



Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Giant African Snail Cooperative Eradication Program in Lee and Pasco Counties, Florida

Draft Environmental Assessment

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List of Abbreviations and Acronyms

A	Acre
a.i.	Active ingredient
APHIS	Animal and Plant Health Inspection Service
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DPS	Distinct population segment
DT ₅₀	Dissipation half-life values
EA	Environmental assessment
EO	Executive Order
ESA	Endangered Species Act
FDACS	Florida Department of Agriculture and Consumer Services
fl.	Fluid
in.	Inch
GAS	Giant African snail
Koc	Soil adsorption coefficient
lb	Pound
LC	Lethal concentration
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act
oz	Ounces
PPE	Personal protective equipment
SHPO	State Historic Preservation Officer
spp.	Species (plural)
ssp.	Subspecies
T&E	Threatened and Endangered
UF/IFAS	University of Florida/Institute of Food and Agricultural Sciences
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

I. Introduction

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) in cooperation with the Florida Department of Agriculture and Consumer Services (FDACS) is considering options for a program to eradicate giant African snails¹ [*Lissachatina fulica* (Bowdich)², (Achatinidae)], in Pasco and Lee Counties, Florida. The giant African snail (GAS³) has been discovered in the New Port Richey (Pasco County) and Fort Myers (Lee County) areas. The proposed program will be similar to the 2011-2021 South Florida Cooperative Snail Eradication Program that started and eradicated an outbreak of GAS in Miami-Dade and Broward Counties in September 2021 (FDACS 2023).

The GAS (Figure 1) is listed as one of the top 100 worst invasive species in the world (Lowe et al. 2000). It has been introduced accidentally or purposefully to countries where it has been kept as a pet, served as a food delicacy, or used for medicinal purposes, religious ceremonies, and scientific research. If introduced, it has the potential to be a significant pest to agricultural crops and be an intermediate host for the rat lungworm (*Angiostrongylus cantonensis*) and other parasites that can infect humans, pets, and livestock (USDA APHIS 2018; Venette and Larson 2004). In the United States, GAS occurs in Hawaii, but it is illegal to import or possess this mollusk anywhere in the United States without a permit.



Figure 1. A giant African snail (*Lissachatina achatina*) (USGS 2015).

¹ Some authors/documents/labels consider *L. fulica* to be the giant African land snail when the genus changed.

² Formerly *Achatina fulica*

³ GAS will be used for plural – giant African snails – in the EA and not GASs.

GAS vary in phenotype (color pattern). GAS populations previously eradicated from Broward and Miami-Dade Counties in southern Florida had dark brown shells with grayish-brown flesh. The GAS detected in west central Florida have light to dark brown shells with milky white flesh (FDACS 2023), suggesting the source population in Pasco County came from elsewhere. Lee County GAS look similar to the Miami-Dade County GAS, but it is unknown where they originated. Typically, albino GAS are the most common in captivity.

An adult GAS can grow to a diameter of 3 in. and 8 in. or more in length, making it one of the largest of all extant land snails. Breeding begins at about 6-8 months and with each mating, one GAS can produce 100 to 500 viable eggs. GAS can reproduce several more times without mating again. They can generate clutches of eggs every 2 to 3 months (USDA APHIS 2018). GAS are hermaphroditic (both sexes on one individual) and can lay dormant for several months at a time (Capinera 2021).

In general, GAS live 3-5 years in the wild and 5-6 years in captivity. Typically, the GAS has a daytime resting site and moves at night to feed, depositing a trail of mucus (slime) along the way. They avoid sunlight and seek shaded, sheltered resting locations with high humidity. They can climb trees and walls and may travel up to 50 feet in a single night (Capinera 2021; USDA APHIS 2018). Transport of this pest over greater distances generally occurs through the human-assisted movement of nursery stock, soil, landscape material, and other objects where they can hide or attach.

GAS is one of the most damaging land snails, consuming at least 500 different plant species (USDA APHIS 2018). Figure 2 describes the snail's varied diet (UF IFAS 2011) and Appendix B contains a list of plants consumed by GAS. In addition to plant damage, GAS can be a nuisance leaving slime trails and potentially causing traffic accidents, multiply rapidly, create a foul stench when large numbers die, and collect on houses, destroying the whitewashed siding (Sarma et al. 2015). Calcium carbonate from decaying GAS shells neutralizes acidic soils (Mead 1973; Poucher 1975; Smith and Fowler 2003; State of New South Wales).

GAS has been eradicated twice in Florida. The first detection was in 1969; the associated infestation was eradicated in 1975. In 1966, a boy carried three GAS in his pocket when he traveled from Hawaii. They were released into a Miami garden. It cost the State of Florida \$1 million and took ten years to eradicate the resulting outbreak in Miami-Dade County.

The most recent eradication of this pest was in 2021 from a detection in 2011 in Miami-Dade and Broward Counties. Eradicating GAS infestations is not completed quickly. The 2011 GAS outbreak in Miami-Dade/Broward Counties took 10 years and cost \$23 million to eradicate (USDA APHIS 2023). The last live GAS in Florida in this outbreak was collected in Miami-Dade County in December 2017 (FDACS 2023).

- Their herbivore diet includes over 500 different plant species, including food plants such as banana, breadfruit, cassava, citrus, coffee, cocoa, papaya, peanut, beans, peas, carrots, lettuce, onions, potatoes (white and sweet), spinach, broccoli, cauliflower, cabbage, cucumbers, pumpkin, and melons.
- They also feed on many types of ornamentals (*e.g.*, marigolds), and on other economic crops (*e.g.*, cotton and rubber trees).
- In addition, they forage on lichens, leaf litter, algae and fungi.
- Will eat other animal matter (*e.g.*, bones), other snail shells, stucco, plaster, and concrete (limestone) as they need a lot of calcium to grow the large shells.

Figure 2. The feeding biology of the giant African snail (UF IFAS 2011).

On June 23, 2022, FDACS confirmed the detection of GAS in the New Port Richey area of Pasco County and USDA APHIS confirmed July 1, 2022. FDACS set up local surveillance, enacted a quarantine, and began treatments to eradicate GAS. FDACS treats properties with a metaldehyde-based molluscicide (snail bait and liquid toxicant formulations). The formulation is labeled by the U.S. Environmental Protection Agency (USEPA) for residential use (FDACS 2023).

On July 15, 2022, FDACS confirmed the presence of rat lungworm in the GAS population infesting Pasco County (FDACS 2023). The rat lungworm causes eosinophilic meningitis⁴ and is prevalent in Southeast Asia and tropical Pacific islands (CDC 2020). The recognized distribution of the parasite has been increasing over time and infections have been identified in other areas, including Africa, the Caribbean, and the United States.

In December 2022, the GAS was found in Lee County along a stretch of the south bank of the Caloosahatchee River (FDACS 2023). FDACS increased surveillance and eradication treatments were begun. Additional GAS detections triggered the Lee County quarantine in March 2023. FDACS is using the same treatment for both counties (metaldehyde snail granular bait or liquid application).

Quarantine maps for Lee and Pasco Counties are provided in Appendix A. Under the current quarantine, it is unlawful to move GAS or a regulated article, including but not limited to, plants, plant parts, plants in soil, soil, yard waste, debris, compost or building materials, within, through or from a quarantine area without a compliance agreement (FDACS 2023).

⁴ Eosinophilic meningitis is a rare form of meningitis. Meningitis is inflammation of the fluid and membranes, the meninges, in the brain and spinal cord. Eosinophilic meningitis generally develops from certain parasites that normally infect animals. It is rare in people but they can be at risk depending where they live, travel, or work.

- FDACS identified 13 stock dealers and 12 nurseries inside the Pasco County quarantine boundary. Within the “core area” (a 200-meter radius centering on each confirmed GAS find), four stock dealers and no nurseries were identified. It is still unknown how the site became infested. So far, GAS have only been found in residential areas as of February 2023 extensive surveys of nurseries and agricultural production facilities within the Pasco County quarantine continue to be negative for GAS.
- FDACS identified four stock dealers and two nurseries inside the Lee County quarantine boundary but none within the core area. It is still unknown how the site became infested. So far only residential areas have been affected; as of May 5, 2023, extensive surveys of nurseries and agricultural production facilities within the Lee County quarantine continue to be negative for GAS.

A. Purpose and Need

The State of Florida has requested federal resources to help control GAS outbreaks in affected counties. An uncontrolled population of GAS could be devastating to Florida as they could cause extensive damage to the state’s tropical and subtropical environments. Regions outside of Lee and Pasco Counties could become infested since people can unknowingly transfer GAS, snails and eggs, from one location to another. Florida crops may also be at risk if GAS infestations spread beyond residential areas.

To protect Florida agriculture and the human environment, USDA APHIS in cooperation with FDACS, proposes to implement an eradication program (“Program”) in Lee and Pasco Counties, Florida. USDA APHIS would undertake a Program like the one implemented for Broward and Miami-Dade Counties (USDA APHIS 2021) which successfully eradicated a GAS infestation detected in 2011. Under the Program, USDA APHIS and FDACS personnel and cooperators would survey properties to delimit the infestation, use detector dogs, visual inspection, or place traps, conduct physical removal of GAS, remove debris, and apply the pesticide (molluscicide) metaldehyde, as appropriate. Pesticides for Program use could be formulated for residential or agricultural settings.

The proposed cooperative Program is needed to eradicate GAS infestations in Lee and Pasco Counties and reduce the potential for the GAS to spread elsewhere. GAS thrive in forest edges, modified forests, and plantation habitats (Smith and Fowler 2003). In countries where the GAS is established, the most severe infestations tend to be in disturbed areas including residential and croplands, forest edges, shorelines, and along roadways (Numazawa et al. 1988). GAS is now found on all continents except Antarctica. In North America, GAS populations could survive the climate in non-mountainous regions of the following states: Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Texas, New Mexico, Arizona, California, and potentially parts of Oregon and Washington (Figure 3).



Figure 3. Potential distribution of GAS in the United States (Stocks et al. 2022).

B. Regulatory Considerations

This document is an environmental assessment (EA) USDA APHIS prepared to determine potential impacts from the GAS eradication activities in Lee and Pasco County, Florida. USDA APHIS considers many laws and regulations while planning a pest response program⁵.

USDA APHIS has prepared this EA to comply with the provisions of the National Environmental Policy Act of 1969 (NEPA) (42 USC §§ 4321 et seq.) as prescribed in implementing regulations adopted by the President’s Council on Environmental Quality (CEQ) (40 CFR parts 1500-1508), USDA’s NEPA regulations at 7 CFR part 1b, and APHIS’ NEPA implementing procedures (7 CFR part 372) for the purpose of evaluating the potential effects of the proposed action on the human environment (40 CFR § 1508.1(m)).

USDA APHIS has the responsibility for taking actions to exclude, eradicate, and control plant pests under the Plant Protection Act of 2000 (7 USC 7701 et seq.). The proposed action will eliminate an infestation of GAS, an invasive mollusk pest that consumes a wide variety of plant species found in Florida agricultural regions and ecosystems.

⁵ Laws and regulations that were deemed relevant to the proposed Program are listed in Appendix C.

II. Alternatives

USDA APHIS compared various action alternatives and selected two for further consideration: the No Action Alternative and the Preferred Alternative (Eradication). Both are reasonable alternatives in that they are each technically and economically feasible. However, the No Action alternative may not meet the purpose and need of the proposed action, nor fulfill the agency's regulatory requirements. Potential impacts from their implementation are discussed in Chapter III, the environmental consequences section of this document.

This chapter also lists action alternatives not analyzed in Chapter III. These alternatives are not technically or economically feasible for USDA APHIS, or do not meet the agency's goal of eradication of GAS from Lee and Pasco Counties and its mission to prevent invasive species introduction to sensitive areas of the United States.

A. No Action Alternative

The No Action Alternative is the *status quo*, a continuation of the state and local actions that are already being taken to eradicate GAS in Lee and Pasco Counties. Under the No Action Alternative, USDA APHIS would not participate in the eradication of GAS populations in either county. Non-federal entities, such as FDACS, Florida landowners, or commercial growers, could conduct control measures on their own without assistance from USDA APHIS. Since USDA APHIS would not provide resources or take other actions, eradication of the GAS in Florida would likely depend on the effectiveness of the response of FDACS and private entities.

B. Preferred Alternative (Eradication)

The GAS Eradication Program proposed for Lee and Pasco Counties (the Preferred Alternative) would be a cooperative effort between USDA APHIS and FDACS with help from Florida commercial crop producers. Under the preferred alternative, Program personnel survey properties to delimit the infestation with detector dogs and visual inspection, and possibly snail traps, physically remove any GAS found, and apply the pesticide (molluscicide) metaldehyde as necessary. Additionally, debris is removed from areas where GAS has been found to reduce areas where they can be found.

FDACS has active GAS quarantines in Lee and Pasco Counties; inside each quarantine is where the Program would conduct eradication activities. Surveillance may occur anywhere in the two counties. The quarantine area may expand if a GAS is found outside the boundary of either quarantine area.

Program personnel conduct surveys anytime, daytime or nighttime, but are typically conducted when the GAS is most active in cooler damp temperatures especially following rain or in early morning hours. The Program uses visual inspection and canine detection to survey for GAS. The

survey boundary is 200-yard circle centering on a confirmed GAS find. In addition, the Program may place “*stop sale/hold*” orders on nurseries that have a positive find. Plant nurseries enter into compliance agreements with the Program that include specific survey and control requirements to ensure their plant material is GAS-free prior to movement off the premises. The Program may use molluscicide treatments as allowed to reduce GAS in the survey area.

Regular and extensive hand picking is effective in reducing adult numbers, but the small size of eggs and juveniles (neonates) makes it difficult to see and remove all GAS. However, when done in combination with other control methods, particularly in newly infested areas, hand-removal contributes to eradication efforts. GAS collected are frozen or immersed in alcohol or boiling water to dispose of them.

Metaldehyde is a commonly used molluscicide that has a wide variety of agricultural and non-agricultural uses. Formulations vary (Table 1), but applications are typically made as bait incorporated into a granule or as a liquid sprayed onto soil or some plants. Slugs, snails, and other gastropods that encounter the bait are exposed to metaldehyde through ingestion or absorption. Metaldehyde disrupts the mucus-secreting cells in the animal, which results in dehydration and eventual death.

The Program would provide multiple metaldehyde treatment options for eradicating GAS infestations. The Program would follow label instructions on application rate and frequency and restrictions. Table 1 lists the product name, application rate, application frequency, and application method the Program proposes to use. ORCAL Slug and Snail Bait 3.25% and Deadline® Ornamental 4% contain a bittering agent to reduce the chance of incidental exposure to birds and mammals, as well as domestic pets. ORCAL Slug-Fest® 25% and Durham® Metaldehyde Granules 7.5% are applied by hand as targeted treatments. ORCAL Slug and Snail Bait and Deadline Ornamental 4% can be applied with a broadcast spreader.

The Program creates a treatment grid based on properties with a positive snail detection. Properties adjoining and adjacent to positive properties are included in the treatment grid. All greenspace on positive and negative properties in a treatment grid would receive a broadcast treatment of ORCAL Slug and Snail Bait or Deadline Ornamental at the label rates. In addition to the broadcast treatment, on positive properties the Program would make an application of Slug-Fest or Durham at the site of the GAS find, applying the product within one foot of the site. The Program applies a second treatment of metaldehyde to the properties within the treatment grid at least 14 or 21 days after the first application or according to label treatment schedules. A 10-foot treatment buffer from aquatic areas is followed for metaldehyde bait and liquid applications. In buffer areas, the Program will use visual detection and detector dogs with physical removal to treat GAS infestations.

Table 1. Metaldehyde formulations the Program proposes to use for GAS eradication.

Product	Application rate	Frequency	Property status for properties other than plant nurseries	Application method
Deadline® Ornamental (Alternative brand name Deadline T&O) 4%, pellet with bittering agent Bitrex EPA Reg. No. 5481-511 FL SLN No. 140001 ^a	2 lb a.i./acre	As needed	Positive or negative - Use to treat snail positive, adjoining, and adjacent properties	Apply using a hand-held spreader The Program would use this pesticide as a second choice to ORCAL Slug and Snail Bait, which also contains a bittering agent
Durham® Metaldehyde Granules 7.5% metaldehyde EPA Reg. No. 5481-103	2 lb a.i./A Applications are made within 1-foot of a GAS find.	As needed but no more than 6 applications/year	Positive - Used in infested areas where the Program collected GAS and egg laying likely occurred	Targeted broadcast by hand in areas where GAS are detected Used to target infested small areas and areas difficult to reach with the preferred pellet formulations. The granules are sand core granules coated with the metaldehyde.
ORCAL® Slug and Snail Bait 3.25% metaldehyde, with bittering agent (bitrex) Sublabel A – Agricultural Label Sublabel B – Residential Label EPA Reg. No. 71096-7	Sublabel A: 2 lb a.i./A Sublabel B: between 18 to 20 pellets per linear foot depending on use site	Sublabel A: As needed but no more than 6 applications/year Sublabel B: 2 to 6 times/year, depending on use site	Positive or negative - Use to treat snail positive, adjoining, and adjacent properties	Broadcast using a hand-held spreader The Program prefers this pesticide for broadcast applications, because it has a bittering agent and would use this more widely than other Program pesticides
ORCAL® Slug-Fest All Weather Formula, 25% metaldehyde, liquid EPA Reg. No. 71096-4 FL SLN No. 140005	118 fl. oz per treated acre (2 lb a.i. /A) For use in traps, mix 5 to 10 fl. oz with 10 gallons of water and fill the bottom of each trap with up to one-inch of pre-moistened soil and then apply the Slug-Fest solution to the soil until moist. Applications are within 1-foot of a snail find.	As needed but no more than 6 applications per year	Positive Used in infested areas where the Program collected snails and egg laying likely occurred Positive/Negative when used in snail traps	Targeted spray in areas where snails are detected using backpack sprayer or hand-pulled tank sprayer Used to target small, infested areas or in areas difficult to reach with the preferred pellet formulations. Used in gastropod traps (SLN) to aid in the detection of snails. Place traps in wet shady areas at a minimum of 3 feet apart in areas specified on the SLN label

^a The Deadline SLN No. FL-140001 is labeled for use in Miami-Dade County but FDACS is seeking to add Lee and Pasco Counties.

The Program could use gastropod (snail) traps to aid in the detection of the GAS but the thus far has not. If used, traps contain a food bait such as fermenting yeast, flour dough, or a synthetic lure which is topped with 1-inch of metaldehyde-treated soil. The Program would mix 5 to 10 fluid ounces of ORCAL Slug-Fest with 10 gallons of water and adds this dilution to the soil in the trap until the soil is moistened. The traps are placed in wet, shady areas at a minimum of three feet apart in areas known to have infestations as well as in areas to confirm control measures were successful. Traps containing metaldehyde could be used in commercial nurseries but not in residential areas. The overall length of time a snail trap would be used at a site varies with the risk associated with that location.

The Program does not anticipate using snail traps but these are discussed if they are needed. Traps could be used in an area for at least 6 months after the last detection of a GAS. The Program would try to service the traps daily to allow for immediate response to the presence of a GAS. The synthetic lure remains attractive to snails for 10 with the Program replacing the bait and lure more frequently, preferably daily, due to secondary invaders such as flies and the tendency for the lure to dry out. The Program replaces the metaldehyde-treated soil regularly and when the trap is saturated with snails following label instructions. The Program uses traps only in areas specified on labels (Table 1).

Prior to treatment with metaldehyde, the Program would obtain signed consent forms from residents or landowners. The Program provides residents or landowners with a 24-hour notice that treatment will occur. Once treated, the Program gives residents and landowners a notice with the date and time the treatment occurred and the time they can enter the treated area. The metaldehyde reentry time is 12 hours; a reentry time is not associated with snail traps.

Pesticide treatments may continue for two to four years. After termination of eradication treatments, the area will be monitored according to the plan that outlines the procedures for the eradication to ensure that the GAS has been eradicated.

C. Alternatives Considered but Not Further Analyzed

A few alternatives were considered but dropped from further analysis because these would not satisfy the regulatory obligations of USDA APHIS.

1. No Federal Program Alternative

Under the No Federal Program Alternative, neither USDA APHIS nor any other federal agency would assist with Florida's GAS eradication program. This alternative is similar to the No Action Alternative because FDACS or private entities would have to conduct GAS removal activities without federal funding or other assistance from USDA APHIS, the agency responsible for plant pests. Without federal resources and coordination, a substantially higher likelihood that GAS could start to populate additional areas is likely in Florida. This alternative does not comply with the Plant Protection Act of 2000 whereby Congress articulated that federal agencies take steps to stop dissemination of plant pests within the United States, or with Executive Order (EO)

13112, which orders federal agencies to minimize problems from invasive species introduction. This is not a viable alternative to meet the requirement for USDA APHIS to act regarding the control of the GAS in the United States.

2. Physical Removal Only Alternative

The public may voice concerns regarding Program methods used to control GAS, particularly the use of toxicants such as the metaldehyde formulations. Program use of detector dogs and visual detection with hand capture and removal of debris may reduce but is unlikely to eliminate GAS eggs and larvae. Metaldehyde is the best molluscicide currently available for this and can be used in treatments and traps (traps have not been used by the Program, thus far). If the current infestation becomes established, GAS could spread in Pasco and Lee Counties and beyond. A Program that targets the different life stages and habitats of GAS is necessary to ensure eradication of the Pasco and Lee Counties infestations. Thus, eliminating the primary method, a molluscicide, for GAS will not be considered for further analysis.

3. Consulting Alternative

This alternative would allow UDSA APHIS to provide FDACS and others with technical assistance to help them resolve the Pasco and Lee Counties GAS infestation. This would be counter to the Plant Protection Act of 2000 whereby Congress articulated that USDA APHIS take steps to protect plants and halt dissemination of plant pests within the United States. Also, under EO 13112 on invasive species, USDA APHIS is tasked with minimizing problems from invasive species including their introduction and control. A consulting alternative does not meet the federal need for action regarding the eradication of this invasive pest.

III. Potential Environmental Consequences

GAS can flourish in the Lee and Pasco Counties’ tropical and subtropical climates and could spread elsewhere if unabated. Both counties contain mixed residential areas, state and county parks, commercial, industrial, and agricultural production, as well as plant nurseries. Between 2012 and 2017 Pasco County saw a 12% increase in acreage used for agriculture; agriculture acreage in Lee County remained almost the same (USDA NASS 2017). Fishing and water recreation are popular along their marine and riverine shorelines. Data about local agricultural production, obtained from the most recent census of agriculture (USDA NASS 2017), is provided in Table 2.

Table 2. Agricultural production in Lee and Pasco Counties during 2017.

NASS Census Categories	Lee County, Florida	Pasco County, Florida
Market Value of Agricultural Products Sold, U.S. dollars	Total (crops, livestock, poultry, etc.) – \$104,359,000. Crops Only – \$97,911,000.	Total (crops, livestock, poultry, etc.) – \$64,966,000. Crops Only – \$15,022,000.
Land in Farms, acres	87,189 A	191,517 A
Farmland by Use, percent	Cropland – 25% Pastureland – 47% Woodland – 20% Other – 08%	Cropland – 14% Pastureland – 61% Woodland – 22% Other – 03%
Agricultural Producers (Data collected for a maximum of 4 producers per farm.)	Total – 1,335 Male – 791 Female – 544 Aged 65 and older – 465 By Race: <ul style="list-style-type: none"> • American Indian/Alaska Native – 2 • Asian – 45 • Black or African American – 7 • Native Hawaiian/Pacific Islander – 2 • White – 1,268 • Two or more races – 11 • Hispanic/Latino/Spanish origin – 134 	Total – 1,982 Male – 1,170 Female - 812 Aged 65 and older – 687 By Race: <ul style="list-style-type: none"> • American Indian/Alaska Native – 1 • Asian – 32 • Black or African American – 46 • Native Hawaiian/Pacific Islander – 4 • White – 1,889 • Two or more races – 10 • Hispanic/Latino/Spanish origin – 163

Lee County is located along the Gulf coast of southwestern Florida; the county seat is Fort Myers. It has a land area of approximately 781 square miles. In 2022, the leading industries in the county were retail, health care and social services, accommodation and food services, and construction. With its road, rail, air, and sea access, Lee County has multiple ways to connect to domestic and international markets (Lee County Economic Development 2023). Lee County's population is mostly in coastal cities in its northern half, overlooking three aquatic preserves,

large barrier islands and numerous tiny islands. Conservation areas include four wildlife refuges, Caloosahatchee, J.N. "Ding" Darling, Matlacha Pass, and Pine Island National Wildlife Refuges.

Pasco County lies on the west central coast of Florida, north of the city of Tampa. It has a land area of approximately 747 square miles. Economic drivers are the citrus industry, retirement communities, outdoor recreation, and naturist resorts. With its road, rail, air, and sea access, Pasco County has multiple ways to connect to domestic and international markets. Government business is conducted in the county seat of Dade City on the east side and in New Port Richey on the west side (Pasco County 2023; Pasco EDC 2023). Pasco County attracts visitors to its open spaces, citrus groves, gulf shoreline, barrier island, and view protected wildlife. Conservation areas include Aripeka Sandhills Preserve, Boy Scout Preserve, Cypress Creek Preserve, Pasco County, Jumping Gully Preserve, Pasco Palms Preserve, Tierra Del Sol Preserve and Upper Pithlachascotee River Preserve.

A. Impacts Considered in This Chapter

This chapter focuses on the potential environmental consequences associated with the two alternatives. The No Action Alternative is used as the baseline and compared to the potential impacts of the Preferred Alternative that could affect environmental quality, ecological resources, and human health and safety. The potential impacts may be direct, indirect, and of short or long duration. Impacts may also be either beneficial or adverse. Reasonably foreseeable effects on the human environment are identified. Overarching impact categories include:

- Impacts on environmental quality.
- Impacts to ecological resources.
- Impacts to human health and safety.

B. Impacts Not Discussed in Depth

Air quality, soil quality, water quality, and climate change are not discussed in depth in this document because USDA APHIS reviewed a similar program targeting hornail snail (*Macrochlamys indica*) in south Florida (USDA APHIS 2022) and expects that the proposed activities for the No Action and Preferred Alternatives for this Program will have minimal to no impacts if the eradication treatment protocols are followed. Adverse impacts to environmental quality are not anticipated because of the prescribed use patterns for metaldehyde, as well as its environmental fate:

- The use of a granular formulation and large coarse droplets in the spot liquid applications along with a lack of volatility of metaldehyde assures that air quality will not be impacted in the treatment areas. Metaldehyde is stable to hydrolysis and photolysis but shows degradation in the presence of microbes with a reported aerobic soil metabolism half-life in soil of 67 days. Degradation by microbial processes is also supported by field data that demonstrates a half-life of metaldehyde of less than 15 days in water and sediment

(Austrian Agency for Health and Food Safety 2016; Bieri 2003; Calumpang et al. 1995; Thomas 2016; Thomas et al. 2017). The primary degradation products of metaldehyde are acetaldehyde and carbon dioxide which have been shown to represent 11 and 74%, respectively, of the parent in laboratory studies (USEPA 2006). Metaldehyde may impact some soil dwelling invertebrates after repeated use in the same area, but due to the limited areas of treatment and selective toxicity, impacts are not expected to be widespread or affect other soil dwelling invertebrates. Metaldehyde has a solubility of 200 mg/L with a range of adsorption coefficient (Koc) values of 57 to 173. Adsorption coefficient values determine how mobile a pesticide may be in soil. The higher the Koc value the more likely it is to bind to soil and not occur in solution in runoff. The Koc values reported for metaldehyde suggest mobility in soil. Metaldehyde is expected to be moderately persistent with an aerobic half-life of 67 days and an anaerobic half-life typically greater than 200 days (USEPA 2006; 2020a). Degradation is much slower under anaerobic conditions with half-lives typically greater than 200 days (USEPA 2006).

- Label restrictions prohibit applications to water and granular formulations minimize the likelihood of runoff. Drift and runoff potential from spot liquid applications is also expected to be low since a large coarse droplet size will be used and all liquid applications will be made by hand to targeted spots (1-foot around a snail find) under vegetated areas. The potential for runoff to occur from applications to treat the GAS will further be reduced by treatment restrictions for the Program that require a 10-foot application buffer from all waterbodies.
- Greenhouse gas emissions and potential contribution to global climate change are expected to be minor. The Program's use of fossil fuels in vehicles for travel to and from treatment sites would be minimal for both the No Action and Proposed Action Alternatives.

C. Impacts Under the No Action Alternative

The No Action Alternative consists of the actions previously conducted by USDA APHIS to eradicate the GAS in Florida, with no participation by USDA APHIS in the current GAS programs for Lee County and Pasco County. Effective September 30, 2021, USDA APHIS declared eradication of the GAS in Florida and ended its snail quarantines after USDA APHIS and FDACS found Broward and Miami-Dade Counties GAS-free for three consecutive years (USDA APHIS 2021).

While other federal and non-federal entities may take control actions on their own, without USDA APHIS participation, the GAS population would likely continue to increase and spread as people inadvertently move GAS life stages in soil, stone, plants, plant debris, and other material. With limited state funding for GAS management, it could spread outside of its current range in Lee and Pasco Counties and expand to other areas of Florida and the United States.

Eradication efforts by FDACS, other agencies, and the private sector in Lee and Pasco Counties would likely involve applications of metaldehyde, visual and canine detection with hand removal, surveillance, and reduced host movement. Debris is also collected around positive finds to reduce habitat for the GAS. The most likely impact to human health and the environment under this alternative would be from uncoordinated or illegal applications of metaldehyde and other pesticides, and improper GAS handling (appropriate personal protective equipment (PPE) such as latex gloves are worn to ensure disease is not transferred to personnel) and disposal.

Under the no action alternative, USDA APHIS would not directly impact air, water, soil, nontarget species, human health, ecosystems, historic, cultural, and other resources in GAS eradication areas. However, the lack of federal participation in Florida's GAS eradication efforts could indirectly support GAS population establishment in Lee and Pasco Counties, damaging the local ecology, economy, and quality of life.

- Ecological resources include plant and animal species and the habitats where they live and includes protected species. The GAS would be expected to damage susceptible native vegetation, including rare species, if populations become sufficiently high. It is expected to cause damage to commercial agricultural crops and horticultural plants.
 - The range of plant species consumed by GAS is broad (Appendix C) but GAS will eat anything in their path including discarded plant material, stucco, detritus, and organic waste. The GAS is not known to feed on any of the federally listed threatened and endangered (T&E) plant species in Lee and Pasco Counties identified in Table 3 (aboriginal pricklyapple, beautiful pawpaw, and Britton's beargrass) but potentially could.
 - Approximately 100 native snail and slug species, and about 40 introduced exotic species make up the land gastropods in Florida (Garofalo et al. 2001). Most of the 140 species are less than ½-inch long. A tree snail species, the Manatee snail (*Drymaeus dormani*), is considered beneficial by citrus growers because it clears algae and mold from the leaves (Garofalo et al. 2001). The invasive GAS will compete for resources with native snails. It is anticipated that pesticide applications would increase over the long term if GAS populations increased and spread. In addition to increased pesticide loading, it is possible that pesticides that pose a higher comparative risk to human health and the environment than metaldehyde that the Program proposes to use under the preferred alternative will be used to remove GAS if they become more abundant.
 - Actions by FDACS and potentially others would not likely impact bird and mammal habitat directly, but eliminating GAS infestations could be beneficial to the environment, especially plants that it consumes or damages. It is possible that migratory birds could be disturbed by actions to eliminate GAS from USDA APHIS personnel coming and going from infested areas where birds may be present and inadvertently scaring them. However, this work would be of short duration and not likely to cause any impacts other than short term harassment.

- Currently, the GAS infestations are found mostly in residential settings where plant loss would be confined to landscape and garden plants. The Program has found the GAS in several plant nurseries. Expansion of the GAS to other areas could pose a threat to agriculture. Commercial producers with GAS in their agricultural and nursery crops may experience loss of market share, loss of property, increase in control costs, and compromised mental and physical health from increased stress.
- Homeowners would also experience damage and loss of landscape plants and could incur costs should they chose to treat the GAS with commercially available products.

D. Impacts Under the Preferred Alternative

This section considers the potential environmental consequences for the preferred alternative by summarizing information associated with environmental quality, ecological resources, and human health and safety in the proposed Program area. The specific location of a GAS population is not likely to alter the type or frequency of any direct or indirect impacts.

1. Environmental Quality

Hand removal of snails will not impact air, soil, or water resources. The most frequent types of ground disturbance would be from vehicles and Program personnel walking to conduct Program activities. Many of the activities associated with the Program may result in temporary soil surface disturbance or compaction. Since the GAS currently occurs in highly disturbed areas where soil quality is already impacted by human activities, the Program in these areas will have negligible negative impacts.

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. 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 remain minor compared to the overall emissions in the four counties.

Impacts from Program use of metaldehyde to air, soil and water quality are not anticipated from the Program's use pattern of the molluscicide and its environmental fate. Metaldehyde is stable to hydrolysis (chemical breakdown from chemical reaction with water) and photolysis (chemical breakdown from reaction to light) and was discussed in Section III.B.

Label restrictions prohibiting applications to water and granular formulation will reduce the likelihood of runoff. Drift and runoff potential from spot liquid applications is expected to be low since a large coarse droplet size will be used and all liquid applications will be made by hand to targeted spots (1-foot around a snail find) under vegetated areas. Metaldehyde runoff from snail traps is also unlikely as the metaldehyde-treated soil is contained within the trap, if a trap is used,

and does not contact the ground and traps are placed under vegetation, which provides some protection from rain events. The potential for runoff to occur from applications to treat the GAS will further be reduced by treatment restrictions for the Program that require a 10-foot application buffer from all water bodies. This 10-foot application buffer would apply to snail traps if used, which reduces the likelihood the traps dislodge into water bodies during extreme rain events. The use of a granular formulation and large coarse droplets in the spot liquid applications along with a lack of volatility of metaldehyde suggests that air quality will not be impacted in the treatment areas.

2. Ecological Resources

Metaldehyde is moderately toxic to mammals and birds (USEPA 2020b); the Program prefers to use metaldehyde formulations that contain a bittering agent to reduce the palatability of metaldehyde to nontarget species. This provides some deterrence to nontarget wildlife, as do the targeted application methods. Exposure and risk to domestic animals is discussed below under Human Health and Safety.

Impacts to some soil dwelling terrestrial invertebrates could occur; however, these effects would be localized to the areas of treatment, and specific to those invertebrates that would be attracted to the bait. Risk to insects such as sensitive lepidopterans is not anticipated because the product is not applied to foliage as a spray where most lepidopterans forage and could be exposed. In addition, the materials in the formulation that are attractive to the GAS are not components that would typically attract lepidopteran insects. Metaldehyde is practically nontoxic to the adult honeybee for both the acute oral ($LD_{50} > 87$ micrograms (μg) a.i./bee) and contact exposure (48 hr $LC_{50} > 113$ μg a.i./bee) (USEPA 2020a). The Program expects minimal exposure to bees based on its use pattern of soil applications and not foliar applications.

In aquatic systems, fish and aquatic invertebrates show low sensitivity to metaldehyde (USEPA 2020a). The lack of toxicity has also been demonstrated in field studies where metaldehyde has been used to treat aquaculture ponds for invasive snails (Borlongan and Coloso 1996; Calumpang et al. 1995; Coloso et al. 1998). Label restrictions regarding metaldehyde applications near water include the requirement a 10-foot application buffer from aquatic resources, reducing the potential for exposure and results in a very low probability for any adverse effects to aquatic organisms. The spot applications and trap placements would also adhere to the 10-foot application buffer from aquatic resources, and with conservative estimates of residues, is not expected to result in impacts to aquatic biota. The bittering agent, denatonium benzoate, appears to have low toxicity to fish.

a) Migratory Bird Treaty Act

While GAS eradication activities may temporarily disturb migratory birds, USDA APHIS expects this disturbance to be negligible. Some examples of anticipated disturbance associated with Program activities includes the use of vehicles and human noise. However, the current GAS outbreak is found in highly disturbed areas and the urban profile of Lee and Pasco Counties indicate that disturbance of migratory birds from Program activities will be minimal.

Metaldehyde treatments will not result in significant adverse direct or indirect impacts to migratory birds. Metaldehyde has moderate toxicity to birds. The selective nature of the metaldehyde formulation as well as the localized treatment areas would result in low direct risk to terrestrial insectivores. The Program prefers to use metaldehyde formulations that contain a bittering agent, which may reduce exposure of birds by reducing the palatability of the product.

b) Bald and Golden Eagle Protection Act

If bald or golden eagles were discovered near a Program area, the State agency responsible for the area would contact the U.S. Fish and Wildlife Service (USFWS) and implement recommendations for avoiding disturbance at nest sites such as conducting all activities at night. For bald eagles, USDA APHIS would follow guidance as provided in the National Bald Eagle Management Guidelines (USFWS 2007). These guidelines include a 330 to 660-foot buffer from an active nest, depending on the visibility and level of activity near the nest. USDA APHIS expects pesticide exposure to terrestrial and aquatic nontarget organisms to be negligible, and subsequently, the potential for risk of eagles to Program pesticides is very low. USDA APHIS expects disturbance from other activities such as survey or accessing treatment sites to be negligible.

c) Endangered Species Act

Prior to implementing a GAS eradication Program, Program personnel will contact the appropriate USFWS and National Marine Fisheries Service (NMFS) offices, when applicable, to conduct Section 7 consultations under the Endangered Species Act (ESA). Contact and coordination between USFWS, NMFS, and treatment applicators would not be required for pesticide treatments occurring outside of habitats where federally listed T&E species may occur. These areas may include but are not limited to residential gardens, urban areas, and other highly managed areas such as industrial sites, farmsteads, lumberyards, parking areas, parks, and petroleum tank farms. If treatments occur in habitats where certain terrestrial or marine listed species may occur, then USFWS and NMFS 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 species identified in the biological assessment.

Although removal of the GAS from the critical habitat of some federally listed species would be beneficial, Program activities potentially could adversely affect listed T&E species and their habitats. Possible adverse effects include toxicity of Program pesticides to listed animal and plant species and trampling of listed plants during survey and treatment activities.

USDA APHIS submitted a biological assessment to the USFWS May 2023 and will abide by any determinations that USFWS makes in the ESA Section 7 consultation. USDA APHIS determined that the Program's surveys or use of handpicking GAS, detector dogs, metaldehyde, and papaya oil attractant would have no effect on most listed T&E species in Lee and Pasco Counties identified in Table 3. USDA APHIS determined, however, that the program's use of

metaldehyde may affect but is not likely to adversely affect the Eastern indigo snake (*Drymarchon couperi*), the Everglade snail kite (*Rostrhamus sociabilis plumbeus*), and the Florida scrub-jay (*Aphelocoma coerulescens*). NMFS, the agency that conducts consultations for marine species, was not consulted because USDA APHIS determined that the Program would have no effect on species they manage.

Table 3. Threatened and endangered species in Lee and Pasco Counties receiving a No Effect Determination.

Species	Description
Mammals	Florida bonneted bat, <i>Eumops floridans</i> Florida panther, <i>Puma (=Felis) concolor coryi</i> Puma (=mountain lion), <i>Puma (=Felis) concolor</i> (all ssp. except <i>coryi</i>) West Indian manatee, <i>Trichechus manatus</i>
Birds	Audubon’s crested caracara, <i>Polyborus plancus audubonii</i> Eastern black rail, <i>Laterallus jamaicensis ssp. jamaicensis</i> Piping plover, <i>Charadrius melodus</i> Red knot, <i>Calidris canutus rufa</i> Red-cockaded woodpecker, <i>Picooides borealis</i> Wood stork, <i>Mycteria americana</i>
Reptiles	American crocodile, <i>Crocodylus acutus</i> Green sea turtle (North Atlantic DPS), <i>Chelonia mydas</i> Kemp’s Ridley sea turtle, <i>Lepidochelys kempii</i> Loggerhead sea turtle (Northwest Atlantic Ocean DPS), <i>Caretta caretta</i>
Fishes	Gulf sturgeon, <i>Acipenser oxyrinchus (=oxyrhynchus) desotoi</i>
Insects	Miami blue butterfly, <i>Cyclargus (=Hemiargus) thomasi bethunebakeri</i>
Flowering Plants	Aboriginal prickly-apple, <i>Harrisia (=Cereus) aboriginum (=gracilis)</i> Beautiful Pawpaw, <i>Deeringothamnus pulchellus</i> Britton’s Beargrass, <i>Nolina brittoniana</i>

USDA APHIS implements a 10-foot buffer from water resources in each metaldehyde treatment area. Program personnel must take care not to remove native snails. Workers must be able to recognize native snail species before performing any hand removal of GAS. Broadcast application of molluscicides and use of traps will not be used in habitats for at-risk snail species.

3. Human Health and Safety

USDA APHIS and FDACS will invite residents who have hypersensitivity to any of the Program treatments to contact the Program to arrange for alternate methods of GAS trapping and eradication. The presence of the GAS could result in additional pesticide applications in residential, commercial, and other locations if GAS populations increase and spread. In addition to increased pesticide loading there is the potential for non-Program use of other pesticides that pose a higher comparative risk to human health and the environment than the prescribed metaldehyde treatments.

The Program applies pesticides in a way that minimizes significant exposure to people. 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 and to limit spray drift, and restricted-entry intervals) result in low health risk to all human population segments from Program use of pesticides. USDA APHIS does not anticipate the metaldehyde formulations proposed for use in this Program would persist in the environment or bioaccumulate. USDA APHIS also used metaldehyde to eradicate the invasive horntail snail in February 2022 from four Florida counties (USDA APHIS 2022). The lack of significant routes of exposure to human health and the environment suggest additive or synergistic impacts from metaldehyde use do not occur in the USDA APHIS horntail snail program and would not occur in the proposed Program targeting GAS.

Metaldehyde is moderately toxic to mammals with an acute median lethality value of 283 milligrams/kilogram in the rat. Dermal and inhalation toxicity is very low with median lethality values greater than the highest test concentration (USEPA 2006). Longer term exposure to metaldehyde results in a no observable effect level of ten milligrams/kilogram or higher, with the liver being the primary organ where effects have been noted. Developmental toxicity has not been observed in dosing studies at relevant doses; however, there is data to suggest that metaldehyde may be neurotoxic and potentially carcinogenic based on the presence of benign liver tumors in long term studies (USEPA 2006). Available data on acute effects for the proposed formulations demonstrate equivalent or less toxicity to mammals.

Dietary exposure and risk from the proposed use of metaldehyde is expected to be low for all population segments. The population segment with the highest probability of exposure is children who may consume bait and soil containing metaldehyde. However, adherence to label language, notification of treatment to property owners, and the use of formulations with a bittering agent will reduce the potential for exposure and reduce the risk to children.

The Program notifies landowners and residents prior to treatment and provides information cards with the date and time the treatment occurred and a reminder of the 12-hour reentry period. Worker exposure and risk is expected to be low based on the toxicity of metaldehyde, the Program method of application, and adherence to label language designed to minimize exposure of humans (USEPA 2006).

Metaldehyde bait formulations contain common food materials that may be attractive to pets such as dogs. If consumed in enough quantities, adverse effects are expected (Richardson et al. 2003). Most of the reported cases involved ingestion of metaldehyde after applications to yards and gardens (not Program applications) or from the animal opening or tearing the packaging to access the product. The requirement for additional precautionary label language is designed to reduce risk of domestic pet exposure to metaldehyde USEPA (2007). Adherence to all precautionary label language, notification to landowners regarding treatments, and the use of bittering agent in some formulations will reduce the potential for adverse effects to domestic pets where metaldehyde may be used.

FDACS monitors reports of pesticide poisoning and no reports of poisoning incidents from metaldehyde have been made for any of its use cases, including its use in their GAS eradication Program which has used metaldehyde since 2013. Their Program gives residents and landowners a notice with the date and time the treatment occurred and the time they can enter the treated area, which is 12 hours after treatment. This reentry period reduces exposure to domestic animals and would be followed by USDA APHIS as well.

a) Minority Populations, Low-Income Populations, Racial Equity, Support for Underserved Communities, Protection of Children from Environmental Health Risks and Safety Risks

Both Lee County and Pasco County may have potentially vulnerable or underserved populations that could be affected by the proposed action. USDA APHIS requires that its pest control programs keep the public informed of eradication activities to avoid adverse impacts to children, the elderly, the poor, people lacking sufficient education or sufficient English, people of color, and so on. Data obtained from the U.S. Census QuickFacts website is provided in Table 4 (U.S. Census Bureau 2023). The Program and local authorities will communicate with residents and property owners about planned activities in advance, via English, Spanish and other languages as appropriate.

Table 4. Selected demographic information.

U.S. Census Categories	Lee County	Pasco County	State of Florida
Population estimated, July 1, 2022	822,453	608,794	22,244,823
Population, Census, April 1, 2020	760,822	561,891	21,538,187
Persons under 5 years, percent	4.4%	4.9%	5.1%
Persons under 18 years, percent	17.3%	20.4%	19.7%
Persons 65 years and over, percent	29.1%	22.1%	21.1%
Female persons, percent	50.8%	51.1%	50.8%
Black or African American alone, percent	9.2%	7.4%	17.0%
American Indian and Alaska Native alone, percent	0.5%	0.5%	0.5%
Asian alone, percent	1.8%	3.1%	3.0%
Native Hawaiian and Other Pacific Islander alone, percent	0.1%	0.1%	0.1%
Two or more Races, percent	1.9%	2.6%	2.4%
Hispanic or Latino, percent	23.8%	18.1%	26.8%
Language other than English spoken at home, percent of persons aged 5 years+, 2017-2021	23.7%	16.1%	29.8%
High school graduate or higher, percent of persons aged 25 years+, 2017-2021	89.8%	90.4%	89.0%
Bachelor's degree or higher, percent of persons aged 25 years+, 2017-2021	29.0%	26.1%	31.5%
Persons in poverty, percent	12.2%	11.6%	13.1%

It should be noted that USDA APHIS will treat GAS wherever they are found to stop infestations. With rat lungworm found in the Pasco County population of GAS, human health and safety would be protected by eliminating any outbreak wherever it occurs.

The GAS consumes a wide range of plants in its diet and can cause damage to commercial crops and ornamental plants. Under the preferred alternative, eradication efforts involve survey of landscapes on public and private properties and treatment of areas where the GAS is found.

Federal agencies are directed under EO 14096 to ensure that the public, including members of communities with environmental justice concerns, receives timely information about releases of toxic chemicals that may affect them or their health and safety measures available to address chemical applications. Before the Program treats a site, it notifies property owners where treatments could occur. The notification process and information provided by the Program regarding reducing exposure to treatments, and the use of bittering agents in bait formulations of metaldehyde, will ensure that human health exposure and risk will be minimized, including minority and low-income populations and underserved communities. Based on the analysis of available toxicity data and the potential for exposure, the human health and environmental risk from the proposed applications are minimal and are not expected to have disproportionate and adverse effects to any minority or low-income family. The Program's goal is the eradication of GAS infestations; this involves working with local communities to inform them about the GAS and its impact and the approaches the Program uses to control populations. The pesticides proposed for Program use will not be used on commercial crops or food items, so no dietary exposure is expected. Oral ingestion could occur through deliberate or accidental ingestion of metaldehyde granules or treated soil. Notification to homeowners and residents on when applications occur will reduce this type of exposure to children and adults with pica disorders. Additionally, exposure to granules is not anticipated to occur in quantities that could result in adverse effects and the Program prefers to use metaldehyde formulations that contain a bittering agent designed to deter ingestion. Therefore, no disproportionate risks to children are anticipated from the use of metaldehyde formulations to eradicate the GAS.

4. Historical and Cultural Resources

Depending on the location of the proposed action the Program may consult with the following six federally recognized Tribal governments:

- The Miccosukee Tribe of Indians of Florida
- The Mississippi Band of Choctaw Indians
- The Muscogee (Creek) Nation
- The Poarch Band of Creek Indians
- The Seminole Nation of Oklahoma
- The Seminole Tribe of Florida

These Tribal governments have ancestral lands throughout the southeastern United States. Two Tribes currently reside and have tribal lands in the state: the Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida. Although the Muscogee Creek Nation, the Poarch

Band of Creek Indians, the Seminole Nation of Oklahoma, and the Mississippi Band of Choctaw Indians do not currently have reservation lands in the state, they once lived in Florida and have a direct historical and cultural association with the state. They are culturally affiliated with the State of Florida.

To date, no GAS detections have occurred on, or adjacent to, Tribal property in Lee or Pasco Counties. Under the Preferred Alternative, USDA APHIS will contact potentially affected Tribes to initiate a dialogue regarding proposed activities to eradicate the GAS if its range expands into or near Tribal property. If USDA APHIS discovers any archaeological Tribal resources, it will notify the appropriate Tribal and local authorities.

Under the Preferred Alternative USDA APHIS will also initiate consultation as appropriate with the Florida State Historic Preservation Officer. The National Register of Historic Places lists 58 properties within Lee County, and 11 properties within Pasco County; these include some districts and archeological sites but most are buildings (NPS 2023). The Register lists the following areas of significance for these properties: agriculture; archeology; architecture; art; black history/culture; commerce; community planning/development; education; entertainment/recreation; ethnic heritage; exploration/settlement; health/medicine; historic - non-aboriginal/aboriginal/prehistoric; industry; industry; invention; literature; maritime history; military; politics/government; religion; science; social history; and transportation.

Based on the criteria defined in Section 106 of the National Historic Preservation Act for what constitutes an adverse effect, the proposed Program will not have a negative impact on historic or cultural sites. Pesticide treatments will not be applied to historic buildings, and other anticipated Program actions (e.g., survey, trapping, and hand removal of snails) will not directly affect the buildings or their properties. The use of metaldehyde on historic properties may temporarily alter public accessibility due to the prescribed 12-hour delayed reentry period.

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

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

State Plant Health Director
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
8100 NW 15th Place
Gainesville, FL 32606

U.S. Fish and Wildlife Service
South Florida Ecological Services Field Office
1339 20th Street
Vero Beach, FL 32960

Florida Department of Agriculture and Consumer Services
Department of Plant Industry
The Doyle Conner Building
1911 SW 34th Street
Gainesville, FL 32608

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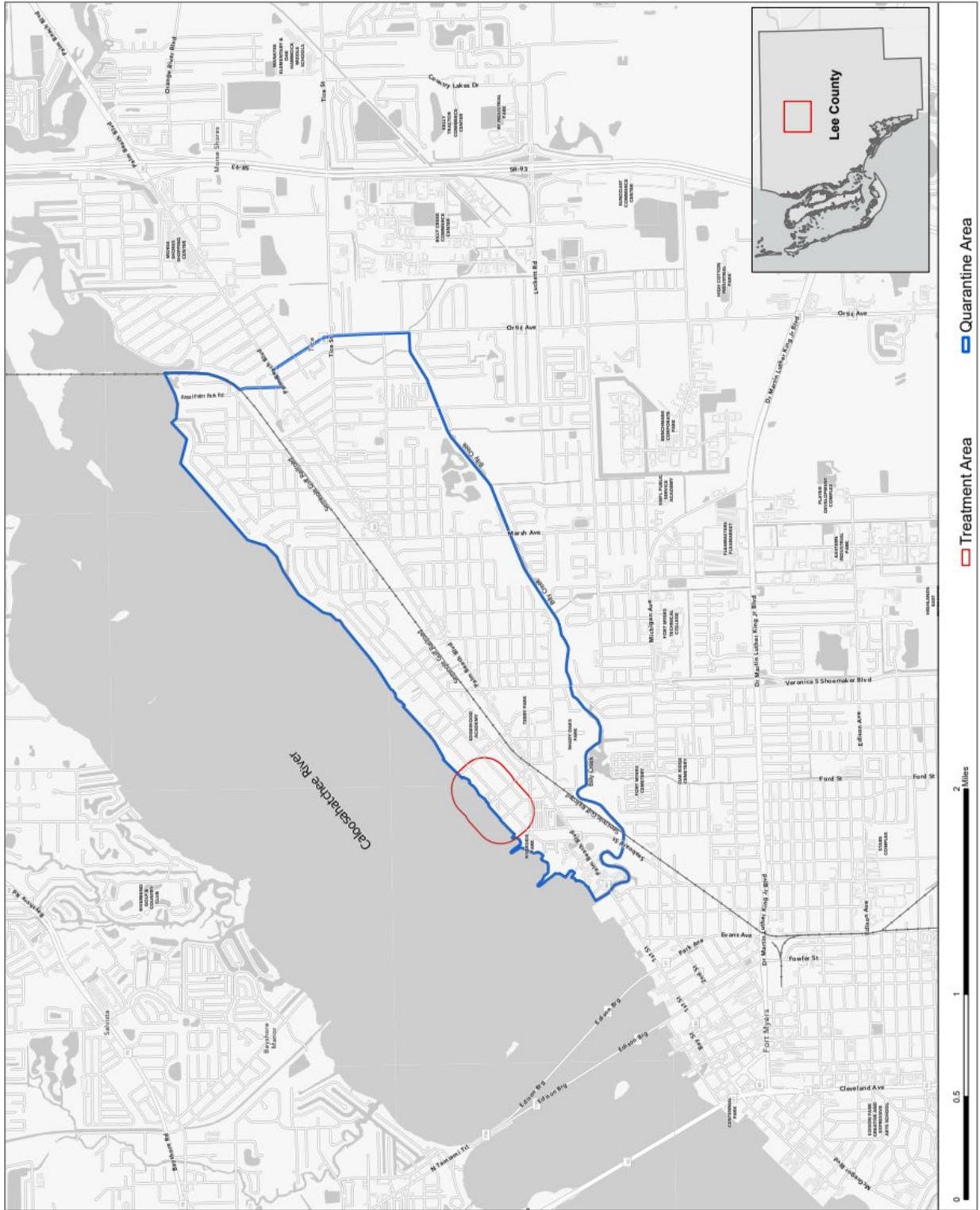
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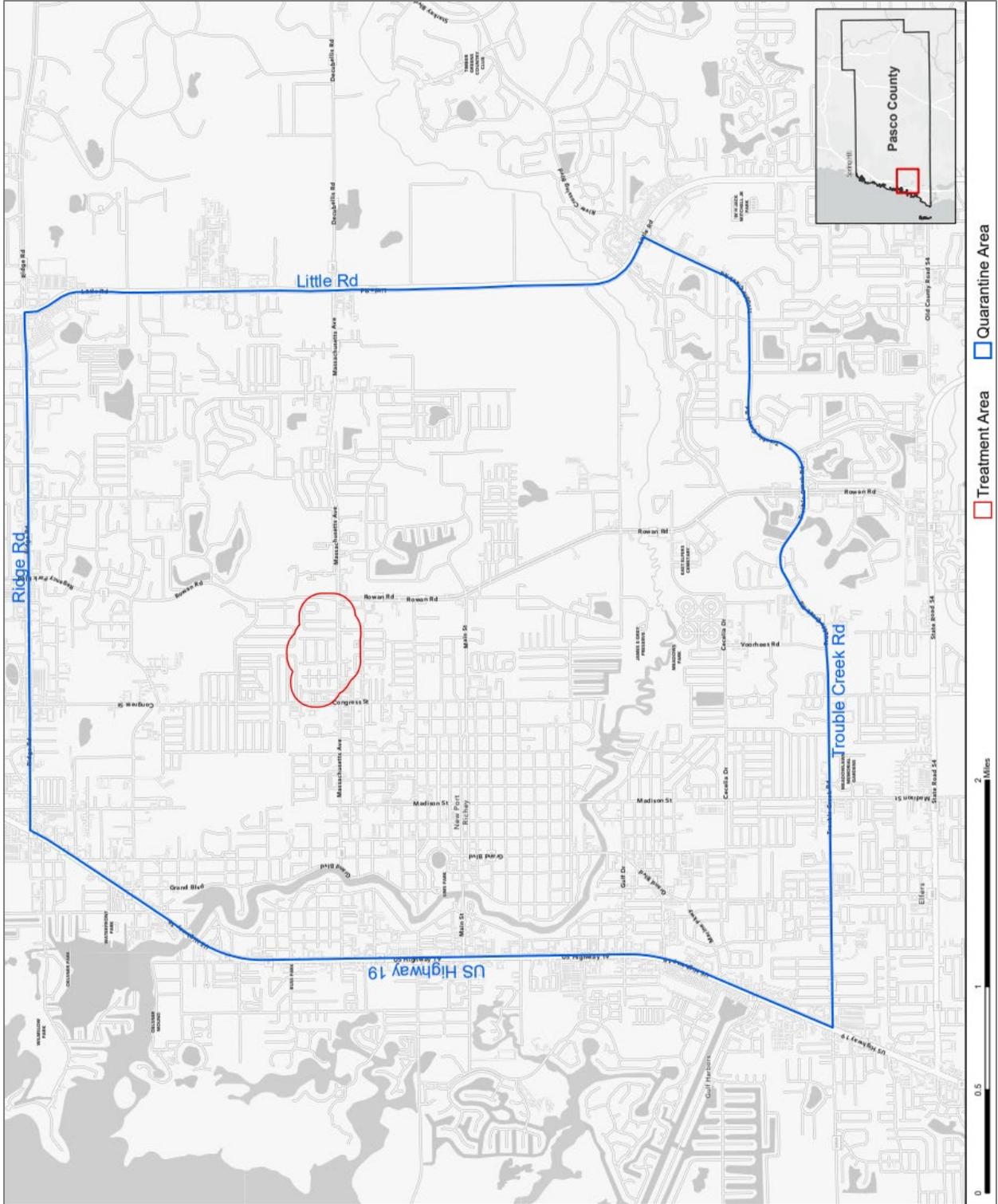
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Appendix A. FDACS program maps for Lee and Pasco Counties.



Map 1. Giant African Snail Program Quarantine Boundary and Treatment Area in Lee County, FL – March 2023 (FDACS 2023).



Map 2. Giant African Snail Program Quarantine Boundary and Treatment Area in Pasco County, FL – August 2022 (FDACS 2023).

Appendix B. Plants consumed by the giant African snail.

(From (Venette and Larson 2004) (common and scientific names updated))

Common name	Scientific name
African Locust Bean	<i>Parkia filicoidea</i>
African Oil Palm	<i>Elaeia quineensis</i>
Air Potato	<i>Discorea bulbifera</i>
Aloe	<i>Aloe indica</i>
Alsophils/Tree Ferns	<i>Alsophila</i> spp.
Amaranths	<i>Amaranthus</i> spp.
Apples	<i>Malus</i> spp.
Arabian Coffee	<i>Coffea arabica</i>
Aubergine	<i>Solanum melongena</i>
Aztec Marigold	<i>Tagetes erecta</i>
Balsampear	<i>Momordica cochinchinensis</i>
Bananas/Plantains	<i>Musa</i> spp.
Basella	<i>Basella alba</i>
Bauhinia	<i>Bauhinia acuminata</i>
Beans/Wild Beans	<i>Phaseolus</i> spp.
Betel	<i>Piper betel</i>
Birds Of Paradise	<i>Heliconia</i> spp.
Bittermelon	<i>Momordica charantia</i>
Blackeyed Pea	<i>Vigna unguiculata</i>
Blimbi	<i>Averrhoa bilimbi</i>
Blue-Sages	<i>Eranthemum</i> spp.
Bluestem Clump Grasses	<i>Andropogon</i> spp.
Boatlily	<i>Tradascantia spathacea</i>
Bottle Gourd	<i>Lagenaria siceraria</i>
Bougainvillea	<i>Bougainvillea</i> spp.
Breadfruit	<i>Artocarpus altilis</i>
Brinjal	see aubergine
Broccoli	<i>Brassica oleracea</i> var. <i>botrytis</i>
Bulrush	<i>Scirpus ternatanus</i>
Butterfly Peas	<i>Centrosema</i> spp.
Cabbage	<i>Brassica oleracea</i> var. <i>capitata</i>
Cacao	<i>Theobroma cacao</i>
Calophyllum	<i>Calophyllum inophyllum</i>
Cannas	<i>Canna</i> spp.
Cantaloupe	<i>Cucumis melo</i> var. <i>dudaim</i>
Carambola	<i>Averrhoa carambola</i>
Carrot	<i>Daucus carota</i>
Cassava	<i>Manihot esculenta</i>
Castor	<i>Ricinus communis</i>
Cathedral Bells	<i>Kalanchoe pinnata</i>
Cauliflower	see broccoli

Common name	Scientific name
Cayenne Pepper	<i>Capsicum annum</i>
Chandelier Plant	<i>Kalanchoe delagoensis</i>
Cherimoya	<i>Annona cheirimoya</i>
Chili Peppers	<i>Capsicum</i> spp.
Chinese Box/Orange Jasmine	<i>Murraya paniculata</i>
Chinese Chive	<i>Allium tuberosum</i>
Chrysanthemum	<i>Chrysanthemum coronarium</i> var. <i>coronarium</i>
Clitoria	<i>Clitoria ternatea</i>
Coco Yam	<i>Colocasia esculenta</i>
Coconuts	<i>Cocos</i> spp.
Coffees	<i>Coffea</i> spp.
Columnar Cactuses	<i>Cereus</i> spp.
Cosmos	<i>Cosmos</i> spp.
Cotton	<i>Gossypium herbaceum</i>
Cowpea	<i>Vigna savi</i>
Crinums	<i>Crinum</i> spp.
Crybaby Tree	<i>Erythrina crist-galli</i>
Cucumber	<i>Cucumis edulis</i> , <i>C. sativus</i>
Cucurbit Climber	<i>Edgaria darjeelingensis</i>
Dahlias	<i>Dahlia</i> spp.
Dancing-Lady Orchids	<i>Oncidium</i> spp.
Devil's Tree	<i>Alstonia scholaris</i>
Dixie Rosemallow	<i>Hibiscus mutabilis</i>
Dracaenas	<i>Dracaena</i> spp.
Drum Stick	<i>Moringa oleifera</i>
Dumbcane	<i>Dieffenbachia sequine</i>
Edible Banana	<i>Musa acuminata</i>
Edward Rose	see rose
Elephant Yam	<i>Amorphophallus paeoniifolius</i>
Elephant's Ears	<i>Xanthosoma</i> spp.
Eranthemum	see blue sage
Erythrinias/Coral Trees	<i>Erythrina</i> spp.
Eucalyptuses	<i>Eucalyptus</i> spp.
False Nettles	<i>Boehmeria</i> spp.
Field Mustard	<i>Brassica campestris</i> var. <i>rapa</i>
Field Pumpkin	<i>Cucurbita pepo</i>
Fig	<i>Ficus hispida</i>
French Plantain	<i>Musa paradisiaca</i>
Garden Pea	<i>Pisum sativum</i>
Gardenia	<i>Gardenia angusta</i>
Garlic	<i>Allium oleraceum</i>
Giant Taro	<i>Alocasia macrorrhizos</i>
Ginger	<i>Zingiber officinale</i>
Globe Amaranth	<i>Gomphrena globosa</i>
Goldenshower	<i>Cassia fistula</i>

Common name	Scientific name
Gourds	<i>Cucurbita</i> spp.
Grape	<i>Vitis vinifera</i>
Graveyard Flower	<i>Plumeria acuminata</i>
Great Bougainvillea	<i>Bougainvillea spectabilis</i>
Green Bean/Soy Bean	<i>Glycine max</i>
Hoary Peas	<i>Tephrosia</i> spp.
Horseradish Tree	see drum stick
Hyacinth Bean	<i>Lablab purpureus</i>
Impatiens	<i>Impatiens balsamina</i>
Indian Bark	<i>Cinnamomum tamala</i>
Indian Lettuce	<i>Lactuga indica</i>
Indian Marigold	<i>Tagetes patula</i>
Indian Mulberry	<i>Morinda citrifolia</i>
Indina Oleander	<i>Nerium indicum</i>
Indian Shot	<i>Canna indica</i>
Indigos	<i>Indigofera</i> spp.
Indonesian Gum	<i>Eucalyptus deglupta</i>
Jackfruit	<i>Artocarpus heterophyllus</i>
Jasmine	<i>Jasmin sambac</i>
Jute	<i>Corchorus capsularis</i>
Kalanchoe	<i>Kalanchoe pinnatum</i>
Knol Kohl	<i>Brassica oleracea</i> var. <i>cauiorapa</i>
Kokko	<i>Albizia lebeck</i>
Kudzus	<i>Pueraria</i> spp.
Laceleafs	<i>Anthurium</i> spp.
Lady's Finger	<i>Abelmoschus esculentus</i>
Lagenarias/Bottle Gourds	<i>Lagenaria</i> spp.
Leadtrees	<i>Leucaena</i> spp.
Lemon	<i>Citrus lemon</i>
Lettuce	<i>Lactuca sativa</i>
Light-Blue Snakeweed	<i>Stachytarpheta jamaicensis</i>
Lily of the Incas/Parrot Flower	<i>Alstromeria psittacina</i>
Lime	<i>Citrus aurantifolia</i>
Lobia	see cowpea
Locoto	<i>Capsicum baccatum</i>
Luffa	<i>Luffa cylindrica</i>
Machete Plant	<i>Erythrina berteriana</i>
Mahogany	<i>Sweitenia mahogani</i>
Maiden Grass	<i>Miscanthus condensatus</i>
Maize	<i>Zea mays</i>
Marigold	see Indian marigold
Marshweeds	<i>Limnophila</i> spp.
Madagascar Periwinkle	<i>Lochnera rosea</i>
Mandarin Orange	<i>Citrus reticulata</i>
Monthan	see banana

Common name	Scientific name
Moth Orchids	<i>Phalaenopsis</i> spp.
Mulberry	<i>Broussonetia papyrifera</i>
Mung Bean	<i>Phaseolus aureus, Vigna radiata</i>
Naupakas	<i>Scaveola</i> spp.
Night Queen	<i>Cestrum nocturnum</i>
Nightshades	<i>Solanum</i> spp.
Nodeweed	<i>Synedrella nodiflora</i>
Okra	see lady's finger
Oleander	<i>Nerium oleander</i>
Onion	<i>Allium cepa</i>
Orange	<i>Citrus sinensis</i>
Palm Nut	<i>Areca catechu</i>
Pancreatium	<i>Pancreatium</i>
Papaya	<i>Carica papaya</i>
Paperflowers	see bougainvillea
Passionfruits/Passionflowers	<i>Passiflora</i> spp.
Patol	<i>Trichsanthes dioica</i>
Peacocksplume	<i>Falcataria moluccana</i>
Peanut	<i>Arachis hypogaea</i>
Peppers	<i>Piper</i> spp.
Periwinkle	<i>Catharanthus roseus</i>
Peruvian Groundcherry	<i>Physalis peruviana</i>
Pigweed	see amaranth
Pigeon Pea	<i>Cajanus cajan</i>
Pineapple	<i>Ananas comosus</i>
Pink Wood Sorrel	<i>Oxalis carymbosa</i>
Pipturuses	<i>Pipturus</i> spp.
Poovan	see banana
Potato	<i>Solanum tuberosum</i>
Potato Yam	see air potato
Pothos	<i>Epipremnum pinnatum</i>
Pricklypears	<i>Opuntia</i> spp.
Puni	<i>Basella rubra</i>
Purple Amaranth	<i>Amaranthus blitum</i>
Purslane	<i>Portulaca grandiflora</i>
Quickstick	<i>Gliricidia sepium</i>
Radish	<i>Raphanus sativus</i>
Rape	<i>Brassica napus</i> var. <i>napus</i>
Rape-Jasmine	<i>Tabernaemontana divaricata</i>
Rattlesnakemasters	<i>Eryngium</i> spp.
Rice	<i>Oryza sativa</i>
Robusta Coffee	<i>Coffea canephora</i>
Roses	<i>Rosa</i> spp.
Rosemallows	<i>Hibiscus</i> spp.
Rubbertree	<i>Hevea brasiliensis</i>

Common name	Scientific name
Sadabahar	<i>Lachnera rosea</i>
Sages	<i>Salvia</i> spp.
Sanchezia	<i>Sanchezia nobilis vargeta</i>
Sansevieria	<i>Sansevieria trifasciata</i>
Scarlet Pimpernel	<i>Anagallis arvensis</i>
Screw Pine	<i>Pandanus tectorius</i>
Sensitive Plant	<i>Mimosa</i>
Sesame	<i>Sesamum indicum</i>
Shishu	<i>Dalbergia sissoo</i>
Shoebark Plant	<i>Hibiscus rosasinensis</i>
Silktrees	<i>Albizia</i> spp.
Sinkwa Towelsponge	<i>Luffa acutangula</i>
Slender Amaranth	<i>Amaranthus viridis</i>
Snake Gourd	<i>Trichosanthes anguina</i>
Solomon's Seal	<i>Polygonatum odoratum</i>
Sorghums/Broomcorns	<i>Sorghum</i> spp.
Soursop	<i>Annona muricate</i>
Spiderwisps	<i>Chleome</i> spp.
Spinach	<i>Spinacia oleracea</i>
Spleenwort	<i>Asplenium nidus</i>
Sponge Gourd	<i>Luffa aegyptiaca</i>
Striped Brake	<i>Pteris quadriaurita</i>
Sugarbeet	<i>Beta vulgaris</i> var. <i>rapa</i>
Sugarcanes	<i>Saccharum</i> spp.
Sunflower	<i>Helianthus annuus</i>
Swamplily	see crinum
Sweet Potato	<i>Ipomoea batatas</i>
Sweet Potato Cactus	see columnar cactus
Synedrella	see nodeweed
Tagar	<i>Valeriana officinalis</i>
Tahitian Spinach	<i>Xanthosoma braziliense</i>
Tampala	<i>Amaranthus tricolor</i>
Tapioca	see cassava
Taros	<i>Alocasia</i> spp.
Tea	<i>Camellia sinensis</i>
Teak	<i>Tectona grandis</i>
Theobromas	<i>Theobroma</i> spp.
Thespesias	<i>Thespesia</i> spp.
Tiplants	<i>Cordyline</i> spp.
Tobacco	<i>Nicotiana tabacum</i>
Tomato	<i>Solanum lycopersicum</i>
Towelsponges	<i>Luffa</i> spp.
Trattlepods	<i>Crotolaria</i> spp.
Treedaisy	<i>Montanoa hibiscifolia</i>
Treemelon	see papaya

Common name	Scientific name
Vanda Orchids	<i>Vanda</i> spp.
Vanillas	<i>Vanilla</i> spp.
Water Yam	<i>Dioscorea alata</i>
Watermelon	<i>Citrullus lanatus</i>
White Leadtree	<i>Leucaena leucocephala</i>
White Mulberry	<i>Morus alba</i>
Wild Peppers	<i>Heckeria</i> spp.
Wild Tantan	<i>Desmathus virgatus</i>
Winter Squash	<i>Cucurbita maxima</i>
Woman's Tongue	see koko
Woodnettlles	<i>Laportea</i> spp.
Yams	<i>Colocasia</i> spp.
Yam Bean	<i>Pachyrhizus erosus</i>
Zinnia	<i>Zinnia linearis</i>

Appendix C. Relevant laws and policies considered in this EA.

Archaeological Resources Protection Act

- This Act secures the protection of archaeological resources and sites on public and Tribal lands. USDA APHIS is not conducting activities that will damage archaeological resources. If USDA APHIS personnel find an archaeological site, they would contact the proper authorities.

Bald and Golden Eagle Protection Act

- This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald or golden eagles, including their parts (including feathers), nests, or eggs. USDA APHIS does not anticipate the take of any eagle by the Program.
- The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." USFWS further defines "disturb" as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

Clean Air Act

- This Act is a comprehensive federal law that regulates air emissions from stationary and mobile sources. Among other things, this law authorizes EPA to establish National Ambient Air Quality Standards to protect public health and public welfare and to regulate emissions of hazardous air pollutants. Air emissions from the program are anticipated to be negligible based on a few vehicles traveling short distances to infested sites.

Endangered Species Act (ESA)

- This Act is the primary federal law in the United States for protecting imperiled species.
- Section 7 of the ESA and its implementing regulations require federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat. USDA APHIS abides by the results of the Section 7 consultations.

Executive Order (EO) 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations and EO 13985 - Advancing Racial Equity and Support for Underserved Communities through the Federal Government and EO 14096 - Executive Order on Revitalizing Our Nation's Commitment to Environmental Justice for All

- EO 12898 focuses federal attention on the environmental and human health effects of federal actions on minority and low-income populations and Tribal nations with the goal of achieving environmental protection for all communities. EO 12898 directs federal

agencies to: (1) identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations to the greatest extent practicable and permitted by law; (2) develop a strategy for implementing EJ; and (3) promote nondiscrimination in federal programs that affect human health and the environment, as well as provide minority and low-income communities access to public information and public participation.

- EO 13985 calls on agencies to advance equity “for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality” by identifying and removing systemic barriers to equal opportunity and benefits in federal policies and programs.
- EO 14096 builds on EO 12898 by expanding the definition of environmental justice (EJ), adding agency accountability measures, and emphasizing the role of the National Environmental Policy Act in evaluating EJ impacts. It requires federal agencies to create EJ strategic plans, directs research on EJ issues, expands notifications for toxic chemical releases, extends the membership of the EJ Interagency Council, and establishes the White House Office of Environmental Justice.

EO 13045 - Protection of Children from Environmental Health and Safety Risks

- This EO acknowledges that children, as compared to adults, may suffer disproportionately from environmental health and safety risks because of developmental stage, greater metabolic activity levels, and behavior patterns. This EO (to the extent permitted by law and consistent with the agency’s mission) requires each Federal agency to identify, assess, and address environmental health risks and safety risks that may disproportionately affect children.

EO 13112 - Invasive Species and EO 13751 - Safeguarding the Nation from the Impacts of Invasive Species

- EO 13112 calls upon executive departments and federal agencies to take steps to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive species that are established.
- EO 13751 ensures the faithful execution of the laws of the United States of America to prevent the introduction of invasive species and provide for their control, and to minimize the economic, plant, animal, ecological and human health impacts that invasive species cause.

EO 13175 - Consultation and Coordination with Indian Tribal Governments

- This EO calls for agency communication and collaboration with Tribal officials for proposed Federal actions with potential Tribal implications. In keeping with this EO APHIS provides opportunities for Tribes to participate in policy development to the greatest extent practicable and permitted by law.

EO 13186 - Responsibilities of Federal Agencies to Protect Migratory Birds

- This EO directs Federal agencies taking actions with a measurable negative effect on migratory bird populations to develop and implement a memorandum of understanding (MOU) with the FWS which promotes the conservation of migratory bird populations. On August 2, 2012, an MOU between USDA APHIS and the FWS was signed to facilitate the implementation of this EO.

EO 13990 - Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis and EO 14008 - Tackling the Climate Crisis at Home and Abroad

- Climate change (CC) refers to long-term shifts in average weather patterns that define the Earth's local, regional, and global climates. This includes changes in average daytime and nighttime temperature, precipitation, drought periods, periodicity of tornadoes and rainfall, polar ice melting, and ocean/sea level rise. Human-produced impact on global temperature (also known as anthropogenic global warming) may be avoided or reduced by government agencies through consideration of CC during the NEPA process. Federal agencies comply with EOs 13990 and 14008 by considering:
 - the effects of CC on a proposed action,
 - the potential effects of a proposed action on CC, and
 - potential mitigation measures that could be applied to the proposed action.

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and Resource Conservation and Recovery Act (RCRA)

- FIFRA governs the sale, distribution, and use of pesticides in the United States. This Act requires such pesticides to be registered by USEPA.
 - During the registration process, USEPA prepares screening level risk assessments that evaluate a pesticide's potential for harm to humans, wildlife, fish, and plants as well as its environmental fate and potential for contamination of air, soil, and water resources.
- Registered pesticides are regulated under FIFRA until disposal, after which they are regulated under RCRA, which ensures responsible management of hazardous waste and nonhazardous solid waste).

Migratory Bird Treaty Act

- This Act establishes a federal prohibition, unless permitted by regulations, 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.

National Environmental Policy Act (NEPA)

- This Act promotes the protection and enhancement of the environment and established the President's CEQ.
- NEPA requires federal agencies to examine the reasonably foreseeable effects of a proposed action on the human environment. NEPA defines "human environment" comprehensively as the natural and physical environment and the relationship of present and future generations of Americans with that environment.
- CEQ created regulations for implementing NEPA. Because NEPA is a procedural law, CEQ requires each federal agency to write their own NEPA compliance regulations to fit their activities.

National Historic Preservation Act

- Section 106 of this Act requires federal agencies to consider the potential for impact to properties included in, or eligible for inclusion in the National Register of Historic Places through consultation with interested parties where a proposed action may occur. This includes districts, buildings, structures, sites, and landscapes.

Plant Protection Act

- This Act regulates the detection, control, eradication, suppression, prevention, or retardation of the spread of plant pests or noxious weeds necessary for the protection of the agriculture, environment, and economy of the United States.