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Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

Cogongrass Control Program in the Southeastern United States – Alabama, Georgia, Mississippi and South Carolina

Final Environmental Assessment—June 2020

Agency Contact:

Anne Lebrun
National Policy Manager
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road
Riverdale, MD 20737-1231

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I. Introduction

A. Background

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) is considering options for actions it can take to assist with control and treatment of cogongrass (*Imperata cylindrica*) in order to slow the spread of this noxious weed. A noxious weed is defined as "any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment" (7 Code of Federal Regulations (CFR) § 360). Since cogongrass is regulated as a Federal Noxious Weed, it is restricted from entry into the United States.

Cogongrass is an aggressive exotic perennial grass found throughout the world. Cogongrass usually grows in warm or tropical areas and is widely distributed on all continents except Antarctica (Bryson and Carter 1993). USDA-APHIS estimates approximately 82 percent of the United States and 12 percent of Canada is suitable for the establishment of cogongrass (Figure 1) (USDA-APHIS 2018).

Cogongrass is naturalized and invasive in the United States. It has been reported in 12 states (Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Virginia) but is primarily in the southeastern United States (Kartesz 2015). It entered Alabama, Mississippi, and Florida on separate occasions, both accidental and intentional, in the early to mid-1900s (Bryson and Carter 1993). Since its introduction, it has spread to infest one million acres in Florida and tens of thousands of acres in Alabama, Georgia, Louisiana, Mississippi, South Carolina, and Texas (Miller 2007). Cogongrass is found in both natural and disturbed areas including around homes, on public properties, paved and unpaved roadways, forestland, stream banks, and farmland. It spreads rapidly, reducing forest productivity, harming wildlife habitat and native ecosystems, encroaching in pasture and hayland, and impacting rights-of-way (USDA 2014), and is considered one of the world's ten worst weeds (Brewer 2008).

Cogongrass assimilates CO_2 by the C_4 photosynthetic pathway, which broadens its ecological range in various soil types, sunlight levels, and moisture contents (Burrell et al. 2015). Cogongrass prefers full sun but can thrive in moderate shade. It also can tolerate dry periods or

moist soils (Bryson and Carter 1993). Plants vary from 1–4 feet in height. Leaves are 0.5–1 inch wide and 12–30 inches long. The leaves are yellowish green with short stems; the leaves may turn a reddish color in the fall (USDA 2014).

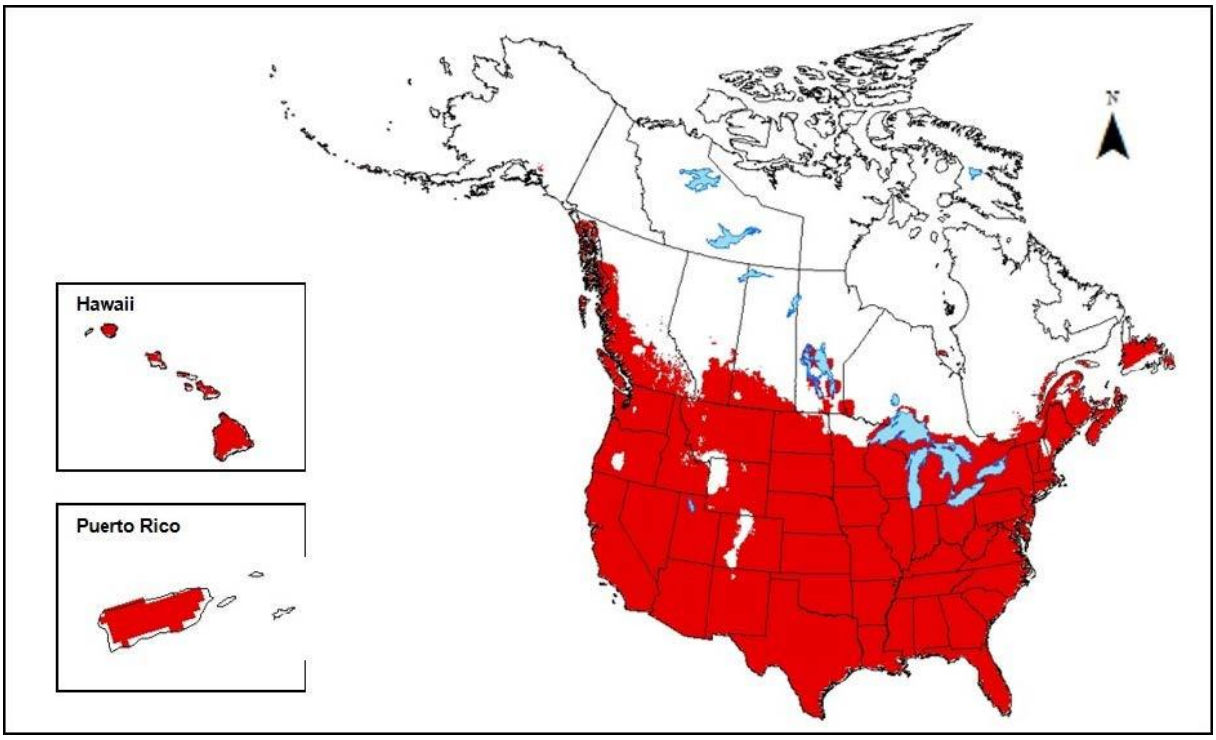

Figure 1. Potential geographic distribution of cogongrass in the United States and Canada.

Cogongrass reproduces both sexually and asexually (Bryson and Carter 1993). Cogongrass is the only warm season grass that produces cotton-like seeds in the spring (GFC 2005). Seed heads range from 2–8 inches in length and can contain as many as 3,000 seeds (Bryson and Carter 1993, USDA 2014); however, most seeds are dispersed within 15 meters of the plant (Daneshgar et al. 2008). When not flowering, the root system is its most identifiable feature. Cogongrass has a dense root system with sharp, pointed, and scaly rhizomes (GFC 2005). These rhizomes often pierce the roots of other plants and can extend 48 inches below the soil surface, but more commonly dominate the upper 6–8 inches. These rhizomes make it difficult to eradicate the plant (MacDonald 2004). Cogongrass rarely grows as a single plant; it forms patches or infestations from its rhizomes, often in a circular pattern (USDA 2014).

USDA-APHIS allows the movement of an ornamental variety of cogongrass, which is marketed under the names *Imperata cylindrica* ‘Rubra’, ‘Red Baron’, and Japanese blood grass (Cseke and Talley 2012). Red Baron is commonly grown in the United States (University of Minnesota 2019) and is promoted as an ornamental grass because of its coloration (Missouri Botanical Garden 2019). In general, this variety is sterile and noninvasive; however, after 3 to 10 years

(USDA-APHIS 2018), it can produce viable seed and revert to a green invasive form that is often indistinguishable from cogongrass (Cseke and Talley 2012).

B. Purpose and Need

Due to the impact cogongrass has on the agriculture and forestry industries, Congress has given USDA-APHIS $2,000,000 to partner with several States to control the spread of cogongrass. Therefore, this EA considers programmatic control efforts in the following southeastern States: Alabama, Georgia, Mississippi, and South Carolina. While it is unlikely that cogongrass can be eliminated from southern regions where plant populations are large and common, active control and eradication programs along the edge of the naturalized distribution area may be successful (USDA-APHIS 2018).

In order to manage cogongrass effectively, an integrated management strategy is necessary (Dozier et al. 1998, MacDonald 2004). This strategy generally includes preventative, cultural, mechanical, biological, and chemical methods (MacDonald 2004). USDA-APHIS discusses the integrated management programs in each of the four States in the program area below.

1. Alabama

Alabama is the most highly infested of the states in the program area (Figure 2). Cogongrass occupies an estimated 200,000 acres in the State, and 75 percent of the infested lands are forests. The yearly loss of productivity in forests is estimated at $50/infested acre, or $7.5 million (Miller 2004). The Alabama Forestry Commission was awarded a $6.3 million grant to establish a cogongrass control program in Alabama through a 2009 American Recovery and Reinvestment Act grant. Considering the number of acres already infested at that time, the Alabama Forestry Commission estimated cogongrass management costs to exceed $50 million (AFC 2009). As a result, the funds allowed the State to have an active control program from 2010–2012 (Enloe and Loewenstein 2014). The State would like to obtain additional funding for cogongrass management and has requested USDA-APHIS funds to pay for outreach, surveys, and chemical treatments.

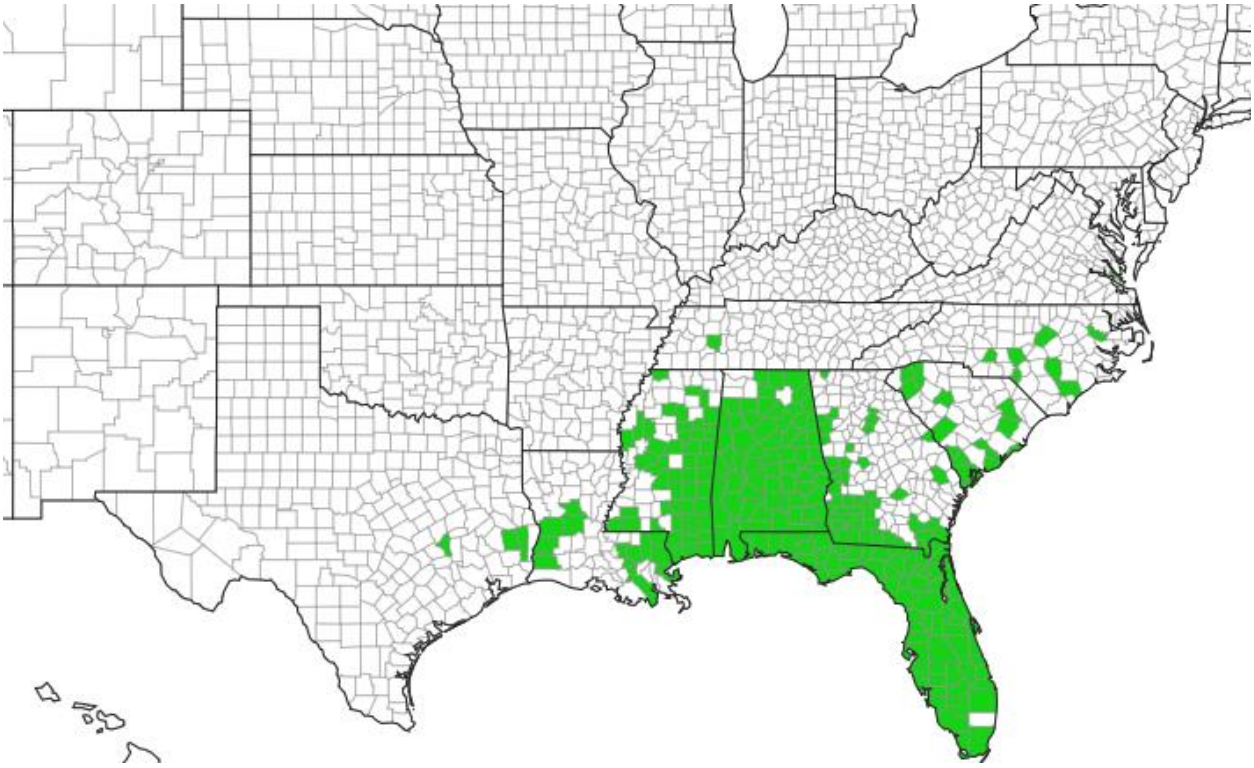

Figure 2. Map of cogongrass locations in the southeastern United States (Source: https://www.eddmaps.org/distribution/uscounty.cfm?sub=2433)

2. Georgia

The majority of cogongrass in Georgia is located in the southwest corner (Figure 3). Hurricane Michael devastated this southwest area in 2018, which resulted in further spread of cogongrass (natural and human-caused disturbances). The most common sites with cogongrass are thinned pine stands (74%), road and utility rights-of-way (18%), and open areas such as pastures/pond dams. An additional 8 percent of cogongrass detections have been in unique locations such as pastures, pond dams, urban landscapes, flowerbeds, welcome centers, wildlife food plots, and within the sand dunes along the coast (McClure, 2018). Out-of-state logging trucks and equipment used for thinning pine stands is the primary method of spreading cogongrass in Georgia.

Georgia has identified approximately 100 new detections of cogongrass each year since 2008. In 2018, there were 91 new detections, bringing the number of known cogongrass sites in the state to 1,256, scattered across 61 counties (McClure, 2018). Sixteen new cogongrass detections were confirmed from January 1, 2019 through March 20, 2019, bringing the statewide total to 1,272. Spot size in 2019 has ranged from 0.05 acres to 2.5 acres, with an average of 0.23 acres (McClure, 2019). Decatur County has the highest number of sites (McClure, 2018). The Georgia Forestry Commission follows the USDA-APHIS Plant Protection and Quarantine protocol of

three consecutive years of no cogongrass re-sprouting to call the site eradicated. Presently, 814 spots have been eradicated, 127 spots have been negative for two years, and 126 spots have been negative for one year, with the remaining 189 spots classified as active. Overall, approximately 85% of all known spots are now negative for cogongrass (McClure, 2018).

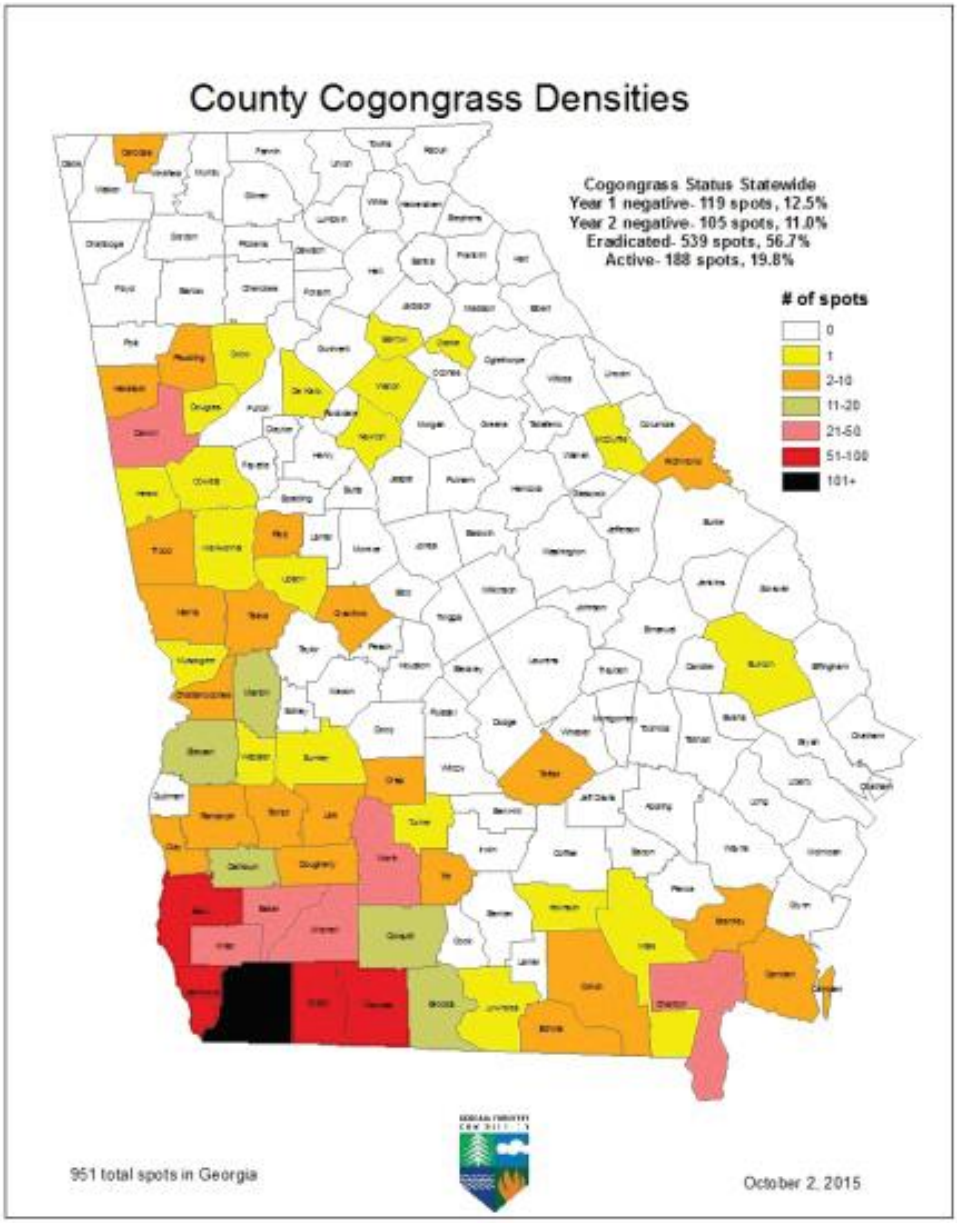

Figure 3. Map of known cogongrass detections and densities in Georgia in 2015. (Source: https://www.fs.fed.us/foresthealth/docs/fhh/GA_FHH_2015.pdf)

The Georgia Forestry Commission treats new cogongrass detections for landowners at no cost. Georgia has requested USDA-APHIS funds to pay for salary and travel (scouting and treating),

herbicide treatments (foliar, roots), equipment replacement, and supplies. Prescribed fire may be used in the winter months to eliminate the heavy thatch common with cogongrass infestations and allow herbicides to be applied directly to new growth (McClure, 2018).

3. Mississippi

Mississippi has 28 counties with significant cogongrass infestations (Figure 4). Between 2010 and 2015, 30,063 infestations were identified and treated, which covered 4,023 acres. Each treated infestation was approximately 0.14 acres (MFC 2016). The Mississippi Forestry Commission (MFC) is currently working in Forrest and Lamar counties to control the spread of cogongrass. Landowners submit applications to request treatment of cogongrass infestations. MFC program representatives map the infestations and then coordinate with contractors for herbicide treatment. The Mississippi Department of Agriculture and Commerce (MDAC) posted herbicide application guidelines on their website - http://www.mdac.state.ms.us/wp-content/uploads/bpi_plant_cong_trt.pdf. The plan provides guidance for the use of imazapyr in areas without hardwood trees and glyphosate in areas with hardwoods. MDAC's proposal indicates that they will purchase herbicide and distribute it to landowners.

4. South Carolina

Cogongrass was first detected in South Carolina in 1987 in Hampton County. Since 2004, Clemson University's Department of Plant Industry (DPI), the regulatory agency for plant protection in South Carolina, has been working on cogongrass control, eradication, outreach, and education through a cooperative agreement with the South Carolina Forestry Commission. While DPI treats all reported infestations, new detections are found each year. An active management program for cogongrass is currently ongoing in the following 13 counties: Pickens, Dorchester, Greenville, Anderson, Colleton, York, Aiken, Florence, Allendale, Hampton, Beaufort, Williamsburg, and Charleston (Figure 5). Within these counties, cogongrass has been found in natural and agronomic areas of the State, as well as in contaminated nursery stock.

The Cogongrass Task Force conducted a volunteer survey from 2008–2018 with more than 2,000 participants covering more than 43,000 miles of highways, secondary roads, residential properties, and public lands. These surveys helped the State find and treat new detections (Clemson University 2019); however, the funding for this survey program ended in September 2018.

DPI requests funding from USDA-APHIS to continue a cogongrass survey, control, eradication, and monitoring program to prevent cogongrass from colonizing important natural and agricultural ecosystems in the State in all 46 counties. With USDA-APHIS funding, DPI would train volunteers to survey cogongrass, conduct treatments on all property that is public or with private landowner permission, and provide cogongrass removal guidance to homeowners in residential areas and South Carolina Department of Transportation personnel. Non-chemical methods of cogongrass removal could include:

- Mowing in residential lawns or areas where vegetation cannot tolerate herbicides;
- Cultivation;
- Deep burial, especially in nursery stock; and,
- Burning to remove thatch as a pre-treatment option.

USDA-APHIS has the responsibility for taking actions to exclude, eradicate, and control plant pests under the Plant Protection Act of 2000 (7 United States Code (U.S.C.) 7701 et seq.). This EA was prepared consistent with the National Environmental Policy Act of 1969 (NEPA) and the APHIS NEPA implementing procedures (7 Code of Federal Regulations (CFR) part 372) for the purpose of evaluating how the proposed action, if implemented, may affect the quality of the human environment. The proposed action does not meet the criteria for actions normally requiring an environmental impact statement (7 CFR § 372.5(a)) based on the lack of significant impacts to the human environment associated with the deployment of control program methodologies.

This environmental assessment (EA) examines the environmental effects associated with the program alternatives. USDA-APHIS will use this EA for planning and decision-making, in addition to informing the public about the environmental effects of the various actions. Program actions would take place in areas with cogongrass infestations. If a State proposes any new control methods in the future, USDA-APHIS would analyze these methods in a separate EA.

USDA-APHIS prepared a draft EA that was published in regulations.gov on March 2, 2020 to begin a 30-day public comment period. USDA-APHIS also released an announcement through its stakeholder registry announcing availability of the draft EA. USDA-APHIS received 11 comments during the public comment period. Comments received were from various Alabama and Mississippi state agencies as well as from the State Group of Southern Foresters, National Alliance of Forest Owners, Mississippi Farm Bureau Federation and Forest Landowners. Comments were similar in nature between the various commenters and were grouped together with a USDA-APHIS response in Appendix 1.

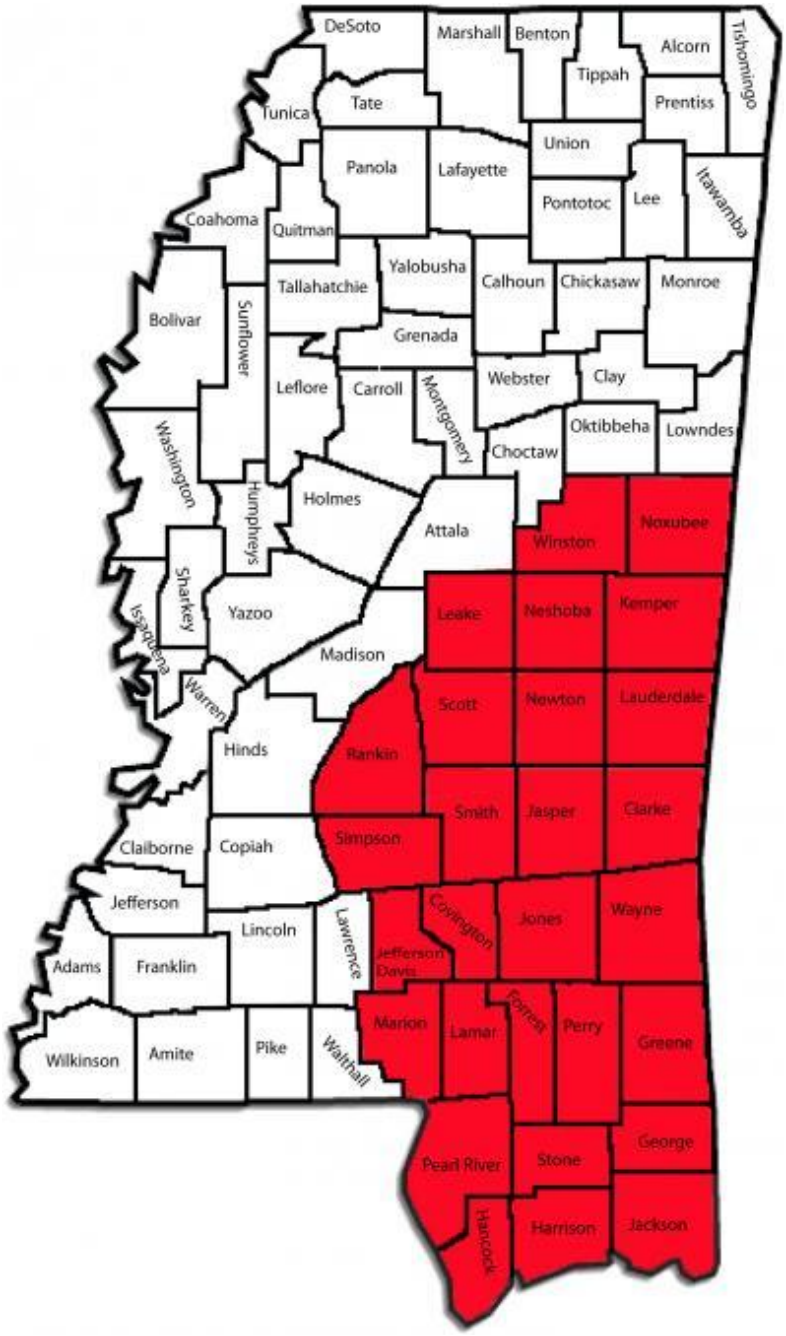

Figure 4. Mississippi counties with significant cogongrass infestations. (Source: Mississippi Department of Agriculture and Commerce)

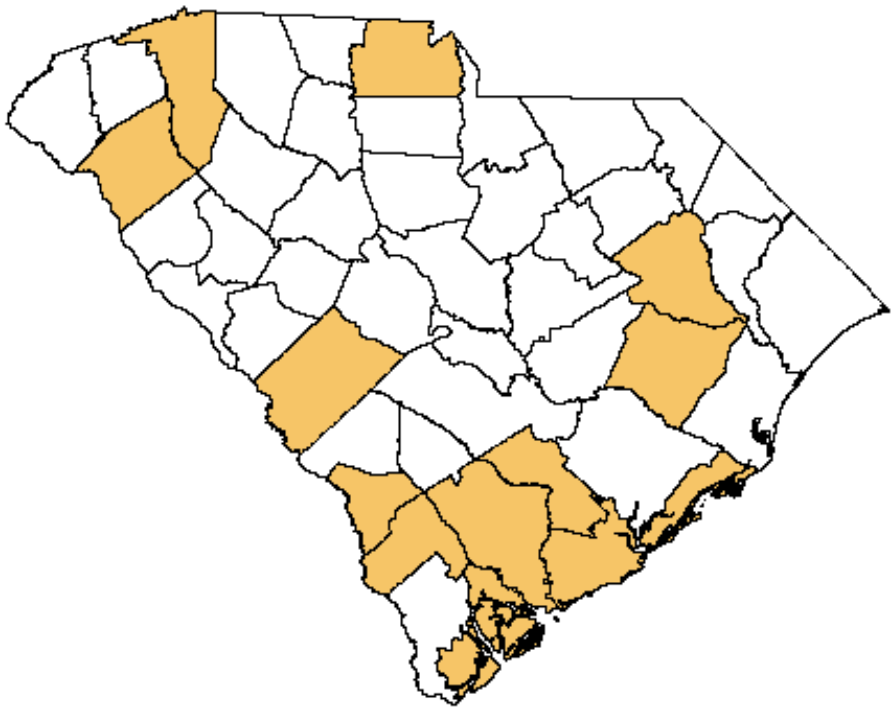

Figure 5. South Carolina cogongrass infestations by county. (Source: USDA APHIS, 2019)

II. Alternatives

A. No Action Alternative

NEPA regulations (40 Code of Federal Regulations (C.F.R.) §§ 1508.25) require the scope of analysis to include a no action alternative in comparison to other reasonable courses of action. Under the no action alternative, USDA-APHIS would not provide funding toward the eradication of cogongrass in Alabama, Georgia, Mississippi, and South Carolina. Cogongrass control program activities would still occur in most states, but on a smaller scale. Since there are not any intrastate or interstate regulations regarding quarantines or restrictions for cogongrass infested areas, cogongrass would likely continue to spread in and across southeastern states under this alternative. With limited state funding for cogongrass management programs, cogongrass spread could continue outside of its current range and expand to other areas of the United States (figure 1).

B. Preferred Alternative

Under the preferred alternative, USDA-APHIS would provide funding toward cogongrass management in Alabama, Georgia, Mississippi, and South Carolina. This integrated management program would consist of preventative (e.g., education and outreach), cultural (e.g., burning),

mechanical (e.g., tilling, mowing, disking), and chemical (e.g., herbicide) methods. Glyphosate (Roundup®, Glypro®, Accord®, etc.) and imazapyr (Arsenal®, Arsenal® AC, and Chopper®) are the most effective herbicides to use on cogongrass. Cogongrass often regenerates within a year following a single application of either herbicide; therefore, a minimum of two applications per year is necessary. Older infestations may require 2–3 years of treatment to eliminate rhizomes (McClure and Johnson 2010, University of Georgia 2018). Subsequently, broadcast or spot treatments could be made 1–3 years following initial treatment depending on the age and size of the spot, and which herbicide treatment the State used. All herbicide applications will follow pesticide label requirements and other applicable Federal and State laws.

Cultural methods such as burning cannot alone kill cogongrass, and instead will encourage its rapid regrowth. As part of an integrated management plan, however, burning is useful. Removal of cogongrass forces the rhizomes to use stored carbohydrates to produce new growth, causing the rhizomes to weaken. This improves the success of other treatment methods such as tillage and herbicide application (Howard 2005). Prescribed burns are used in pine plantations during winter months to eliminate logging debris and cogongrass thatch prior to herbicide application in the spring (University of Georgia 2018).

Mechanical methods such as mowing, tilling, and disking are useful in controlling cogongrass when combined with other treatment methods. In one study, researchers found disking alone provided short-term control of cogongrass, but disking and imazapyr application provided 96 percent control of cogongrass one year after treatment. Mowing in late spring to remove old growth and thatch, followed by disking 6 to 8 weeks later, was also effective (Shilling et al. 1997).

Each state in the program area has enacted or is exploring numerous preventative methods to keep cogongrass from entering new areas. Education and outreach methods may occur via billboards, magazines, websites, newsletters, video campaigns, educational spots on radio news networks, brochures, presentations, workshops, and field days. Additionally, South Carolina is exploring the use of regulatory actions for the interstate and intrastate movement of cogongrass, including cultivars. Regulatory actions could consist of stop-sale orders, seizure orders, and destruction orders.

III. Potential Environmental Consequences

The affected environment occurs in Alabama, Georgia, Mississippi, and South Carolina. This section evaluates at a broad scale the potential environmental impacts associated with each of the alternatives in these states. The no action alternative is compared to the potential of the preferred alternative to affect human health, nontarget species (including threatened and endangered species), and environmental quality. This EA presents a short description of the environmental

baseline for each environmental resource analyzed, followed by an analysis of the potential environmental impact to that resource. The potential impacts may be direct, indirect, or cumulative, and of short or long duration. The impacts may also be either beneficial or adverse.

A. No Action Alternative

This subsection considers the potential environmental consequences under the no action alternative by summarizing information associated with the physical environment, biological resources, human health and safety, environmental justice, Tribal consultation, and historic and cultural resources.

1. Physical Environment

The southeastern United States is known for its hot and humid climate, abundant water resources, and biodiversity (Sun et al. 2013). Mississippi and Alabama are located on the coast of the Gulf of Mexico and on the southern end of the flat plains of the central United States (NOAA 2019c, NOAA 2019a). Georgia is the largest state in the land area east of the Mississippi River and has elevation ranges from sea level along the Atlantic coast to more than 4,700 feet in the Blue Ridge Mountains (NOAA 2019b). South Carolina is located adjacent to the Atlantic Ocean and has the Appalachian Mountains to the north and west (NOAA 2019d).

Relatively mild winters, hot summers, and year-round precipitation are a predominant part of Alabama and Mississippi's climate (NOAA 2019b, NOAA 2019d). In the summer, daytime high temperatures in Alabama typically range from 85 to 95°F. In recent decades, the number of days with the daytime temperature at or above 95°F has been below the number of days experienced during the 1930s and early 1950s (NOAA 2019d). Alabama receives an average of 55 inches annually, with some areas of the east-central and west-central part of the State receiving less rain, and areas along the coast receiving the most rain (Hairston et al. 2018, NOAA 2019d). Statewide average annual precipitation in Mississippi is approximately 56 inches, ranging from 50 inches in the north to 65 inches along the coast. The years 2015, 2016, and 2017 were the 10th, 3rd, and 6th warmest years on record, respectively (NOAA 2019b).

Temperature varies substantially across Georgia. Inland cities experience high summer temperatures with an average of 20 days per year exceeding 95°F. In contrast, areas in the Appalachian Mountains average less than one day. In 2012, Georgia experienced its 3rd hottest year on record. Georgia receives frequent precipitation throughout the year, with annual averages ranging from upwards of 80 inches in the mountainous northeastern corner of the State to around 45 inches in the eastern and central parts (NOAA 2019b).

South Carolina has a humid climate with hot summers and mild winters. The Appalachian Mountains partially shield the State from cold air masses approaching from the northwest, which causes somewhat mild winters. The average annual temperature ranges from the mid-50s (°F) in the mountains to the mid-60s (°F) along the coast. Temperatures in South Carolina have

increased approximately 0.5°F since the beginning of the 20th century (NOAA 2019d). South Carolina has an annual average of 56 inches of rain (SCDNR undated).

Climate change has the potential to further the invasion of nonnative plant species in forest and rangelands due to increased stress to native species and ecosystems (Kerns and Guo 2012). Temperatures across the southeast are expected to increase this century with significant increases in the number of hot days (95 degrees F or above) and decreases in freezing events (Carter et al. 2014). Because the southeast is located in the transition zone between predicted wetter conditions to the north and drier conditions to the southwest, future precipitation patterns are uncertain. However, the net water supply is expected to decline over the next several decades (Carter et al. 2014).

Air

The Clean Air Act (CAA) is the primary Federal law that protects the Nation's air quality for the purposes of public health and welfare. The CAA requires the U.S. Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) for specific pollutants. These pollutants are known as criteria pollutants, and they include ozone, particulate matter, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide (SO_2), and lead. The NAAQS are intended to represent the maximum concentration of a particular pollutant in the ambient air that will not adversely impact public health or welfare. The stringency of air pollution regulations in a particular area is based upon whether that area is in attainment (e.g. compliance) or nonattainment (e.g. not in compliance) with the NAAQS. National levels of criteria pollutants have been trending downward from 1990 to 2006 (Figure 6).

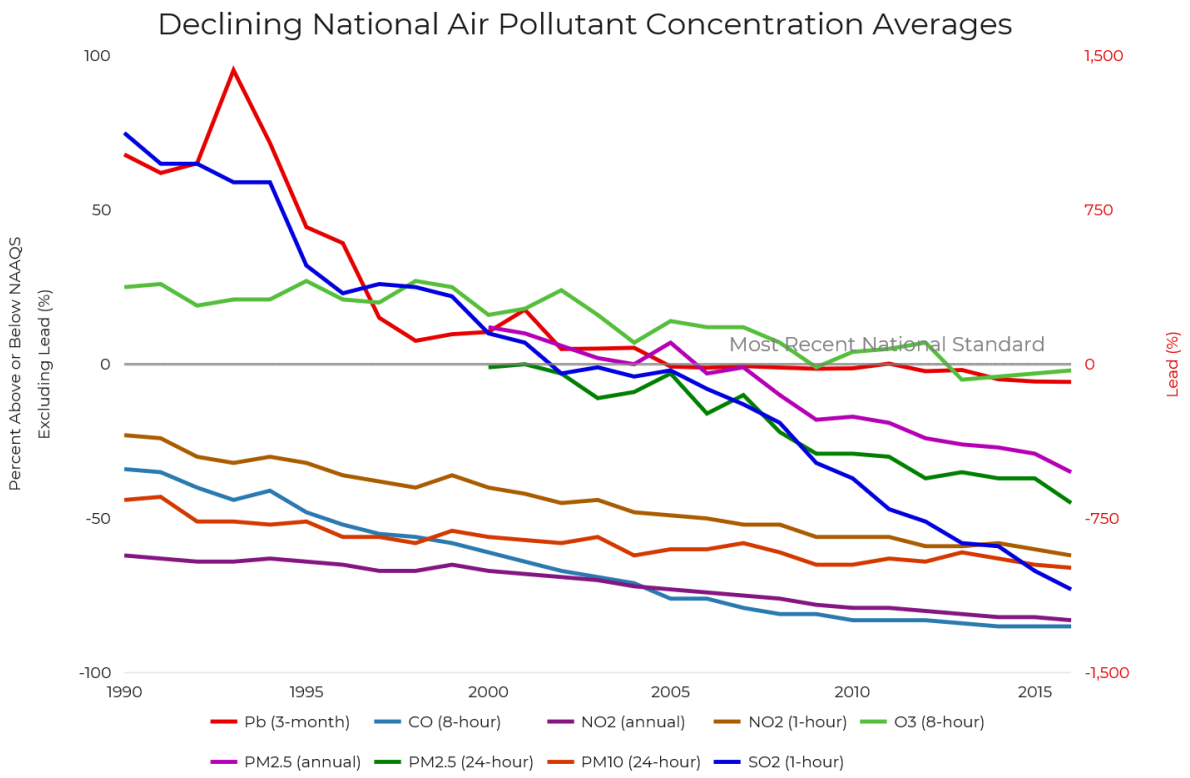

Figure 6. National levels of criteria pollutants from 1990-2016. Source: USEPA (https://gispub.epa.gov/air/trendsreport/2017/#highlights)

Greenhouse gases impact air quality; these gases include carbon dioxide (CO_2), methane, nitrous oxide, and fluorinated gases. Global atmospheric concentrations of these gases have risen significantly over time (USEPA, 2016). Figure 7 shows the increasing concentration of CO_2 in the atmosphere from 800,000 BCE to 2015.

Increased air pollution with higher carbon dioxide levels facilitates cogongrass growth. In one study, elevated CO_2 levels led to increased height, biomass, and nitrogen and water use efficiencies in cogongrass while lowering tissue nitrogen concentrations; these results are typical C_4 plant responses to elevated CO_2. Notably, the 'Red Baron' ecotype did not respond similarly to elevated CO_2 levels (Runion et al. 2016).

In general, grass invasions can lead to the replacement of woody vegetation, which subsequently leads to higher canopy and surface temperatures and lower relative humidity. These changes in microclimate favor the growth of C_4 species, such as cogongrass, and also favors fire. Nonnative grasses recover more quickly than native species, which further increases an area's susceptibility to fire (D'Antonio and Vitousek 1992).

Cogongrass is highly flammable. It burns hot and can subsequently kill seedling trees and native plants. Hot-burning fires can also stress mature trees, which can lead to disease and insect

infestation (USDA 2014). Climate change may increase wildfire prevalence in areas infested with cogongrass (Bradley and Wilcove 2009); increased wildfire is another factor that impacts air quality (Miller 2004). Under the no action alternative, USDA-APHIS will not fund activities that could decrease the frequency of wildfires.

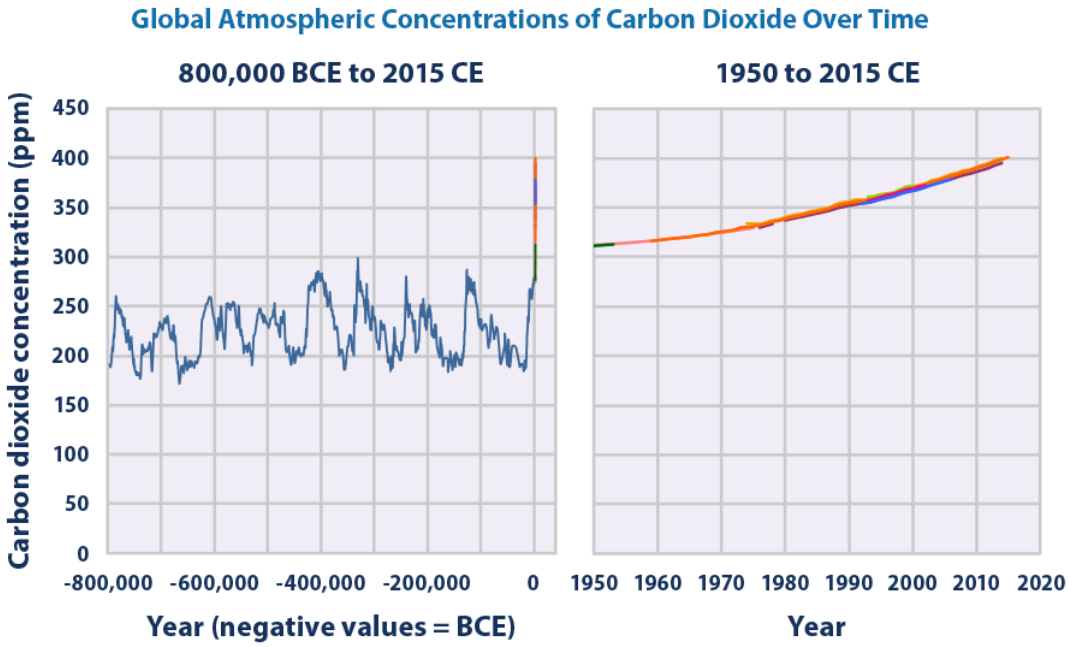

Figure 7. Global atmospheric concentrations of carbon dioxide (CO_2) from 800,000 BCE to 2015, measured in parts per million (ppm). Source: USEPA (https://www.epa.gov/climate-indicators/climate-change-indicators-atmospheric-concentrations-greenhouse-gases).

Water

The Clean Water Act, the Safe Drinking Water Act, and the Water Quality Act are the primary federal laws protecting the Nation's waters. Federal activities also must seek to avoid or mitigate actions that would adversely affect areas immediately adjacent to wild and scenic rivers (National Wild and Scenic Rivers Act of 1968, as amended (16 U.S.C. §§ 1271-1287)).

Surface water runoff can affect surface water (e.g., streams) quality by depositing sediment, minerals, or contaminants into water bodies. Meteorological factors such as rainfall intensity and duration, and physical factors such as vegetation, soil type, and topography influence surface water runoff (USGS, 2016). Groundwater (e.g., aquifer) levels vary seasonally and annually depending on hydrologic conditions. Groundwater is ecologically important because it supplies water to wetlands, and through groundwater-surface water interaction, groundwater contributes flow to surface water bodies (USGS, 1999).

The U.S. Geological Survey estimates approximately 10 percent of the freshwater resources in the continental United States originates in or flows through Alabama. The State's rivers and streams are used for hydroelectric power, thermonuclear power plant cooling, navigation, recreation, consumption, and commercial and industrial needs. Historically, annual groundwater discharge has been equal to groundwater recharge by rainfall; however, in the last 20 years, additional discharge of water for human use and drought has led some areas to have a gradual drop in ground water levels (Hairston et al. 2018). Alabama's groundwater supply is stored in 19 major aquifers or aquifer systems across the State. Most groundwater is of good quality, except for some highly mineralized waters underneath the Blackland Prairie area of west Alabama (Hairston et al. 2018).

Polluted runoff, known as nonpoint source pollution, occurs when rainfall picks up contaminants such as sediment, nutrients, or bacteria on its way to lakes, rivers, wetlands, coastal waters, and ground water. Nonpoint source pollution occurs from activities such as fertilizing a lawn, constructing roads, not picking up pet waste, and improperly managed livestock, crop, and forest lands. Today, states report that nonpoint source pollution is the leading cause of water quality problems (USEPA 2018). In Alabama, the most common nonpoint source pollution water quality impairments are bacteria, nitrogen, phosphorous, and sediment (ADEM 2014).

In South Carolina, most of the groundwater is located in the Coastal Plain (the area between the ocean and the Fall Line), while most of the surface water is located in large, manmade reservoirs on major rivers, in addition to rivers and streams. South Carolina has four major river basins (SCDNR undated). Lakes in South Carolina are constructed for flood control, water supply, hydropower generation, and recreation. The coastal plain aquifers serve as a source of water for public supply, commerce, industry, irrigation, livestock, aquaculture, and mining. The Piedmont region (the area above the Fall Line) lacks the porous sediments that form aquifers in the Coastal Plain (SCDNR undated). Water quality in the State is generally of good quality (USEPA 2019). In 2008, South Carolina developed a Coastal Nonpoint Pollution Control Program, which eventually merged with the statewide Nonpoint Pollution Control Program. The most common measured nonpoint source of pollution in South Carolina is *E. coli* bacteria. Other common pollutants include phosphorous and nitrogen, pesticides, oil and grease, toxic chemicals, and heavy metals (SCDHEC 2018).

Mississippi has abundant water supplies, which the State considers to be one of its most important and valuable natural resources. There are 16 major aquifers and several minor aquifers in Mississippi (MDEQ 2015). Mississippi also has nine major river basins (MDEQ 2019). Water resources in the State are used for public consumption, irrigation, aquaculture, fisheries and aquatic habitat, wetland function, and wastewater assimilation. The heavy use of water groundwater, especially for aquaculture and irrigation, has caused groundwater withdrawals to exceed the recharge rate resulting in water-level declines in some aquifers. The overall quality of

the groundwater resources in the State remains very good (MDEQ 2015); however, nonpoint source pollution consisting of sediment, bacteria, pesticides, fertilizer, pet waste, oil, and other toxic materials is the leading cause of water quality problems in Mississippi (MDEQ 2019).

Georgia also has abundant surface and groundwater resources that are important to the life, health, and economy of Georgia. The State has 14 major river basins. These river basins are used for recreational opportunities, industrial purposes, hydroelectricity, and waste assimilation (GDNR 2015). Georgia also has nine major aquifer systems. The increase in growth and population in Georgia is placing additional demands on the State's ground and surface water, which is further complicated by limited surface water resources in southern Georgia and limited groundwater resources in northern Georgia (GDNR 2015). Nonpoint source pollution affects Georgia's water resources and consists of sediment, litter, bacteria, pesticides, fertilizers, metals, oils, surfactants, and other pollutants (GDNR 2015).

Elevated CO_2 levels may increase the water use efficiency of cogongrass (Runion et al. 2016), further straining water resources in the program area. Under the no action alternative, USDA-APHIS would not improve water uptake by native plants by removing cogongrass in infested areas.

Soil

The southeastern United States has diverse soils with eight of the 12 soil orders present (Table 1)(Picconi and Swaby 2016).

Table 1. Dominant soil orders of the southeastern United States. (Source: (Picconi and Swaby 2016))

Soil Order	Description	Location in Program Area
Alfisols	Partially leached soils with clay accumulating below surface, commonly separating humid areas from arid ones. Widely distributed.	South Carolina, Georgia, Alabama, Mississippi
Entisols	Soils of recent origin with poorly developed horizons typically near floodplains. Common in Coastal Plain region and along streams and river valleys.	South Carolina, Georgia, Alabama, Mississippi
Inceptisols	Soils with poorly developed horizons associated with steep slopes and erosion-resistant parent material. Concentrated in the Blue Ridge and Piedmont regions.	South Carolina, Georgia, Alabama, Mississippi
Histosols	Carbon-rich soils where half or more of the upper 80 cm is organic. Poor drainage creates conditions of slow	Rare in South Carolina, Alabama, and Mississippi

Soil Order	Description	Location in Program Area
	decomposition and peat (or muck) accumulates.	
Mollisols	Dominant soils of grasslands with thick, organic-rich surface layer.	Rare in South Carolina and Alabama
Spodosols	Acidic soils with an accumulation of iron and aluminum in the humus. Soils support cool, moist coniferous stands of forest and are located along the Atlantic Coastal Plain.	South Carolina and Georgia
Ultisols	Weathered soils rich in the clay mineral kaolinite. Soils form in warm, humid climates with distinctive wet-dry seasons. Most common soil in the southeast. Often supports forest vegetation.	South Carolina, Georgia, Alabama, Mississippi
Vertisols	Clayey soils with high shrink swell capacity. Associated with the Black Belt agricultural region and the Mississippi River Valley.	Alabama and Mississippi

Cogongrass tolerates a wide range of soil conditions including course sands of shorelines, fine sands or sandy loam soils of swamps and river margins, and >80 percent clay soils of reclaimed phosphate settling ponds (MacDonald 2004). Cogongrass also has invaded many southeastern sandhill ecosystems with soils ranging from loamy sands over clay to well-drained low-nutrient sands (Lippincott 2000) and is now considered naturalized in much of the southeastern Coastal Plain (Bryson and Carter 1993).

Cogongrass appears to be extremely efficient in nutrient uptake (Saxena and Ramakrishnan 1983), and may be a better competitor for phosphorus than native pine-savanna species (Brewer and Cralle 2003). In one study, the abundance of mycorrhizal fungi and fine feeder roots were significantly reduced in commercial loblolly pine (*Pinus taeda*) stands when cogongrass was present (Trautwig et al. 2017) through production of exudates that may have an allelopathic effect (Holzmueller and Jose 2011, Hagan et al. 2013). This likely contributes to a lower microbial density and a reduction in the rate of nutrient cycling. It also may affect the soil nutrients present. Over time, this could lead to plant communities that are more susceptible to disease and secondary invasion (Trautwig et al. 2017).

Under the no action alternative, USDA-APHIS would not positively or negatively impact the soils in the program area.

2. Biological Resources

Biological resources include plant and animal species and the habitats where they live. For this EA, biological resources will focus on plants, wildlife, and protected species. The plant and wildlife subsections include both native and non-native species. Protected species refers to migratory birds protected under the Migratory Bird Treaty Act of 1918 (MBTA), as amended, and threatened and endangered species and their critical habitats as protected under the Endangered Species Act (ESA).

Vegetation

Ecoregions are areas where ecosystems are generally similar (USEPA 2016). There are several ecoregions within the program area, and USDA-APHIS identifies them in Table 2. These ecoregions have a variety of vegetation types including pine and hardwood woodlands, cropland, pastures, and forests.

Table 2. Level III Ecoregions in Alabama, Georgia, Mississippi, and South Carolina. (Source: (USEPA 2000d, USEPA 2000a, USEPA 2000b, USEPA 2000c))

State	Ecoregion	Description
Alabama	Piedmont	Historically cultivated, but much of the region has reverted to pine and hardwood woodlands.
	Southeastern Plains	Irregular plains with cropland, pasture, woodland, and forest. Natural vegetation is mostly oak-hickory-pine and southern mixed forest.
	Ridge and Valley	Forests cover approximately 50% of the region.
	Southwestern Appalachians	Mosaic of forest and woodland with some cropland and pasture. Mixed mesophytic forest in deep ravines and escarpment slopes. Upland forests dominated by mixed oaks with shortleaf pine.
	Interior Plateau	Primarily oak-hickory forest with some bluestem prairie and cedar glades.
	Southern Coastal Plain	Historically covered by a forest of beech, sweetgum, southern magnolia, slash pine, loblolly pine, white oak, and laurel oak, but is now mostly longleaf-slash pine forest, oak-gum-cypress forest in some low lying areas, pasture for beef cattle, and urban development.
Georgia	Piedmont	See above
	Southeastern Plains	See above

State	Ecoregion	Description
	Blue Ridge	One of the most floristically diverse ecoregions with Appalachian oak forests, northern hardwoods, and southeastern spruce-fir forests. Shrub, grass, and heath balds, hemlock, cove hardwoods, and oak-pine communities also occur.
	Ridge and Valley	See above
	Southwestern Appalachians	See above
	Southern Coastal Plain	See above
Mississippi	Southeastern Plains	See above
	Mississippi Alluvial Plains	Historically, bottomland deciduous forest covered the region. Presently, most of the northern and central parts of the region are in cropland with soybeans, cotton, and rice as the major crops.
	Mississippi Valley Loess Plains	Irregular plains with oak-hickory and oak-hickory-pine natural vegetation. Mississippi has a mosaic of forest and cropland.
	Southern Coastal Plain	See above
South Carolina	Piedmont	See above
	Middle Atlantic Coastal Plain	Some swampy or marshy areas. Forest cover is predominantly loblolly-shortleaf pine with patches of oak, gum, and cypress near major streams. Central and southwestern parts of the region have 15 percent of land in cropland; northeastern part has 20–40 percent in cropland.
	Southeastern Plains	See above
	Blue Ridge	See above
	Southern Coastal Plain	See above

Cogongrass is a competitive plant that grows in many of the ecoregions defined in table 2. In some agricultural areas where tilling is not possible, cogongrass reduces the growth of some crop plants by 85 to 96 percent (MacDonald 2004). In root and tuber crops such as cassava and yam, cogongrass not only reduces crop yield through direct competition, but its sharp rhizomes also facilitate fungal infections by wounding crop roots and tubers. In some regions, growers have abandoned their farmland because of cogongrass infestations (Terry et al. 1997).

Cogongrass seed is also capable of growing in established plant communities. Cogongrass often invades and spreads rapidly through longleaf pine savannas and similar habitats. The longleaf pine savanna ecosystem, a species rich but rare sandhill ecosystem in the southeastern United States, is vulnerable to cogongrass invasion. The ecosystem is fire-dependent; however, burning favors cogongrass establishment. Cogongrass recovers from fire more rapidly than native vegetation, which increases the potential for cogongrass to replace native species (Lippincott 2000, Brewer 2008). Additionally, cogongrass increases the amount of shade native groundcover species receive (99% at ground level), causing displacement of this short vegetation (Brewer 2008). Some studies suggest that cogongrass has the ability to displace most sandhill vegetation, which would cause a shift toward a tree-less, fire-prone grassland (Lippincott 2000).

Cogongrass also appears to be able to outcompete *P. taeda* seedlings. Daneshgar et al. (2008) reported that while competition from both native species and cogongrass prevents pine seedlings from reaching their full growth potential, cogongrass competition affects the physiological function of the pine seedlings more than competition from native species. Pine seedlings in study areas with cogongrass had lower rates of light-saturated photosynthesis than pine seedlings without cogongrass. The researchers also determined that cogongrass reduced water availability for pine seedlings and caused a reduction in levels of foliar nitrogen. The decrease in photosynthesis in pine seedlings caused by water stress, a reduction in nutrients, or both, indicates belowground stress from cogongrass. This research indicates the intensity of resource competition belowground between cogongrass and pine seedlings could be far greater than resource competition between pine seedlings and native vegetation (Daneshgar et al. 2008).

Under the no action alternative, USDA-APHIS will not provide funding for control of cogongrass. While some states are funding components of a coordinated cogongrass program on their own, other states lack the funds to get started or to continue the work they have been doing. Without USDA-APHIS funding, cogongrass will continue to outcompete native species, which has the potential to fundamentally shift the health and the make-up of the ecosystems in the southeast.

Wildlife

(1) Overview

Due to the diverse habitats in the cogongrass management program area, there is also a diverse array of wildlife species. Alabama is home to 62 native mammal species, of which more than half are rodents or bats (Manno and Paemelaere 2007). Georgia is home to more than 90 species of mammals, with sizes ranging from the American pygmy shrew (*Sorex hoyi*) to the North Atlantic right whale (*Eubalaena glacialis*). Approximately half of the mammals in Georgia are rodents or bats (Castleberry 2005). Common mammals in cogongrass control program area include the Virginia opossum (*Didelphis virginiana*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), North American river otter (*Lontra canadensis*), bobcat (*Felis rufus*), white-tailed deer

(*Odocoileus virginianus*), nine-banded armadillo (*Dasypus novemcinctus mexicanus*), northern short-tailed shrew (*Blarina brevicauda*), and hispid cotton rats (*Sigmodon hispidus*) (Castleberry 2005, Manno and Paemelaere 2007, SCDNR 2015b). Additionally, as many as 100 black bears live in Mississippi (Lindell 2017).

Alabama is home to 450 fish species in 29 families, which is more than any other state or province in North America. This total includes 325 native freshwater species, 15 nonnative freshwater species, and more than 100 marine species. Bass tournaments and other recreational fishing activities, in addition to commercial fishing and catfish farming, generate millions of dollars of revenue for the State's economy (Mettee 2008). Georgia ranks third in the nation for the number of native freshwater species with 265 native species and 19 nonnative species. Georgia's most diverse freshwater fish families are the minnows (Cyprinidae), darters (Percidae), sunfishes (Centrarchidae), suckers (Catostomidae), and catfishes (Ictaluridae) (GDNR 2017). Mississippi is home to more than 289 species of freshwater fish, the majority of which are native (MDWFP Undated). In South Carolina, fish occur throughout the State and support a robust recreational and commercial fishing industry (SCDNR 2015b). South Carolina also has several hundred species of marine fish occurring off its coastal waters (Sanders 2016).

The southeastern United States has the greatest freshwater mollusk diversity in the world (Johnson 2003). Alabama is home to the most diverse fauna of freshwater mussels in North America with as many as 180 species (Garner 2008). Georgia ranks fourth in total diversity with 165 mollusk species (67 snails and 98 mussels) (Johnson 2003). Water pollution, sedimentation, construction of dams, channel dredging, and nonnative species have caused 22 species to be extirpated from Alabama and 27 to become extinct. Only 38 species in Alabama are considered stable (Garner 2008). In Georgia, 12 species of mussels and three species of snails have become extinct, while 46 percent of freshwater snails and 75 percent of freshwater mussels are considered at risk (Johnson 2003).

The richest biodiversity of reptile and amphibian species in the United States is in the southeast (Gibbons and Jensen 2004). Alabama is home to approximately 85 species of native reptiles, including turtles, lizards, snakes, and the American alligator. (*Alligator mississippiensis*). The most widely distributed lizards include the terrestrial ground skink (*Scincella lateralis*), arboreal green anole (*Anolis carolinensis*), and fence lizard (*Sceloperus undulates*). Common snakes include the cottonmouth (*Agkistrodon piscivorus*), copperhead (*Agkistrodon contortrix*), eastern diamondback rattlesnake (*Crotalus adamanteus*), black racer (*Coluber constrictor*), rat snake (*Elaphe obsolete*), and eastern garter snake (*Thamnophis sirtalis*) (Nelson 2010). Georgia includes native reptilian species such as the American alligator, alligator snapping turtle (*Macrochelys temminckii*), loggerhead sea turtle (*Caretta caretta*), gopher tortoise (*Gopherus polyphemus*), and six species of skinks. Georgia also has 41 native species of snakes including the copperhead, cottonmouth, eastern indigo snake (*Drymarchon corais couperi*), eastern worm

snake (*Carphophis amoenus*), and scarlet kingsnake (*Lampropeltis triangulum*) (Gibbons and Jensen 2004). Mississippi has 84 species of reptiles including the American alligator, 29 species of turtles, 41 species of snakes, and 13 lizards (Jones 2017), while South Carolina has at least 36 reptiles that occur throughout the State (Sanders 2016).

Amphibians are abundant in the southeast due to the temperate climates and a variety of terrestrial and aquatic habitats. Alabama is home to approximately 70 species of amphibians (Nelson 2010), while Georgia is home to approximately 80 species, including at least 50 different salamanders (Gibbons and Jensen 2004). Mississippi has 30 species of salamanders, including the two-toed amphiuma (*Amphiuma means*), three-toed amphiuma (*Amphiuma tridactylum*), and Catahoula salamander (*Plethodon mississippi*), the latter of which does not occur in any other state (Keiser 2017). South Carolina has at least 11 amphibian species that occur in the majority of the State (Sanders 2016).

Insects, including pollinators, are a critical part of any ecosystem. There are several hundred butterfly species and more than 1,000 moth species in Georgia. Butterflies and moths are second only to bees and wasps as pollinators of flowers in Georgia. Habitat loss and the use of herbicides present challenges to insects (Thomas 2006). The various ecoregions throughout the program area supports a diversity of insect species, including pollinators, some of which are dependent on plant communities in rare habitats.

Cogongrass outcompetes native grasses and forbs that are important to a variety of wildlife species, subsequently reducing native species biodiversity (Miller 2007, USDA 2014). Because of its high silica content, cogongrass is not useful as a forage crop (USDA 2014). Over time, cogongrass is causing a reduction in white-tailed deer, turkey, dove, squirrel, quail, and rabbit habitat (Miller 2004). However, three native North American skipper butterfly species (Hesperiidae)—the least skipper (*Ancyloxypha numitor*), sachem skipper (*Atalopedes campestris*), and fiery skipper (*Hylephila phyleus*)—make use of cogongrass by feeding on it, in addition to bermudagrass (*Cynodon dactylon*), corn (*Zea mays*), Johnsongrass (*Sorghum halepense*), and St. Augustine grass (*Stenotaphrum secundatum*) (Bryson and Carter 1993).

Cogongrass in the action area, especially in longleaf pine savannas, is having negative impacts on wildlife, including some rare species. Impacts are due to loss of native vegetation from cogongrass or the impacts of cogongrass on natural fire regimes that result in greater fire intensities (Platt and Gottschalk, 2001; Lipinscott, 2000). Cogongrass is not a forage item for the rare gopher tortoise, but it can affect its habitat and ability to navigate to burrows or areas where preferred native herbaceous forage items are available (Basiotis, 2007). Changes in the natural fire patterns in longleaf pine savannas due to cogongrass can also affect native bird species. In particular, ground nesting birds and species such as the red-cockaded woodpecker depend on longleaf pine trees for nesting; these can be lost as a result of fires in cogongrass-dominated

areas (Barnes et al., 2013). Similar impacts would occur for other terrestrial vertebrates and invertebrates that use longleaf pine savannas for food or habitat. Loss of habitat due to monotypic stands of cogongrass and alterations in natural fire cycles would have detrimental impacts to most savanna-dependent species.

(2) Migratory Bird Treaty Act

Federal law prohibits an individual to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird (16 U.S.C. §§ 703-712; 50 CFR § 21).

Mild winters and diverse habitats attract migratory birds in both the winter and summer in the proposed cogongrass control area. Georgia and South Carolina are in the Atlantic Flyway for migratory birds while Alabama and Mississippi are in the Mississippi Flyway (USFWS 2019). The Atlantic Flyway has a variety of ecosystems and more than a third of the human population (National Audubon Society 2019a). In the Mississippi Flyway, more than 325 bird species make a round-trip each year (National Audubon Society 2019b).

Alabama has one of the greatest diversity of birds with 433 species observed. Of these birds, 158 breed in Alabama, 80 species are migrants, and approximately 175 species are winter residents (Haggerty 2007). Georgia has approximately 347 species of birds, and between 90 and 110 of them breed and nest in southern Georgia. In northern Georgia, nearly 130 bird species nest there (Meyers 2005). In South Carolina, there are hundreds of species of birds found throughout the State as permanent or seasonal migrants (Sanders 2016). In Mississippi, management and habitat restoration for unique migratory birds such as the critically endangered Mississippi sandhill crane (*Grus canadensis pulla*) occur (USFWS 2019). The major groups of birds in the cogongrass program area include waterfowl (e.g., ducks, geese, and swans), waders (e.g., herons, bitterns, egrets, ibises, rails, and the wood stork), birds of prey (e.g., osprey, kites, eagles, hawks, and owls), shorebirds and gulls (e.g., plovers, oystercatchers, sandpipers, gulls, and terns), woodpeckers, and perching birds (Haggerty 2007).

Cogongrass displaces native vegetation that can be used by migratory birds, it impedes the movement of small animals, which impacts the prey base for raptors, and it impacts ground-nesting birds. Under the no action alternative, USDA-APHIS will not improve habitat conditions for migratory birds, nor will it inadvertently disturb migratory birds.

(3) Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. § 668) prohibits the take of bald or golden eagles unless permitted by the USFWS. The term “take” is defined as “pursue, shoot, shoot at,

poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" (50 CFR § 22.3). Disturb means to agitate or bother to a degree that causes . . . injury . . . a decrease in its productivity . . . or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior (§ 22.3).

In Georgia, Alabama, South Carolina, and Mississippi, the bald eagle (*Haliaeetus leucocephalus*) is the only regularly occurring eagle (Cornell University 2017b, Cornell University 2017a) In 2003, Georgia had 81 nesting pairs of bald eagles, which resulted in 97 offspring (Meyers 2005). In 2006, 77 nesting pairs of bald eagles were found throughout Alabama (Haggerty 2007). In 2009, 77 active nests were observed in Mississippi (Shannon 2018). South Carolina ranked twelfth in the nation for the number of nesting bald eagle pairs in 2005 with more than 200. In 2016, more than 350 bald eagle nesting pairs were observed (SCDNR 2015a)

USDA-APHIS conducted a literature review and did not find evidence of cogongrass impacting bald eagles. Therefore, the no action alternative is unlikely to have any negative impacts on nesting bald eagles.

(4) Endangered Species Act

Section 7 of the ESA and ESA's implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species, or result in the destruction or adverse modification of critical habitat.

Federally listed species and species proposed for listing in the program area include mammal, bird, reptile, amphibian, fish, insect, crustacean, snail, mussel, and plant species (Appendix 2). The presence of cogongrass in the habitat of certain listed species is known to adversely affect them. Cogongrass displaces native grasses, greatly reducing foraging areas, and forms thick mats so dense that ground-dwelling wildlife such as the black pine snake (*Pituophis melanoleucus lodingi*) has difficulty traversing them (USDOI, FWS, 2015). Cogongrass can replace native plants used for food in Alabama beach mouse (*Peromyscus polionotus ammobates*) habitat (FWS, 2019). Cogongrass outcompetes native grasses and forbs that are important to the eastern indigo snake (*Drymarchon corais couperi*) (USDA, 2014). Cogongrass effectively eliminates gopher tortoise (*Gopherus polyphemus*) food sources and habitat, and disrupts their orientation (Basiotis, 2007). A cogongrass infestation may eliminate gopher tortoise populations if its spread is not checked (Basiotis, 2007). Cogongrass invasion is also a threat to the habitat of the dusky gopher frog (*Rana sevosa*) (FWS, 2015), frosted flatwoods salamander, (*Ambystoma cingulatum*) (USDOI, FWS, 2009) and the reticulated flatwoods salamander (*Ambystoma bishop*) (USDOI, FWS, 2009).

3. Human Health and Safety

Cogongrass presents a risk to homeowners and firefighters due to its highly flammable nature (Miller 2007). In addition, cogongrass poses a fire hazard along highways, which could lead to

excessive smoke and limited visibility to drivers (MacDonald 2004). Residents potentially impacted by cogongrass include farmers, producers, individuals working in other industries, children, and the general public. Table 3 presents demographics for Alabama, Georgia, Mississippi, and South Carolina.

Table 3. Demographics in the Affected Environment

State	Total population[1]	Percent white	Percent black	Percent Hispanic (all races)	Percent language other than English at home	Percent high school graduate or higher	Percent below poverty level[2]
Alabama	4,887,871	69.1	26.8	4.4	5.1	85.3	16.9
Georgia	10,519,475	60.5	32.4	9.8	13.9	86.3	14.9
Mississippi	2,986,530	59.1	37.8	3.4	3.9	83.4	19.8
South Carolina	5,084,127	68.5	27.1	5.8	6.9	86.5	15.4

[1]Based on U.S. Census Bureau data from 2018 estimates (Total Population), last accessed July 8, 2019 https://www.census.gov/quickfacts/fact/table/US/PST045218
[2]Based on the official poverty definition that uses monetary income before taxes and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps). If the total income for a family is less than the threshold, then that family (and every individual in it) is considered in poverty.

Many residents reside in rural areas in the cogongrass control program area. In Alabama, approximately 23 percent of the population lives in rural areas (Rural Health Information Hub 2019a). In Georgia, Mississippi, and South Carolina, approximately 17 percent (Rural Health Information Hub 2019b), 53 percent (Rural Health Information Hub 2019c), and 15 percent (Rural Health Information Hub 2019d) live in rural areas, respectively.

When averaged across each state, between 15 and 20 percent of the residents in the program area live in poverty (Table 3). Poverty levels differ between rural and urban areas, however. In Alabama, the poverty rate in rural areas is 20.1 percent, compared with 15.9 percent in urban areas (Rural Health Information Hub 2019a). In Georgia, the poverty rate in rural areas is 20.3 percent, compared with 13.9 percent in urban areas (Rural Health Information Hub 2019b). In South Carolina, the poverty rate for those living in rural areas is 22.3 percent, whereas it is 14.2 percent in urban areas of the State (Rural Health Information Hub 2019d). In Mississippi, the poverty rate for rural residences is 23.1 percent, compared to 15.9 percent in urban areas (Rural Health Information Hub 2019c).

To effectively control cogongrass, management of it includes the use of herbicides. Extensive research with a variety of herbicides has shown imazapyr and glyphosate to be the two most

effective herbicides for cogongrass control (Dozier et al. 1998). In general, multiple applications are needed to inhibit regrowth from the extensive rhizome system (Dozier et al. 1998).

Under the no action alternative, USDA-APHIS would not fund activities that have the potential to reduce cogongrass infestations. As a result, producers with cogongrass in their pine plantations or farmers with croplands may experience loss of market share, loss of property, and compromised mental and physical health from increased stress. A lack of Federal action could result in adverse economic and health impacts for the public such as higher consumer prices for wood or other agricultural products. While some states have cogongrass control programs currently in place, there would not be an increase in the use of herbicides to control cogongrass under the no action alternative. The potential for exposure of humans to these chemicals would also not increase under this alternative.

4. Environmental Justice

Federal agencies identify and address disproportionately high and adverse human health or environmental impacts of proposed activities, as described in Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Federal agencies also comply with EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO requires each Federal agency, consistent with its mission, to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure its policies, programs, activities, and standards address the potential for disproportionate risks to children. USDA-APHIS developed agency guidance for its programs to follow to ensure the protection of children (USDA-APHIS, 1999). The no action alternative does not pose any highly disproportionate adverse effects to minority or low-income populations, or children.

5. Historic and Cultural Resources

The National Historic Preservation Act of 1966, as amended (16 United States Code (U.S.C.) §§ 470 et seq.), requires Federal agencies to consider the potential for impact to properties included in, or eligible for inclusion in the National Register of Historic Places (36 C.F.R. §§ 63 and 800) through consultation with interested parties where a proposed action may occur. This includes districts, buildings, structures, sites, and landscapes. The no action alternative does not pose adverse effects to these resources.

B. Preferred Alternative

This subsection considers the potential environmental consequences for the preferred alternative by summarizing information associated with the physical environment, biological resources, human health and safety, environmental justice, Tribal consultation, and historic and cultural resources. The specific location of a project is not likely to alter the type or frequency of any direct or indirect impacts.

1. Physical Environment

Air

USDA-APHIS would consider impacts to air resources as significant if they exceeded the NAAQS for particulate matter, ozone precursors, and greenhouse gas emissions. USDA-APHIS anticipates implementation of the preferred alternative could result in short term localized minor impacts to air quality. However, USDA-APHIS would implement mitigation measures to reduce or avoid any minor or temporary negative impacts to air quality.

The use of imazapyr and glyphosate will not affect air quality. Both products have environmental fate characteristics, such as low vapor pressure, that would suggest a lack of volatilization into the atmosphere. In addition, both products are applied either by backpack sprayers or by low boom ground equipment using large coarse droplets that reduce drift and presence in the atmosphere. Any drift that would be present in the atmosphere would occur immediately after application and is not expected to persist due to the methods of application.

Burning cogongrass will have short-term impacts to air quality resulting in the release of combustion by-products and smoke into the atmosphere. The typical areas of treatment for burning or herbicide treatment are small (less than an acre); therefore, any impacts to air quality will be localized and transient. Applicable permits that may be required for burning will ensure air quality standards are not affected.

Water

USDA-APHIS would consider impacts to water resources as significant if they exceeded Federal or State water quality standards. The cogongrass eradication program is likely to improve water quality by improving vegetative cover, etc. It is possible, however, for some eradication program methods (e.g. mechanical removal and herbicide use) to cause temporary adverse effects to water quality (increased sediment, water temperature, turbidity, loss of shade, increased nutrient levels or contaminants). USDA-APHIS expects long-term improvements to outweigh short-term effects of these types of activities.

Herbicide use can cause a temporary increase in sedimentation, and herbicides themselves can end up in water bodies if they are not properly applied. Direct adverse effects to waterways could occur if (1) waters receive herbicides from sprays, drift, or spills; or (2) run-off transports herbicides to surface and ground water in solution or on soil particles moved by hydraulic forces. The methods of application that includes spot treatments using backpack sprayers or the use of ATVs with low boom applicators will reduce off-site transport of herbicides from drift. In addition, the use of large coarse droplets will further reduce the potential for offsite transport of either herbicide from drift.

The potential for runoff relates to the chemical properties for each herbicide. Glyphosate has high water solubility but binds tightly to soil particles indicating a low runoff potential. Runoff containing glyphosate would primarily occur with the herbicide bound to soil particles, thereby reducing its availability to aquatic fauna. Imazapyr has high water solubility and does not bind strongly to soil particles, suggesting that it has the potential to run off from the site of application. Herbicide applications to cogongrass typically occur to dense stands that reduce the amount of imazapyr or glyphosate that could be deposited onto soil and susceptible to runoff. Historically, treated areas are typically small (< 1 ac) further reducing the amount of any loading that could occur into a water body from either herbicide.

Soil

USDA-APHIS would consider impacts to soil resources as significant if proposed activities resulted in substantially increased erosion and sedimentation or adversely affected unique soil conditions. USDA-APHIS does not expect this situation to occur under the preferred alternative because the purpose of the cogongrass eradication program is to restore lands with native vegetation, which would have a positive effect on soil conditions.

Potential negative effects of herbicide application could include decreased or altered microbial populations in the soil (Adomako and Akyeampong, 2016). These potential negative effects are expected to be short-term, especially when compared to the long-term positive effect to overall soil quality.

Many of the activities associated with the program will result in temporary soil surface disturbance or compaction. Since cogongrass frequently grows in highly disturbed areas where soil quality has already been impacted by man-made activities, the cogongrass control program in these areas will have negligible negative impacts. The most frequent types of ground disturbance would be from vehicles and pedestrians. Soil disking and tilling, as well as burning cogongrass, will cause chemical and physical impacts and will affect soil quality. These impacts, however, are localized to areas where cogongrass is present, and the long-term benefit to soil quality from the removal of cogongrass outweighs the short-term impacts.

2. Biological Resources

Vegetation

Prescribed burning and chemical control are the two primary methods for removal of cogongrass. Prescribed burning is often used as an invasive plant management tool; however, it affects entire plant communities and not just the target invasive plant (USFWS 2009). In the short-term, native plants near cogongrass in prescribed burn areas may be impacted by fire. Long-term goals for the cogongrass control program include restoring native plant communities in the program area. Disking and tilling may also occur to control cogongrass; however, these methods only occur in stands of cogongrass and is not likely to affect native vegetation.

Effective chemical control of cogongrass occurs using glyphosate and imazapyr herbicides. Glyphosate is a broad-spectrum post-emergent herbicide that is toxic to a variety of aquatic and terrestrial plants (US FS, 2011). Imazapyr is also a broad-spectrum herbicide used for pre- and post-emergent control of a variety of terrestrial and aquatic plants (USDA APHIS, 2015). Nontarget vegetation exposed to glyphosate and imazapyr treatments, especially for those plants that occur intermixed within stands of cogongrass, are at risk. Vegetation immediately adjacent to treated cogongrass will be also be affected; however, the method of application and adherence to label requirements for both herbicides reduces the affected area. The States will take additional precautions in cases where State- or Federal-listed plants occur in proximity to cogongrass treatment areas; this provides another layer of protection for sensitive species.

Wildlife

(1) Overview

USDA-APHIS would consider impacts to wildlife as significant if there are significant adverse environmental impacts to fish and wildlife, threatened and endangered species, or critical habitat for biological resources. Many of the potential cogongrass control activities will cause minimal effects to wildlife. However, actions associated with the preferred alternative would temporarily increase the presence or level of human activities (noise and visual disturbance) in the program area. This is of particular concern during migratory bird breeding and nesting season. Temporary adverse effects can include increased levels of stress hormones, disturbance or flushing of young broods, and decreased fitness. USDA-APHIS expects the adverse effects associated with this concern to be localized and temporary, and the use of mitigation measures will further reduce the risks of adverse effects. However, USDA-APHIS anticipates removal of cogongrass will improve the overall quality of habitat.

The use of prescribed fire is often used to restore important wildlife habitat, in addition to reducing the risk of catastrophic wildfires. Land managers carefully select locations for prescribed burns, which gives wildlife a chance to find safety during these fires (USFWS 2017). While prescribed burns may displace some wildlife in the short-term, USDA-APHIS expects the long-term benefits of establishing native habitat to exceed any negative impacts associated with the burning of cogongrass.

Herbicide risks to most fish and wildlife under the preferred alternative will be minimal. Below is a summary of the risks to nontarget fish and wildlife from imazapyr and glyphosate use in the cogongrass control program. Detailed information regarding each herbicide is located in ecological risk assessments that have been prepared for imazapyr (US FS, 2008; USDA APHIS, 2015) and glyphosate (US FS, 2011; USEPA, 2015).

Imazapyr and glyphosate toxicity to terrestrial wildlife such as invertebrates, wild mammals, and birds is low when considering the available effects data for these taxa (US FS, 2011; USDA

APHIS, 2015; USEPA, 2015). Direct risk to terrestrial invertebrates or vertebrates is low since there is a lack of significant effects at relevant doses, and the proposed methods of application reduce exposure to the areas of treatment. USEPA (2015) estimated the potential for chronic risk to some wild mammals and birds that consume vegetation treated with glyphosate. The use patterns where these risks occur differ from those proposed in the cogongrass control program, which results in a lower risk of chronic exposure to glyphosate in wildlife. In addition, cogongrass is not a preferred forage item for mammals and birds and this route of exposure would be negligible. Indirect effects, such as impacts to food sources or habitat for terrestrial invertebrates or vertebrates is not anticipated since cogongrass is not considered a valuable forage item for terrestrial vertebrates and invertebrates, or valuable habitat. Any impacts to terrestrial vertebrates or invertebrates that use cogongrass as habitat would be limited to the areas of treatment and transient as other vegetation would colonize the treated areas. Cogongrass treatment areas are typically small and any habitat-impacted nontarget terrestrial vertebrates or invertebrates would move to adjacent native habitats.

USDA-APHIS also anticipates minimal effects to fish and their habitats. The potential for herbicide exposure in aquatic habitats is low due to the method of application to cogongrass and small areas of treatment near aquatic habitats.

Imazapyr median lethality toxicity levels for fish and aquatic invertebrates are typically greater than 100 milligrams/liter suggesting imazapyr is practically non-toxic. Available toxicity data for formulations of imazapyr show higher toxicity to fish and aquatic invertebrates than imazapyr alone; however, effects are above expected residues that would occur from the proposed applications (USDA APHIS, 2015). Imazapyr chronic aquatic toxicity data is limited, but available data demonstrates low toxicity to fish and aquatic invertebrates.

A substantial amount of aquatic toxicity data is available for glyphosate and its various formulations, and associated surfactants (US FS 2011; USEPA 2015). This includes data on fish, aquatic-phase amphibians, and aquatic invertebrates. In summary, toxicity to technical glyphosate and its amine salt is less than the toxicity of glyphosate formulations or when mixed with surfactants. Toxicity of technical glyphosate, and its amine salt, to fish ranges from slightly to practically non-toxic. Toxicity varies dependent on the test species used, as well as test parameters, in particular water pH (US FS 2011; USEPA 2017). Toxicity to amphibians for some glyphosate formulations is high (King and Wagner 2010) while toxicity to aquatic invertebrates varies from low to high depending on the formulation being tested (US FS, 2011; USEPA, 2015). Formulation toxicity to aquatic vertebrates and invertebrates varies based on which formulation is being tested, including those that may be used in the cogongrass program. Glyphosate is toxic to some aquatic plant species (US FS, 2011; USEPA, 2015).

Formulation toxicity increases for several glyphosate formulations compared to glyphosate alone, and toxicity can increase when adding certain types of surfactants. Surfactants enhance the herbicidal activity of glyphosate and have similar uses in other pesticides. Surfactants may occur in some formulations of glyphosate or be added to a formulation as an adjuvant. Several glyphosate formulations are available for cogongrass treatments. Selection of formulations or surfactants with lower aquatic toxicity reduces risk when applied following label requirements, in particular those designed to protect aquatic resources.

(2) Migratory Bird Treaty Act

While cogongrass control methods may temporarily disturb migratory birds, USDA-APHIS expects migratory birds to benefit from these activities in the long-term because invasive plants are considered a stressor for some migratory birds (USFWS, undated). Some examples of anticipated disturbance associated with program activities includes the use of off-road vehicles and noise. However, cogongrass is frequently found in highly disturbed areas, indicating that disturbance of migratory birds from cogongrass control program activities in many locations will be minimal.

Herbicide treatments will not result in significant adverse direct or indirect impacts to migratory birds. Both herbicides have low toxicity to birds, and cogongrass is not a preferred habitat or a food source for migratory birds.

To minimize impacts to migratory birds, State agencies will conduct as many activities as possible outside of the nesting season. Prescribed burns, tilling, and disking is more likely to take place in the fall versus the spring. However, USDA-APHIS expects that some activities will take place during migratory bird breeding. For example, herbicide treatments would take place between May and October (or up until the first frost). In some instances, it may be possible to establish a buffer zone around ground-nesting breeding birds until nestlings have fledged or breeding behaviors are no longer observed. State agencies also may establish site-specific migratory bird conservation measures, as needed, prior to beginning any program activities.

(3) Bald and Golden Eagle Protection Act

If bald or golden eagles were discovered near a program action area, the State agency responsible for the area would contact the USFWS and implement recommendations for avoiding disturbance at nest sites. For bald eagles, USDA-APHIS would follow guidance as provided in the National Bald Eagle Management Guidelines (USFWS, 2007). These guidelines include a 330−660 foot buffer from an active nest, depending on the visibility and level of activity near the nest. USDA-APHIS expects herbicide exposure to terrestrial and aquatic nontarget organisms to be very low, and subsequently, the potential for exposure and risk of eagles to herbicides is very low. USDA-APHIS expects disturbance from other activities such as burning, tilling, or disking outside of the nesting season to be negligible.

(4) Endangered Species Act

Although removal of cogongrass from the habitat of some federally listed species would be beneficial, program activities potentially could adversely affect listed species and their habitats. Possible adverse effects include toxicity of program herbicides to listed animal and plant species, decreased water quality from erosion and direct impacts caused by cogongrass burning, and trampling of listed plants during survey and treatment activities.

USDA-APHIS has proposed treatment buffers from the habitats of listed species in the program area (appendix 2) and has determined that with the implementation of these buffers, the proposed action may affect, but is not likely to adversely affect these species. APHIS prepared two programmatic biological assessments, and requested concurrence with these determinations for the appropriate species under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). USDA-APHIS submitted the biological assessment to the USFWS on September 16, 2019. USDA-APHIS received concurrence on the USFWS biological assessment on January 22, 2020. USDA-APHIS revised the biological assessment submitted to NMFS and made a no effect determination for species under jurisdiction of NMFS-based on the use of no treatment aquatic buffers for the cogongrass program. This includes a 100-foot buffer for broadcast ground applications and a 25-foot buffer for handheld or backpack spray treatments. Other application methods such as wick and spray bottle treatments do not require no treatment application buffers from aquatic habitats. USDA-APHIS will consult with NMFS if changes are made to the prescribed no treatment buffers.

Prior to implementing a cogongrass control program, program personnel from each state will contact the appropriate USFWS office when applicable. Contact and coordination between USFWS and treatment applicants would not be required for treatments (herbicide applications, disking, mowing, fire) occurring outside of habitats and counties where listed species or listed plants occur. These areas may include, but are not limited to pine plantations, gardens, urban areas and other highly managed areas such as industrial sites, farmsteads, lumberyards, parking areas, parks, petroleum tank farms, etc.). If treatments occur in counties or habitats where certain terrestrial listed species occur then USFWS personnel will review maps of the treatment areas and indicate whether listed species or critical habitat are present in or near the treatment area. This process would only apply to listed plants and certain listed species identified in the USFWS BA and would not apply to aquatic listed species. If listed species are present, program personnel will implement the treatment buffers developed in the programmatic consultation process. Coordination with NMFS is not required based on mitigation measures defined in the BA.

3. Human Health and Safety

The program applies pesticides in a way that minimizes significant exposure to soil, water, and air. USDA-APHIS personnel and contractors are required to comply with all USEPA use requirements and meet all recommendations for personnel protective equipment (PPE) during

pesticide application. Adherence to label requirements and additional program measures designed to reduce exposure to workers (e.g., PPE requirements include long-sleeved shirt and long pants and shoes plus socks) and the public (e.g., mitigations to protect water sources, mitigations to limit spray drift, and restricted-entry intervals) result in low health risk to all human population segments from program use of chemicals. USDA-APHIS does not anticipate the chemicals proposed for use in this program would persist in the environment or bioaccumulate. The lack of significant routes of exposure to human health and the environment, along with favorable toxicity profiles for these compounds, suggest cumulative impacts would not occur with their use.

Where applicable, appropriate analyses examining human health and safety related to imazypyr is incorporated by reference. The Programmatic Asian Longhorned Beetle Eradication Environmental Impact Statement, Appendix E, has an imazapyr risk assessment that discusses acute and chronic risk (USDA-APHIS, 2015), and is incorporated by reference. Risks associated with the use of glyphosate are as discussed in the U.S. Forest Service's and USEPA's risk assessment (USDA-FS, 2011; USEPA, 2017, 2019), which is incorporated by reference.

Herbicide Use

Risks to human health from the use of imazapyr or glyphosate is low when factoring the available toxicity data and proposed use pattern for cogongrass control. Dietary risks to the public will not occur since the use pattern does not include food uses. There is a low risk to surface and ground water drinking sources based on the proposed application methods and environmental fate data that suggest a low leaching and runoff potential. This is especially true for glyphosate because it has environmental properties that would suggest it is not susceptible to leaching or runoff. Imazapyr does have properties that suggest it could occur in runoff in surface drinking water sources or leach to groundwater; however, the method of application and small areas of treatment suggest that risks to drinking water resources would be minimal. The population subgroup at greatest risk from imazapyr and glyphosate applications are workers and applicators. Both products require PPE that will reduce exposure and risk to this population subgroup.

(1) Imazapyr

Imazapyr has low acute, oral, dermal toxicity to mammals with median lethality values typically greater than the highest test concentration (USDA APHIS, 2015). Imazapyr is not a skin sensitizer or irritant, but it is an eye irritant. Imazapyr is not considered to be carcinogenic, mutagenic, or a developmental or reproductive toxicant at relevant doses (USDA APHIS, 2015).

(2) Glyphosate

The acute toxicity of glyphosate to mammals is considered low in oral, dermal, and inhalation exposures. Effects typically occur at concentrations equal to or exceeding 1,000 mg/kg/day (USEPA, 2017; ASTDR, 2019). Gastrointestinal effects are the most sensitive endpoint observed in studies, although this typically occurs at high doses in acute, intermediate, and chronic

exposures (ASTDR, 2019). Other effects such as developmental, ocular, renal, liver, and body weight have been noted in intermediate and chronic studies; however, these impacts are typically at much higher concentrations than those measuring gastrointestinal effects (US FS, 2011; USEPA, 2017; ASTDR, 2019).

The USEPA recently published a Proposed Interim Decision (PID) that determined glyphosate is not likely to be carcinogenic to humans and animals (USEPA, 2019). The PID summarized various technical documents supporting registration of glyphosate and studies that evaluated the carcinogenic potential of glyphosate. The Agency for Toxic Substances and Disease Registry summarized the carcinogenicity classification from several other regulatory agencies and found that they are consistent with the determination from the USEPA (ASTDR, 2019). The International Agency for Research on Cancer (IARC), however, evaluated the available toxicity data for glyphosate and determined that glyphosate is probably carcinogenic to humans (IARC, 2015). IARC determined that the evidence for carcinogenicity was limited as it relates to humans but was sufficient when evaluating the potential for carcinogenicity using laboratory animals. Benbrook (2019) and the USEPA (2017) summarized reasons for the disparity in the classification of the carcinogenicity potential between the USEPA and IARC. Consideration of non-mammalian data in the IARC report as well as additional literature were listed as some of the reasons for the difference in classification between IARC and the USEPA.

4. Environmental Justice

USDA-APHIS has considered the potential environmental impacts of implementing the action alternatives on minority and/or low-income communities. The Agency expects the distance from program areas to environmental justice communities, many of which are rural, to influence if there are direct adverse impacts to those communities. In general, each State agency would reach out to landowners prior to implementing the cogongrass control program. USDA-APHIS would encourage Alabama, Georgia, Mississippi, and South Carolina to engage with locally impacted people in collaborative decisions about cogongrass control whenever possible.

In Georgia, nearly 14 percent of the residents speak a language other than English at home, which suggests that outreach in other languages may be beneficial. Notification of herbicide treatments in multiple languages, as appropriate, will ensure individuals avoid treated areas for an appropriate amount of time.

The preferred alternative is not likely to pose any highly disproportionate adverse effects to children because program activities would not occur when children are present in the immediate area. Program activities would not occur on, in, or near school properties, or while school buses are likely to be transiting around treatment areas.

5. Tribal Consultation and Coordination

Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments," calls for agency communication and collaboration with Tribal officials for proposed Federal actions with potential Tribal implications. The Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aa-mm), secures the protection of archaeological resources and sites on public and Tribal lands. USDA-APHIS provided the federally recognized Tribes in the region with information about the cogongrass control program in August 2019, and offered each Tribe the opportunity to consult with the Agency. Consultation with local Tribal representatives occurs prior to the onset of program activities to fully inform the Tribes of possible actions the Agency may take on or near Tribal lands. If USDA-APHIS discovers any archaeological Tribal resources, it will notify the appropriate individuals.

6. Historic and Cultural Resources

USDA-APHIS is consulting with State Historic Preservation Officers about the proposed cogongrass control program. The Agency expects that the proposed program activities will not alter, change (restore or rehabilitate), modify, relocate, abandon, or destroy any historic buildings, edifices, or nearby infrastructure. Herbicides will not be applied to the buildings, and other anticipated program actions (e.g., burning, tilling) will not directly affect the buildings or their properties. Therefore, program activities are not likely to directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the National Register of Historic Properties.

C. Cumulative Impacts

Cumulative impacts on the environment result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of the entity conducting those other actions (40 C.F.R. § 1508.7). Cumulative effects most likely arise when a relationship exists between a proposed action and other actions expected to occur in a similar location or during a similar period in time. Cumulative effects may not be reasonably foreseeable until a variety of direct and indirect impacts interact with each other or over time.

Cumulative impacts to soil, water, and air quality are not expected to be significant for the no action and preferred alternatives. Current and future activities related to urbanization, agricultural activities, logging, and roadway construction appear more likely to significantly impact environmental quality than the cogongrass control program. The impacts from the actions discussed in this EA are expected to result in only minor or transient impacts; therefore, any increase in cumulative impacts would be negligible.

Soil disturbance related to the removal of invasive vegetation would be short-term. The amount of erosion from cogongrass eradication activities would be minor relative to the erosion potential from current and future agricultural and urban activities, including the use of herbicides.

Glyphosate use has increased substantially in the United States and is used in both agricultural and urban areas. Researchers have detected glyphosate in more than 50 percent of soil and sediment samples, and surface water samples from ditches and drains, precipitation, large rivers, and streams (Battaglin et al. 2014). All four states in the program area will use glyphosate to control cogongrass; however, some of these states are already using the herbicide in their own State-funded cogongrass control programs. The addition of glyphosate into the environment from the USDA-APHIS funded cogongrass control program is very small relative to all other uses in the program area.

While imazapyr has the potential to run off from the site of application into surface water due to its chemical properties, mitigations and best management practices will reduce the chances of both glyphosate and imazapyr moving into water. Additionally, herbicide applications typically occur in small areas. Therefore, USDA-APHIS anticipates the application of herbicides at the approved application rates under the preferred alternative will not contribute to any significant cumulative impacts to water quality.

Similar to cumulative impacts to soil and water, USDA-APHIS anticipates the potential for cumulative impacts to air quality to be minor under both the no action and preferred alternatives. Vehicle emissions associated with getting to and from project sites would be minor relative to the ongoing and future emissions from urbanization, highway traffic, and agricultural production. Any increases in air pollutants associated with mechanical removal of invasive vegetation and vehicle emissions would cease upon completion of program activities at each site. Future actions that could increase emissions (e.g., housing developments and road expansions leading to more traffic) are difficult to quantify because emissions from mobile sources are subject to changing fuel mileage and emissions standards and regulations. Nevertheless, the contribution from the preferred alternative would still remain minor compared to the overall emissions in the southeastern United States.

USDA-APHIS expects the potential human health impacts related to the preferred alternative to be minimal, and in the context of potential cumulative impacts to past, present, and future activities, these impacts would be incrementally minor. The greatest sector of the human population at risk of exposure to herbicides are program workers and herbicide applicators; however, these risks are minimized through the use of PPE.

The potential for cumulative impacts to ecological resources is related to the potential for the spread of invasive weed seeds. Nearly all past, present, and future actions in the southeastern United States have the potential to introduce weed seeds into non-infested areas, resulting in the spread of invasive vegetation. Natural disasters such as hurricanes and human disturbance from logging and road construction favor cogongrass spread and establishment from seeds. The movement of vehicles from one site to another is the primary action that could contribute to the

spread of invasive weeds; however, seeds could also become lodged in the tread of shoes, attach to clothing, and be dispersed by trade and soil movement. People can spread cogongrass rhizomes in a similar manner (USDA-APHIS 2018). To minimize the potential for spreading invasive species, and in particular, cogongrass, tire and shoe tread and clothing would be examined before leaving a work site. In comparison to impacts from habitat fragmentation, human population growth, and development, the cumulative impacts from the preferred alternative are not expected to comprise a significant contribution to impacts on ecological resources.

The cumulative impacts from the preferred alternative, when assessed in relation to the current baseline and past, present, and future activities, constitutes a small incremental change in the human environment. Past and present USDA-APHIS activities in the southeastern United States include the boll weevil eradication program, the imported fire ant program, and other activities such as wildlife damage management. Some of the cumulative changes from these activities may be positive, such as a reduction in invasive species. To preserve environmental quality for the human population and ecological resources, potentially negative cumulative impacts are minimized throughout the preferred alternative by following best management practices and training personnel to reduce or avoid adverse impacts to eagles, threatened and endangered species, and the surrounding environment.

IV. Listing of Agencies Consulted

Environmental and Risk Analysis Services
Policy and Program Development
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 149
Riverdale, MD 20737

Permitting and Compliance Coordination
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 150
Riverdale, MD 20737

Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
8001 Centerview Pkwy., Ste 216
Cordova, TN 38018

State Plant Health Director
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4600 Goer Drive, Suite 104
North Charleston, SC 29406

U.S. Fish and Wildlife Service
South Atlantic-Gulf & Mississippi-Basin Regions
1875 Century Boulevard
Atlanta, GA 30345

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Appendix 1. Response to comments on the Cogongrass Control Program in the Southeastern United States – Alabama, Georgia, Mississippi and South Carolina – Draft Environmental Assessment (EA).

USDA-APHIS received 11 comments during the 30-day public comment period that started on March 2, 2020. Similar comments were grouped together in the below responses. Information was also updated in the final EA, where appropriate.

Comment: There was inadequate scoping and consultation with state agencies and stakeholders during preparation of the draft EA and Biological Assessment (BA).

USDA-APHIS Response: USDA-APHIS met with Alabama Department of Agriculture and Industries, Clemson Department of Plant Industries, Georgia Forestry Commission, and Mississippi Department of Agriculture and Commerce in May and June 2019 to explain the process for completing documentation required under the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). During the initial meeting, state cooperators shared information about their cogongrass programs. Following that meeting, USDA-APHIS sent a request for information to the States asking that each cooperator provide information outlining when and where the program will occur, who will be conducting treatments, what pesticides and formulations will be used, what the treatment protocols are, what the application rate is, and if there were any State restrictions or regulations that would apply to the program. USDA-APHIS used the information provided by the States to comply with NEPA and ESA requirements. USDA-APHIS also provided the federally recognized Tribes in the region with information about the cogongrass control program in August 2019 and offered each Tribe the opportunity to consult with the Agency.

Scoping does not normally occur for preparation of biological assessments. Upon request, USDA-APHIS provided the draft biological assessments to the Alabama Forestry Commission and the Mississippi Forestry Commission for review prior to submission to the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) (Services).

Comment: There is an inadequate number of alternatives in the draft EA. An additional alternative should be added to the draft EA with input from state agencies and stakeholders that would ensure effective control of cogongrass. The no-action nor preferred alternative in the draft EA will be successful in any significant way at reducing the spread of cogongrass. The current preferred alternative will not result in effective cogongrass control due to restrictions related to the protection of species listed under the Endangered Species Act (ESA).

USDA-APHIS Response: The preferred alternative in the draft EA does result in the control of cogongrass. Control measures discussed in the preferred alternative are based on current control measures that were provided by each of the States covered in the draft EA.

Federal agencies, including USDA-APHIS, are required to comply with Section 7(a)(2) of the ESA. The addition of a new alternative does not change that requirement nor would it result in changes to whether mitigation measures would be required. USDA-APHIS can reinitiate consultation with the Services if the mitigation measures in the current BA need to be re-evaluated.

Comment: A third alternative should be proposed that would include treatments regardless of distance to water or listed plant species in order to be effective. The BAs for this alternative may come to a "may affect, likely to adversely affect" determination and trigger formal consultation, but such an option must still be considered to meet the true Purpose and Need for the document – reducing the spread of cogongrass.

USDA-APHIS Response: Formal consultation requires a minimum of 135 days to complete once the Services receive a complete initiation package from USDA-APHIS. Therefore, if USDA-APHIS initiated formal consultations with the Services in May 2020, this process would not be completed until approximately September or October 2020, at the earliest, which is approaching the end of the cogongrass treatment season. In addition, formal consultation would not necessarily reduce restrictions or requirements. Reasonable and prudent measures would likely require restrictions to avoid take of listed animals, and could require survey for presence of plants. In other words, formal consultation would not likely remove restrictions and requirements for protection of federally-listed species. However, USDA-APHIS can revisit consultations with the Services for the 2021 treatment season.

Treatments using a hand held wipe-on wick applicator or a handheld spray bottle sprayer may still be used up to the edge of water (if allowable by the herbicide label). Only broadcast applications within 100 feet and backpack/handheld tank sprayer applications within 25 feet of surface water are prohibited.

Comment: Funding provided to USDA-APHIS was diverted from "treatment" to "education". Recognizing that education can often be a wise use of funds, in this case funding made available by Congress should be used for treatment.

USDA-APHIS Response: Cogongrass funding was made available for outreach and treatment to each of the States covered in the draft EA. While the agency worked to fulfill the ESA and NEPA requirements for treatments, USDA-APHIS made funding available to each of the States to support survey and outreach activities at their discretion. Money was not diverted from treatment to education since funding will be available for both activities. Money not used for survey and outreach in fiscal year 2019 was carried over and will be available in 2020 for treatments.

Comment: State agencies will be required to contact the appropriate USFWS office for threatened and endangered species locations before every treatment. These delays will reduce a state's ability to quickly treat all infestations within appropriate treatment windows. Because these treatments will occur on private land through landowner sign-ups, the exact location of all treatments may not be known until very close to treatment time and this consultation requirement will most likely cause delays in treatment and reduce effectiveness.

USDA-APHIS Response: State agencies will not have to contact the USFWS for listed species locations for every treatment. Contact would need to be made only in certain habitats in certain counties in certain States. It is likely that once State agencies make initial contact with USFWS, responses would come in a matter of days, and once the process and connections are established, turnaround time for requests would be made in a timely manner. Cogongrass infestations are not emergencies; thus, adding additional minutes, hours or even days to the process will not reduce the effectiveness of the cogongrass program, and will ensure the protection of federally listed species, a required mandate for federal funding of projects.

Comment: The EA states that the BAs are included in the administrative record for the EA, but they were not included in the material provided to the public for comment. These documents, which were only provided by request after the comment period began, contain descriptions of treatment methods as well as required program mitigation measures. These seem like essential elements for inclusion in the EA relative to potential environmental impacts, yet any discussion on these items has not been carried over from the BAs into the EA, nor have the BAs been provided for public comment to all interested stakeholders.

USDA-APHIS Response: The biological assessments that were prepared for this program are included in the administrative record for the EA; however, these documents are not made available for public comment or review. These are documents used for interagency consultation between the Services and USDA-APHIS, as mandated by Section 7(a)(1) of the ESA. There is no requirement under ESA or NEPA that requires BAs to be made available to the public for comment or review, therefore APHIS does not routinely provide BAs for public comment. Draft documents were provided to stakeholders upon request. The EA includes a section that discusses USDA-APHIS compliance with the ESA.

Comment: The proposed treatment requirements found in the BAs are far more restrictive than label directions, other USDA-APHIS and US Forest Service NEPA documents, and other FWS consultations for similar treatments in the south.

USDA-APHIS Response: The U.S. Environmental Protection Agency has not consulted with the Services on the herbicides used by cogongrass program. Therefore, the directions on the label cannot be construed as protective of federally-listed species. USDA-APHIS has consulted on some of the proposed herbicides in other programs and has required mitigation measures, such as buffers to protect federally-listed species. Mitigation measures may differ based on the species being evaluated and the proposed use pattern for a given herbicide. USDA-APHIS NEPA documents, such as risk assessments, are more general in their approach to evaluating non-target risk and do not cover mitigation measures required to protect federally-listed species.

Comment: The scientific data presented in the BAs do not include the current Human Health and Ecological Risk Assessments utilized in other NEPA documentation by USDA-APHIS and the conclusions do not follow previous USDA-APHIS and USFWS recommendations for imazapyr and glyphosate use.

USDA-APHIS Response: USDA-APHIS prepared an ecological risk assessment specific to this proposed program and used it in the preparation of the biological assessments. It is included as an appendix to the biological assessments. Ecological risk assessments prepared specifically for other USDA-APHIS invasive species control programs cannot be applied to this program-, as these assessments are tailored specifically to the pesticides to be used, their methods of application, the types of listed species located in the treatment area, and whether there is overlap between treatment locations and listed species and habitats.

Comment: US Forest Service risk assessments for imazapyr and glyphosate are listed as sources in Appendix 1 of the BA, but the conclusions drawn do not incorporate the assessments. These assessments would lead to finding of no significant conclusions for both herbicides and are standard for NEPA documentation in other USDA programs. Previous USDA-APHIS NEPA documents (Spotted Lanternfly; March 2018 and Asian Long-horned Beetle; September 2015) also concluded 'no significance' for labeled uses of imazapyr.

USDA-APHIS response: The comment mixes terminology used in the biological assessment prepared for compliance with ESA and the environmental assessment prepared for compliance with NEPA. The conclusions reached for each of these documents differ. For ESA, determinations of no effect or may affect are made for each species, but determination of significant conclusions are not made. Significance is a NEPA term.

USDA-APHIS prepared an ecological risk assessment (ERA) specific to the actions proposed for the cogongrass program. In the ERA, U.S. Forest Service and the U.S. Environmental Protection Agency documents were used as resources for summarizing glyphosate effects and environmental fate. Risk assessments that were cited in the appendix of the BA also show risks to terrestrial and aquatic organisms similar to conclusions that are summarized in the cogongrass BA.

The comment suggests that the ERA precludes USDA-APHIS from reaching a "finding of no significant impact (fonsi); however, USDA-APHIS has indeed reached a fonsi for the proposed cogongrass program. Otherwise, USDA-APHIS would need to prepare an environmental impact statement. For both the USDA-APHIS Asian longhorned beetle program and spotted lanternfly programs ESA consultations occurred and numerous protection measures are in place to protect federally listed species as a result of these consultations, including herbicide treatment buffers and requirements for program personnel to contact USFWS prior to conducting treatments in certain locations. The proposed uses for the herbicides in the referenced programs were for stump treatments, or direct applications to sprouting vegetation, and did not include broadcast treatments as proposed in the cogongrass program. USDA-APHIS also reached fonsis for both programs completing its NEPA requirements.

Comment: The buffer zone requirements presented in the BAs do not match the data conclusions from the science cited, and are greater than any science would require.

USDA-APHIS response: The ecological risk assessment prepared by USDA-APHIS specifically for the cogongrass program provides the justification for the treatment buffer sizes, and is science based. USDA-APHIS used the EPA standard AgDrift model to estimate the impact of buffer zones on drift at various distances from the application area. The reduction in drift from the application of buffers was evaluated in relation to the toxicity data that are available for

each herbicide. The results of the assessment and the buffers evaluated in the BA are also consistent with results from other risk assessments that have been prepared for some of the proposed herbicides used in the cogongrass program.

Comment: Disking and mowing alone are not effective treatments, and research was incorrectly cited in the BA where it is stated that mowing followed by disking is effective control (USFWS BA, pg. 10). Disking and mowing can provide control if repeated over multiple seasons, but this is impractical for most cogongrass sites. Mechanical methods, when feasible, should be a part of an integrated plan to reduce thatch prior to herbicide application.

USDA-APHIS response: Page 3 of the biological assessment indicates that repeated applications of herbicides, disking, mowing, and burn treatments are often needed for effective control of cogongrass. The first sentence in the "Mowing, Tilling, and Disking" section on page 10 of the biological assessment states, "[m]echanical methods such as mowing, tilling, and disking are useful in controlling cogongrass when combined with other treatment methods." However, as the commenter indicates, the third sentence in that section should say that mowing and disking "followed by imazapyr or glyphosate applications" were effective.

There is no conclusion in the biological assessment that these treatments alone would be effective, but is rather provided for informational purposes to indicate why these treatments are done at all. The impact of these treatments on federally listed species and use of these methods in species' habitats are what is evaluated in the biological assessment regardless of their efficacy alone or in combination with other treatments. Therefore, the incorrect statement does not result in any change to the conclusions of the biological assessment.

Comment: Not allowing treatments up to 25 feet of the water's edge will lead to partial treatment sites that will easily be re-infested by the portion of cogongrass that is not treated.

USDA-APHIS response: As stated above, treatments using a hand held wipe-on wick applicator or a handheld bottle sprayer may be used up to the edge of water (if allowable by the herbicide label). Only broadcast applications within 100 feet and backpack/handheld tank sprayer applications within 25 feet of surface water are prohibited.

Comment: Not treating cogongrass in the vicinity of a listed plant would be a death sentence for that plant population due to the competitiveness of cogongrass. Spray bottles and wicking are not feasible options for cogongrass treatment and should not be a recommendation or requirement within any buffer zone. With this in mind, the operational minimum buffer for listed plants would be 150 feet, which would be devastating for plant communities.

USDA-APHIS Response: Spraying listed plants with herbicide or disking them would also result in significant impacts to listed plants. Spray bottles and wicking are actions included in the proposed program – although these are less convenient than broadcast or backpack applications, these methods are more targeted to prevent destruction of listed plants. USDA-APHIS is open to suggestions for other cogongrass control methods that could be used within the buffer zone that could be discussed in a reinitiation of consultation. USDA-APHIS recognizes that treating cogongrass will also provide benefits to listed plants that could be impacted by

cogongrass. The ESA requires consultation with the FWS regardless of whether the impacts to listed species are adverse or beneficial.

Comment: Aquatic herbicides, which could be used within riparian areas for treating cogongrass, including up to the water's edge, were not mentioned in the BA as a mitigation option.

USDA-APHIS Response: As stated above, treatments using a hand held wipe-on wick applicator or a handheld spray bottle may be used up to the edge of water (if allowable by the herbicide label). Herbicides evaluated in the draft EA and BAs were based on State recommendations of products for terrestrial use to treat cogongrass and did not include any aquatic use herbicides. Aquatic herbicides could be considered for use in any future consultations with the Services. However, if the proposed aquatic herbicides are new active ingredients and are not analyzed in the EA, USDA-APHIS would be required to prepare additional NEPA documentation for the new active ingredients. If the aquatic herbicides contain the same active ingredients discussed in the draft EA and BA, these products may reduce aquatic buffers to some extent due to the use of different other ingredients in the formulation but may not eliminate the need for buffers to protect listed species when applied using broadcast or backpack applications. The active ingredients in the formulations, whether for terrestrial or aquatic use, can still result in direct and indirect risk to listed aquatic organisms.

Comment: Recommending herbicide/surfactant products by product name, including the required use of Dyne-a-Pak, limits the use of herbicide and spray adjuvant options to fit treatment and budget needs.

USDA-APHIS Response: The EA does not specify the type of surfactant that may be used with any herbicide applications. The EA states that the use of surfactants are needed for various herbicides, in particular glyphosate. The BA does reference the use of Dyne-a-Pak but does not require that surfactant to be the only one used by the program. Dyne-a-Pak was listed as a surfactant for use in information provided by the States to USDA-APHIS regarding treatment methods for cogongrass.

Appendix 2. Federally listed animal and plant species that occur in Alabama, Georgia, Mississippi, and South Carolina.

Animals

Status*	Common Name	Scientific Name	Critical Habitat	State(s) of Occurrence
E	Acornshell, southern	*Epioblasma othcaloogensis*	Yes	AL, GA
T	Bankclimber, purple (mussel)	*Elliptoideus sloatianus*	Yes	AL, GA
E	Bat, gray	*Myotis grisescens*	No	AL, MS, GA
E	Bat, Indiana	*Myotis sodalis*	Yes	AL, MS, GA
T	Bat, Northern long-eared	*Myotis septentrionalis*	No	AL, MS, GA SC
E	Bean, Choctaw	*Villosa choctawensis*	Yes	AL
E	Bean, Cumberland (pearlymussel)	*Villosa trabalis*	No	AL
E	Blossom, tubercled (pearlymussel)	*Epioblasma torulosa torulosa*	No	GA
E	Butterfly, Mitchell's satyr	*Neonympha mitchellii mitchellii*	No	AL, MS
E	Campeloma, slender	*Campeloma decampi*	No	AL
E	Cavefish, Alabama	*Speoplatyrhinus poulsoni*	Yes	AL
T	Chub, spotfin	*Erimonax monachus*	Yes	AL
E	Clubshell, black	*Pleurobema curtum*	No	AL, MS
E	Clubshell, ovate	*Pleurobema perovatum*	Yes	AL, MS, GA
E	Clubshell, southern	*Pleurobema decisum*	Yes	AL, MS, GA
E	Clubshell	*Pleurobema clava*	No	MS
E	Combshell, Cumberlandian	*Epioblasma brevidens*	Yes	MS
E	Combshell, southern	*Epioblasma penita*	No	MS
E	Combshell, upland	*Epioblasma metastriata*	Yes	AL

Status*	Common Name	Scientific Name	Critical Habitat	State(s) of Occurrence
E	Crane, Mississippi sandhill	*Grus canadensis pulla*	Yes	AL, MS
PT	Crayfish, slenderclaw	*Cambarus cracens*	Proposed	AL
E	Darter, amber	*Percina antesella*	Yes	GA
T	Darter, bayou	*Etheostoma rubrum*	No	MS
E	Darter, boulder	*Etheostoma wapiti*	No	AL
T	Darter, Cherokee	*Etheostoma scotti*	No	GA
E	Darter, Etowah	*Etheostoma etowahae*	No	GA
T	Darter, goldline	*Percina aurolineata*	No	AL, GA
T	Darter, pearl	*Percina aurora*	No	MS
E	Darter, rush	*Etheostoma phytophilum*	Yes	AL
T	Darter, slackwater	*Etheostoma boschungi*	Yes	AL,
T	Darter, snail	*Percina tanasi*	Yes	AL, MS, GA
T	Darter, trispot	*Etheostoma trisella*	Proposed	AL, GA
E	Darter, vermilion	*Etheostoma chermocki*	Yes	AL
E	Darter, watercress	*Etheostoma nuchale*	No	AL
E	Ebonyshell, round	*Fusconaia rotulata*	Yes	AL
T	Elimia, lacy (snail)	*Elimia crenatella*	No	AL
E	Fanshell	*Cyprogenia stegaria*	No	AL
E	Frog, dusky gopher	*Rana sevosa*	Yes	AL, MS
T	Heelsplitter, inflated	*Potamilus inflatus*	No	AL, MS
E	Heelsplitter, Carolina	*Lasmigona decorata*	Yes	SC
E	Hornsnail, rough	*Pleurocera foremani*	Yes	AL
E	Kidneyshell, southern	*Ptychobranchus jonesi*	Yes	AL,
E	Kidneyshell, triangular	*Ptychobranchus greenii*	Yes	AL, GA

Status*	Common Name	Scientific Name	Critical Habitat	State(s) of Occurrence
T	Knot, red	*Calidris canutus rufa*	No	AL, MS, GA, SC
E	Logperch, Conasauga	*Percina jenkinsi*	Yes	GA
E	Lampmussel, Alabama	*Lampsilis virescens*	No	AL
E	Lilliput, pale (pearlymussel)	*Toxolasma cylindrellus*	No	AL
E	Lioplax, cylindrical (snail)	*Lioplax cyclostomaformis*	No	AL
T	Manatee, West Indian	*Trichechus manatus*	Yes	AL, MS, GA SC
T	Moccasinshell, Alabama	*Medionidus acutissimus*	Yes	AL, MS, GA
E	Moccasinshell, Coosa	*Medionidus parvulus*	Yes	AL, GA
E	Moccasinshell, Gulf	*Medionidus penicillatus*	Yes	AL, GA
E	Moccasinshell, Ochlockonee	*Medionidus simpsonianus*	Yes	GA
T	Moccasinshell, Suwannee	*Medionidus walkeri*	No	GA
E	Monkeyface, Cumberland (pearlymussel)	*Quadrula intermedia*	No	AL, GA
E	Mouse, Alabama beach	*Peromyscus polionotus ammobates*	Yes	AL
E	Mouse, Perdido Key beach	*Peromyscus polionotus trissyllepsis*	Yes	AL
T	Mucket, orangenacre	*Lampsilis perovalis*	Yes	AL, MS
E	Mucket, pink (pearlymussel)	*Lampsilis abrupta*	No	AL, MS, GA
E	Mussel, oyster	*Epioblasma capsaeformis*	Yes	AL
E	Mussel, sheepnose	*Plethobasus cyphyus*	No	AL, MS
E	Mussel, snuffbox	*Epioblasma triquetra*	No	AL, MS

Status*	Common Name	Scientific Name	Critical Habitat	State(s) of Occurrence
E	Pearlshell, Alabama	*Margaritifera marrianae*	Yes	AL
E	Pearlymussel, cracking	*Hemistena lata*	No	AL
E	Pearlymussel, dromedary	*Dromus dromas*	No	AL
E	Pearlymussel, littlewing	*Pegias fabula*	No	AL
E	Pearlymussel, slabside	*Pleuronaia dolabelloides*	Yes	AL, MS
E	Pebblesnail, flat	*Lepyrium showalteri*	No	AL
PT	Petrel, black-capped	*Pterodroma hasitata*	No	GA, SC
PT	Pigtoe, Atlantic	*Laterallus jamaicensis ssp. jamaicensis*	No	GA
E	Pigtoe, dark	*Pleurobema furvum*	Yes	AL
E	Pigtoe, finerayed	*Fusconaia cuneolus*	No	AL
E	Pigtoe, flat	*Pleurobema marshalli*	No	MS
T	Pigtoe, fuzzy	*Pleurobema strodeanum*	Yes	AL
E	Pigtoe, Georgia	*Pleurobema hanleyianum*	Yes	AL, GA
E	Pigtoe, heavy	*Pleurobema taitianum*	No	AL, MS
T	Pigtoe, narrow	*Fusconaia escambia*	No	AL
E	Pigtoe, oval	*Pleurobema pyriforme*	Yes	AL, GA
E	Pigtoe, rough	*Pleurobema plenum*	No	AL
E	Pigtoe, shiny	*Fusconaia cor*	No	AL
E	Pigtoe, southern	*Pleurobema georgianum*	Yes	AL, GA
T	Pigtoe, tapered	*Fusconaia burkei*	Yes	AL,
E	Pimpleback, orangefoot (pearlymussel)	*Plethobasus cooperianus*	No	AL,

Status*	Common Name	Scientific Name	Critical Habitat	State(s) of Occurrence
T	Plover, piping [Atlantic Coast and Northern Great Plains populations]	*Charadrius melodus*	Yes	AL, MS, GA, SC
E	Pocketbook, fat	*Potamilus capax*	No	MS
T	Pocketbook, finelined	*Lampsilis altilis*	Yes	AL, GA
E	Pocketbook, shinyrayed	*Lampsilis subangulata*	Yes	AL, GA
E	Purple Cat's paw (=Purple Cat's paw pearlymussel)	*Epioblasma obliquata obliquata*	No	AL
T	Rabbitsfoot	*Quadrula cylindrica cylindrica*	Yes	AL, MS
PT	Rail, eastern black	*Laterallus jamaicensis ssp. jamaicensis*	No	AL, MS, GA, SC
E	Riffleshell, tan	*Epioblasma florentina walkeri (=E. walkeri)*	No	AL, MS
E	Ring pink (mussel)	*Obovaria retusa*	No	AL
E	Riversnail, Anthony's	*Athearnia anthonyi*	No	AL, GA
E	Rocksnail, interrupted (=Georgia)	*Leptoxis foremani*	Yes	AL, GA
T	Rocksnail, painted	*Leptoxis taeniata*	No	AL
E	Rocksnail, plicate	*Leptoxis plicata*	No	AL
T	Rocksnail, round	*Leptoxis ampla*	No	AL
T	Salamander, Red Hills	*Phaeognathus hubrichti*	No	AL
T	Salamander, frosted flatwoods	*Ambystoma cingulatum*	Yes	GA, SC
E	Salamander, reticulated flatwoods	*Ambystoma bishopi*	Yes	GA

Status*	Common Name	Scientific Name	Critical Habitat	State(s) of Occurrence
T	Sandshell, Southern	*Hamiota australis*	Yes	AL
E	Sawfish, smalltooth US DPS	*Pristis pectinata*	No	GA
T	Sculpin, pygmy	*Cottus paulus (=pygmaeus)*	No	AL
T	Sea turtle, green North Atlantic DPS	*Chelonia mydas*		SC
E	Sea turtle, hawksbill	*Eretmochelys imbricata)*	Yes	AL, MS, GA
E	Sea turtle, Kemp's ridley	*Lepidochelys kempii*	Yes	AL, MS, GA, SC
E	Sea turtle, leatherback	*Dermochelys coriacea*	Yes	AL, MS, GA, SC
T	Sea turtle, loggerhead Northwest Atlantic Ocean DPS	*Caretta caretta*	Yes	AL, MS, GA, SC
T	Shiner, blue	*Cyprinella caerulea*	No	AL, GA
E	Shiner, Cahaba	*Notropis cahabae*	Proposed	AL
E	Shiner, palezone	*Notropis albizonatus*	No	AL
E	Shrimp, Alabama cave	*Palaemonias alabamae*	No	AL
T	Slabshell, Chipola	*Elliptio chipolaensis*	Yes	AL
E	Snail, armored	*Pyrgulopsis (=Marstonia) pachyta*	No	AL
T	Snail, tulotoma	*Tulotoma magnifica*	No	AL
T	Snake, black pine	*Pituophis melanoleucus lodingi*	No, proposed rule	AL, MS
T	Snake, eastern indigo	*Drymarchon corais couperi*	No	AL, GA
E	Spectaclecase (mussel)	*Cumberlandia monodonta*	No	AL
E	Spinymussel, Altamaha	*Elliptio spinosa*	Yes	GA

Status*	Common Name	Scientific Name	Critical Habitat	State(s) of Occurrence
E	Stirrupshell	*Quadrula stapes*	No	AL, MS,
T	Stork, wood	*Mycteria americana*	No	AL, MS, GA, SC
E	Sturgeon, Atlantic Carolina DPS	*Acipenser oxyrinchus oxyrinchus*	No	GA
T	Sturgeon, Atlantic (Gulf subspecies), Atlantic	*Acipenser oxyrinchus (=oxyrhynchus) desotoi*	Yes	AL, MS
E	Sturgeon, Alabama	*Scaphirhynchus suttkusi*	Yes	AL
E	Sturgeon, pallid	*Scaphirhynchus albus*	No	MS
E	Sturgeon, shortnose	*Acipenser brevirostrum*	No	GA, SC
T	Sunfish, spring pygmy	*Elassoma alabamae*	Yes	AL
E	Tern, least interior pop.	*Sterna antillarum*	No	MS
E	Threeridge, fat (mussel)	*Amblema neislerii*	Yes	GA
T	Tortoise, gopher West of Mobile and Tombigbee Rivers	*Gopherus polyphemus*	No	AL, MS
E	Turtle, Alabama red-bellied	*Pseudemys alabamensis*	No	AL, MS
T	Turtle, flattened musk Black Warrior R. system upstream from Bankhead Dam	*Sternotherus depressus*	No	AL
T	Turtle, ringed map	*Graptemys oculifera*	No	MS
T	Turtle, yellow-blotched map	*Graptemys flavimaculata*	No	MS
E	Warbler, Kirtland's	*Setophaga kirtlandii (= Dendroica kirtlandii)*	No	SC
E	Warbler (=wood), Bachman's	*Vermivora bachmanii*	No	SC

Status*	Common Name	Scientific Name	Critical Habitat	State(s) of Occurrence
E	Wartyback, white (pearlymussel)	*Plethobasus cicatricosus*	No	AL
E	Waterdog, black warrior (=Sipsey Fork)	*Necturus alabamensis*	Yes	AL
E	Whale, finback	*Balaenoptera physalus*	No	AL, GA
E	Whale, North Atlantic Right	*Eubalaena glacialis*	Yes	GA
E	Woodpecker, red-cockaded	*Picoides borealis*	No	AL, MS, GA, SC

*E=Endangered, T=Threatened, PT=Proposed Threatened

Plants

Status*	Common Name	Scientific Name	Critical Habitat	State(S)
T	Amaranth, seabeach	*Amaranthus pumilus*	No	SC
T	Amphianthus, little	*Amphianthus pusillus*	No	AL, GA, SC
E	Arrowhead, bunched	*Sagittaria fasciculata*	No	SC
T	Barbara's Buttons, Mohr's	*Marshallia mohrii*	No	AL, GA
T	Bladderpod, lyrate	*Lesquerella lyrata*	No	AL
E	Campion, fringed	*Silene polypetala*	No	GA
E	Chaffseed, American	*Schwalbea americana*	No	AL, GA, SC
E	Coneflower, smooth	*Echinacea laevigata*	No	GA, SC
E	Dropwort, Canby's	*Oxypolis canbyi*	No	GA, SC
T	Fern, Alabama streak-sorus	*Thelypteris pilosa var. alabamensis*	No	AL

T	Fern, American hart's-tongue	*Asplenium scolopendrium var. americanum*	No	AL
T	Gooseberry, Miccosukee	*Ribes echinellum*	No	SC
E	Gladecress, Fleshy-fruit	*Leavenworthia crassa*	Yes	AL
E	Grass, Tennessee yellow-eyed	*Xyris tennesseensis*	No	AL, GA,
E	Harperella	*Ptilimnium nodosum*	No	AL, GA, SC
T	Heartleaf, dwarf-flowered	*Hexastylis naniflora*	No	SC
E	Irisette, white	*Sisyrinchium dichotomum*	No	SC
E	Leather flower, Alabama	*Clematis socialis*	No	AL, GA
E	Leather flower, Morefield's	*Clematis morefieldii*	No	AL
E	Lichen, rock gnome	*Gymnoderma lineare*	Yes	GA, SC
E	Loosestrife, rough-leaved	*Lysimachia asperulaefolia*	No	SC
E	Meadowrue, Cooley's	*Thalictrum cooleyi*	No	GA
T	Orchid, white fringeless	*Platanthera integrilabia*	No	AL, MS, GA, SC
T	Pink, swamp	*Helonias bullata*	No	GA, SC
E	Pinkroot, gentian	*Spigelia gentianoides*	No	AL,
E	Pitcher-plant, Alabama canebrake	*Sarracenia rubra ssp. alabamensis*	No	AL,
E	Pitcher-plant, mountain sweet	*Sarracenia rubra ssp. jonesii*	No	SC
E	Pitcher-plant, green	*Sarracenia oreophila*	No	AL, GA
T	Pogonia, small whorled	*Isotria medeoloides*	No	GA, SC
E	Pondberry	*Lindera melissifolia*	No	AL, MS, GA, SC
T	Potato-bean, Price's	*Apios priceana*	No	AL, MS,
E	Prairie-clover, leafy	*Dalea foliosa*	No	AL,

E	Quillwort, black spored	*Isoetes melanospora*	No	GA, SC
E	Quillwort, mat-forming	*Isoetes tegetiformans*	No	GA
E	Quillwort, Louisiana	*Isoetes louisianensis*	No	AL, MS,
E	Rattleweed, hairy	*Baptisia arachnifera*	No	GA
T	Rockcress, Georgia	*Arabis georgiana*	Yes	AL, GA
T	Skullcap, large-flowered	*Scutellaria montana*	No	GA
T	Spiraea, Virginia	*Spiraea virginiana*	No	GA
E	Sumac, Michaux's	*Rhus michauxii*	No	GA, SC
E	Sunflower, Schweinitz's	*Helianthus schweinitzii*	No	SC
E	Sunflower, whorled	*Helianthus verticillatus*	Yes	AL, MS, GA,
E	Torreya, Florida	*Torreya taxifolia*	No	GA
E	Trillium, persistent	*Trillium persistens*	No	GA, SC
E	Trillium, relict	*Trillium reliquum*	No	AL, GA, SC
T	Water-plantain, Kral's	*Sagittaria secundifolia*	No	AL, GA

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