many circumstances, requests for assistance arise when some or all of those elements have contrived to elevate target species populations or place target species at a juncture to cause damage to resources. The 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 uses the Decision Model to evaluate damage occurring, including other affected elements and the dynamics of the damaging species; to determine appropriate strategies to minimize effects on environmental elements; applies damage management actions; and subsequently monitors and adjusts/ceases damage management actions (Slate et al. 1992). This process allows WS to take into consideration other influences in the environment, such as those listed above, in order to avoid cumulative adverse impacts on target species.

With management authority over deer in West Virginia, the WVDNR can adjust take levels, including the take of WS, to ensure population objectives for deer are achieved. Consultation and reporting of take by WS will ensure the WVDNR considers any activities conducted by WS.

WS' take of deer in West Virginia from FY 2000 through FY 2007 was of a low magnitude when compared to the total known take. WS' annual take of deer in the State will occur under depredation permits issued by the WVDNR. The WVDNR considers all known take when determining population objectives for deer in the State and adjusts the number of deer that will be taken during the regulated hunting season and the number of deer taken for damage management purposes to achieve the population objectives. Any take by WS will occur at the discretion of the WVDNR and any deer population declines or increases will be the collective objective for deer populations established by the WVDNR. Therefore, the cumulative take of deer annually or over time by WS will occur at the desire of the WVDNR as part of management objectives for deer in the State.

4.2.2 Issue 2 - Effects on Non-target Species' Populations, including T&E Species

Potential effects on non-target species from conducting deer damage management arise from the use of non-lethal and lethal methods to alleviate or prevent those damages. The use of non-lethal methods during activities to reduce or prevent damage caused by deer has the potential to exclude, disperse, or capture non-target wildlife. However, the effects of non-lethal methods are often temporary and often do not involve the take (killing) of non-target wildlife species. When using exclusion devices and/or repellents, both target and non-target wildlife can be prevented from accessing the resource being damaged. Since exclusion does not involve lethal take, cumulative impacts on non-target species from the use of exclusionary methods will not occur but would likely disperse those individuals to other areas. Exclusionary methods are often expensive

and require constant maintenance to ensure effectiveness. Therefore, the use of exclusionary devices will be somewhat limited to small, high-value areas and not used to the extent that non-targets are excluded from large areas that would cumulatively impact populations from the inability to access a resource, such as potential food sources or fawning sites. The use of visual and auditory harassment and dispersion methods are generally temporary with non-target species returning after the cessation of those activities. Dispersal and harassment do not involve the take (killing) of non-target species and similar to exclusionary methods are not used to the extent or at a constant level that would prevent non-targets from accessing critical resources that would threaten survival of a population.

The use of lethal methods or those methods used to live-capture target species followed by euthanasia also have the potential to impact non-target wildlife through the take (killing) or capture of non-target species. Capture methods used are often methods that are set to confine or restrain target wildlife after being triggered by a target individual. Capture methods are employed in such a manner as to minimize the threat to non-target species by placement in those areas frequently used by target wildlife, using baits or lures that are as species specific as possible, and modification of individual methods to exclude non-targets from capture. Most methods described in Appendix B are methods that are employed to confine or restrain wildlife that are subsequently euthanized using humane methods since relocation is currently not permitted by the WVDNR. With all live-capture devices, non-target wildlife captured can be released on site if determined to be able to survive following release. Minimization and SOPs are intended to ensure take of non-target wildlife is minimal during the use of methods to capture target wildlife.

The use of firearms, immobilizing chemicals, and euthanasia chemicals are essentially selective for target species since identification of an individual is made prior to the application of the method. Both euthanasia and immobilizing drugs are applied through direct injection to target wildlife. Therefore, the use of those methods will not impact non-target species.

The methods described in Appendix B all have a high level of selectivity and can be employed using SOPs and minimization measures to ensure minimal impacts to non-targets species. No non-targets were taken by WS during deer damage management activities from FY 2000 through FY 2007. Based on the methods available to resolve deer damage and/or threats, WS does not anticipate the number of non-targets taken to reach a magnitude where declines in those species' populations would occur. Therefore, take under the proposed action of non-targets will not cumulatively impact non-target species. WS' has reviewed the T&E species listed by the WVDNR and the USFWS and has determined that deer damage management activities proposed by WS will have no effect on T&E species. The USFWS concurred in the BO with WS' determination that WS' programmatic activities would not adversely affect those T&E species addressed as part of WS' programmatic consultation. WS has also determined that deer damage management activities will not adversely affect T&E species and species of concern that are listed by the WVDNR. Cumulative impacts will be minimal on non-targets from any of the alternatives discussed.

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

Non-Chemical Methods

All non-chemical methods described in Appendix B 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. All non-chemical methods are used after careful consideration of the safety of

those employing methods and to the public. All capture methods are employed where human activity is minimal and warnings signs are placed in conspicuous areas, when appropriate, to ensure the safety of the public. Capture methods also require direct contact to trigger ensuring that those methods, when left undisturbed will have no effect on human safety. All methods are agreed upon by the requesting entities which are made aware of the safety issues of those methods when entering into a MOU, cooperative service agreement, or other comparable document between WS and the cooperating entity. SOPs and minimization measures also ensure the safety of the public from those methods used to capture or take wildlife. A formal risk assessment conducted by APHIS determined that WS' non-chemical methods, when used as intended, poses a low risk to human safety (USDA 1997). Firearms used to alleviate or prevent damage, though hazards do exist, are employed to ensure the safety of employees and the public.

WS has received no reports or documented any adverse affects to human safety from WS' deer damage management activities conducted from FY 2000 through FY 2007. Personnel employing non-chemical methods will continue to be trained to be proficient in the use of those methods to ensure safety of the applicator and to the public. Based on the use patterns of non-chemical methods, those methods will not cumulatively impact human safety.

Chemical Methods

Chemical methods available for use under the proposed action are repellents, immobilizing drugs, and euthanizing drugs described in Appendix B. Immobilizing drugs are administered to target individuals using devices or methods that ensure the identification of the target animal. The immobilizing drugs discussed in Appendix B require injection of the drug directly into an animal. Injection would occur through hand injection via a syringe, by jabstick, or by a pneumatically propelled dart that mechanically injects the drug into the animal upon impact. Immobilizing drugs temporarily sedate an animal to minimize stress of handling and reduce the risks to human safety. Immobilized animals may also be euthanized using a euthanizing drug described in Appendix B. Euthanasia drugs would only be administered after the deer has been properly restrained and immobilized and would occur through direct injection. WS' personnel are required to attend training courses and be certified in the use of immobilizing and euthanizing drugs to ensure proper care and handling occurs, to ensure the proper doses is administered, and to ensure human safety. WS' personnel will continue to be trained in the proper handling and administering of immobilizing and euthanasia drugs to ensure human safety.

Direct application of chemical methods to target species will ensure that there are no cumulative impacts to human safety. All chemical methods will be tracked and recorded to ensure proper accounting of used and unused chemicals occurs. All chemicals will be stored and transported according to FDA and DEA regulations, including the directives of WS. The amount of chemicals used or stored by WS and cooperating agencies will be minimal to ensure human safety.

Repellents available for use to disperse deer from areas of application must be registered with the EPA according to FIFRA. Many of the repellents currently available for use have active ingredients that are naturally occurring and are generally regarded as safe. Although some hazards exist from the use of repellents, hazards occur primarily to the handler and applicator. When repellents are applied according to label requirements, no adverse affects to human safety are expected.

No adverse affects have been report to or identified by WS from the use of chemical methods during deer damage management conducted by WS from FY 2000 through FY 2007. When

chemical methods are applied as intended and when safety guidelines are followed, no adverse affects to human safety are expected. The primary risk of exposure to chemical methods occurs to handlers and applicators. WS' personnel who use and apply chemical methods will be trained according to federal, state, and local laws and regulations, including WS' directives. Based on this information, the use of chemical methods as part of the proposed action by WS will not have cumulative impacts on human safety.

4.2.4 Issue 4 - Humaneness of Damage Management Methods

WS continues to seek new methods and ways to improve current technology to improve the humaneness of methods used to manage damage caused by wildlife. 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 humane methods.

All methods not requiring direct supervision during employment (e.g., live traps) will be checked and monitored at least every 24 hours to ensure any wildlife confined or restrained are addressed in a timely manner to minimize distress of the animal. Live-captured deer will be immobilized to minimize stress of handling. All euthanasia methods used for live-captured deer will be applied according to AVMA guidelines for free-ranging wildlife. Shooting will occur in limited situations and personnel will be trained in the proper use of firearms to minimize pain and suffering of deer taken by this method.

WS employs methods as humanely as possible by applying measures to minimize pain and that allow wildlife captured to be addressed in a timely manner to minimize distress. Through the establishment of minimization measures and SOPs that guide WS in the use of methods to address damage and threats associated with deer in the State, the cumulative impacts on the issue of method humaneness are minimal. All methods will be evaluated annually to ensure measures and SOPs are adequate to ensure those methods continue to be used to minimize suffering and that wildlife captured are addressed in a timely manner to minimize distress.

4.2.5 Issue 5 - Effects on the Aesthetic Values of Target Species

The activities of the cooperating agencies would result in the removal of deer from those areas where damage or threats were occurring. Therefore, the aesthetic value of deer in those areas where damage management activities were being conducted would be reduced. However, for some people, the aesthetic value of a more natural environment would be gained by reducing deer densities, including the return of native wildlife and plant species that may be suppressed or displaced by high deer densities.

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 deer may lead to further degradation of some people's enjoyment of any wildlife or the natural environment. The actions of WS could positively affect the aesthetic enjoyment of wildlife for those people that are being adversely affected by the target species identified in this EA.

Deer population objectives are established and enforced by the WVDNR through the regulating the take of deer during the statewide hunting season and through the issuance of depredation permits after consideration of other known mortality factors. Therefore, WS has no direct impact on the status of the deer population since all take by WS occurs at the discretion of the WVDNR. Since those persons seeking assistance could remove deer from areas where damage is occurring

through depredation permits issued by the WVDNR, WS' involvement would have no effect of the aesthetic value of deer in the area where damage was occurring. When a depredation permit has been issued by the WVDNR to a property owner and/or manager that is experiencing damage caused by deer, the removal of deer under that permit would likely occur whether WS was involved with taking the deer or not.

Therefore, the activities of WS are not expected to have any cumulative adverse affects on this element of the human environment if occurring at the request of a property owner and/or manager and a permit has been issued by the WVDNR who are responsible for regulating a resident wildlife species, like deer.

4.2.6 Issue 6 - Effects on Regulated White-tailed Deer Hunting

As discussed in section 4.1.1 of this EA, the magnitude of WS' deer take for damage management purposes from FY 2000 through FY 2007 was low when compared to the total take of deer and when compared to the estimated statewide population. Since all take of deer is regulated by the WVDNR, the take of deer by WS that would occur annually and cumulatively would occur pursuant to deer population objectives established in the State. WS' take of up to 1,000 deer annually to alleviate damage and up to an additional 1,500 deer as part of disease surveillance and monitoring would be a minor component to the known take that occurs annually. With oversight of deer take, the WVDNR maintains the ability to regulate take by WS to meet management objectives for deer in the State. Therefore, the cumulative take of deer is considered as part of the WVDNR objectives for deer populations in the State.

4.3 ADDITIONAL ANALYSES OF POTENTIAL CUMULATIVE IMPACTS

4.3.1 Irreversible and Irretrievable Commitments of Resources

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

4.3.2 Effects on Sites or Resources Protected under the National Historic Preservation Act

Actions of WS are not undertakings that could adversely affect historic resources.

4.4 SUMMARY OF CUMULATIVE IMPACTS

No significant cumulative environmental impacts are expected from any of the four alternatives, including the proposed action. Under the proposed action, the lethal removal of deer by WS would not have significant impacts on statewide deer populations. No risk to public safety is expected when activities are provided and accepted by requesting individuals in Alternative 1, Alternative 2, and Alternative 3 since only trained and experienced personnel would conduct and recommend damage management activities. There is a slight increased risk to public safety when persons who reject assistance and recommendations and conduct their own activities, and when no assistance is provided in Alternative 1. In all Alternatives, however, it would not be to the point that the impacts would be significant. Although some persons will likely be opposed to deer damage management activities in the State, the analysis in this EA indicates that an integrated approach to management damage and threats caused by deer will not result in significant cumulative adverse impacts on the quality of the human environment.

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APPENDIX A

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APPENDIX B

WHITE-TAILED DEER DAMAGE MANAGEMENT METHODS RECOMMENDED OR AUTHORIZED FOR USE BY THE WEST VIRGINIA WILDLIFE SERVICES PROGRAM

NON-LETHAL METHODS

Resource Management

These consist primarily of non-lethal preventive methods such as cultural methods and habitat modification. Resource owner/manager implements cultural methods and other management techniques. Resource owners/managers may be encouraged to use these methods, based on the level of risk, need, and professional judgment on their effectiveness and practicality. These methods include:

Changes in human behavior: These may include altering the flight times of departing and arriving aircraft so that flying is at a time period of low wildlife activity. It may also include restricting departures and arrivals on specific runways.

Habitat modification: Localized habitat management is an integral part of an integrated approach to managing damage. The type, quality, and quantity of habitat are directly related to the wildlife produced or attracted to an area. Habitat can be managed to not produce or attract certain wildlife species. Limitations of habitat management as a method of reducing wildlife damage are determined by the characteristics of the species involved, the nature of the damage, economic feasibility, and other factors. Legal constraints may also exist which preclude altering particular habitats.

Though habitat management could be recommended, any modification to habitat would be localized and would not involve modification of habitat over a large area. Habitat modification may include removal of trees or vegetation that may be attracting deer to the area, such as fruit trees or other natural food sources. WS may recommend that a requester clear vegetation from specific areas to reduce the availability of cover for deer. Habitat management would be available for use under any of the alternatives discussed previously.

The resource/property owner is responsible for implementing habitat modifications, and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect. Habitat management is most often a primary component of wildlife damage management strategies at or near airports to reduce problems by eliminating loafing, bedding, and feeding sites. Generally, many problems on airport properties can be minimized through management of vegetation and water on areas adjacent to aircraft runways.

Livestock management: Modifying or eliminating habitat utilized by deer may change deer behavior and reduce some deer-human conflicts. This could include reducing vegetative cover and forage plants used or preferred by deer. One method, to eliminate habitat, is using cattle to consume the biomass that deer and other wildlife would feed upon. Reardon and Merrill reported that continuous heavy grazing by cattle or by mixed classes of livestock eliminated preferred deer foods and adversely impacts other aspects of white-tailed deer habitat (Merrill et al. 1957, Merrill 1959, Reardon and Merrill 1976). Crawford (1984) noted that livestock grazing affects the vigor and composition of plants and the direction and rapidity of plant succession. Thus, it can significantly influence carrying capacity of white-tailed deer habitat.

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Cultural practices: Studies in agriculture areas of Missouri indicate cultivated crops comprised 41 percent of deer diet by volume (Beringer and Hansen 1997). Thus, by reducing the amount of crops adjacent to the airports runways, deer densities next to these areas may decrease. For example, brome grass could be chosen to replace row crops, as brome is not a highly preferred plant species by deer, relative to other row crops, alfalfa and clover and still provides the owner with a source of revenue.

Physical Exclusion

Physical exclusion methods restrict the access of wildlife to resources. These methods can provide effective prevention of wildlife damage in many situations.

Exclusionary fences can be effective in keeping species from some resources, however, the design of the enclosure and height of the fence must be able to keep the target species out. Electric fences must be maintained and tested regularly. Vegetation and fallen branches on the fence drain current, thus reducing efficacy. Also, dry soil conditions prevent grounding, and thus the animal can pass through the fence without being shocked. Temporary fencing is placing temporary electric polytape fence to deter target species for a day to a week or more to protect resources. Other exclusionary methods could be used such as different types of fencing or other barriers that prevent access to a valuable resource.

However, fencing and exclusionary devices do have limitations. Even an electrified fence is not always effective and the expense of the fencing can often exceed the benefit. Some fences inadvertently trap, catch, or affect the movement of non-target wildlife. Further, fencing is not practical or legal in some areas (*e.g.*, areas near people). Exclusion devices would be available under all the alternatives discussed in detail.

A fence can limit the entry of deer onto affected properties. There are several types of fences that inhibit the movement of deer if properly installed, including electric fencing, woven wire, and chain link fencing. The height of a fence required to exclude deer is a much debated topic. Smith and Coggin (1984) reported that a 7-foot fence (2.1-meters) reduced deer-vehicle collisions by 44.3% to 83.9% along a New York Thruway. Clearly and Dolbeer (1999) recommend that airports install a 10-foot chain link fence with barbed-wire outriggers to limit deer entry. For the purpose of this EA, WS recommends a fence height of 12 feet, with an additional three feet buried below the ground, to exclude deer. However, other permanent fencing heights from eight to ten feet can be utilized and can be effective at excluding deer (VerCauteren et al. 2006). Other types of non-permanent fencing can be utilized to reduce damage, including high tensile electric fencing as well as slanted configurations that give a three-dimensional appearance which makes the jump required to clear the fence look higher and longer (VerCauteren et al. 2006).

Behavior Modification

This refers to tactics that alter the behavior of wildlife to reduce damage. Effective behavior modification usually requires integrating two or more auditory scaring or visual scaring techniques.

Auditory scaring techniques

The proper use of frightening devices and harassment techniques including sirens, flashing lights, electronic distress sounds, pyrotechnics, propane exploders, dogs, and rubber projectiles fired from a shotgun could help reduce conflicts (Craven and Hygnstrom 1994). Used in the proper context, these devices can help keep deer away from conflict areas. Some disadvantages are that these methods can be labor intensive and expensive. Also, frightening methods must be continued indefinitely unless the deer population is reduced or excluded from the resource.

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Pyrotechnics: Pyrotechnics are specialized fireworks that are shot out of a pistol/shotgun to deter deer or other wildlife. To be successful, pyrotechnics should be carried by wildlife control personnel at all times and used whenever the situation warrants. Continued use of pyrotechnics, alone may lesson the effectiveness.

Propane Cannons: Propane cannons are mechanical devices that use propane gas and an igniter to produce a loud explosive sound. Propane cannons are often suggested as effective frightening agents for deer (Craven and Hygnstrom 1994), and have been used frequently in attempts to reduce crop damage and encroachment on airports. Research has shown that propane cannons detonated systematically at 8-10 minute intervals are effective in frightening deer away from protected areas for two days. Motion-activated cannons however, detonate only when deer approach the area to be protected and have been shown to be effective up to 6 weeks (Belant et al. 1996).

Visual scaring techniques

Visual techniques such as use of mylar tape (highly reflective surface produces flashes of light), eye-spot balloons (the large eyes supposedly give deer a visual cue that a large predator is present), flags, effigies (scarecrows), sometimes are effective in reducing deer damage in a localized area for a limited time period. Deer resistant cattle feeders, which use reflective tape and motion, have also been developed to deter deer from locations where cattle are feeding (Seward et al. 2007). This technique was effective in reducing deer intrusions to feeders initially. However, more frequent intrusions occurred in later weeks and some cattle were also deterred from feeding at the feeders due to the scaring device (Seward et al. 2007).

Repellents

Repellents have had mixed results in reducing deer damage to shrubs and trees (Palmer et al. 1983, Conover 1984, Matschke et al. 1984, Hygnstrom and Craven 1988, Andelt et al. 1991, Craven and Hygnstrom 1994). Results are generally linked to deer numbers, availability of preferred food plant species, alternate food sources, season, and weather. Two repellents that are commercial available there have been evaluated showed that neither repellent reduced deer damage during field trials despite some avoidance of treated food during pen trials (Arjo et al. 2005). Commercial repellents are costly ranging from $20/gallon to $80/gallon.

Repellents require continuous applications and are limited in their effectiveness. The effectiveness of a topical repellent is directly related to residue present on the plant. Rain, heavy dew, and watering will remove the residue requiring reapplication of the material. The use of repellents can cause a decrease in native vegetation by shifting browsing pressure from protected plants to native flora. The effectiveness of repellents decreases as deer numbers increase and available food plants decrease.

Live-capture

Live-capture methods are used to capture deer for disease sampling and/or relocation. A permit is required by the WVDNR to live-capture deer, including the relocation of deer. The WVDNR currently prohibits relocation due to disease concerns. Live-Capture methods for deer include: clover traps, box traps, drop nets, and cannon nets. Deer could also be live-captured and subsequently euthanized according to WS' directives and AVMA guidelines for the euthanizing of free-ranging wildlife. The use of live-capture methods and subsequent euthanizing of deer is discussed further under the section in Appendix B discussing lethal methods.

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Trapping

Live-capture using trapping methods often requires an acclimation period where deer are conditioned to frequent an area where methods will be employed, primarily through the use of baiting. Baiting occurs to monitor the number of deer that could frequent the site, to identify non-target risks, and to acclimate deer to the presence of equipment used to trap them. Baiting also occurs to identify a bait that is selective for the target species which can minimize the presence of non-targets at the location. Live-capture methods are primarily used during the fall, winter, and spring when deer are concentrated and food sources are limited. Once deer are sufficiently attracted and are consistently frequently a location, live-capture methods can be used to maximize capture rates. When live-capture methods are not directly activated by WS' personnel (e.g., cannon nets, drop nets), trap checks will occur at least every 24 hours to ensure live-captured deer are attended to appropriately and recovered in a timely manner. Once live-captured, deer will be immobilized according to WS' Directives and as required by WS' training guidelines (Johnson et al. 2001). Live-captured deer will be released on site, if relocation is not the objective of trapping them or if they are not subsequently euthanized.

Cage Traps: Cage traps come in a variety of styles to target different species. Generally, cage traps are a box designed for the size of the target animal that is activated by the animal once they enter. The most common cage trap for deer is the clover trap (Clover 1954). The clover trap has been modified since the original design was developed but remains generally a box trap that allows the sides to collapse and fold together for easy transport and to restrain deer once captured (Sparrowe and Springer 1970, Roper et al. 1971, McCullough 1975). Traps are placed in areas where activity by the target species is high and are baited with an attractant. When the target animal enters the cage trap to investigate the attractant, a pan or wire is triggered releasing the door and enclosing the animal inside the cage trap. Traps can also be designed with a one way door so target animals enter into the trap to investigate an attractant but once inside, are unable to exit the trap. Cage traps generally allow for the capture of one individual at a time so their use can be labor intensive and costly.

Injuries can occur as deer are restrained in cage traps (Beringer et al. 1996, Haulton et al. 2001, Peterson et al. 2003). Some non-target animals become habituated to cage traps and purposely get captured to eat the bait, making the trap unavailable to catch target animals. These behaviors can make a cage trap less effective. Cage traps will be checked at least every 24 hours to ensure animals captured are addressed in a timely manner to minimize distress. The use of cage traps to live-capture deer requires a permit from the WVDNR. Cage traps to live-capture deer are generally not available to the public. The use of cage traps would be available for use by WS under Alternative 2 and Alternative 3 and likely not available under Alternative 1.

Drop-nets: Nylon or cloth nets are suspended above an area actively used by an animal or group of animals where target individuals have been conditioned to feed (Ramsey 1968). The area is baited and once feeding occurs under the net, the net is released. Drop nets require constant supervision by personnel to drop the net when target individuals are present and when deer are underneath the net. This method has limited use due to the time and effort required to condition deer to feed in a location and the required monitoring of the site to drop the net when target wildlife are present. Nets are used to live-capture target individuals and if any non-targets are present, they can be released on site unharmed. Drop nets allow for the capture of several deer during a single application. Injuries to deer also occur when using drop nets with the rate of injury being correlated with the number of deer captured during a single application of the net (Haulton et al. 2001). Drops nets would be available under

Alternative 3 and Alternative 4 with the appropriate permit from the WVDNR. Nets are not generally available to the public.

Cannon Nets: Similar to drop nets, cannon nets use a nylon or cloth net to capture wildlife that have been conditioned to feed in a given area through baiting (Hawkins et al. 1968). When using cannon nets, the net is fully deployed to determine the capture area when fired. Once the capture zone has been established the net is rolled up upon itself and bait is placed inside the zone to ensure feeding wildlife are captured. When target wildlife are feeding at the site and within the capture zone of the net, the launcher is activated by personnel near the site which launches the net over the target wildlife. The net is launched using small explosive charges and weights. Only personnel trained in the safe handling of explosive charges will be allowed to employ rocket nets when explosive charges are used. Pneumatic cannon nets can also be used which propels the net using compressed air instead of small explosive charges. Cannon nets require personnel to be present at the site continually to monitor for feeding. Similar to drop nets, cannon nets can be used to capture multiple deer during a single application. Injury rates for cannons nets appear to be correlated with the number of deer captured during a single application of the net (Haulton et al 2001). Non-targets incidentally captured can be released on site unharmed. Cannon nets would be available for use by WS under the proposed action and under Alternative 3 and Alternative 4. Cannon nets would not be available for use by the general public and would not be available for use by the public under Alternative 1, Alternative 2, or Alternative 3. A permit would be required from the WVDNR to use cannon net to capture deer.

Chemical Immobilization

Chemical immobilizing drugs are important tools for managing wildlife. All personnel involved with using immobilizing drugs will be properly trained in the use and handling of those drugs. The AMDUCA and its implementing regulations (21 CFR Part 530) establish several requirements for the use of animal drugs (see section 1.6.12). For WS, all personnel involved with deer damage management activities that use immobilizing drugs will be certified for their use and follow the guidelines established in the WS' Field Operational Manual for the Use of Immobilization and Euthanasia Drugs (Johnson et al. 2001). Administering immobilizing drugs to live-captured deer will occur primarily through intramuscular injection of the drug once live-captured and restrained. Immobilizing drugs may be administered through direct injection into deer from a syringe or the use of pneumatic dart guns, blowgun, or jabsticks, in those situations where deemed appropriate. The use of immobilizing drugs as part of an adaptive management program will pose no threat to human safety given the controlled situation of application. Storage, transportation, and handling of all immobilizing drugs will be in accordance to WS' directives, DEA requirements, FDA requirements, and State laws and regulations. Immobilizing drugs would only be available to for WS under the proposed action and Alternative 3. Immobilizing drugs are not available to the general public and would not be available for use under Alternative 1 but would be available for use by WS under Alternative 2 and Alternative 3.

The immobilizing agents available include:

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 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. A DEA license is required to possess ketamine.

Telazol is a more powerful anesthetic and usually used for larger animals. Telazol is a combination of equal parts of tiletamine hydrochloride and zolazepam hydrochloride (a tranquilizer). The product is generally supplied sterile in vials, each containing 500 mg of active drug, and when dissolved in sterile water has a pH of 2.2 to 2.8. Telazol produces a state of unconsciousness in which protective reflexes, such as coughing and swallowing, are maintained during anesthesia. Schobert (1987) listed the dosage rates for many wild and exotic animals. Before using Telazol, the size, age, temperament, and health of the animal are considered. Following a deep intramuscular injection of Telazol, onset of anesthetic effect usually occurs within 5 to 12 minutes. Muscle relaxation is optimum for about the first 20 to 25 minutes after the administration, and then diminishes. Recovery varies with the age and physical condition of the animal and the dose of Telazol administered, but usually requires several hours.

Xylazine is a sedative (analgesic) that calms nervousness, irritability, and excitement, usually by depressing the central nervous system. Because xylazine is not an anesthetic, sedated animals are usually responsive to stimuli which can put handlers at risk if the animal reacts to stimulus. Therefore, personnel should be even more attentive to minimizing sight, sound, and touch. To minimize risks to the handler, xylazine is commonly used with ketamine to produce a relaxed anesthesia. 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. No federal license is required for xylazine.

The use of immobilizing drugs with follow those published dosages and veterinarian recommended dosages for deer. Kreeger et al. (2002) recommends 4.4 mg/kg Telazol plus 2.2 mg/kg xylazine for immobilizing deer. An alternative recommendation is 7.5 mg/kg of ketamine and 1.5 mg/kg of xylazine (Kreeger et al. 2002). Kilpatrick and Spohr (1999) found that the mean distance traveled and the area searched for darted deer was greater with a ketamine-xylazine mixture compared to a Telazol-xylazine mixture.

A concern when using drugs is the potential for human consumption of meat from wildlife that has been immobilized. Since deer are harvested during a regulated harvest season and consumed, the use of immobilizing drugs is of concern. To mitigate the risk associated with the consumption of wildlife recently injected with drugs, withdrawal times are often established. A withdrawal time is the period of time established between when the animal was administered drugs to when it is safe to consume the meat of the animal by humans. A provision of the AMDUCA states that animals be administered drugs in an extra-label manner should not be used for human consumption in the absence of withdrawal data. However, the Act allows for a licensed veterinarian to establish withdrawal periods for a specific drug for a specific wildlife species when justified from available sources of information. Although unlikely, in the event that WS is requested to immobilize and release deer either during a period of time when the harvest of deer is occurring or during a period of time where the withdrawal period could overlap with the start of a harvest season, WS would adhere to the regulation governing the extra-label use of immobilizing drugs established by the AMDUCA after consultation with a veterinarian and the WVDNR. Activities would only occur as permitted by the WVDNR.

Since withdrawal periods are not well defined for free-ranging wildlife species for all drugs, the WWHC, in consultation with cooperators, has established suggested withdrawal time for specific drugs that are intended to be applicable to most free-ranging wildlife. For ketamine and xylazine, the suggested withdrawal time is 30 days. For Telazol, the recommended withdrawal period is 14 days (WWHC 2008). WS would adhere to all established withdrawal times for deer when using immobilizing drugs for the capture of deer after consultation with a veterinarian and the WVDNR.

In the unlikely event that WS is requested to immobilize and release deer either during a period of time when harvest of deer is occurring or during a period of time where the withdrawal period could overlap with the start of a harvest season, WS would adhere to the federal regulations requiring that wildlife given drugs that might be consumed by humans be identified. If deer are to be released after immobilizing during a period when deer could harvested and consumed, identification of the deer would occur using durable ear tags, neck collars, and/or other external, readily identifiable markers. The identification markers would be affixed at the time the animal was immobilized with the markers containing information that the deer carcass should not be consumed and the person harvesting the deer should contact WS and/or the WVDNR. If the deer was harvested during the withdrawal period, the carcass would be condemned as unfit for consumption by the WVDNR. The carcass would be confiscated and destroyed either through deep burial or incineration. The adherence to federal regulations on withdrawal periods and identification of immobilized wildlife will greatly minimize the risks to human safety from WS' use of immobilizing drugs. Risks from the use of immobilizing drugs are expected to be low.

LETHAL METHODS

Hunting Programs

WS sometimes recommends sport hunting as a viable damage management method when the deer can be legally hunted. A valid hunting license and other licenses or permits may be required by the WVDNR. This method provides sport and food for hunters and requires no cost to the landowner.

Sharp shooting

Studies have suggested that localized management by removing deer is an effective tool where deer are causing undesirable effects (McNutly et al. 1997). This research supports the hypothesis that the removal of a small, localized group of white-tailed deer would create a population of low density in that localized area.

WS would conduct sharp shooting, with center-fire rifles or shotguns, during daylight or at night using spotlights, night-vision equipment, and/or forward looking infrared systems. Rifles would be equipped with noise suppressors, to avoid disturbance, and to facilitate success by minimizing the tendency of deer to flee from the sound of gunfire. Shots would be taken from elevated positions in tree stands, in the beds of trucks, or other vantage points. Elevated positions cause a downward angle of trajectory, so that any bullets that inadvertently miss or pass through targeted deer, will hit into the ground or into earthen embankments to minimize the risk of stray bullets presenting a safety hazard to people, pets, or property. WS' personnel would strive for head and neck shots when shooting deer to achieve quick, humane kills. Bait may be used to attract deer to safe sites for shooting and to enhance success and efficiency. All deer carcasses would be disposed of in accordance with applicable local, state and federal laws and regulations.

Only WS' personnel, who have completed firearms safety training, have demonstrated skill and proficiency with the firearms used for deer removal, and have been approved for sharp shooting by the State Director in West Virginia will participate in sharp shooting deer.

Firearm use is very sensitive and a public concern because of safety issues relating to the public and misuse. To ensure safe use and awareness, WS' employees who use firearms to conduct official duties are required to attend an approved firearms safety-and-use training program within three months of their appointment and a refresher course every two years afterwards (WS Directive 2.615). WS employees, who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Live Capture and Euthanasia

Some situations restrict or do not warrant standard shooting operations. In such cases, it may be appropriate to remove individual deer by trapping and euthanizing the animals. Clover traps, box traps, drop nets, and rocket nets are several methods that can be used to live capture deer. Deer that are live captured would subsequently be dispatched using a handgun, rifle, or euthanasia drug according to WS' Directives and AVMA guidelines for euthanizing free-ranging wildlife.

Euthanasia drugs available for use include:

> **Sodium Pentobarbital** is a barbiturate that rapidly depresses the central nervous system to the point of respiratory arrest. Barbiturates are a recommended euthanasia drug for free-ranging wildlife (AVMA 2007). Sodium Pentobarbital would only be administered after deer have been live-captured and properly immobilized to allow for direct injection. 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.

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APPENDIX C
FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

Listed species (based on published population data) -- 23 listings

Animals -- 17

Status	***Species/Listing Name***
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Bat, Virginia big-eared (*Corynorhinus (=Plecotus) townsendii virginianus*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Clubshell Entire Range; Except where listed as Experimental Populations (*Pleurobema clava*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Fanshell (*Cyprogenia stegaria*)
T	Isopod, Madison Cave (*Antrolana lira*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Riffleshell, northern (*Epioblasma torulosa rangiana*)
E	Ring pink (mussel) (*Obovaria retusa*)
T	Salamander, Cheat Mountain (*Plethodon nettingi*)
T	Snail, flat-spired three-toothed (*Triodopsis platysayoides*)
E	Spinymussel, James (*Pleurobema collina*)
E	Squirrel, Virginia northern flying (*Glaucomys sabrinus fuscus*)
E	Wolf, gray Lower 48 States, except where delisted; where XN; and Mexico. (*Canis lupus*)

Plants -- 6

E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
E	Clover, running buffalo (*Trifolium stoloniferum*)
E	Harperella (*Ptilimnium nodosum*)
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Rock-cress, shale barren (*Arabis serotina*)

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T	Spiraea, Virginia (*Spiraea virginiana*)

E=Endangered, T= Threatened

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