SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT: REDUCING FERAL HOG DAMAGE THROUGH AN INTEGRATED WILDLIFE DAMAGE MANAGEMENT PROGRAM IN THE STATE OF GEORGIA

United States Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services

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I. INTRODUCTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program prepared an environmental assessment (EA) to evaluate potential impacts to the quality of the human environment from the implementation of a management program to address damage to property, agricultural resources, natural resources, and threats to human safety caused by feral swine (*Sus scrofa*) in the State of Georgia (USDA 2005). The EA evaluated the need for damage management and the relative effectiveness of four alternatives to meet that proposed need, while accounting for the potential environmental effects of those activities. WS' proposed action in the EA implements an integrated damage management program in Georgia to fully address the need for feral swine damage management while minimizing impacts to the human environment.

Feral swine are not native to Georgia or any part of North America. Swine were first brought to North America during the arrival of Spanish explorers. Feral swine in Georgia and across North America include released or escaped domestic swine and the wild boar that are native to Europe and Asia. When free-roaming in North America, all swine are included in the term "*feral swine*", as are hybrids of the two types. Although morphologically distinct, both the feral swine and European wild boar are recognized as *S. scrofa*. The prolific breeding habits of swine and the translocation of feral swine by hunters appear to be responsible for their rapid range expansion into areas not previously occupied.

II. AUTHORITY AND COMPLIANCE

WS' activities to reduce threats associated with feral swine in Georgia are regulated by federal, State, and local laws and regulations. The authority of WS is discussed in detail in section 1.1 of the EA (USDA 2005), along with the authorities of other federal, State, and local entities. WS' compliance with relevant laws and regulations are also discussed in detail in section 1.1 of the EA (USDA 2005). WS' authorities and those of federal, State, and local entities would remain as addressed in the EA, including compliance with all applicable federal, State, and local laws and regulations. WS would continue to coordinate activities to alleviate or prevent feral swine damage with the Georgia Department of Natural Resources (GDNR) to ensure WS' activities are considered as part of the population objectives established for feral swine.

III. PURPOSE

The purpose of the EA remains as addressed in section 1.2 of the EA (USDA 2005). This supplement to the EA examines potential environmental impacts of WS' program as it relates to: 1) new information that has become available from public comments, research findings, and data gathering since the issuance of the Decision and Finding of No Significant Impact (FONSI) in 2005, 2) new methods that have become available since the Decision for the EA, 3) conducting disease surveillance and monitoring for the presence of feral swine diseases (*e.g*., swine brucellosis, pseudorabies, classical swine fever), 4) clearly communicating to the public the analysis of individual and cumulative impacts of the proposed action since 2005, and 5) document the analyses of WS' feral swine damage management activities in Georgia

since the Decision/FONSI was issued in 2005 to ensure program activities remain within the impact parameters analyzed in the EA.

IV. NEED FOR ACTION

Across the United States, as human populations have expanded, wildlife species have been introduced into new areas, and land has been transformed to meet human needs. Those changes often increase the potential for conflicts between wildlife and people that result in damage to resources and threaten human health and safety. One encroachment on native ecosystems is the introduction of non-native, invasive species into naïve environments. Invasive species often compete with native plants and wildlife and can threaten biodiversity. The number of invasive species introduced in the history of the United States has been estimated at 50,000 species (Pimentel et al. 2005). Some introduced species benefit society, such as corn, wheat, cattle, poultry, and other food items. Nearly 98% of the food system in the United States is derived from introduced species (USBC 2001, Pimentel et al. 2005). Other invasive species have caused considerable economic and environmental damage. Pimentel et al. (2005) estimated invasive species cause nearly $120 billion in environmental damages and losses in the United States annually. Of particular concern are the impacts of invasive species on threatened and endangered (T&E) species worldwide. Invasive species negatively impact nearly 42% of the species listed as T&E in the United States (Wilcove et al. 1998, Pimentel et al. 2005). Worldwide nearly 80% of wildlife populations at risk of extinction are threatened or negatively impacted by invasive species (Pimentel et al. 2005).

A description of the need for action to address threats and damages associated with feral swine in the State is provided in section 1.3 of the EA (USDA 2005). The need for action addressed in the EA remains applicable to this supplement to the EA. The need for action is based on a need to manage feral swine damage to agricultural resources, natural resources, and property, including threats to human safety.

WS continues to receive requests for both operational and technical assistance from those persons experiencing damage or threats of damage caused by feral swine in the State. Table 1 shows the number of technical assistance projects conducted by WS by federal fiscal year[1] (FY). Technical assistance was provided to those persons requesting assistance through the dissemination of handouts and information regarding damage management techniques, methods demonstrations, loaning of equipment, and site visits. Through technical assistance, WS made recommendations on the appropriate methods available for use that a requestor could employ to resolve damage or reduce threats without WS' direct involvement. Technical assistance as provided by WS to resolve damage or threats associated with feral swine in the State under the proposed action alternative was discussed in the EA under Section 3.2.2 (USDA 2005).

As shown in Table 1, WS has conducted 156 technical assistance projects since FY 2005 involving feral swine damage to agricultural resources, natural resources, property, and human safety in the State through the dissemination of information and handouts on feral swine damage management. Technical assistance projects were conducted to resolve damage occurring to primarily property. Nearly 77% of the requests for technical assistance received by WS since FY 2005 involved feral swine damage to property in the State. Damage to property is usually associated with feral swine rooting which tears up and overturns turf. From FY 2005 through FY 2010, WS conducted 29 technical assistance projects involving feral swine damage to agriculture and seven projects involving damage to natural resources.

During requests for assistance received by WS, cooperators often report or WS verifies through site visits damage associated with feral swine in the State. Since FY 2005, damage has been reported to WS or WS

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

has verified over $124,000 in damages caused by feral swine in the State (see Table 2). Damages have been reported or verified as occurring primarily to property. Over $123,000 in damages to property was reported to, or verified by, WS in the State since FY 2005. An additional $1,000 in damages to agriculture was also reported.

Table 1 – Technical assistance requests received by WS involving feral swine in Georgia by year

Resource Type	Fiscal Year						TOTAL[1]
	2005	2006	2007	2008	2009	2010	
Property	16	22	24	27	20	11	**120**
Agriculture	3	2	3	4	12	5	**29**
Natural Resources	3	2	1	0	1	0	**7**
Human Safety	0	0	0	0	0	0	**0**
Total	**22**	**26**	**28**	**31**	**33**	**16**	**156**

[1]Technical assistance project often involve multiple resources; therefore, a single technical assistance project could involve one or more resource

Table 2 only reflects damage that has been reported to or verified by WS based on requests received for assistance. Assigning monetary damage to natural resources can be difficult especially when factoring in the lost aesthetic value when natural resources are damaged by feral swine. Similarly, placing a monetary value on threats to human safety can be difficult. Monetary damage reported reflects damage that has occurred and that has been reported to WS, but is not reflective of all feral swine damage occurring in the State since not all swine damage or threats are reported to WS.

Table 2 – Reported or WS' verified damage by resource caused by feral swine in Georgia

Resource Type	Fiscal Year						TOTAL
	2005	2006	2007	2008	2009	2010	
Property	$5,200	$11,200	$21,100	$41,600	$39,500	$4,500	**$123,100**
Agriculture	$1,000	0	0	0	0	0	**$1,000**
Natural Resources	0	0	0	0	0	0	**0**
Human Safety	0	0	0	0	0	0	**0**
Total	**$6,200**	**$11,200**	**$21,100**	**$41,600**	**$39,500**	**$4,500**	**$124,100**

WS has also conducted direct operational assistance to manage and prevent damage associated with feral swine. Operational assistance occurs when WS is directly involved with employing methods to resolve or alleviate damage occurring, to prevent damage from occurring, and/or to reduce threats of damage associated with feral swine. As directed by the selected alternative, WS continues to apply multiple methods as part of an integrated damage management program to resolve requests for assistance based on WS' Decision Model. WS' direct operational assistance involves providing direct management to prevent feral swine damage. As part of an integrated management program, that includes the employment of non-lethal methods, WS employed lethal methods to take feral swine in the State to alleviate or prevent damage. WS' direct operational assistance was discussed in section 3.2.2 of the EA (USDA 2005). The procedures used by WS' personnel to determine management strategies or methods applied to specific requests for assistance using WS' Decision Model can be found in section 3.2.3 of the EA (USDA 2005) and is discussed in detail in WS' programmatic Final Environmental Impact Statement (FEIS; USDA 1997).

Agricultural damage and threats caused by feral swine in Georgia occurs to crops, livestock, and other agricultural resources. Feral swine can cause damage to a variety of agricultural crops through direct consumption of the crop but damage can also occur from trampling, rooting, and wallowing (Beach 1993). Rooting is a common activity of feral swine where they overturn sod and soil in the search for

food (Stevens 1996). Feral swine also wallow in water and mud to regulate body temperature and to ward off skin parasites.

Damage and threats to livestock associated with feral swine occurs from predation on livestock and the risks associated with disease transfer from feral swine to domestic livestock. Feral swine can also cause damage to other agricultural resources. For example, feral swine can cause damage to pastures and land used for hay by rooting and wallowing, can cause damage to ponds and water sources for livestock, and can cause damage from the consumption of livestock feed. Feral swine feeding activities in agricultural crops can also lead to increased erosion from the removal of vegetation that leaves the soil bare along with the overturning of soil caused by rooting.

In Georgia, numerous grain crops and vegetable crops are susceptible to feral swine damage, including corn, soybeans, peanuts, sorghum, sugarcane, sweet potatoes, wheat, cantaloupe, cucumbers, squash, tomatoes, and watermelons. In 2009, Georgia ranked first in the United States in the production of peanuts (USDA 2010). Georgia ranked second in the United States in the production of cucumbers, onions, rye, and snap beans (USDA 2010). Georgia also ranked highly in the production of many other vegetables and melons (USDA 2010). Although crop damage is not well documented in Georgia, the presence of feral swine in agricultural areas of the State are likely to lead to requests for assistance to manage and prevent damage to agricultural crops.

In addition to crop damage, feral swine also damage pastures, land used for hay, and sod farms from rooting and wallowing activities (Beach 1993). Rooting activities can also lead to increased erosion and soil loss. Wallowing and rooting activities in livestock watering areas can lead to a degradation in water quality by increasing turbidity, by causing algal blooms, by depleting dissolved oxygen, and increasing erosion (Beach 1993). Since feral swine often travel in family groups, damages from rooting and wallowing can be extensive often encompassing several acres.

Additional risks associated with feral swine are the potential for disease transmission from feral swine to domestic livestock, especially to domestic swine. Feral swine are potential reservoirs for several diseases that are known to be transmissible between feral swine and domestic livestock (Wood and Barrett 1979, Corn et al. 1986, Beach 1993). Corn et al. (1986) found feral swine tested in Texas were positive for pseudorabies, brucellosis, and leptospirosis. A study in Oklahoma found samples from feral swine tested positive for antibodies of porcine parvovirus, swine influenza, and porcine reproductive and respiratory syndrome virus (Saliki et al. 1998). Cholera, trichinosis, and African swine fever are additional diseases that can be transmitted between livestock and feral swine. Disease transmission is likely to occur where domestic livestock and feral swine have a common interface, such as at water sources and livestock feeding areas.

Although several diseases known to be carried by swine are also transmissible to other livestock, the primary concern is the potential transmission of diseases from feral swine to domestic swine. Pseudorabies is a viral disease associated with an extremely contagious herpes virus that can have negative impacts on reproduction in domestic swine. Brucellosis is a bacterial disease that can also have negative impacts on reproduction of swine. Many of the other diseases associated with feral swine also negatively affect the health and marketability of domestic swine that can lead to economic losses to the livestock producer.

The United States is one of the world's largest producers of pork and is the second largest exporter of pork. Pork production in the United States accounts for about 10% of the total world supply. The retail value of pork sold to consumers exceeds $30 billion annually. In addition, the pork industry supports more than 600,000 jobs. An economic analysis estimated that the annual cost of pseudorabies to pork producers in the United States at more than $30 million annually in lost production as well as testing and

vaccination costs (USDA 2008). The WS program in Georgia conducts disease surveillance in the feral swine population as part of the National Wildlife Disease Surveillance Program.

Although the source of livestock disease outbreaks can be difficult to identify, a risk of transmission and the spreading of diseases to domestic swine and other livestock exists wherever feral swine and domestic livestock interact. A disease outbreak not only has negative economic implications to the individual livestock producer, but can cause economic losses that can negatively impact the statewide swine industry.

In addition to the potential for disease transmission, feral swine are also known to predate on livestock. Feral swine are known to kill calves, kids, lambs, and poultry (Stevens 1996). Predation occurs primarily on young livestock but feral swine can also kill weakened or injured livestock.

Feral swine cause damage to natural flora and fauna on private lands along with designated natural areas such as parks and wildlife management areas in Georgia. Those sites suffer erosion and local loss of critical ground plants and roots as well as destruction of seedlings as a result of their feeding and other activity (Barrett and Birmingham 1994). Feral swine compete with over 100 species of native wildlife for important and limited natural food supplies. Native animals in direct competition with feral swine for quality food include high profile species such as deer, wild turkey, quail, and black bear. Some species including quail, turkey, endangered sea turtles, and shorebirds are at risk of predation by nest destruction and the consuming of eggs. Feral swine cause damage to natural flora and fauna on private lands along with designated natural areas such as parks and wildlife management areas. Those sites suffer erosion and local loss of critical ground plants and roots as well as destruction of seedlings as a result of their feeding and other activity (Barrett and Birmingham 1994). Many state and federal natural resource managers are now in the process of controlling swine numbers because of their known impact to endangered plants and animals (Thompson 1977).

Feral swine are known to feed on many smaller animals (some threatened or endangered), disrupt ecosystems via rooting, and feeding on rare and endangered plants. Many experts in the fields of botany and herpetology have observed marked declines in some rare species of plants, reptiles, amphibians, and soil invertebrates (Singer et al. 1982) in areas inhabited by feral swine. It has been well documented that feral swine disturb large areas of vegetation and soils through rooting, and it is documented that swine inhabiting coastal, upland, and wetland ecosystems are uprooting, damaging, and feeding on rare native species of plants and animals (Means 1999). It has been documented that swine can disrupt natural vegetative communities, eliminate rare plants and animals, alter species composition within a forest including both canopy and low growing species (Lipscomb 1989, Frost 1993), increase water turbidity in streams and wetlands (reducing water quality and impacting native fishes), and increase soil erosion and alter nutrient cycling (Singer et al. 1982, DeBenedetti 1986). Kaller and Kelso (2003) found that feral and free-ranging swine were linked to increased levels of fecal coliform and other potentially pathogenic bacteria in several Louisiana watersheds. Additionally, some species of freshwater mussels and aquatic insects were negatively impacted by feral swine (Kaller and Kelso 2006).

Feral swine can damage landscaping, golf courses, roads, drainage ditches and cause erosion by feeding in these areas. Feral swine dig or root in the ground with their nose in search of desired roots, grubs, earthworms, and other food sources. Feral swine can damage landscaping, golf courses, roads, drainage ditches and cause erosion by feeding in these areas. The rooting and digging activity of feral swine turns sod and grass over which often leaves the area bare of vegetation and susceptible to erosion. Feral swine also pose a threat to property from being struck by motor vehicles and aircraft. WS has documented damage to landscaping, levees, and drainage ditches caused by feral swine in urban areas in Georgia.

Feral swine can pose a threat to human safety from disease transmission, from aggressive behavior, and

from being struck by vehicles and aircraft. Feral swine are potential reservoirs for at least 30 viral and bacterial diseases (Davidson and Nettles 1997, Samuel et al. 2001, Williams and Barker 2001) and 37 parasites (Forrester 1991) that are transmissible to humans. Brucellosis, salmonellosis, toxoplasmosis, trichinosis, tuberculosis, and tularemia are some of the common disease that can be carried by feral swine that are also known to infect humans (Stevens 1996, Hubalek et al. 2002, Seward et al. 2004). Actual transmission of diseases from feral swine to humans is rare (Amass 1998).

In addition to threats from disease transmission, is the threat that feral swine can pose from aggressive behavior and from being struck by motor vehicles and aircraft. Feral swine can be very aggressive toward people, especially when threatened. Collisions with motor vehicles and aircraft can also threaten human safety if the operator loses control of the vehicle or if the damage to aircraft is severe.

V. RELATIONSHIP OF THIS DOCUMENT TO OTHER ENVIRONMENTAL DOCUMENTS

Information from the following documents has been incorporated by reference into the EA and this supplement.

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 supplement to the EA.

VI. WS' RECORD KEEPING

WS continues to maintain a Management Information System to document assistance provided when addressing wildlife damage in the State. The Management Information System maintained by WS is addressed in Section 1.5 of the EA (USDA 2005). The System only includes requests for assistance and the associated actions that are received by WS and does not include requests for assistance or information provided by other local, State, or federal entities. Therefore, the database only reflects activities conducted by WS and information associated with those activities.

VII. PROPOSED ACTION

A summary of the proposed action alternative is provided in Section 1.6 of the EA (USDA 2005). The no action/proposed action alternative continues the current implementation of an adaptive integrated approach utilizing non-lethal and lethal techniques, as deemed appropriate using the WS Decision Model, to reduce damage and threats caused by feral swine in the State. A major goal of the program would be to resolve and prevent feral swine damages and to reduce threats to human safety. To meet this goal, WS would continue to respond to requests for assistance with, at a minimum, technical assistance, or when funding is available, operational damage management. Funding could occur through federal appropriations or from cooperative funding. The adaptive approach to managing damage associated with feral swine would integrate the use of the most practical and effective methods to resolve a request for damage management as determined by site-specific evaluation to reduce damage or threats to human safety for each request. City/town managers, agricultural producers, property owners, and others requesting assistance would be provided information regarding the use of appropriate non-lethal and lethal techniques.

Non-lethal methods include, but are not limited to: behavior modification, lure crops, visual deterrents, dogs, live traps, exclusionary devices, frightening devices, chemical immobilization (see the EA for a complete list and description of potential methods). Lethal methods considered by WS include: live-

capture followed by euthanasia and shooting. Euthanasia could occur through the use of barbiturates and gunshot once feral swine are live-captured using other methods. Barbiturates are an acceptable form of euthanasia for swine while gunshot is a conditionally acceptable[2] method of euthanasia for swine (AVMA 2007). In addition, gunshot could be used to lethally take feral swine that are not confined using live-capture methods which is a conditionally acceptable method for the lethal take of free-ranging wildlife.

The EA contains a thorough discussion of the methods available for use in an integrated wildlife damage management approach to address requests for assistance to manage damage or reduce threats to human safety. WS' programmatic FEIS contains additional discussion on adaptive management using an integrated approach to address damage to resources and threats to human safety (USDA 1997). As part of an integrated approach, WS may provide technical assistance and direct operational assistance to those persons experiencing damage associated with feral swine.

Upon receiving a request for assistance, feral swine damage management activities could be conducted on private, federal, state, county, and municipal lands in the State for the purposes of studying, containing, and curtailing disease outbreaks. Activities are only conducted by WS when requested and only on those properties where a MOU, cooperative service agreement, or other comparable document has been signed between WS and the entity that owns or manages the property.

Disease Surveillance and Monitoring

The ability to efficiently conduct surveillance for and detect diseases is dependent upon rapid detection of the pathogen if it is introduced. Effective implementation of a surveillance system would facilitate planning and execution at regional and state levels, and coordination of surveillance data for risk assessment. It would also facilitate partnerships between public and private interests, including efforts by federal, state, and local governments as well as non-governmental organizations, universities, and other interest groups.[3]

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

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

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

<u>Surveillance in Harvested Feral Swine</u>: Check stations for harvestable feral swine provide an opportunity

[2]The AVMA (2007) defines conditional acceptable as "...[methods] *that by the nature of the technique or because of greater potential for operator error or safety hazards might not consistently produce humane death or are methods not well documented in the scientific literature"*.
[3]Data collected by organizations/agencies conducting research and monitoring will provide a broad species and geographic surveillance effort.

to sample dead feral swine to determine the presence of a disease, and could supplement data collected during surveillance of live feral swine. Sampling of feral swine harvested or taken as part of damage management activities would focus on feral swine that are most likely to be exposed to a disease.

VIII. DECISIONS TO BE MADE

Based on agency relationships, MOUs, and legislative authorities, WS was the lead agency in developing the EA, and therefore, responsible for the scope, content, and decisions made. The GDNR is responsible for managing wildlife in the State, including the establishment of population objectives and enforcement of regulated hunting seasons for feral swine. WS' activities to reduce and/or prevent feral swine damage in the State would be coordinated with the GDNR which ensures WS' actions are incorporated into population objectives established by the GDNR for feral swine populations in the State.

Based on the scope of the EA and this supplement to the EA, the decisions to be made are: 1) should WS continue to conduct feral swine damage management to alleviate damage and threats in Georgia, when requested, 2) should WS continue to implement an integrated wildlife damage management strategy, including technical assistance and direct operational assistance, to meet the need for feral swine damage management in the State, 3) if not, should WS attempt to implement one of the alternatives to an integrated damage management strategy as described in the EA, and 4) would continuing the proposed action result in adverse impacts to the environment requiring the preparation of an Environmental Impact Statement (EIS) based on activities conducted since the completion of the EA and/or based on new information available.

IX. SCOPE OF THE ANALYSIS

The EA and this supplement to the EA evaluate feral swine damage management activities in the State of Georgia. The scope of analysis remains valid as addressed in the EA for those activities to manage damage and threats associated with feral swine in the State (see Section 1.8 of the EA). This supplement analyzes activities that have occurred under the proposed action alternative since implementation of activities described in the alternative to ensure those activities were within the parameters evaluated in the EA and to ensure continued implementation of the selected alternative would not adversely affect the human environment.

Actions Analyzed

The EA and this supplement evaluate the need for feral swine damage management to reduce threats to agricultural resources, natural resources, property, and threats to human safety wherever such management is requested by a cooperator. The EA and this supplement discuss the issues associated with conducting feral swine damage management in the State to meet the need for action and evaluate different alternatives to meeting that need while addressing those issues.

WS uses a decision model based on a publication by Slate et al. (1992) which involves evaluating each threat situation, taking action, evaluating the action taken, and monitoring results of the actions taken. The published article provides more detail on the processes used in WS' Decision Model. WS' programmatic FEIS (USDA 1997) provides more detail and examples of how the model is used. WS' personnel use the Decision Model to develop the most appropriate strategy to reduce damage and to determine potential environmental effects from damage management actions (Slate et al. 1992, USDA 1997, USDA 2005).

Native American Lands and Tribes

Currently, WS does not have a Memorandum of Understanding (MOU) or signed cooperative service agreements with any Native American tribe in Georgia. If WS enters into an agreement with a tribe for wildlife damage management on tribal property, the EA would be reviewed and supplemented, if appropriate, to insure compliance with the National Environmental Policy Act (NEPA).

Period for which the EA is Valid

If the analyses in this supplement indicates an EIS is not warranted, the EA, as supplemented, would remain valid until WS, in consultation with the GDNR, determines that new needs for action, changed conditions, new issues, or new alternatives having different environmental impacts must be analyzed. At that time, the analysis in the EA and this supplement would be reviewed and further supplemented pursuant to the NEPA. Review of the EA and this supplement would be conducted to ensure that the EA and supplement are sufficient. This process ensures the EA is complete and still appropriate to the scope of feral swine damage management activities conducted in the State by WS.

Site Specificity

The EA and this supplement analyze the potential impacts of feral swine damage management and address activities in Georgia that have occurred and are currently occurring on properties where a MOU or cooperative service agreement with WS has been signed. The EA and this supplement also addresses the impacts of feral swine damage management in the State where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional feral swine damage management efforts could occur at additional locations in the State. Thus, the EA and this supplement anticipate the potential expansion and analyze the impacts of such efforts as part of the program. Because feral swine are present statewide and damage can occur where ever feral swine occur, it is conceivable that WS' direct control activities could occur anywhere in the State, when requested.

Planning for the management of feral swine damage must be viewed as being conceptually similar to the actions of other entities whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where those events would occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, and insurance companies. Although some of the sites where feral swine damage could occur can be predicted, all specific locations or times where such damage would occur in any given year cannot be predicted. The WS program cannot predict the specific locations or times at which affected resource owners (*i.e.*, people experiencing feral swine damage) will determine a damage problem has become intolerable to the point that they request assistance from WS. In addition, the WS program would not be able to prevent such damage in all areas where it might occur without resorting to destruction of wild animal populations over broad areas at a much more intensive level than would be desired by most people, including WS and other agencies. Such broad scale population management would also be impractical or impossible to achieve within WS' policies and professional philosophies.

The EA and this supplement emphasize major issues as they relate to specific areas whenever possible; however, many issues apply wherever feral swine damage and the resulting management occur, and are treated as such. The standard WS' Decision Model (Slate et al. 1992, USDA 1997, USDA 2005) and WS Directive 2.105 are the routine thought processes that provide the site-specific procedure for determining methods and strategies to use or recommended for individual actions conducted by WS in the State.

Appropriate strategies to addressing feral swine damage that are made using this thought process would be in accordance with Standard Operating Procedures (SOP) described herein or in the EA, along with applicable federal, State, and local laws and regulations, including WS' Directives.

The analyses in this supplement are intended to apply to any action that may occur in any locale and at any time within the analysis area. In this way, WS believes it meets the intent of the NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with the NEPA and still be able to accomplish its mission. This supplement adds to the analysis in the EA and the 2005 Decision/FONSI. The information and analyses in the EA remain valid unless otherwise noted.

Public Involvement

The EA was made available to the public for review and comment by a legal notice published in the *Atlanta Journal Constitution* on February 4, 2005. A letter of availability for the EA was also mailed directly to agencies, organizations, and individuals with probable interest in the proposed program. Public review and comment occurred during a 30-day comment period. During the 30-day comment period, four comment letters were received. The comment letters received during the public involvement process were reviewed for substantive issues and alternatives which were considered in developing the Decision for the EA. Responses to specific comments were addressed in Appendix A of the Decision for the EA.

After consideration of the analysis contained in the EA and review of the comment letters received, a Decision and FONSI for the EA was issued on April 11, 2005. The Decision and FONSI selected the proposed action alternative which implemented an integrated damage management program in the State using multiple methods to adequately address the need to manage damage and threats associated with feral swine.

This supplement to the EA along with the EA and the 2005 Decision/FONSI will be made available for public review and comment through the publication of a legal notice announcing a minimum of a 30-day comment period. The legal notice will be published at a minimum in the *Atlanta Journal Constitution* and posted on the APHIS website located at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml according to WS' public notification requirements (72 FR 13237-13238). A letter of availability will also be directly mailed to agencies, organizations, and individuals with probable interest in feral swine damage management in the State. Comments received during the public involvement process would be fully considered for new substantive issues and alternatives.

X. AFFECTED ENVIRONMENT

The affected environment was addressed in Chapter 2 of the EA and remains valid and as described (USDA 2005). Damage or threats of damage caused by feral swine can occur statewide in Georgia where ever feral swine occur. However, feral swine damage management would only be conducted by WS when requested by a landowner or manager and only on properties where a cooperative service agreement or other comparable document has been signed between WS and the property owner or manager. Feral swine can be found throughout the year across the State where suitable habitat exists for foraging and shelter. Feral swine are capable of utilizing a variety of habitats, including rural and urban areas. Since feral swine can be found throughout the State, requests for assistance to manage damage or threats of damage could occur in areas occupied by feral swine. Additional information on the affected environment is provided in Chapter 4 of the EA.

Upon receiving a request for assistance, the proposed action or those actions described in the other alternatives could be conducted on private, federal, State, tribal, and municipal lands in Georgia to reduce

damages and threats associated with feral swine to agricultural resources, natural resources, property, and threats to human safety. The analyses in the EA and this supplement are intended to apply to actions taken under the selected alternative that could occur in any locale and at any time within the analysis area. The EA and this supplement analyzes the potential impacts of feral swine damage management and address activities in Georgia that are currently under a MOU or cooperative service agreement with WS where activities have been and currently are being conducted. The EA and this supplement also addresses the impacts of feral swine damage management in the State where additional agreements may be signed in the future.

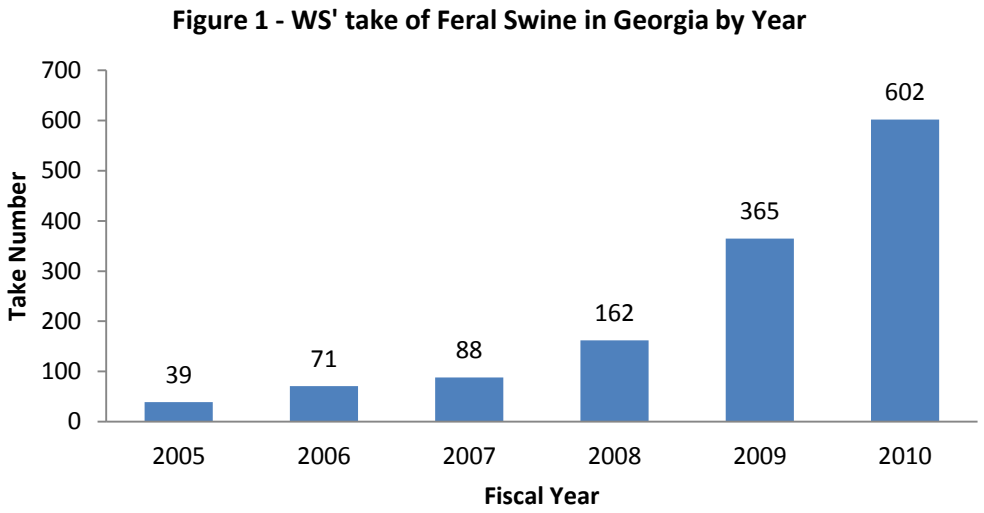
WS' Activities to Manage Damage Caused by Feral Swine in Georgia

Since the Decision and FONSI were signed in 2005 for the EA, WS continued to provide both technical assistance and direct operational assistance to cooperators requesting assistance with damage caused by feral swine in Georgia from FY 2005 through FY 2010. WS' total take of feral swine by FY is shown in Figure 1.

In FY 2005, WS received several requests for assistance to reduce damage occurring to agricultural resources and property. Damage to agricultural resources occurred to corn and turf at a sod farm. Property damage occurred to turf areas associated with landscaping around residential and business areas. As part of an integrated management program implemented for those assistance requests, 39 feral swine were lethally removed by shooting and trapping to resolve requests for assistance in FY 2005. Trapping occurred through the use of corral traps and feral swine live-captured were subsequently euthanized in accordance with WS Directive 2.515. In FY 2006, WS again received requests for assistance to alleviate damage occurring to agricultural resources and property. To resolve those requests for assistance, WS lethally removed a total of 71 feral swine during FY 2006 by shooting and trapping.

Similar to the previous two years, WS received requests for assistance to reduce damage occurring to agricultural resources and property in FY 2007. In addition, WS received a request for assistance to manage feral swine damage to natural resources in the State. Damage to agricultural resources occurred from feral swine rooting and wallowing in a hay field while damage to property occurred from swine rooting and wallowing in landscaped areas around residential areas and business. WS documented 35 incidents of property damage in the State during FY 2007. The threat to natural resources occurred from feral swine predation on threatened sea turtles in Georgia. To alleviate damage or threats of damage, WS employed shooting and trapping to lethally remove 88 feral swine during FY 2007. Biological samples were collected from 50 feral swine for testing for communal diseases, such as brucellosis, classical swine fever, and pseudorabies.

WS documented 21 incidents of feral swine damages or threats to agriculture, 41 incidents of damages or threats to natural resources, 264 incidents of property damage or threats to property, and 34 incidents of threats to human health and safety in FY 2008. Agriculture losses consisted of damage to peanut fields and the threat of disease transmission to domestic swine. Damages to natural resources caused by feral swine consisted of damage to native habitat and the threat of predation of game birds. Feral swine also caused damage to property through rooting and digging. Property damage caused by feral swine occurred to landscaping, golf courses, recreational areas, and to general property. Human safety conflicts included 34 incidents where feral swine were a strike hazards to aircraft at airports. To alleviate feral swine damage to those resources and to collect biological samples for disease testing, WS removed 162 feral swine by trapping and shooting in FY 2008. As part of diseases monitoring and surveillance activities, WS collected biological samples from 103 of the feral swine killed during FY 2008.



WS assisted cooperators in alleviating feral swine damage to agriculture resources, natural resources, private property, and human safety in FY 2009. Agricultural losses consisted of damage to peanut, corn, milo, pasture, and sod fields including possible disease threats to domestic swine. Natural resources consisted of damage to native habitat and nest predation of game birds and endangered sea turtles. Property damage included landscaping, golf courses, recreational areas, and general property. Human safety conflicts included several threats to aviation at airports. To alleviate feral swine damage to those resources and to collect biological samples for disease testing, WS removed 365 feral swine by trapping and shooting in FY 2009. Feral swine live-captured in traps were euthanized using firearms. WS collected samples for testing from 127 feral swine that were lethally removed during FY 2009. The swine diseases that were tested for in FY 2009 included pseudorabies, swine brucellosis, classical swine fever as well as a Foot-and-Mouth negative cohort study.

In FY 2010, WS collected 192 biological samples from feral swine throughout Georgia. In addition to the four diseases tested for in FY 2009 these samples were also tested for African swine fever negative cohort study as well as swine influenza. WS collected these samples while providing assistance to property owners experiencing damage caused by feral swine. WS documented swine damage occurring to agriculture, natural resources and property. Agricultural losses consisted of damage to tree seedlings, soybeans, corn, milo, peanuts, and hay as well as disease threats to domestic swine. Natural resource damages included predation on game birds and threatened sea turtle nests as well as rooting damage to designated natural areas. Property damage occurred to landscaping, turf, and irrigation lines. As part of direct operational assistance projects to alleviate damages and threats, WS removed 602 feral swine by trapping and shooting in FY 2010.

XI. ISSUES ANALYZED IN DETAIL

Issues are concerns raised regarding potential environmental problems that might occur from a proposed action. Such issues must be considered in the NEPA decision-making process. 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. Issues related to managing damage and threats associated with feral swine in the State were developed by WS in consultation with the GDNR. In addition, the EA was made available to the public to identify additional issues.

The major issues are discussed in detail in Chapter 2 of the EA (USDA 2005). Alternatives developed and identified during the development of the EA to address those issues are discussed in Chapter 3 of the

EA (USDA 2005). The following issues were identified during the scoping process for the EA:

- Issue 1 - Effects on feral hog populations
- Issue 2 - Effects on other wildlife species, including T&E species
- Issue 3 - Effects on human health and safety
- Issue 4 - Humaneness and animal welfare concerns of methods used

XII. ISSUES ADDRESSED BUT NOT IN DETAIL WITH RATIONALE

In addition to the identified major issues considered in detail, four additional issues were considered in section 2.3 of the EA, but were not analyzed in detail with rationale provided in the EA. WS has reviewed the issues not considered in detail as described in the EA and has determined that the analyses provided in the EA are still appropriate regarding those issues.

XIII. ALTERNATIVES ANALYZED IN DETAIL

The alternatives considered and evaluated using the identified issues are described and discussed in detail in Chapter 3 of the EA (USDA 2005). In addition, the EA contains a detailed description and discussion of the alternatives and the effects of the alternatives on the issues identified (USDA 2005). The EA also provides a description of the methods that could be used or recommended by WS under each of the alternatives. The EA describes four alternatives that were developed to address the issues identified above. Alternatives analyzed in detail include:

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

XIV. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

An additional alternative was considered but not analyzed in detail in the EA (see Section 3.3). WS has reviewed the alternative not analyzed in detail in the EA and has determined that the analysis provided in the EA has not changed and is still appropriate.

XV. WILDLIFE DAMAGE MANAGEMENT METHODS

This supplement to the EA also evaluates additional methods available to resolve feral swine damage that have become available since the completion of the EA. Since the completion of the EA, trap monitors, Forward Looking Infrared (FLIR) devices, and night vision equipment have become available and could be used or recommended as part of an integrated damage management strategy to alleviate feral swine damage by WS under the proposed action alternative. The use of those methods as part of an integrated approach to resolving damage and threats associated with feral swine are also analyzed in this supplement to the EA. A description of the wildlife damage management methods that could be used or recommended by WS is provided in the EA (USDA 2005) and in Appendix J of WS' programmatic FEIS (USDA 1997).

Trap monitors are devices that send a radio signal to a receiver if a set trap is disturbed and alerts field personnel that an animal may be captured. Trap monitors can be attached directly to the trap or attached to a string or wire and then placed away from the trap in a tree or shrub. When the monitor is hung above the ground, it can be detected from several miles away, depending on the terrain in the area. There are

many benefits to using trap monitors, such as saving considerable time when checking traps, decreasing fuel usage, prioritizing trap checks, and decreasing the need for human presence in an area. Trap monitors would be used under the proposed supplement where appropriate.

Night vision and FLIR equipment aid in locating wildlife at night when wildlife may be more active. Night vision and FLIR equipment could be used during wildlife surveys and in combination with shooting to remove feral swine at night. WS' personnel most often use this technology to target feral swine in the act of causing damage or likely responsible for causing damage. The use of those methods allows WS to conduct activities at night when human activities are minimal in an area which reduces risks to human safety.

XVI. STANDARD OPERATING PROCEDURES

The current WS' program, nationwide and in Georgia, uses many SOPs. SOPs are discussed in Chapter 3 of the EA (USDA 2005) and Chapter 5 of WS' programmatic FEIS (USDA 1997). The SOPs discussed in the EA remain appropriate for WS' wildlife damage management activities conducted in the State.

XVII. ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

The major issues are discussed in detail in Chapter 2 of the EA (USDA 2005). Alternatives developed and identified during the development of the EA to meet the need for action and to address those issues are discussed in Chapter 3 of the EA (USDA 2005). Potential impacts of Alternative 1, Alternative 3, and Alternative 4 on the human environment related to the major issues have not changed from those described and analyzed in the EA and thus do not require additional analyses in this supplement. Chapter 4 of the EA contains a detailed discussion and comparison of the identified alternatives and the major issues (USDA 2005). The issues were identified as important to the scope of the analysis in the EA (40 CFR 1508.25). Alternative 2 (proposed action/no action), as described in the EA, addresses requests for feral swine damage management in the State using an integrated damage management approach by WS. The following is an analysis of potential impacts for each of the major issues analyzed in the EA since the completion of the EA and this supplement to the EA as related to Alternative 2 (proposed action/no action alternative):

Issue 1 - Effects on feral hog populations

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on the population of target species. Methods used to resolve damage can involve altering the behavior of target species and may require the use of lethal methods when appropriate. Under the proposed action, WS provides technical and direct damage assistance using methods described in the EA in an integrated approach in which all or a combination of methods may be employed to resolve a request for assistance.

Non-lethal methods can disperse or otherwise make an area unattractive to wildlife causing damage or posing a threat of damage; thereby, reducing the presence of wildlife 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. For example, if a cooperator requesting assistance has already attempted to disperse feral swine using non-lethal harassment methods, WS would not necessarily employ those methods again during direct operational assistance since those methods have already been proven to be ineffective in that particular situation. Non-lethal methods are used to exclude, harass, and disperse target wildlife from areas where damage or threats are occurring. When effective,

non-lethal methods would disperse feral swine from the area resulting in a reduction in the presence of feral swine at the site where those methods were employed. However, individual feral swine responsible for causing damage or threats are moved to other areas with minimal impact on those species' populations. Non-lethal methods are not employed over large geographical areas or applied at such intensity that essential resources (*e.g*., shelter, food sources) would be unavailable for extended durations or over a wide geographical scope that long-term adverse effects would occur to the populations of feral swine.

Non-lethal methods are generally regarded as having minimal impacts on overall populations of wildlife since those species are unharmed and the actual number of individuals of a population is not reduced. WS' previous and continued use of non-lethal methods would have no adverse impacts on feral swine populations in the State.

Of primary concern is the magnitude of take on a species' population from the use of lethal methods. Lethal methods are employed to remove an individual feral swine or those swine responsible for causing damage or having potential to cause damage and only after requests for such assistance are received by WS. The use of lethal methods would therefore result in local population reductions in the area where damage or threats were occurring. The number of target species removed from the population using lethal methods under the proposed action would be dependent on the number of requests for assistance received, the number of swine involved with the associated damage or threat, and the efficacy of methods employed. The EA evaluated a lethal take of up to 1,000 feral swine annually by WS in Georgia to alleviate damage and threats.

The analysis for magnitude of impact generally follows the process described in Chapter 4 of 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 when population densities are high and usually only after damages have occurred or are likely to occur.

Feral Swine Population Impact Analysis

Feral swine are a non-native species in Georgia that are negatively impacting resources and causing extensive damage. Executive Order 13112 directs federal agencies whose actions may affect the status of invasive species to reduce invasion of those species and the associated damages to the extent practicable and permitted by law.

The GDNR has management authority over all wildlife species, including feral swine, in Georgia. There is no closed season for feral swine in the State which allows feral swine to be lethally removed at any time, including at night. There is no limit on the number of feral swine that can be removed, including no daily possession limit.

Since the GDNR regulates take of feral swine, any reduction in the feral swine population in Georgia would be at the direction of the GDNR which views any reduction in the population of feral swine as benefiting the native environment in Georgia (USDA 2005). Long-term objectives of the GDNR could include the suppression or complete removal of feral swine from the State. All activities to manage feral swine in Georgia would be conducted pursuant to Executive Order 13112 and from the direction of the GDNR.

Feral swine have been considered one of the most prolific wild mammals in North America (Barrett and

Birmingham 1994). As was noted in the EA, feral swine can breed throughout the year with peak breeding periods occurring in January and February as well as early summer. Litter sizes have been reported to range from three to 13 piglets with female swine generally producing two litters per year (Barrett and Birmingham 1994, National Audubon Society 2000).

Pimental et al. (2007) estimated the feral swine population in the United States to be 5 million swine. The current population of feral swine in Georgia is unknown. The current estimated distribution of feral swine in the State is shown in Appendix B of this supplement. A population estimate was derived in the EA based on the best available information for feral swine to provide an indication of the magnitude of the annual take proposed by WS to alleviate damage and threats of damage. Using information available from the GDNR, the EA estimated the statewide feral swine population at 43,400 swine using a feral swine population density of five swine per square mile in the State and feral swine occupying only 15% of the land area of the State (USDA 2005). No additional information on feral swine densities are available in the State; therefore, the information provided in the EA remains the best available. During the development of the EA, the feral swine population in the State was estimated to be increasing (USDA 2005). Precise population trend information is currently unavailable.

As shown in Figure 1, WS has lethally removed 1,327 feral swine between FY 2005 and FY 2010, with the highest level of take occurring during FY 2010 when 602 feral swine were lethally removed to alleviate damage or threats of damage. The number of feral swine lethally removed by WS has increased annually as the number of requests for assistance received by WS has increased. As stated previously, feral swine can be lethally removed at any time in the State; therefore, take likely occurs from hunting as well as to alleviate damage. The number of feral swine lethally removed by entities other than WS is currently unavailable. If the population of feral swine has remained at least stable in the State, the take of 1,327 feral swine by WS would have represented 3.1% of the estimated population. The highest level of take by WS of 602 feral swine would have represented 1.4% of the estimated population, if the population has remained at least stable.

The EA evaluated an annual take of up to 1,000 feral swine annually in the State by WS. Activities conducted pursuant to the selected alternative from FY 2005 through FY 2010 have not exceeded 1,000 feral swine. WS' lethal take of feral swine has been within the estimated level of take analyzed in the EA. WS' damage management activities were site specific, and although local populations of feral swine were reduced or dispersed, there was no probable adverse impact on statewide populations of feral swine from WS' activities. Program activities and their potential impact on feral swine have not changed from those analyzed in the EA. Based upon the information provided above, WS' management actions would have no adverse effect on feral swine populations.

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

Analysis of the Availability of Additional Methods to Resolve Damage and Threats

As described previously, since the completion of the EA, trap monitors, FLIR devices, and night vision equipment have become available for use while conducting feral swine damage management activities. Those methods aid in the use of other methods or allow other methods to be applied more selectively and efficiently. Since those methods are components of other methods, there would be no adverse effects on the populations of feral swine from the use of those methods.

Issue 2 - Effects on other wildlife species, including T&E species

The issue of non-target species effects, including effects on T&E species arises from the use of non-lethal and lethal methods identified in the alternatives. The use of non-lethal and lethal methods has the potential to inadvertently disperse, capture, or kill non-target wildlife. SOPs developed by WS are designed to reduce the effects of damage management activities on non-target species' populations. To reduce the risks of adverse effects to non-target wildlife, WS selects damage management methods that are as target-selective as possible or applies such methods in ways that reduces the likelihood of affecting non-target species. Before initiating management activities, WS also selects locations which are extensively used by the target species and employs baits or lures which are preferred by those species. Despite WS' best efforts to minimize non-target take during program activities, the potential for WS to disperse, live-capture, or kill non-targets exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety.

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. Those occurrences are minimal and should not affect the overall populations of any species. Since FY 2005, WS has live-captured four white-tailed deer (*Odocoileus virginianus*) and one coyote (*Canis latrans*) in traps during feral swine damage management activities. Those four deer and one coyote were released unharmed on site by WS. In addition, two coyotes were euthanized after it was determined they would not survive after being released.

There is no closed season for coyotes in the State which allows coyotes to be lethally removed at any time with no limit on the number of coyotes that can be lethally removed. The number of coyotes lethally taken in the State by hunters, trappers, and to alleviate damage is unknown. However, the unlimited take of coyotes allowed by the GDNR with no closed season provides an indication that densities of coyotes in the State are not likely to decline from the overharvest of coyotes, including the limited take that occurred by WS. Although the cumulative take of coyotes in the State is unknown, take of two coyotes unintentionally by WS during feral swine damage management activities from FY 2005 through FY 2010 has not reached a magnitude where adverse effects to the population of coyotes occurred.

WS would continue to monitor the take of non-target species to ensure program activities or methodologies used in feral swine damage management do not adversely impact non-targets. WS' activities are not likely to adversely affect the viability of any wildlife populations from damage management activities.

As was discussed in the EA and previously in this supplement, feral swine can compete with over 100 species of native wildlife for important and limited natural food supplies. Some species including quail, turkey, endangered sea turtles, and shorebirds are at risk of predation by nest destruction and the consuming of eggs. Therefore, removing feral swine may provide some benefit to native wildlife and flora by reducing competition for food resources and preventing further habitat destruction.

No T&E species were taken or adversely affected by WS' actions conducted from FY 2005 through FY

2010. A review of T&E species listed by the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service showed that additional listings of T&E species in Georgia have occurred since the completion of the EA in 2005. Since the completion of the EA, the rough hornsnail (*Pleurocera foremani*), Georgia pigtoe (*Pleurobema hanleyianum*), interrupted rocksnail (*Leptoxis foremani*), fat three-ridge (*Amblema neislerii*), American burying beetle (*Nicroporus americanus*), spotfin chub (*Erimonax monachus*), ovate clubshell (*Pleurobema perovatum*), cylindrical lioplax (*Lioplax cyclostomaformis*), gray wolf (*Canis lupus*), Florida panther (*Puma concolor coryi*), gulf sturgeon (*Acipenser oxyrinchus desotoi*), reticulated flatwoods salamander (*Ambystoma bishopi*), smalltooth sawfish (*Pristis pectinata*), Virginia spiraea (*Spiraea virginiana*), and Cooley's meadowrue (*Thalictrum cooleyi*) have been listed in Georgia.

Of those species, the American burying beetle, spotfin chub, ovate clubshell, cylindrical lioplax, Florida panther, gulf sturgeon, and the gray wolf are listed as threatened or endangered in Georgia but no known populations currently occur in the State according to the USFWS (see Appendix A in this supplement). Based on the likely absence of those species from the State and since WS' feral swine damage management activities conducted pursuant to the proposed action alternative do not cause habitat destruction or modification, WS' activities to resolve damage caused by feral swine in Georgia would have no effect on those T&E species listed after the development of the EA that are not known to occur within the State.

The reticulated flatwoods salamander, smalltooth sawfish, Virginia spiraea, and Cooley's meadowrue are listed as occurring within Georgia (see Appendix A in this supplement); however, based on the use patterns of available methods and based on WS' previous activities to address feral swine damage, WS has concluded the activities conducted pursuant to the proposed action alternative would have no effect on those species based on the following information.

Breeding habitat of the flatwoods salamander has been identified as small fresh water wetlands that seasonally flood that occur within pine flatwoods-savanna communities that are dominated by grass species and overstories of pond-cypress, blackgum, and slash spine. Non-breeding habitat has been identified as upland pine flatwoods-savanna habitat that are near breeding ponds with moist soils that is open and maintained by frequent fires (see 74 FR 6700-6774 for more detailed information on habitat requirements). Based on the most recent breeding pond surveys, the reticulated flatwoods salamander is thought to breed in three ponds on private property in Baker County, Georgia and one pond on the Mayhaw Wildlife Management Area which is managed by the GDNR located in Miller County, Georgia. The primary threats to flatwoods salamanders are habitat destruction, deterioration of wetlands, and habitat fragmentation. Under the proposed action alternative, WS would not contribute to habitat destruction, the deterioration of wetlands, or habitat fragmentation based on the use patterns of methods available. The methods available to live-capture or lethally remove feral swine are mechanical methods that are selective and do not result in habitat destruction; therefore, WS has determined the proposed action alternative would have no effect on the status of the flatwoods salamander in Georgia.

The smalltooth sawfish historically has occurred in the shallow coastal waters of the Gulf of Mexico from Texas to Florida and the shallow coastal areas along the Atlantic Ocean from Florida to New York. WS' activities to resolve damage or threats associated with feral swine are not those that cause major disturbances to habitat or the introduction of pollutants into the waters where sawfish are known to occur. Current populations of smalltooth sawfish are only known to occur off the southern coasts of Florida (National Marine Fisheries Service 2009). Based on the current known range of the smalltooth sawfish being restricted to peninsular Florida, WS' feral swine damage management activities conducted pursuant to the proposed action alternative would have no effect on the status of the smalltooth sawfish.

Virginia spiraea is found in sandy, silty, or clay soils along the scoured banks of high gradient streams or

on meander scrolls, point bars, natural levees, and braided natural features of lower stream reaches within an elevation range of 1,000 to 2,400 feet. The Virginia spiraea is thought to only occur in Dade County and Walker County in the extreme northwest corner of Georgia. The greatest threats to spiraea are reservoir construction, highway maintenance and construction, insect damage, the lack of seedling production, and low genetic diversity. Given the habitat requirements of Virginia spiraea and the use patterns of methods available to address feral swine under the proposed action alternative, WS has determined the proposed action alternative would have no effect on the status of Virginia spiraea.

Habitats where Cooley's meadowrue are found include fine sandy loam soils in open, seasonally wet areas within pine-hardwoods along with adjacent wet savannahs. In Georgia, populations of meadowrue are threatened by fire suppression and agricultural development. Meadowrue is thought to occur in Doughtery, Mitchell, and Worth Counties in southwestern Georgia where suitable habitat requirements exists. Based on the use patterns of methods available under the proposed action alternative, WS has determined that activities conducted pursuant to the alternative would have no effect on the status of Cooley's meadowrue in the State.

Program activities and methods conducted during the reporting period have not changed from those analyzed in the EA. Thus, WS' determination that feral swine damage management activities conducted within the scope of the proposed action was not likely to adversely affect T&E species in Georgia is still valid and appropriate for those T&E species addressed in the EA (USDA 2005). WS has also reviewed the list of species listed as threatened and endangered in Georgia by the GDNR. Based on activities conducted from FY 2005 through FY 2010 and in consideration of the use patterns of those methods available since the development of the EA, WS has determinate that activities conducted pursuant to the proposed action alternative would have no effect on species listed in the State by the GDNR that were not addressed in the EA. WS' determination for those species listed by the GDNR in the State during the development of the EA is still appropriate.

Effects on Non-targets from the Use of those Additional Methods Addressed in the Supplement

Those additional methods discussed in this supplement to the EA that are available to manage damage associated with feral swine, that have become available since the completion of the EA, allow for methods discussed in the EA to be employed more effectively and to be more target specific.

Night vision equipment and FLIR devices are most often used in association with the use of firearms and are employed to allow activities to be conducted at night. Night vision and FLIR equipment allow for the identification of target species during night activities which reduces the risks to non-targets and reduces human safety risks. Since night vision equipment and FLIR devices only aid in the identification of wildlife and are not actual methods of take, the use of visual aids would not contribute to the take of non-targets. Therefore, the use of night vision and FLIR equipment would not adversely affect non-targets.

Trap monitoring devices would be employed when applicable that indicate when a trap has been activated. Trap monitoring devices would allow personnel to prioritize trap checks and decrease the amount of time required to check traps which decreases the amount of time captured non-targets would be restrained. By reducing the amount of time non-targets are restrained, pain and stress can be minimized and non-targets can be addressed in a timely manner, which could allow for non-targets to be released unharmed. Trap monitoring devices would be employed where applicable to facilitate monitoring of the status of traps in remote locations to ensure any captured wildlife is removed promptly to minimize distress and to increase the likelihood non-targets can be released unharmed.

WS has determined the use of trap monitors, night vision equipment, and FLIR equipment would have no effect on any species listed as threatened or endangered in the State or their critical habitats based on the

use patterns of those methods.

Issue 3 - Effects on Human Health and Safety

Based on the analyses in the EA and WS' programmatic FEIS, when WS' activities are conducted according to WS' directives and SOPs; federal, state, and local laws; and methods are used as intended, those activities pose minimal risks to human safety (USDA 1997, USDA 2005). The analyses in the EA also concluded that WS' activities to reduce damage and threats associated with feral swine were likely to have positive impacts to human health and safety by addressing safety issues and disease transmission.

Management activities conducted by WS from FY 2005 through FY 2010 did not result in any injuries or illnesses to any members of the public or to WS' personnel. No injuries or illnesses from WS' activities were reported to WS from FY 2005 through FY 2010. WS' program activities had a positive impact in those situations that reduced the risks of potential injury, illness, and loss of human life from feral swine. The EA concluded that an integrated approach to wildlife damage management had the greatest potential of successfully reducing potential risks to human health and safety in Georgia.

Human Safety Analysis of the Additional Methods Available

Those methods described in the EA inherently pose minimal risks to human safety when used appropriately and in consideration of human safety (USDA 1997, USDA 2005). WS would continue to incorporate those SOPs described in Chapter 3 of the EA into feral swine damage management activities which would minimize the risks to human safety. As was stated previously, those methods available since the development of the EA are components of other methods. Based on the use patterns of the methods available, the use of those methods available since the development of the EA to address feral swine damage would not increase risks to human safety. WS' employees are trained in the proper use of methods to ensure the safety of the employee and the public. No adverse effects to human safety have occurred or have been reported to occur from WS' activities conducted from FY 2005 through FY 2010.

Issue 4 - Humaneness of methods to be used

As discussed in the EA, 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 within the constraints imposed by current technology.

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, the analyses must consider the most effective way to address damage and threats caused by wildlife in a humane manner. WS is 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 continues to evaluate methods and activities to minimize the potential pain and suffering of those 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 example, a cage trap is

generally considered by most members of the public as "*humane*" since an animal is captured alive. Yet, without proper care, live-captured wildlife in a cage trap can be treated inhumanely if not attended to appropriately.

Therefore, WS' mission is to effectively address requests for assistance using methods in the most humane way possible that minimizes the stress and pain of the animal. WS' personnel are experienced and professional in their use of management methods. When employing methods to resolve damage to resources or threats to human safety, methods are applied as humanely as possible. Methods used in feral swine management activities in Georgia since the completion of the EA and their potential impacts on humaneness and animal welfare have not changed from those analyzed in the EA. No new methods were identified that would alter the analysis contained in the EA on the issue of method humaneness. Therefore, the analyses of the humaneness of methods used by WS to manage damage and threats caused by feral swine have not changed from those analyzed in the EA.

Methods used in feral swine damage management activities in Georgia from FY 2005 through FY 2010 and their potential impacts on humaneness and animal welfare have not change from those analyzed in the EA. All methods employed by WS from FY 2005 through FY 2010 to alleviate feral swine damage were discussed in the EA (USDA 2005). WS continued to employ methods as humanely as possible to minimize distress. Live-captured feral swine were euthanized using methods considered appropriate for wild mammals by the American Veterinary Medical Association (AVMA). Therefore, the analyses of the humaneness of methods used by WS to manage damage and threats caused by feral swine from FY 2005 through FY 2010 has not change from those analyzed in the EA.

Humaneness Analysis of the Additional Methods Available

The proposed use of trap monitoring devices would likely result in methods being used more humanely since monitoring devices allow traps to be checked using a receiver that indicates whether a trap has been triggered and potentially live-captured an animal. By allowing traps to be monitored remotely, traps can be checked more effectively and efficiently which allows those animals live-captured to be addressed more timely which minimizes the amount of time the animal is restrained. Therefore, the use of trap monitoring devices would likely result in traps being used more humanely. Additionally, the use of FLIR and night vision equipment to remove feral swine may improve the perceived humanness of the removal as shooting is generally considered to involve less stress to the animal than trapping.

XVIII. CUMULATIVE IMPACTS

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 actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

WS would be the primary federal program with damage management responsibilities; however, other entities may conduct similar activities in the State as permitted by the GDNR. Through ongoing coordination with the GDNR, WS is aware of such activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with other entities in the same area, but may conduct activities at adjacent sites within the same timeframe. The potential cumulative impacts analyzed below could occur either as a result of WS' program activities over time or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

Chapter 4 of the EA provides further information and analyses on potential cumulative impacts of the

proposed action. The following resource values in the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, critical habitats (areas listed in T&E species recovery plans), visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources would not be analyzed further. The activities proposed in the alternatives would have a negligible effect on atmospheric conditions including the global climate. Meaningful direct or indirect emissions of greenhouse gases would not occur as a result of any of the proposed alternatives. Those alternatives would meet the requirements of applicable laws, regulations, and Executive Orders including the Clean Air Act and Executive Order 13514.

Issue 1 - Effects on feral hog populations

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

- Natural mortality of feral swine
- Mortality of feral swine from vehicle collisions and aircraft strikes
- Human-induced mortality of feral swine through private damage management activities
- Human-induced harvest mortality during a continuously open harvest season
- Human and naturally induced alterations of wildlife habitat
- Annual and perennial cycles in population densities

All of those factors play a role in the dynamics of feral swine populations. In many circumstances, requests for assistance arise when some or all of those elements have contrived to elevate feral swine populations at a juncture to cause damage to resources. WS' actions taken to minimize or eliminate damage are constrained as to scope, duration, and intensity, for the purpose of minimizing or avoiding impacts to the environment. WS evaluates damage occurring, including other affected elements and the dynamics of the damaging species; determines appropriate strategies to minimize effects on environmental elements; applies damage management actions; and subsequently monitors and adjusts/ceases damage management actions (Slate et al. 1992, USDA 1997, USDA 2005). 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.

No cumulative adverse impacts on wildlife populations are expected from WS' actions based on the following considerations:

Historical outcomes of WS' activities to address feral swine damage in the State

No cumulative adverse effects have been identified for feral swine as a result of program activities implemented over time based on analyses contained in the EA and from annual monitoring reports. WS continues to implement an integrated damage management program that adapts to the damage situation and the species involved with causing the damage. WS only targets feral swine causing damage and only after a request for assistance is received. All program activities are coordinated with appropriate federal, State, and local entities to ensure WS' activities do not adversely impact the populations of any native wildlife species.

With management authority over feral swine in Georgia, the GDNR can adjust take levels, including the take of WS, to ensure population objectives for feral swine are achieved. Consultation and reporting of take by WS would ensure the GDNR considers any activities conducted by WS.

Since the completion of the EA, the population of feral swine continues to show a stable to increasing trend in the State which provides some indication that WS' activities are not cumulatively impacting populations. From FY 2005 through FY 2010, 1,327 feral swine have been taken by WS since the completion of the EA to alleviate damage in the State. The highest level of take by WS of 602 feral swine would have represented 1.4% of statewide feral swine population estimated at 43,400 feral swine under a worst case scenario, if the population has remained at least stable. The statewide population of feral swine is likely higher than 43,400 feral swine. WS' cumulative take of feral swine from FY 2005 through FY 2010 has been 3.1% of estimated population of 43,400 under a worst case scenario. The take of feral swine by WS has been of low magnitude when compared to the estimated population.

WS' take has been and would continue to be a small component of the overall harvest of feral swine which is monitored and adjusted by the GDNR to meet management objectives for feral swine populations in the State. Feral swine populations in the State continue to remain relatively stable to increasing which provides an indication that the cumulative take of feral swine has not reached a level where an undesirable decline in the feral swine population has occurred. WS' activities are conducted on a small portion of the land area of the State and although local declines in feral swine populations could occur from WS' activities, those activities would not reach a level where feral swine populations would be adversely affected from those actions.

In addition, feral swine are a non-native species in the State which often competes with native wildlife. Their rooting and wallowing behavior can also alter local habitat characteristics. Therefore, any reduction in the local or statewide population could be viewed as providing some benefits to native wildlife and plant communities.

SOPs built into WS' program

SOPs are designed to reduce the potential negative effects of WS' actions on feral swine populations, and are tailored to respond to changes in feral swine populations which could result from unforeseen environmental changes. This would include those changes occurring from sources other than WS. Alterations in program activities are defined through SOPs and implementation is insured through monitoring, in accordance with WS' Decision Model (Slate et al. 1992, USDA 1997, USDA 2005).

Issue 2 - Effects on other wildlife species, including T&E species

Potential effects on non-target species from conducting feral swine damage management arise from the use of non-lethal and lethal methods to alleviate or prevent those damages or to alleviate threats of damage. The use of non-lethal methods during activities to reduce or prevent damage caused by feral swine 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, 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 would 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 would 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. The use of visual and auditory harassment and dispersion methods are generally temporary with non-target species often 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 feral swine 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 the EA are methods that are employed to confine or restrain wildlife that are subsequently euthanized using humane methods since translocation is currently not permitted by the GDNR. With all live-capture devices, non-target wildlife captured can be released on site if determined to be able to survive following release. 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 would not impact non-target species.

The methods described in the EA all have a high level of selectivity and can be employed using SOPs to ensure minimal impacts to non-targets species. Only seven non-targets were taken by WS during feral swine damage management activities from FY 2005 through FY 2010. Five of those non-targets were released on site unharmed. Based on the methods available to resolve feral swine 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 would not cumulatively impact non-target species. WS has reviewed the T&E species listed by the USFWS and the National Marine Fisheries Service and has determined that feral swine damage management activities proposed by WS in this supplement would have no effect on T&E species listed since the development of the EA. The determination made by WS for those T&E species addressed in the EA is still appropriate for those species (USDA 2005). Cumulative impacts would be minimal on non-targets from any of the alternatives discussed.

Issue 3 – Effects on Human Health and Safety

Non-Chemical Methods

All non-chemical methods described in the EA 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 would 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 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, pose 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 effects to human safety from WS' feral swine

damage management activities conducted from FY 2005 through FY 2010. Personnel employing non-chemical methods would 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 would not cumulatively impact human safety.

Questions have arisen about the deposition of lead into the environment from ammunition used in firearms to lethally remove feral swine. The lethal removal of feral swine 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). Wildlife killed with rifles using lead bullets may pose a risk of lead exposure to scavengers from ingestion of lead fragments in the carcass (Hunt et al. 2009).

Many of the feral swine taken by WS in Georgia are taken by rifles. To reduce risks to human safety and property damage from bullets passing through feral swine, the use of firearms is applied in such a way (*e.g.*, caliber, bullet weight, bullet placement) as to reduce the chances of bullets passing through feral swine. When using firearms, the retrieval of 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 feral swine carcasses would 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) passes through a feral swine, if misses occur, or if the feral swine 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 eight 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 feral swine 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 feral swine can be removed at any time, including the use of firearms, WS' assistance with removing feral swine would not be additive to the environmental status quo since those feral swine removed by WS using firearms could be lethally removed by other entities 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 feral swine damage management activities due to efforts by WS to ensure projectiles do no pass through but are contained within the feral swine 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 feral swine 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 feral swine carcasses lethally removed using firearms would be retrieved and disposed of properly to limit the availability of lead in the environment and ensures feral swine 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 feral swine carcasses that may be irretrievable would be below any level that would pose any risk from exposure or significant contamination of water.

Chemical Methods

Chemical methods available for use under the proposed action are immobilizing drugs and euthanizing drugs described in the EA. Immobilizing drugs are administered to target individuals using devices or methods that ensure the identification of the target animal. The immobilizing drugs discussed in the EA require injection of the drug directly into an animal. Injection would occur through hand injection via a syringe, by jabstick, or by a dart fired from a projector that mechanically injects the drug into the animal upon impact. Immobilizing drugs temporarily sedate an animal to minimize stress of handling and to reduce the risks to human safety. Immobilized animals may also be euthanized using a euthanizing drug described in the EA. Euthanasia drugs would only be administered after the feral swine 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 are administered, and to ensure human safety under WS Directive 2.430. WS' personnel would 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 would ensure that there are no cumulative impacts to human safety. All chemical methods would be tracked and recorded to ensure proper accounting of used and unused chemicals occurs. All chemicals would be stored and transported according to regulations, including the directives of WS. The amount of chemicals used or stored by WS and cooperating agencies would be minimal to ensure human safety.

No adverse effects have been reported to or identified by WS from the use of chemical methods during feral swine damage management conducted by WS from FY 2005 through FY 2010. When chemical methods are applied as intended and when safety guidelines are followed, no adverse effects 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 would 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 would not have cumulative impacts on human safety.

Issue 4 - Humaneness and animal welfare concerns of methods used

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) would be checked and monitored at least every 24 hours to ensure any feral swine confined or restrained are addressed in a timely manner to minimize distress of the animal. Live-captured feral swine would be immobilized to minimize stress of handling if not euthanized on site. All euthanasia methods used for live-captured feral swine would be applied according to WS Directive 2.505. Shooting would occur in limited situations and personnel would be trained in the proper use of firearms to minimize pain and suffering of feral swine 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 SOPs that guide WS in the use of methods to address damage and threats associated with feral swine in the State, the cumulative impacts on the issue of method humaneness are minimal. All methods would be evaluated annually to ensure 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.

XIX. LITERATURE CITED

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APPENDIX A
FEDERALLY LISTED T&E SPECIES IN GEORGIA

Listings and occurrences for Georgia

Notes:

- This report shows the listed species associated in some way with this state.
- This list does not include experimental populations and similarity of appearance listings.
- This list includes non-nesting sea turtles and whales in State/Territory coastal waters.
- This list includes species or populations under the sole jurisdiction of the National Marine Fisheries Service.

Summary of Animals listings

Animal species listed in this state and that occur in this state	
Status	Species
E	Acornshell, southern (*Epioblasma othcaloogensis*)
T	Bankclimber, purple (mussel) (*Elliptoideus sloatianus*)
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Clubshell, southern (*Pleurobema decisum*)
E	Combshell, upland (*Epioblasma metastriata*)
E	Darter, amber (*Percina antesella*)
T	Darter, Cherokee (*Etheostoma scotti*)
E	Darter, Etowah (*Etheostoma etowahae*)
T	Darter, goldline (*Percina aurolineata*)
T	Darter, snail (*Percina tanasi*)
E	Hornsnail, rough (*Pleurocera foremani*)
E	Kidneyshell, triangular (*Ptychobranchus greenii*)
E	Logperch, Conasauga (*Percina jenkinsi*)
E	Manatee, West Indian (*Trichechus manatus*)
T	Moccasinshell, Alabama (*Medionidus acutissimus*)
E	Moccasinshell, Coosa (*Medionidus parvulus*)
E	Moccasinshell, Gulf (*Medionidus penicillatus*)
E	Moccasinshell, Ochlockonee (*Medionidus simpsonianus*)
E	Pigtoe, Georgia (*Pleurobema hanleyianum*)
E	Pigtoe, oval (*Pleurobema pyriforme*)
E	Pigtoe, southern (*Pleurobema georgianum*)
T	Pocketbook, finelined (*Lampsilis altilis*)
E	Pocketbook, shinyrayed (*Lampsilis subangulata*)
E	Rocksnail, interrupted (=Georgia) (*Leptoxis foremani*)
T	Salamander, frosted flatwoods (*Ambystoma cingulatum*)
T	Sea turtle, green except where endangered (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)

Animal species listed in this state and that occur in this state	
Status	Species
T	Sea turtle, loggerhead (*Caretta caretta*)
T	Shiner, blue (*Cyprinella caerulea*)
T	Snake, eastern indigo (*Drymarchon corais couperi*)
E	Stork, wood AL, FL, GA, SC (*Mycteria americana*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Three-ridge, fat (mussel) (*Amblema neislerii*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, North Atlantic Right (*Eubalaena glacialis*)
E	Woodpecker, red-cockaded (*Picoides borealis*)

Animal species listed in this state that do not occur in this state	
Status	Species
E	Beetle, American burying (*Nicrophorus americanus*)
T	Chub, spotfin Entire (*Erimonax monachus*)
E	Clubshell, ovate (*Pleurobema perovatum*)
E	Lioplax, cylindrical (snail) (*Lioplax cyclostomaformis*)
E	Mussel, oyster Entire Range; Except where listed as Experimental Populations (*Epioblasma capsaeformis*)
E	Panther, Florida (*Puma (=Felis) concolor coryi*)
T	Plover, piping except Great Lakes watershed (*Charadrius melodus*)
E	Riversnail, Anthony's Entire Range; Except where listed as Experimental Populations (*Athearnia anthonyi*)
T	Sturgeon, gulf (*Acipenser oxyrinchus desotoi*)
E	Wolf, gray Lower 48 States, except MN, MT, ID, portions of eastern OR, eastern WA, north-central UT, and where EXPN. Mexico. (*Canis lupus*)

Animal listed species occurring in this state that are not listed in this state	
Status	Species
E	salamander, Reticulated flatwoods (*Ambystoma bishopi*)
E	Sawfish, smalltooth (*Pristis pectinata*)
T	Tern, roseate Western Hemisphere except NE U.S. (*Sterna dougallii dougallii*)

Summary of Plant listings

Plant species listed in this state and that occur in this state	
Status	Species
T	Amphianthus, little (*Amphianthus pusillus*)
T	Button, Mohr's Barbara (*Marshallia mohrii*)
E	Campion, fringed (*Silene polypetala*)
E	Chaffseed, American (*Schwalbea americana*)
E	Coneflower, smooth (*Echinacea laevigata*)
E	Dropwort, Canby's (*Oxypolis canbyi*)
E	Grass, Tennessee yellow-eyed (*Xyris tennesseensis*)
E	Harperella (*Ptilimnium nodosum*)

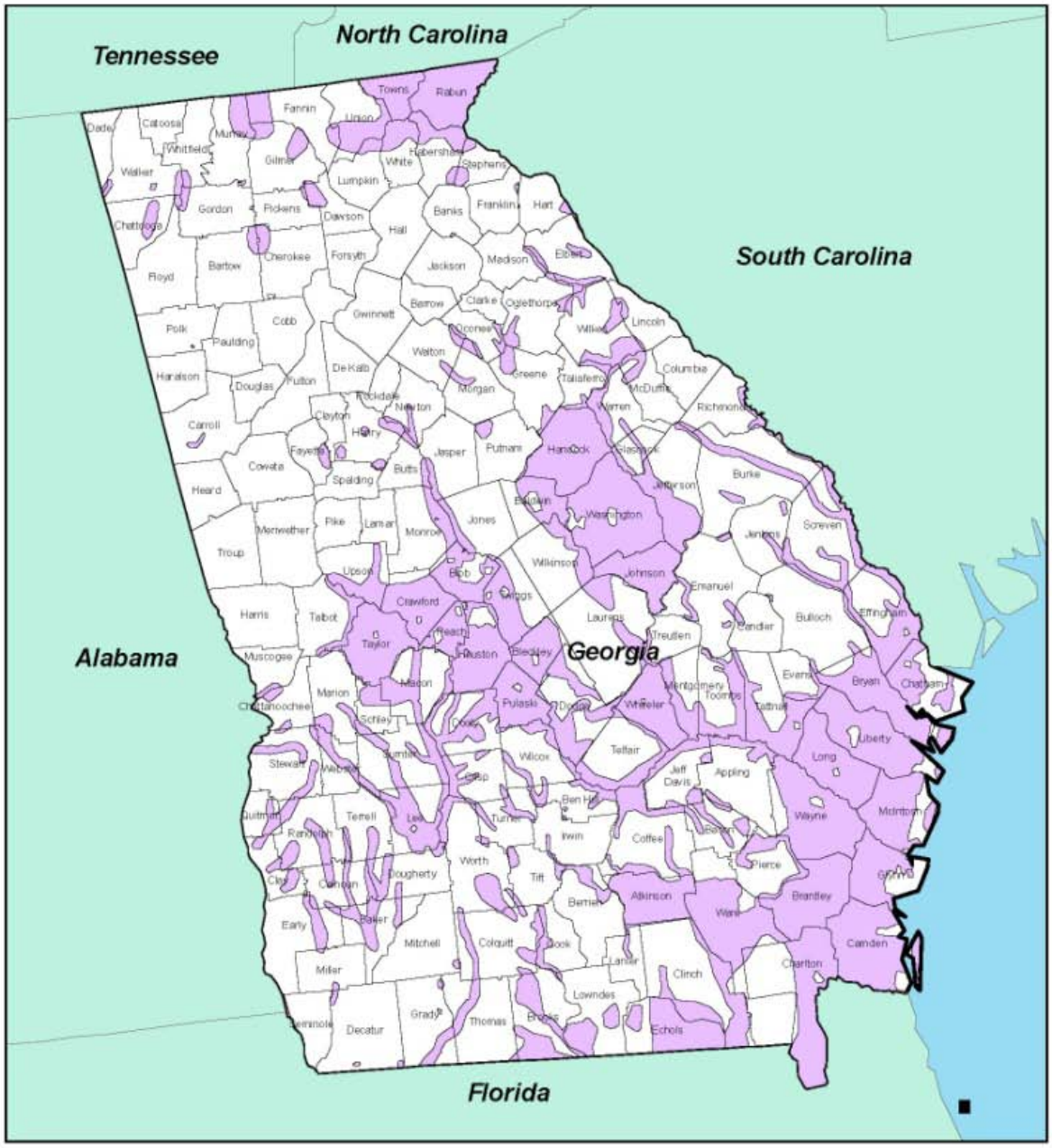
Plant species listed in this state and that occur in this state

Status	Species
T	Pink, swamp (*Helonias bullata*)
E	Pitcher-plant, green (*Sarracenia oreophila*)
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Pondberry (*Lindera melissifolia*)
E	Quillwort, black spored (*Isoetes melanospora*)
E	Quillwort, mat-forming (*Isoetes tegetiformans*)
E	Rattleweed, hairy (*Baptisia arachnifera*)
T	Skullcap, large-flowered (*Scutellaria montana*)
T	Spiraea, Virginia (*Spiraea virginiana*)
E	Sumac, Michaux's (*Rhus michauxii*)
E	Torreya, Florida (*Torreya taxifolia*)
E	Trillium, persistent (*Trillium persistens*)
E	Trillium, relict (*Trillium reliquum*)
T	Water-plantain, Kral's (*Sagittaria secundifolia*)

Plant listed species occurring in this state that are not listed in this state

Status	Species
E	Leather flower, Alabama (*Clematis socialis*)
E	Meadowrue, Cooley's (*Thalictrum cooleyi*)

Appendix B
Current Distribution of Feral Swine in Georgia, 2009



Feral/Wild Swine Populations 2009
Georgia

This feral swine distribution map was prepared from data independently compiled by state and territorial fish and wildlife management agencies, agriculture agencies, and universities of the United State in cooperation with the Southeastern Cooperative Wildlife Disease Study, College of Veterinary Medicine, University of Georgia. Support for this project was through Cooperative Agreement Numbers 04-9113-0963-CA, 02-9113-0731-GR and 04-9613-0032-CA, Veterinary Services, Animal and Plant Health Inspection Service, U.S. Department of Agriculture.

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