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

November 2013

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 caused by feral swine (*Sus scrofa*) in the State of Georgia (USDA 2005*a*). The EA evaluated the need for damage management and the relative effectiveness of four alternative approaches to meet that proposed need, while accounting for the potential environmental effects of those activities. After consideration of the analysis contained in the EA and review of public comments, WS issued a Decision and Finding of No Significant Impact (FONSI) for the EA on April 11, 2005. The Decision and FONSI selected the proposed action alternative, which implemented a damage management program using multiple methods to address the need to manage damage associated with feral swine.

To evaluate the activities WS conducted since issuing the Decision for the EA, WS prepared a supplement to the EA[1] in 2011. The supplement to the EA was prepared to examine potential environmental impacts of the proposed action alternative based on new information available from research findings and data gathering since the issuance of the Decision and FONSI in 2005. In addition, the supplement evaluated the potential environmental consequences associated with WS' potential use of methods that had become available since WS issued the Decision for the EA. The supplement to the EA also communicated to the public the analysis of individual and cumulative impacts of the proposed action alternative and documented the analyses of WS' activities in Georgia since WS issued the Decision/FONSI in 2005 to ensure program activities remained within the impact parameters analyzed in the EA. Based on the evaluation in the supplement to the EA, WS issued a new Decision and FONSI on November 1, 2011.

Since issuing the Decision in 2005 and the Decision in 2011, the WS program has begun evaluating the use of aerial operations to address feral swine damage. Studies found that shooting feral swine from an aircraft using a pilot and gunner could rapidly reduce local populations of feral swine (Hone 1990, Saunders 1993, Saunders and Bryant 1988). WS is preparing this supplement to the EA to evaluate the potential environmental consequences of using aircraft to remove feral swine and for monitoring feral swine populations in the State.

II. AUTHORITY AND COMPLIANCE

Federal, state, and local laws and regulations regulate WS' activities to reduce threats associated with feral swine in Georgia. The authority of WS is discussed in detail in Section 1.1 of the EA (USDA 2005*a*), along with the authorities of other federal, state, and local entities. Section 1.1 of the EA also discusses WS' compliance with relevant laws and regulations (USDA 2005*a*). WS' authorities and those of federal, state, and local entities would remain as addressed in the EA. WS would comply with applicable federal, state, and local laws and regulations pursuant to WS Directive 2.210. WS would

[1]The supplement to the EA WS developed in 2011 evaluated activities WS conducted from FY 2005 through FY 2010.

continue to coordinate activities to alleviate or prevent feral swine damage with the Georgia Department of Natural Resources (GDNR)[2].

In addition, this supplement to the EA will evaluate the potential use of aircraft to alleviate damage or threats of damage associated with feral swine in the State. The Airborne Hunting Act, passed in 1971 (Public Law 92-159) and amended in 1972 (Public Law 92-502), added a new section to the Fish and Wildlife Act of 1956 that prohibits shooting or attempting to shoot, harassing, capturing, or killing any bird, fish, or other animal from aircraft, except for certain specified reasons (16 USC 742j-l). Under exception [16 USC 742j-l(b)(1)], state and federal agencies are allowed to protect or aid in the protection of land, water, wildlife, livestock, domesticated animals, human life, or crops using aircraft.

III. PURPOSE

The purpose of the EA remains as addressed in Section 1.2 of the EA (USDA 2005*a*), as supplemented by the 2011 Decision and FONSI. This supplement to the EA examines the potential environmental effects of WS' program as it relates to: 1) new information that has become available from research findings and data gathering since the issuance of the Decision and FONSI in 2011, 2) the use of aircraft to alleviate damage or threats of damage associated with feral swine, 3) clearly communicating to the public the analysis of individual and cumulative impacts of the proposed action since 2011, and 4) document the analyses of WS' feral swine damage management activities in Georgia since the Decision/FONSI was issued in 2011 to ensure program activities remain within the impact parameters analyzed in the EA.

IV. NEED FOR ACTION

Feral swine are not native to Georgia or any part of North America. Spanish explorers were likely the first group of people to bring feral swine to North America. 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, most experts recognize both the released or escaped domestic swine and the European wild boar 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 in North America.

Section 1.3 of the EA provides a description of the need for action to address threats and damages associated with feral swine in the State. The 2011 supplement to the EA further addresses the need for action (USDA 2005*a*). The need for action addressed in the EA and the previous supplement to the EA remains applicable to this supplement. The bases for the need are requests for assistance WS receives to manage damage caused by feral swine.

WS continues to receive requests for both operational and technical assistance from those people 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 (FY)[3]. WS provided technical assistance to those people 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. Section 3.2.2 of the EA provides a discussion of the technical assistance WS could provide to resolve damage or threats associated with feral swine in the State under the proposed action alternative

[2]The GDNR has management authority over wildlife in the State, including feral swine.

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

(USDA 2005*a*).

As shown in Table 1, WS has conducted 132 technical assistance projects since FY 2007 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. WS conducted technical assistance projects to resolve damage occurring to primarily property. Nearly 70% of the requests for technical assistance received by WS since FY 2007 involved feral swine damage to property in the State. Damage to property is usually associated with the rooting behavior of feral swine, which tears up and overturns turf. From FY 2007 through FY 2012, WS conducted 23 technical assistance projects involving feral swine damage to agriculture and 16 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 2007, WS has received reports of damage or WS has verified over $151,000 in damages caused by feral swine in the State. Monetary damage recorded by WS reflects damage that WS has verified based on requests for assistance or damage that someone reported to WS, but is not reflective of all feral swine damage occurring in the State since WS is unlikely to receive requests for assistance from all persons experiencing damage in the State.

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

	Fiscal Year						
Resource Type	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**TOTAL[1]**
Property	24	18	18	10	15	7	**92**
Agriculture	3	3	8	5	2	2	**23**
Natural Resources	1	5	1	0	0	9	**16**
Human Safety	0	0	0	0	0	1	**1**
Total	**28**	**26**	**27**	**15**	**17**	**19**	**132**

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

Assigning monetary damage to natural resources can be difficult especially when factoring in the lost aesthetic value when feral swine damage natural resources. Similarly, placing a monetary value on threats to human safety can be difficult.

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 (see WS Directive 2.201)[4]. WS' direct operational assistance involves providing direct management to prevent feral swine damage. Section 3.2.2 of the EA and the 2011 supplement to the EA discuss WS' direct operational assistance (USDA 2005*a*). 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*a*).

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, Barrett and Birmingham 1994, West et al. 2009). Rooting is a common activity of feral swine where they

[4]At the time this supplement was developed, WS' directives could be found at http://www.aphis.usda.gov/wildlife_damage/ws_dir_ch2.shtml.

overturn sod and soil in the search for food (Barrett and Birmingham 1994, 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 2011, Georgia ranked first in the United States in the production of peanuts and rye (USDA 2012). Georgia ranked second in the United States in the production of cucumbers and onions (USDA 2012). Georgia also ranked highly in the production of many other vegetables and melons (USDA 2012). 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.

Feral swine can 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 and often encompasses 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 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 feral swine could transmit to domestic livestock. 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 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. In FY 2011 and FY

2012, WS collected 204 and 181 feral swine samples, respectively, for testing. Table 2 shows the number of positive results for each disease and the number of samples tested.

Table 2 – Positive results and number of swine disease samples taken, FY 2011 - FY 2012

Swine Disease	FY 2011		FY 2012	
	Samples Taken	No. Positives	Samples Taken	No. Positives
Pseudorabies Virus	204	12	181	13
Swine Brucellosis	204	32	181	5
Toxoplasmosis	201	32	0	0
Trichinosis	201	4	0	0
Leptospirosis	73	3	54	25
Swine Influenza Virus	0	0	53	6
Hepatitis E Virus	0	0	181	10

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 also can cause economic losses that can negatively affect the statewide swine industry (Witmer et al. 2003).

In addition to the potential for disease transmission, feral swine can also kill and feed on livestock. Feral swine can 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 can 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 because of their feeding and other activity (Barrett and Birmingham 1994). Feral swine can 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 because 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 can also 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, the foraging, rooting, and wallowing behavior of feral swine can negatively affect some species of freshwater mussels and aquatic insects (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 motor vehicles and aircraft strikes. 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 vehicles and aircraft strikes. 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 feral swine can carry that are also known to infect people (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

WS has determined that an EA evaluating activities at the State-level was the most appropriate approach to address the need for action, the issues associated with meeting the need for action, and the alternative approaches to meeting the need for action. Therefore, WS' decision and actions regarding managing feral swine damage in Georgia would rely solely and exclusively on the decision and record related to the EA. The EA developed by WS to address the need to reduce damage associated with feral swine incorporated by reference, sections, discussions, appendices, or other portions thereof, of the WS' programmatic Environmental Impact Statement (EIS). This supplement to the EA does not incorporate by reference that EIS.

The APHIS and cooperating agencies are in the process of preparing a programmatic EIS to address feral swine damage management in the United States, American Samoa, Mariana Islands, United States Virgin Islands, Guam, and Puerto Rico. When WS issues the Record of Decision (ROD) for the EIS, WS would review the EA for consistency with the findings in the EIS and the ROD. Based on the findings in the EIS and the ROD, WS could supplement the EA, as needed, pursuant to the requirements of the National Environmental Policy Act (NEPA) and the NEPA implementing regulations of the USDA and the APHIS.

VI. WS' RECORD KEEPING

WS continues to maintain a Management Information System to document assistance provided when addressing wildlife damage in the State. The EA addresses the Management Information System maintained by WS in Section 1.5 (USDA 2005*a*). The System only includes requests for assistance and the associated actions that WS conducts. The Management Information System 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 activities conducted solely by WS.

VII. PROPOSED ACTION

Section 1.6 of the EA provides a summary of the proposed action alternative (USDA 2005*a*). 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 was 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 evaluations. WS could provide information regarding the use of appropriate non-lethal and lethal techniques to city/town managers, agricultural producers, property owners, and other entities requesting assistance.

Non-lethal methods include, but would not be limited to behavior modification, lure crops, visual deterrents, dogs, live traps, exclusionary devices, frightening devices, and chemical immobilization (see the EA for a full description of potential non-lethal methods). Lethal methods considered by WS include live-capture followed by euthanasia, and shooting. In addition, this supplement to the EA will evaluate the use of aircraft by WS to alleviate damage and threats of damage associated with feral swine as a method that would be available under the alternatives. Euthanasia using barbiturates and gunshot could occur once feral swine were live-captured using other methods. Barbiturates and gunshot are acceptable forms of euthanasia for swine (AVMA 2013). In addition, WS could use a firearm to remove feral swine that were not confined using live-capture methods.

The EA contains a thorough discussion of the methods available for use in an integrated approach to address requests for assistance to manage damage or reduce threats to human safety. 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, WS could conduct damage management activities on private, federal, state, county, and municipal lands in the State for the purposes of studying, containing, and curtailing disease outbreaks. WS would only conduct activities when requested and only on those properties where WS and the entity that owns or manages the property signed a Memorandum of Understanding (MOU), cooperative service agreement, or other comparable document.

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 the GDNR would have the opportunity to incorporate the actions of WS into population objectives established for feral swine populations in the State.

Based on the scope of the EA, the 2011 supplement to 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 methods 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 methods strategy as described in the EA, and 4) would continuing the proposed action result in effects to the environment requiring the preparation of an 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, the 2011 supplement to the EA, and this supplement evaluate damage management activities associated with feral swine in the State of Georgia. The scope of analysis remains valid as addressed in the EA for those activities associated with managing damage and threats caused 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 the Decision was issued for the supplement to the EA in 2011 to ensure those activities remain within the parameters evaluated in the EA. In addition, this supplement will evaluate the continued implementation of the selected alternative to ensure implementation would not cause effects to the human environment in Georgia requiring the preparation of an EIS.

Actions Analyzed

The EA and this supplement evaluate the need for feral swine damage management to reduce damage and threats to agricultural resources, natural resources, property, and threats to human safety wherever a cooperator requests such management. 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) that 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' 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; see WS Directive 2.201). Therefore, the actions evaluated in the EA, 2011 supplement, and this supplement are the use or recommendation of those methods available under the alternatives and the employment or recommendation of those methods by WS to manage or prevent damage and threats associated with feral swine from occurring when requested by the appropriate resource owner or manager.

Native American Lands and Tribes

The WS program in Georgia would only conduct damage management activities on Native American lands when requested by a Native American Tribe. WS would only conduct activities after the requesting Tribe and WS signed a MOU, cooperative service agreement, or a similar document, which authorized WS to conduct those activities. Therefore, the Tribe would determine when WS' assistance was required and what activities the Tribe would allow. Because Tribal officials would be responsible for requesting assistance from WS and determining what methods would be available to alleviate damage, WS does not anticipate any conflicts with traditional cultural properties or beliefs. Those methods available to alleviate damage associated with feral swine on federal, state, county, municipal, and private properties under the alternatives analyzed in the EA would be available for use to alleviate damage on Tribal properties when the Tribe requesting WS' assistance had approved the use of those methods. Therefore, the activities and methods addressed under the alternatives would include those activities that WS could employ on Native American lands, when requested and when agreed upon by the Tribe and WS.

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, WS would review the analysis in the EA, the 2011 supplement to the EA, and this supplement and WS would further supplement the EA pursuant to the NEPA or conduct another evaluation pursuant to the NEPA. WS would conduct a review of the EA, the 2011 supplement to the EA, and this supplement to ensure that the EA and supplements were sufficient. This process would ensure the EA was complete and still appropriate to the scope of activities conducted in the State by WS.

Site Specificity

The EA, the 2011 supplement to 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 WS and a cooperating entity have signed a MOU or cooperative service agreement. The EA, the 2011 supplement to the EA, and this supplement also address the effects of feral swine damage management in the State where WS and a requesting entity may sign additional agreements in the future. Because the proposed action would be to reduce damage and because the program's goals and directives would be to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional damage management efforts could occur at additional locations in the State. Thus, the EA, the 2011 supplement, and this supplement to the EA anticipate those additional efforts and analyze the effects of such efforts as part of the program. Because feral swine are present statewide and damage could occur wherever feral swine occur, it is conceivable that direct operational assistance provided by WS could occur anywhere in the State, when requested.

Feral swine occur throughout the year in a variety of habitats across Georgia; therefore, damage or threats of damage could occur wherever feral swine occur. Planning for the management of feral swine damage must be viewed as being conceptually similar to the actions of other entities whose missions were 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 departments, police departments, emergency clean-up organizations, and insurance companies. Although WS could predict some of the sites where feral swine damage would occur, WS could not predict every specific location or the specific time where such damage would occur in any given year. The WS program cannot predict the specific locations or times at which affected resource owners (*i.e*., people experiencing feral swine damage) would determine a damage problem had 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 because WS can only conducted activities on properties where the appropriate property owner or manager has requested WS' assistance.

The EA, the 2011 supplement to the EA, and this supplement emphasize major issues as they relate to specific areas whenever possible; however, many issues would apply wherever feral swine damage and the resulting management occurred, and are treated as such. The standard WS' Decision Model (Slate et al. 1992, USDA 2005*a*; see WS Directive 2.201) and WS Directive 2.105 would be the routine thought processes that provide the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS in the State. Appropriate strategies to addressing feral swine damage that were made using those thought processes 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 would 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, the 2011 supplement to the EA, and their associated Decisions. The information and analyses in the EA and the 2011 supplement to the EA remain valid unless otherwise noted.

Public Involvement

WS made the EA available to the public for review and comment by a legal notice published in the *Atlanta Journal Constitution*. WS also mailed a letter of availability for the EA 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, WS received four comment letters. WS reviewed the comment letters received during the public involvement process for substantive issues and alternatives, which WS considered during the development of the Decision for the EA. Responses to specific comments were addressed in Appendix A of the Decision for the EA.

Similarly, WS made the supplement to the EA developed in 2011, along with the EA and the 2005 Decision/FONSI available for public review and comment through the publication of a legal notice announcing a minimum of a 30-day comment period. WS published a legal notice in the *Atlanta Journal Constitution* and posted a notice 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). WS also directly mailed a letter of availability to agencies, organizations, and individuals with probable interest in feral swine damage management in Georgia. WS received no comment letters during the public involvement process for the supplement developed in 2011.

WS will also notice this supplement to the EA to the public for review and comment. WS will notify the public through legal notices published in local print media, through direct notification of parties that have requested to be notified, or have been identified to have an interest in the reduction of threats and damage associated with mammals in the State, and by posting the EA on the APHIS website at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml.

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

X. AFFECTED ENVIRONMENT

Chapter 2 of the EA addressed the affected environment and remains valid and as described (USDA 2005*a*). Feral swine occur 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 occur throughout the State, requests for assistance to manage damage or threats of damage could occur in areas that feral swine occupy. Appendix C of this supplement to the EA shows the current known distribution of feral swine in the State. However, WS would only conduct feral swine damage management when a landowner or manager requests such assistance and only on properties where WS and the requesting entity sign a MOU, cooperative service agreement, or other comparable document. Chapter 4 of the EA provides additional information on the affected environment.

Upon receiving a request for assistance from the appropriate landowner or manager, WS could conduct actions described in the alternatives 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, the 2011 supplement to the EA, and this supplement apply to actions that WS could take under the selected alternative that could occur in any locale and at any time within the analysis area. The EA, the 2011 supplement, and this supplement analyze the potential effects of feral swine damage management and addresses activities on properties 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, the 2011 supplement to the EA, and this supplement also addresses the potential effects of feral swine damage management in the State where WS and a requesting entity sign additional agreements in the future.

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

Since signing the new Decision and FONSI for the EA in 2011, WS continued to provide both technical assistance and direct operational assistance to cooperators requesting assistance with damage caused by feral swine in Georgia during FY 2011 and FY 2012.

In FY 2011, WS received several requests for assistance to reduce damage occurring to agricultural resources and property. 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, WS lethally removed 198 feral swine by shooting and trapping to resolve requests for assistance in FY 2011. WS trapped feral swine using corral traps and euthanized those feral swine live-captured in accordance with WS Directive 2.505. In FY 2012, WS again received requests for assistance to alleviate damage occurring to agricultural resources and property. To resolve those requests for assistance, WS lethally removed 280 feral swine during FY 2012 by shooting and trapping.

XI. ISSUES ANALYZED IN DETAIL

Issues are concerns regarding potential effects that might occur from a proposed action. Agencies must consider such issues during the decision-making process of the NEPA. Initially, WS developed the issues related to managing damage associated with feral swine in Georgia in consultation with the GDNR. In addition, WS made the EA and the 2011 supplement available to the public to identify additional issues. Similarly, WS will invite the public to review and comment on this supplement to the EA to identify additional issues.

Chapter 2 of the EA discusses the major issues in detail (USDA 2005*a*). Chapter 3 of the EA addresses the alternatives developed and identified during the development of the EA to address those issues (USDA 2005*a*). The scoping process for the EA identified the following issues:

- 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

Based on those damage management activities WS conducted previously, those issues identified during the development of the EA remain applicable and appropriate to resolving damage and threats of damage associated with feral swine in the State.

XII. ISSUES ADDRESSED BUT NOT IN DETAIL WITH RATIONALE

In addition to the issues considered in detail, WS considered four additional issues in Section 2.3 of the EA, but WS did not consider those issues in detail. Section 2.3 of the EA also discusses the rationale for not considering those issues in detail. 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

Chapter 3 of the EA describes and discusses in detail the alternatives WS considered and evaluated using the identified issues (USDA 2005*a*). 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*a*). The EA also provides a description of the methods that WS could use or recommend under each of the alternatives. The EA describes four alternatives that WS 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

WS also considered an additional alternative but WS did not analyze that alternative in detail (see Section 3.3 of the EA). 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 an additional method available to resolve feral swine damage that the EA and the 2011 supplement to the EA did not evaluate. Since the completion of the EA and the 2011 supplement to the EA, WS has identified the use of aircraft, including shooting from aircraft, as a possible method that WS could use or recommend as part of an integrated damage management strategy to alleviate feral swine damage under the proposed action alternative. This supplement to the EA will analyze the use of aircraft as part of an integrated approach to resolving damage and threats associated with feral swine.

Shooting from aircraft is a commonly used damage management method for feral swine in certain circumstance and can be especially effective and efficient in removing target animals. Shooting from an aircraft would only occur in those areas where WS and the cooperating landowner or manager signed a cooperative service agreement allowing the use of aircraft. The amount of time spent conducting aerial operations varies. Variations can occur depending on the severity of damage, the size of the area where damage or threats were occurring, the number of target animals causing damage, and the weather, as low-level aerial activities would be restricted to visual flight rules and would be impractical in high winds or at times when animals were not easily visible.

Aerial surveying is a commonly used tool for evaluating and monitoring damage and establishing population estimates and locations of various species of wildlife. Aerial surveying occurs throughout the United States to monitor and locate wildlife populations. Many entities use aerial telemetry in research projects studying the movements of various wildlife species. Biologists will frequently place radio-

transmitting collars on selected individuals of a species and then monitor their movements over a specified period. Whenever possible, biologists attempt to locate the research subject using a hand-held antennae and radio receiver; however, occasionally animals will make large movements that prevent biologists from locating the animal from the ground. In those situations, WS could utilize either fixed wing aircraft or helicopters and elevation to conduct aerial telemetry and locate the specific animal wherever it has moved to.

XVI. STANDARD OPERATING PROCEDURES

The WS program in Georgia uses many SOPs. Chapter 3 of the EA discusses the SOPs WS would incorporate into the selected alternative (USDA 2005*a*). The SOPs discussed in the EA remain appropriate to activities WS could conduct in the State. WS' employees participating in any aspect of aerial wildlife operations would receive training in their role and responsibilities during the operations. All WS' personnel would follow the policies and directives set forth in WS' Directive 2.620; WS' Aviation Operations Manual; WS' Aviation Safety Manual and its amendments; Title 14 CFR; and Federal Aviation Regulations (FAR), Part 43, 61, 91, 119, 133, 135, and 137.

XVII. ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

Chapter 2 of the EA discusses the major issues WS considered in detail (USDA 2005*a*). Chapter 3 of the EA discusses the alternatives that WS developed and identified during the development of the EA to meet the need for action and to address those issues (USDA 2005*a*). 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. The use of aircraft would only be available for use under the proposed action alternative (Alternative 2) and the alternative requiring WS to use of non-lethal methods only (Alternative 4); however, WS would only conduct surveillance and monitoring of feral swine under Alternative 4. Shooting from an aircraft to remove feral swine would not occur under Alternative 4. Therefore, the potential effects associated with the use of aircraft for monitoring and surveillance would be similar between the Alternative 2 and Alternative 4.

Chapter 4 of the EA contains a detailed discussion and comparison of the identified alternatives and the major issues (USDA 2005*a*). WS identified those issues 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 would provide technical and direct damage assistance using methods in an integrated approach in which WS could employ all or a combination of methods to resolve a request for assistance.

Non-lethal methods could 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 were employed. WS would give non-lethal

methods priority when addressing requests for assistance (see WS Directive 2.101). However, WS would not necessarily employ non-lethal methods to resolve every request for assistance if deemed inappropriate by WS' personnel using the WS Decision Model. For example, if a cooperator requesting assistance had 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 had already been proven ineffective in that particular situation. WS would employ non-lethal methods to exclude, harass, and disperse target wildlife from areas where damage or threats were 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 an entity employed those methods or those methods would exclude feral swine from an area. However, employing those methods would disperse individual feral swine responsible for causing damage or threats to other areas with minimal effect on the overall feral swine population. Non-lethal methods would not be 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 such a wide geographical scope that long-term adverse effects would occur to the populations of feral swine.

Non-lethal methods would generally be regarded as having minimal effects on overall populations of feral swine since individual swine are unharmed and the actual number of individuals of a population would not be reduced. WS' previous and continued use of non-lethal methods would not adversely affect feral swine populations in the State.

Of primary concern would be the magnitude of take on a species' population from the use of lethal methods. Lethal methods would be employed to remove an individual feral swine or those swine responsible for causing damage or having potential to cause damage. The use of lethal methods by WS would only occur after WS received requests for such assistance. The use of lethal methods by WS could result in local population reductions in the area where damage or threats were occurring. The number of swine 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. Based on anticipated requests for assistance, the EA evaluated the lethal removal of up to 1,000 feral swine annually by WS in Georgia to alleviate damage and threats.

The analysis in the EA and the 2011 supplement to the EA measured the number of feral swine lethally removed in relation to the abundance of feral swine to determine the magnitude of impact to the population from the use of lethal methods. Magnitude may be determined either quantitatively or qualitatively. Determinations based on population estimates, allowable harvest levels, and actual harvest data are quantitative. Determinations based on population trends and harvest trend data, when available, are qualitative.

Feral Swine Population Impact Analysis

Feral swine are a non-native species in Georgia that are negatively affecting 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 in Georgia, including feral swine. There is no closed season for feral swine in the State on private property, which allows the public to remove feral swine at any time, including at night. There is no limit on the number of feral swine that the public can lethally remove, including no daily possession limit.

Since the GDNR could regulate 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 providing some benefit to the native environment in Georgia (USDA 2005*a*). Long-term objectives of the GDNR could include the suppression or complete removal of feral swine from the State. WS would conduct all activities to manage feral swine in Georgia 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. Litters sizes usually range from one to 13 piglets, with female swine generally producing two litters per year (Barrett and Birmingham 1994, National Audubon Society 2000, Mayer and Brisbin 2009). Given adequate nutrition, a feral swine population can reportedly double in just four months (Barrett and Birmingham 1994). Feral swine may begin to breed as young as four months of age and sows can produce two litters per year (Mayer and Brisbin 2009). Feral swine are found in variable habitat in most of the United States, with the highest densities occurring in the southern United States. Populations are usually clustered around areas with ample food and water supplies. Evidence of the presence of feral swine may be rooted-up earth, tree rubs at ground level to 900 cm (36 inches) high, with clinging hair or mud, and muddy wallows.

Pimentel 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. Appendix C of this supplement shows the current estimated distribution of feral swine in the State. 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*a*). 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*a*). However, precise population trend information is currently unavailable.

WS has lethally removed 478 feral swine between FY 2011 and FY 2012, with the highest level of take occurring in FY 2012 when 280 feral swine were lethally removed to alleviate damage or threats of damage. As stated previously, feral swine can be lethally removed at any time in the State on private property; therefore, lethal removal 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 478 feral swine by WS would have represented 1.1% of the estimated population. The highest level of take by WS of 280 feral swine would have represented 0.7% 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 2011 through FY 2012 have not exceeded 1,000 feral swine. WS' lethal take of feral swine has occurred 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 effect on statewide populations of feral swine from WS' activities. Program activities and their potential effect on feral swine have not changed from those analyzed in the EA. Based on available information and evaluation of activities that could occur pursuant to the alternatives, the removal of feral swine by WS would not affect the overall statewide population of feral swine because of the high reproductive rates feral swine exhibit (Barrett and Birmingham 1994).

For example, Timmons et al. (2012) was able to model population growth rates for the feral swine

population in Texas using demographic parameters gathered from feral swine in the southeastern United States. Using those demographic parameters, Timmons et al. (2012) estimated that an annual harvest of 66% of the feral swine population was needed to hold the population stable in Texas (Timmons et al. 2012). The South Carolina Wild Hog Task Force (2012) estimated that 50 to 75% of the statewide feral swine population in South Carolina would have to be removed annually to stabilize or reduce the population.

Activities that could be conducted by WS under the alternatives would occur within the goals and strategies outlined for the statewide feral swine population by the GDNR. Therefore, activities that could be conducted by WS under the alternatives would not adversely affect the ability to harvest feral swine in the State.

Disease sampling strategies that could be implemented to detect or monitor feral swine diseases in the United States 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 would be 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. 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

WS is considering the use of aircraft to aid in alleviating or preventing feral swine damage. Under the proposed action alternative, aerial operations could include the use of aircraft for surveillance and monitoring, as well as, WS' employees shooting feral swine from aircraft. Under Alternative 4, WS would only conducted surveillance and monitoring of feral swine using aircraft. Surveillance and monitoring activities would use aircraft to locate feral swine, to determine the size of a local population, and when using radio telemetry, to locate radio collared swine.

Although the use of aircraft could rapidly reduce feral swine densities in an area (Saunders 1993, Choquenot et al. 1999, Campbell et al. 2010), WS does not anticipate the lethal removal of feral swine by WS in the State would exceed the level analyzed in the EA. The EA analyzed the lethal removal of up to 1,000 feral swine by WS annually (USDA 2005*a*). Studies conducted in Australia found that shooting feral swine from an aircraft reduced local populations of swine by 65 to 80% and surviving feral swine could continue to cause damage and pose disease risks (Hone 1990, Saunders 1993, Saunders and Bryant 1988). Choquenot et al. (1999) found the efficiency of aerial gunning was influenced by feral swine density in the area. Saunders and Bryant (1988) found feral swine "*...became attuned to the significance of a hovering helicopter and* [feral swine] *modified their behaviour* [sic] *to avoid detection*." Dexter (1996) concluded that harassment caused by the use of aircraft in New South Wales, Australia had little effect on the movements of surviving swine since no statistically significant differences were observed in the hourly distanced moved by surviving feral swine, the home ranges of surviving feral swine, and their positions within their home ranges. Campbell et al. (2010) stated the use of aircraft to shoot feral swine "*...had only minor effects on the behavior of surviving swine...*" and the use of aircraft to remove feral swine "*...should be considered a viable tool...*" when managing disease outbreaks.

Since the number of feral swine that WS could lethally remove annually would remain as analyzed in the EA and the use of aircraft would not result in direct mortality of feral swine, the use of aircraft to lethally remove feral swine or for surveillance would not affect the population of feral swine in the State.

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 (see Section 3.4 of the EA). To reduce the risks of adverse effects to non-target wildlife, WS would select methods that were as target-selective as possible or would apply such methods in ways that reduced the likelihood of affecting non-target species. Before initiating management activities, WS would also select locations that were extensively used by feral swine. WS would employ baits or lures that were preferred by feral swine. Despite WS' best efforts to minimize non-target take during program activities, the potential for WS to disperse, live-capture, or kill non-targets would exist when applying both non-lethal and lethal methods to manage damage or reduce threats to safety.

While every precaution would be taken to safeguard against taking non-targets during operational use of methods and techniques for resolving damage and reducing threats caused by feral swine, the use of such methods could result in the incidental take of unintended species. Those occurrences would be minimal and should not affect the overall populations of any species. During FY 2011 and FY 2012, the unintentional take of non-targets did not occur during activities conducted by WS targeting feral swine.

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 affect non-targets. The primary methods used by WS for removing feral swine have been shooting and the use of live-traps. Shooting is essentially selective for target species since identification of the target occurs prior to application. Non-target species are usually not affected by WS' use of firearms, except for the occasional scaring that may result from discharging a firearm. In those cases, non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action in the absence of direct reinforcement.

Cage traps are a common method employed and recommended by WS to resolve damage caused by feral swine in the State. Although there are several cage trap designs available to live-capture feral swine, the type of trap most commonly used by WS is the "*corral*" trap. Corral traps are comprised of woven metal side panels generally referred to as "*hog*" panels that are interconnected and held in place by steel posts forming an enclosure. Side panels are generally 4 to 6 feet tall and attached to the steel posts. The traps are baited with corn and/or other attractants for feral swine. Corral traps generally do not contain overhead panels, which allows non-target species the ability to escape, if able. In addition, the corral traps are checked at least daily, which ensures any non-target species could be released.

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, alligators, 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 during FY 2011 and FY 2012. 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 has occurred since the completion of the EA in 2005 and the development of the supplement to the EA in 2011. Those species listed in the State since the completion of the EA were addressed in the 2011 supplement to the EA.

As part of the development of this supplement to the EA, WS re-initiated consultation with the USFWS under Section 7 of the ESA. Based on a review of the activities conducted previously and those methods currently available, including the use of aircraft, WS determined that activities conducted under the proposed action, as supplemented by this document, would not likely adversely affect many T&E species listed within the State (see Appendix B for a list of specific species). The USFWS concurred with WS' determination that activities conducted pursuant to the proposed action, including the use of aircraft, would not likely adversely affect those species or their critical habitats (R. B. Goodloe, USFWS pers. comm. 2013).

Effects on Non-targets from the Use of Aircraft

An additional concern that WS has identified is the potential for low-level aircraft flights to potentially disturb wildlife, including T&E species. Low-level aircraft flights would be associated with the use of firearms from aircraft and from the use of aircraft for wildlife surveillance. Aerial operations could be an important method of damage management in Georgia when used to address damage or threats associated with feral swine in remote areas where access was limited due to terrain and habitat. Aerial operations would only occur in those areas where a MOU, cooperative service agreement, or a comparable document allowing the use of aircraft had been signed between WS and the cooperating landowner or manager. Aerial operations would typically be conducted with aircraft between the months of December and April when the foliage has fallen; however, aircraft could be used at any time of year. The amount of time spent conducting aerial operations would vary depending on the severity of damage, the number of feral swine causing damage, the size of the area where damage or threats were occurring, and the weather, as low-level aerial activities would be restricted to visual flight rules and would be impractical in high winds or at times when animals were not easily visible.

Aircraft play an important role in the management of various wildlife species for many agencies. Resource management agencies rely on low flying aircraft to monitor the status of many animal populations, including large mammals (Lancia et al. 2000), birds of prey (Fuller and Mosher 1987), waterfowl (Bellrose 1976), and colonial waterbirds (Speich 1986). Low-level flights could also be required when aircraft are used to track animal movements by radio telemetry (Gilmer et al. 1981, Samuel and Fuller 1994).

A number of studies have looked at responses of various wildlife species to aircraft overflights. The National Park Service (1995) reviewed the effects of aircraft overflights on wildlife and suggested that adverse effects could occur to certain species. Some species will frequently or at least occasionally show an adverse response to even minor overflights. In general though, it appears that the more serious potential adverse effects occur when overflights are chronic (*i.e.*, they occur daily or more often over long periods). Chronic exposures generally involve areas near commercial airports and military flight training facilities. Aerial operations conducted by WS rarely occur in the same areas on a daily basis and little time is actually spent flying over those particular areas.

The effects on wildlife from military-type aircraft have been studied extensively (Air National Guard 1997), and were found to have no expected adverse effects on wildlife. Examples of species or species groups that have been studied with regard to the issue of aircraft-generated disturbance are as follows:

Waterbirds and Waterfowl: Low-level overflights of two to three minutes in duration by a fixed-wing airplane and a helicopter produced no "*drastic*" disturbance of tree-nesting colonial waterbirds, and, in 90% of the observations, the individual birds either showed no reaction or merely looked up (Kushlan 1979). Belanger and Bedard (1989, 1990) observed responses of greater snow geese (*Chen caerulescens atlantica*) to man-induced disturbance on a sanctuary area and estimated the energetic cost of such

disturbance. Belanger and Bedard (1989, 1990) observed that disturbance rates exceeding two per hour reduced goose use of the sanctuary by 50% the following day. They also observed that about 40% of the disturbances caused interruptions in feeding that would require an estimated 32% increase in nighttime feeding to compensate for the energy lost. They concluded that overflights of sanctuary areas should be strictly regulated to avoid adverse effects. Conomy et al. (1998) quantified behavioral responses of wintering American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) exposed to low-level military aircraft and found that only a small percentage (2%) of the birds reacted to the disturbance. They concluded that such disturbance was not adversely affecting the "*time-activity budgets*" of the species. Aerial operations conducted by WS would not be conducted over federal, state, or other governmental agency property without the concurrence of the managing entity. Those flights, if requested, would be conducted to reduce threats and damages occurring to natural resources and should not result in impacts to bird species. Thus, there is little to no potential for any adverse effects on waterbirds and waterfowl.

Raptors: The Air National Guard (1997) analyzed and summarized the effects of overflight studies conducted by numerous federal and state government agencies and private organizations. Those studies determined that military aircraft noise initially startled raptors, but negative responses were brief and did not have an observed effect on productivity (see Ellis 1981, Fraser et al. 1985, Lamp 1989, United States Forest Service 1992 as cited in Air National Guard 1997). A study conducted on the impacts of overflights to bald eagles (*Haliaeetus leucocephalus*) suggested that the eagles were not sensitive to this type of disturbance (Fraser et al. 1985). During the study, observations were made of more than 850 overflights of active eagle nests. Only two eagles rose out of either their incubation or brooding postures. This study also showed that perched adults were flushed only 10% of the time during aircraft overflights. Evidence also suggested that golden eagles (*Aquila chrysaetos*) were not highly sensitive to noise or other aircraft disturbances (Ellis 1981, Holthuijzen et al. 1990). Finally, one other study found that eagles were particularly resistant to being flushed from their nests (see Awbrey and Bowles 1990 as cited in Air National Guard 1997). Therefore, there is considerable evidence that eagles would not be adversely affected by overflights during aerial operations.

Mexican spotted owls (*Strix occidentalis lucida*) (Delaney et al. 1999) did not flush when chain saws and helicopters were greater than 110 yards away; owls flushed to these disturbances at closer distances and were more prone to flush from chain saws than helicopters. Owls returned to their pre-disturbance behavior 10 to 15 minutes following the event and researchers observed no differences in nest or nestling success (Delaney et al. 1999), which indicates that aircraft flights did not result in adverse effects on owl reproduction or survival.

Andersen et al. (1989) conducted low-level helicopter overflights directly at 35 red-tailed hawk (*Buteo jamaicensis*) nests and concluded their observations supported the hypothesis that red-tailed hawks habituate to low level flights during the nesting period; results showed similar nesting success between hawks subjected to overflights and those that were not. White and Thurow (1985) did not evaluate the effects of aircraft overflights, but found that ferruginous hawks (*B. regalis*) were sensitive to certain types of ground-based human disturbance to the point that reproductive success may be adversely affected. However, military jets that flew low over the study area during training exercises did not appear to bother the hawks, nor did the hawks become alarmed when the researchers flew within 100 feet in a small fixed-wing aircraft (White and Thurow 1985). White and Sherrod (1973) suggested that disturbance of raptors by aerial surveys with helicopters may be less than that caused by approaching nests on foot. Ellis (1981) reported that five species of hawks, two falcons (*Falco* spp.), and golden eagles (*Aquila chrysaetos*) were "*incredibly tolerant*" of overflights by military fighter jets, and observed that, although birds frequently exhibited alarm, negative responses were brief and the overflights never limited productivity.

Grubb et al. (2010) evaluated golden eagle response to civilian and military (Apache AH-64) helicopter

flights in northern Utah. Study results indicated that golden eagles were not adversely affected when exposed to flights ranging from 100 to 800 meters along, towards, and from behind occupied cliff nests. Eagle courtship, nesting, and fledging were not adversely affected, indicating that no special management restrictions were required in the study location.

The above studies indicate raptors were relatively unaffected by aircraft overflights, including those by military aircraft that produce much higher noise levels. Therefore, we conclude that aerial operations would have little or no potential to adversely affect raptors.

Passerines: Reproductive losses have been reported in one study of small territorial passerines ("*perching*" birds that included sparrows, blackbirds) after exposure to low altitude overflights (see Manci et al. 1988 as cited in Air National Guard 1997), but natural mortality rates of both adults and young are high and variable for most of those species. The research review indicated passerine birds cannot be driven any great distance from a favored food source by a non-specific disturbance, such as military aircraft noise, which indicated quieter noise would have even less effect. Passerines avoid intermittent or unpredictable sources of disturbance more than predictable ones, but return rapidly to feed or roost once the disturbance ceases (Gladwin et al. 1988, United States Forest Service 1992). Those studies and reviews indicated there was little or no potential for aerial operations to cause adverse effects on passerine bird species.

Pronghorn (antelope) and Mule Deer: Krausman et al. (2004) found that Sonoran pronghorn (*Antilocapra americana sonoriensis*) were not adversely affected by military fighter jet training flights and other military activity on an area of frequent and intensive military flight training operations. Krausman et al. (1986) reported that only three of 70 observed responses of mule deer (*Odocoileus hemionus*) to small fixed-wing aircraft overflights at 150 to 500 feet Above Ground Level (AGL) resulted in the deer changing habitats. The authors believed that the deer might have been accustomed to overflights because the study area was near an interstate highway that was followed frequently by aircraft. Krausman et al. (2004) also reported that pronghorn and mule deer do not hear noise from military aircraft as well as humans, which potentially indicates why they appeared not to be disturbed as much as previously thought.

Mountain Sheep: Krausman and Hervert (1983) reported that, of 32 observations of the response of mountain sheep to low-level flights by small fixed-wing aircraft, 60% resulted in no disturbance, 81% in no or "*slight*" disturbance, and 19% in "*great*" disturbance. Krausman and Hervert (1983) concluded that flights less than 150 feet AGL could cause mountain sheep to leave an area. When Weisenberger et al. (1996) evaluated the effects of simulated low altitude jet aircraft noise on desert mule deer (*Odocoileus hemionus crooki*) and mountain sheep (*Ovis canadensis mexicana*), they found that heart rates of the ungulates increased according to the dB levels, with lower noise levels prompting lesser increases. When they were elevated, heart rates rapidly returned to pre-disturbance levels suggesting that the animals did not perceive the noise as a threat. Responses to the simulated noise levels were found to decrease with increased exposure.

Bison: Fancy (1982) reported that only two of 59 bison (*Bison bison*) groups showed any visible reaction to small fixed-winged aircraft flying at 200 to 500 feet AGL. The study suggests that bison were relatively tolerant of aircraft overflights.

Domestic Animals and Small Mammals: A number of studies with laboratory animals (*e.g.*, rodents [Borg 1979]) and domestic animals (*e.g.*, sheep [Ames and Arehart 1972]) have shown that these animals can become habituated to noise. Long-term lab studies of small mammals exposed intermittently to high levels of noise demonstrate no changes in longevity. The physiological "*fight or flight*" response, while marked, does not appear to have any long-term health consequences on small mammals (Air National

Guard 1997). Small mammals habituate, although with difficulty, to sound levels greater than 100 dbA (United States Forest Service 1992).

Although many of those wildlife species discussed above are not present in Georgia, the information was provided to demonstrate the relative tolerance most wildlife species have of overflights, even those that involve noise at high decibels, such as from military aircraft. In general, the greatest potential for impacts to occur would be expected to exist when overflights were frequent, such as hourly and over many days that could represent "*chronic*" exposure. Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. Even then, many wildlife species become habituated to overflights, which appears to naturally minimize any potential adverse effects where such flights occur on a regular basis. Therefore, aircraft used by WS should have far less potential to cause any disturbance to wildlife than military aircraft. Military aircraft produce much louder noise and would be flown over certain training areas many more times per year, and yet, were found to have no expected adverse effects on wildlife (Air National Guard 1997).

The fact that WS would only conduct overflights on a very small percentage of the land area of the State indicates that most wildlife would not be exposed to overflights, In addition, such flights would occur infrequently throughout a year, which would further lessened the potential for any adverse effects.

Issue 3 - Effects on Human Health and Safety

Based on the analyses in the EA and the 2011 supplement to the EA, when WS' activities were conducted according to applicable laws, including WS' directives, and methods were used as intended, those activities pose minimal risks to human safety (USDA 2005*a*). The analyses in the EA also concluded that WS' activities to reduce damage and threats associated with feral swine were likely to reduce risks to human health and safety by addressing safety issues and disease transmission.

Management activities conducted by WS in FY 2011 and FY 2012 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 during FY 2011 and FY 2012. 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 Associated with the Use of Aircraft

Aerial wildlife operations, like any other flying, may result in an accident. WS' pilots and crewmembers would be trained and experienced to recognize the circumstances that lead to accidents. The national WS Aviation Program has increased its emphasis on safety, including funding for additional training, the establishment of a WS Flight Training Center and annual recurring training for all pilots. Still, accidents may occur and the environmental consequences should be evaluated.

Major Ground or Wild/Forest Fires: Although fires could result from aircraft-related accidents, no such fires have occurred from aircraft incidents previously involving government aircraft and low-level flights.

Fuel Spills and Environmental Hazard from Aviation Accidents: A representative of the National Transportation Safety Board has stated previously that aviation fuel is extremely volatile and will evaporate within a few hours or less to the point that even its odor cannot be detected (USDA 2005*b*). Helicopters used for aerial wildlife operations carry less fuel than fixed-wing aircraft with 30 gallons the maximum for most helicopters. In some cases, little or none of the fuel would be spilled if an accident occurred. Thus, there should be little environmental hazard from unignited fuel spills.

Oil and Other Fluid Spills: With the size of aircraft used by WS, the quantities of oil (*e.g.*, 3 to 5 quarts in helicopters) capable of being spilled in any accident would be small and insignificant with respect to the potential for environmental damage. The greatest potential amount of oil that could be spilled in one accident would be about eight quarts.

Petroleum products biodegrade through volatilization and bacterial action, particularly when exposed to oxygen (EPA 2000). Thus, small quantity oil spills on surface soils can be expected to biodegrade readily. Even in subsurface contamination situations involving underground storage facilities that would generally be expected to involve larger quantities than would ever be involved in a small aircraft accident, EPA guidelines provide for "*natural attenuation*" or volatilization and biodegradation in some situations to mitigate environmental hazards (EPA 2000). Thus, even where oil spills in small aircraft accidents were not cleaned up, the oil does not persist in the environment or persists in such small quantities that no adverse effects would be expected. In addition, WS' accidents generally would occur in remote areas away from human habitation and drinking water supplies. Thus, the risk to drinking water appears to be exceedingly low to nonexistent.

For these reasons, the risk of ground fires or fuel/oil pollution from aviation accidents could be considered low. In addition, based on the history and experience of the program in aircraft accidents, it appears the risk of significant environmental damage from such accidents is exceedingly low.

Issue 4 - Humaneness and Animal Welfare Concerns of Methods 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 would be to use methods as humanely as possible to 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.

If feral swine were to be live-captured by WS, capture devices would be checked in accordance with State laws and regulations to ensure feral swine captured were addressed in a timely manner and to prevent injury. Although stress could occur from being restrained, timely attention to live-captured wildlife would alleviate suffering; therefore, stress would likely be temporary. When live-capture methods were employed, WS would euthanize feral swine live-captured pursuant to WS Directive 2.505. Lethal

methods could also be employed to resolve requests for assistance to alleviate or prevent feral swine damage and threats. Lethal methods would include shooting, euthanasia chemicals, and cable restraints. In addition, target species live-captured using non-lethal methods could be euthanized by WS. WS' use of lethal control methods under the proposed action would follow those required by WS' directives (see WS Directive 2.505, WS Directive 2.430).

Therefore, WS' mission would be to address requests for assistance using methods in the most humane way possible that minimizes the stress and pain of the animal. WS' personnel would be experienced and professional in their use of management methods. When employing methods to resolve damage to resources or threats to human safety, methods would be 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 during FY 2011 and FY 2012 and their potential impacts on humaneness and animal welfare have not change from those analyzed in the EA. All methods employed by WS during FY 2011 and FY 2012 to alleviate feral swine damage were discussed in the EA (USDA 2005*a*). 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 during FY 2011 and FY 2012 has not change from those analyzed in the EA.

Humaneness Analysis Associated with the Use of Aircraft

As noted previously, aircraft can play an important role in the management of various wildlife species. Resource management agencies rely on low flying aircraft to monitor the status of many animal populations and to track animal movements by radio telemetry. Similarly, aircraft could be used by WS to monitor and track feral swine in the State under the proposed action alternative (Alternative 2) and the use of non-lethal methods only alternative (Alternative 4). Dexter (1996) and Campbell et al. (2010) concluded the use of aircraft had little effect on the movements and behavior of swine. In addition, aerial overflights appear to have minimal effects on other wildlife species, especially when those flights occur infrequently and are of limited duration. Most activities associated with low-flying aircraft would occur between December and April when visibility would be highest due to the lack of foliage and limited vegetation, which is not generally the reproductive seasons for many wildlife species present in the State during that time. Therefore, low-flying aircraft would not be 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 such a wide geographical scope that long-term adverse effects would occur to the populations of wildlife species.

Of primary concern would be the humaneness of using firearms to shoot feral swine from aircraft. The use of firearms as a method was addressed in the EA and the supplement to the EA (USDA 2005*a*). Therefore, the issue of humaneness associated with the use of a firearm was addressed in the EA and the supplement to the EA. All personnel who use firearms would be trained in their proper use according to WS' Directives (*e.g.*, see WS Directive 2.615), including guidance provided to WS' personnel on the lethal removal of animals (see WS Directive 2.505). The AVMA has stated previously "[c]*onditions found in the field, although more challenging than those that are controlled, do not in any way reduce or minimize the ethical obligation of the responsible individual to reduce pain and distress to the greatest extent possible during the taking of an animal's life*" (AVMA 2007). Therefore, the goal of WS would be

to effectively address requests for assistance using methods, including shooting from an aircraft, in the most humane way possible that minimizes the stress and pain to the animal.

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 agency with damage management responsibilities; however, other entities may conduct similar activities in the State. 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 because of WS' program activities over time or because 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 will 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 because 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 would be constrained as to scope, duration, and intensity, for the purpose of minimizing or avoiding impacts to the environment. WS would evaluate damage occurring, including other affected elements and the dynamics of the damaging species; determine appropriate strategies to minimize effects on environmental elements; would apply damage management actions; and would subsequently monitor and adjust/cease damage management actions (Slate et al. 1992, USDA 2005*a*). This process would allow 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 effects on feral swine populations would be 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 because of program activities implemented over time based on analyses contained in the EA, monitoring reports, and the 2011 supplement to the EA. WS continues to implement an integrated damage management program that adapts to the damage situation and the behavior of feral swine. WS would only target feral swine that were causing damage after a request for assistance was received. All program activities would be coordinated with appropriate federal, state, and local entities to ensure WS' activities would not adversely affect the populations of any native wildlife species.

With management authority over feral swine in Georgia, the GDNR could adjust take levels, including the take of WS, to ensure population objectives for feral swine were achieved. Consultation and reporting of take by WS would ensure the GDNR considered 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 and have increased in range, which provides some indication that WS' activities are not cumulatively affecting populations (C. Killmaster, GDNR pers. comm. 2013). During FY 2011 and FY 2012, 478 feral swine were lethally removed by WS to alleviate damage in the State. The highest level of take by WS of 280 feral swine would have represented 0.7% 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 during FY 2011 and FY 2012 has been 1.1% of the 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' lethal removal has been and would continue to be a small component of the overall harvest of feral swine. 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 would be conducted on a small portion of the land area of the State and although local declines of 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 that 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 2005*a*).

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. 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 would often be temporary and often do not involve the take (killing) of non-target wildlife species. When using exclusion devices, both target and non-target wildlife could be prevented from accessing the resource being damaged. Since exclusion does not involve lethal take, cumulative effects on non-target species from the use of exclusionary methods would not occur but would likely disperse those individuals to other areas. Exclusionary methods can often require constant maintenance to ensure effectiveness. Therefore, the use of exclusionary devices would be somewhat limited to small, high-value resources and would not be used to the extent that non-targets would be excluded from large areas that would cumulatively affect populations from the inability to access a resource, such as potential food sources. The use of visual and auditory harassment and dispersion methods would generally be 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 would not be 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 affect non-target wildlife through the removal (killing) or capture of non-target species. Capture methods used would often be methods that would be set to confine or restrain feral swine after being triggered by a target individual. Capture methods would be 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 were 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 would be employed to confine or restrain wildlife that would be subsequently euthanized using humane methods since translocation is currently not permitted by the GDNR. With all live-capture devices, non-target wildlife captured could be released on site if determined to be able to survive following release. SOPs are intended to ensure take of non-target wildlife would be minimal during the use of methods to capture target wildlife.

The use of firearms, immobilizing drugs, and euthanasia chemicals would essentially be selective for target species since identification of an individual would be made prior to the application of the method. Firearms require the identification of the target before application, which essentially is selective with minimal risks to non-targets. Immobilizing drugs and euthanasia chemicals would be applied through direct application to target wildlife. Therefore, the use of those methods would not affect non-target species.

The methods described in the EA all have a high level of selectivity and could be employed using SOPs to ensure minimal impacts to non-target species. During FY 2011 and FY 2012, no lethal removal of non-targets occurred during damage management activities. 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 affect non-target species. As part of the development of this supplement to the EA, WS re-initiated consultation with the USFWS under Section 7 of the ESA. Based on a review of the activities conducted previously and those methods currently available, including the use of aircraft, WS determined that activities conducted under the proposed action, as supplemented by this document, would not likely adversely affect many T&E species listed within the State. The USFWS concurred with WS' determination that activities conducted pursuant to the proposed action, including the

use of aircraft, would not likely adversely affect those species or their critical habitats (R. B. Goodloe, USFWS pers. comm. 2013). Cumulative impacts would be minimal on non-targets from any of the alternatives discussed.

Issue 3 – Effects on Human Health and Safety

Safety of Non-Chemical Methods

All non-chemical methods described in the EA would be used within a limited period, would not be residual, and do not possess properties capable of inducing cumulative adverse effects on human health and safety. All non-chemical methods would be used after careful consideration of the safety of those people employing methods and to the public. Activities would generally be conducted when human activity was minimal (*e.g.*, early mornings, at night) or in areas where human activities was minimal (*e.g.*, in areas closed to the public), whenever possible. All capture methods would be employed in areas where human activity was minimal and warnings signs would be 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 would be agreed upon by the requesting entities, which would be 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 would also ensure the safety of the public from those methods used to capture or take wildlife. Firearms used to alleviate or prevent damage, though hazards do exist, would be employed to ensure the safety of employees and the public.

WS received no reports or documented any adverse effects to human safety from WS' feral swine damage management activities conducted previously. 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 affect 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 could occur using a rifle, shotgun, or handgun. 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 firearms. To reduce risks to human safety and property damage from bullets passing through feral swine, the use of rifles is applied in such a way (*e.g.*, caliber, bullet weight, bullet placement) as to reduce the chances of bullets passing through feral swine. 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 was 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 would be 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 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. 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.

Safety of Chemical Methods

Chemical methods available for use under the proposed action are immobilizing drugs and euthanizing chemicals described in the EA. Immobilizing drugs would be 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 chemical described in the EA. Euthanasia chemicals would only be administered after the feral swine had been properly restrained and immobilized and would occur through direct injection. WS' personnel would be required to attend training courses to become certified in the use of immobilizing drugs and euthanizing chemicals 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 drugs and euthanasia chemicals to ensure human safety.

Direct application of chemical methods to target species would ensure that there were no cumulative effects 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 previous feral swine damage management conducted by WS. When chemical methods were applied as intended and when safety guidelines were followed, no adverse effects to human safety would be 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 and 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 were 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 would be minimal. All methods would be evaluated annually to ensure SOPs were adequate to ensure those methods continue to be used to minimize suffering and that wildlife captured were addressed in a timely manner to minimize distress.

XIX. LIST OF PREPARERS, REVIEWERS, AND PERSONS CONSULTED

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APPENDIX A
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APPENDIX B
FEDERALLY LISTED T&E SPECIES IN GEORGIA AND WS' DETERMINATION

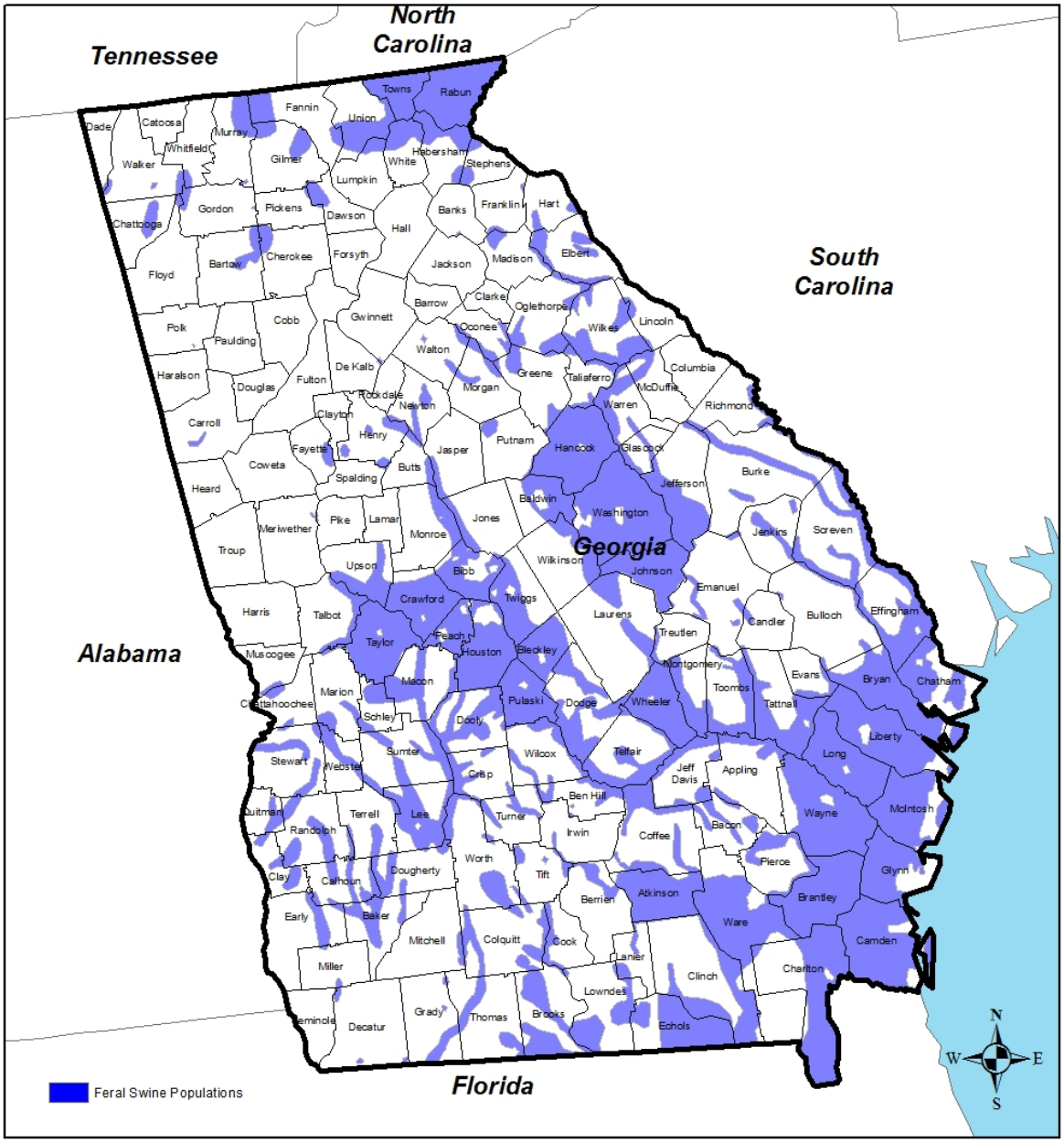
Common Name	Scientific Name	Status[†]	Determination[‡]
Animals			
Invertebrates			
Purple bankclimber	*Elliptoideus sloatianus*	T	MANLAA
Fine-lined pocketbook	*Hamiota altilis*	T	MANLAA
Alabama moccasinshell	*Medionidus acutissimus*	T	MANLAA
Fat three-ridge	*Amblema neislerii*	E	MANLAA
Upland combshell	*Epioblasma metastriata*	E	MANLAA
Southern acornshell	*Epioblasma othcaloogensis*	E	MANLAA
Shiny-rayed pocketbook	*Hamiota subangulata*	E	MANLAA
Coosa moccasinshell	*Medionidus parvulus*	E	MANLAA
Gulf moccasinshell	*Medionidus penicillatus*	E	MANLAA
Ochlockonee moccasinshell	*Medionidus simpsonianus*	E	MANLAA
Southern clubshell	*Pleurobema decisum*	E	MANLAA
Southern pigtoe	*Pleurobema georgianum*	E	MANLAA
Oval pigtoe	*Pleurobema pyriforme*	E	MANLAA
Triangular kidneyshell	*Ptychobranchus greeni*	E	MANLAA
Altamaha spinymussel	*Elliptio spinosa*	E	MANLAA
Georgia pigtoe	*Pleurobema hanleyianum*	E	MANLAA
Reptiles and Amphibians			
Green sea turtle	*Chelonia mydas*	T	MANLAA
Loggerhead sea turtle	*Caretta caretta*	T	MANLAA
Hawksbill sea turtle	*Eretmochelys imbricata*	E	NE
Kemp's Ridley sea turtle	*Lepidochelys kempii*	E	NE
Leatherback sea turtle	*Dermochelys coriacea*	E	MANLAA
Frosted Flatwoods salamander	*Ambystoma cingulatum*	T	MANLAA
Reticulated Flatwoods salamander	*Ambystoma bishopi*	E	MANLAA
Eastern indigo snake	*Drymarchon corais couperi*	T	MANLAA
Gopher tortoise	*Gopherus polyphemus*	C	MANLAA
Fish			
Blue shiner	*Cyprinella caerulea*	T	MANLAA
Cherokee darter	*Etheostoma scotti*	T	MANLAA
Goldline darter	*Percina aurolineata*	T	MANLAA
Snail darter	*Percina tanasi*	T	MANLAA
Shortnose sturgeon	*Acipenser brevirostrum*	E	NE
Etowah darter	*Etheostoma etowahae*	E	MANLAA
Amber darter	*Percina antesella*	E	MANLAA
Conasauga logperch	*Percina jenkinsi*	E	MANLAA
Mammals			
Gray bat	*Myotis grisescens*	E	NE
Indiana bat	*Myotis sodalis*	E	NE
West Indian manatee	*Trichechus manatus*	E	NE
Humpback whale	*Megaptera novaeangliae*	E	NE

Right whale	*Eubalaena glacialis*	E	NE
Birds			
Piping plover	*Charadrius elodus*	T	MANLAA
Kirtland's warbler	*Dendroica kirtlandii*	E	NE
Wood stork	*Mycteria americana*	E	MANLAA
Red-cockaded woodpecker	*Picoides borealis*	E	NE
Plants			
Pool Sprite, Little Amphianthus	*Amphianthus pusillus*	T	NE
Swamp pink	*Helonias bullata*	T	MANLAA
Small whorled pogonia	*Isotria medeoloides*	T	MANLAA
Mohr's Barbara's-buttons	*Marshallia mohrii*	T	MANLAA
Kral's water-plantain	*Sagittaria secundifolia*	T	MANLAA
Large-flowered skullcap	*Scutellaria montana*	T	MANLAA
Virginia spiraea	*Spiraea virginiana*	T	NE
Hairy rattleweed	*Baptisia arachnifera*	E	MANLAA
Smooth coneflower	*Echinacea laevigata*	E	MANLAA
Black-spored quillwort	*Isoetes melanospora*	E	NE
Mat-forming quillwort	*Isoetes tegetiformans*	E	NE
Pondberry	*Lindera melissifolia*	E	MANLAA
Canby's dropwort	*Oxypolis canbyi*	E	MANLAA
Harperella	*Ptilimnium nodosum*	E	MANLAA
Michaux's sumac	*Rhus michauxii*	E	MANLAA
Green pitcher plant	*Sarracenia oreophila*	E	MANLAA
American Chaff-seed	*Schwalbea americana*	E	MANLAA
Fringed campion	*Silene polypetala*	E	MANLAA
Cooley's meadowrue	*Thalictrum cooleyi*	E	MANLAA
Florida torreya	*Torreya taxifolia*	E	MANLAA
Persistent trillium	*Trillium persistens*	E	MANLAA
Relict trillium	*Trillium reliquum*	E	MANLAA
Tennessee yellow-eyed grass	*Xyris tennesseensis*	E	MANLAA
Alabama leather flower	*Clematis socialis*	E	MANLAA

† T=Threatened; E=Endangered

‡ NE=No effect; MANLAA=May affect, not likely to adversely affect

APPENDIX C
CURRENT DISTRIBUTION OF FERAL SWINE IN GEORGIA, 2013



Feral/Wild Swine Populations 2013
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 11-9113-1156-CA and 13-9613-0032-CA, Veterinary Services, Animal and Plant Health Inspection Service, U.S. Department of Agriculture.

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