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Spotted Lanternfly Control Program in the Mid-Atlantic Region, North Carolina, Ohio, and Kentucky

Environmental Assessment—June, 2020

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Spotted Lanternfly Control Program

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I. Introduction

A. Background

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) is considering actions that will assist with control and treatment of spotted lanternfly (SLF), *Lycorma delicatula*, in order to slow the spread of this invasive insect. The SLF is primarily known to affect *Ailanthus altissima*, otherwise known as Tree-of-Heaven and stinking sumac; but also feeds on grapevine (*Vitis vinifera*); stone fruits (almond, apricot, cherry, nectarine, peach, and plum); and, other tree species (e.g., apple, oak, pine, poplar, and walnut). If allowed to spread, APHIS is concerned that SLF could prove harmful to grape, apple, peach, stone fruit, and logging industries throughout the country.

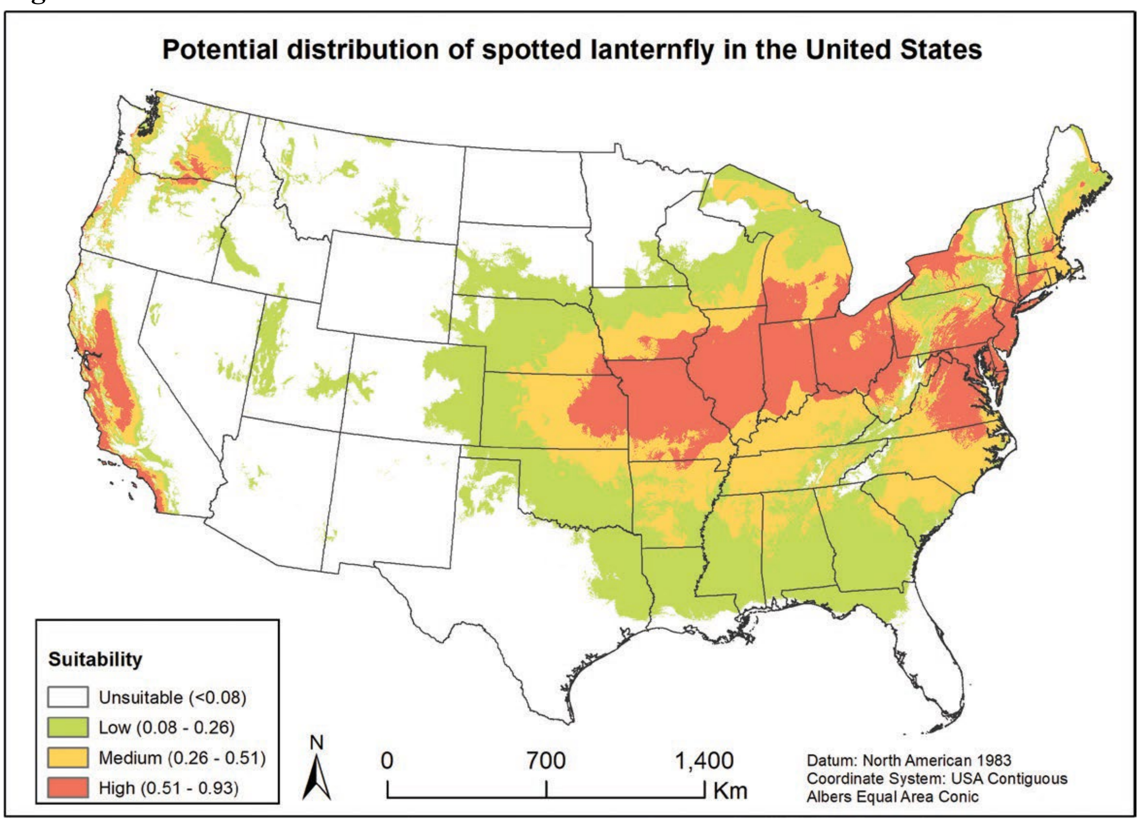
Both nymphs and adults of SLF damage host plants when they feed by sucking sap from stems and leaves. This reduces photosynthesis, weakens the plant, and eventually may contribute to the plant's death. SLF feeding can cause the plant to ooze or weep down the exterior of the tree (Dara et al., 2015) and the insects themselves excrete large amounts of fluid (honeydew), potentially increasing the rate of tree decay. The sap and other fluids promote mold and fungi growth and attract other insects (PDA, 2018). USDA-APHIS does not have specific data on the level of tree mortality SLF may cause over time; however, stress from attack by SLF could predispose native host trees and other plants to other pests and pathogens. A 2019 study in Pennsylvania, estimates that direct impacts of SLF damage in Pennsylvania will amount to $13.1 million in damage even if SLF is successfully limited to the current quarantine zone, an additional $7.7 million damage if SLF expands to counties adjacent to the quarantine zone, and a total of $42.6 million if SLF expands statewide (Harper et. al., 2019). Pest damage leading to changes in forest composition is well-characterized (McGarvey et al., 2015; Mikkelson et al., 2013).

Adult SLF are approximately one inch long and one-half inch wide, appear in late July, and have large and visually striking wings. Their forewings are light brown with black spots at the front and a speckled band at the rear. Their hind wings are scarlet with black spots at the front and white and black bars at the rear. Their abdomen is yellow with black bars. Nymphs in their early stages of development appear black with white spots and turn to a red phase before becoming adults (PDA, 2018).

The SLF lays its eggs on smooth host plant surfaces and on non-host material, such as bricks, stones, and dead plants. Egg masses are yellowish-brown in color, covered with a gray, waxy coating prior to hatching. Eggs hatch in the spring and early summer. Egg masses can easily be transported long distances on a wide variety of non-food commodities such as rock, concrete, tile, and wood. SLF can walk, jump, or fly short distances, and its long-distance spread is facilitated by people who move infested material or items containing egg masses (PDA, 2018). Spreading SLF populations make it harder to control this pest, and are associated with increased pesticide use that increases risks to human health and the environment.

Wakie et al. 2020, assessed the risk of SLF becoming established in the United States using the ecological niche model MAXENT. Wakie predicted that SLF can become established in most of New England and the Mid-Atlantic States, as well as central United States and the Pacific Coast states. See figure 1 below. Areas shaded in orange, yellow, and green indicate high, medium, and low suitability, respectively. Unshaded/blank areas indicate areas that are unsuitable for SLF establishment.

Figure 1.



By August 2019, SLF populations had been detected in Pennsylvania, Virginia, New Jersey, Delaware, and Maryland (see latest SLF activity update, as well as a brief history of SLF spread at https://www.aphis.usda.gov/plant_health/plant_pest_info/slf/DA-2019-20.pdf). In November 2019, SLF was detected in Berkeley County, WV (see https://extension.wvu.edu/lawn-gardening-pests/pests/spotted-lanternfly). Control programs in these areas are as described in prior SLF Environmental Assessments (EAs) and their related decision documents, a Finding of No Significant Impact (FONSI). This EA incorporates the four prior EAs and their FONSIs by reference (see https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/sa_environmental_assessments/ct_slf for links to four prior EAs and their related FONSIs).

B. Purpose and Need

APHIS has the responsibility to take actions that exclude, eradicate, and control plant pests under the Plant Protection Act of 2000 (7 United States Code (U.S.C.) 7701 et seq.). Due to the potential effects of SLF to agriculture and forest host plants, the goal of the SLF program is to increase APHIS' and APHIS cooperator's preparedness by having a combination of actions available for deployment wherever and whenever SLF outbreaks may occur. When an outbreak presents new environmental issues, program actions will be deployed after the new environmental issues are considered in site-specific documentation.

This EA considers SLF control efforts throughout the Mid-Atlantic States (includes Connecticut, Delaware, Maryland, New York, New Jersey, Pennsylvania, Virginia, West Virginia, and the District of Columbia) as well as North Carolina, Ohio, and Kentucky. This EA was prepared consistent with the National Environmental Policy Act of 1969 (NEPA) and the Animal Plant Health Inspection Service (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 environmental impact statement (7 CFR § 372.5(a)) based on the lack of significant impacts to the human environment associated with the as-needed deployment of control program actions. Notice of the availability of the draft EA was published in newspapers within each state and the EA was made available in regulations.gov on May 6th, 2020, for a 30-day public comment period. APHIS received 1 comment regarding the control measures outlined in the EA; the comment is addressed in appendix 1 of this EA.

II. Alternatives

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.

A. No Action Alternative

Under the no action alternative, USDA-APHIS will continue the current program actions, as analyzed in the May, 2018 EA (EA found at the following website: https://www.aphis.usda.gov/plant_health/ea/downloads/2018/mid-atlantic-region-slf-ea.pdf). Program actions include any or all of the following: herbicide applications, tree bands and traps, insecticide applications, detection and visual reconnaissance surveys, and egg mass scraping. Insecticides include either dinotefuran or imidacloprid on trap trees (i.e., trees left alive with the purpose of luring the insect pests where they can easily be killed). Locations of actions will continue to include the Mid-Atlantic States (i.e., Connecticut, Delaware, Maryland, New York, New Jersey, Pennsylvania, Virginia, West Virginia, and the District of Columbia) as well as North Carolina. Under this alternative, USDA-APHIS will continue to use a combination of measures in an integrated manner on an as-needed basis when there are SLF detections.

B. No Treatment Alternative

Under the no treatment alternative, USDA-APHIS will not provide funding for SLF control. Other government agencies and private landowners may work to eradicate SLF; however, there will be no cooperative or coordinated efforts among USDA-APHIS and other stakeholders. If any SLF-control actions are taken, efforts will primarily be completed by State workers, Federal District workers, and volunteers.

C. Preferred Alternative

Under the preferred alternative, USDA-APHIS is proposing a continuation of the current action alternative analyzed in the May, 2018 SLF EA, with the addition of:

- 2 treatment locations- Ohio and Kentucky;
- 4 insecticides- bifenthrin, beta-cyfluthrin, *Beauveria bassiana*, and soybean oil on new use sites; and,
- circle traps containing dichlorvos (DDVP) strips. A circle trap includes a circle of mesh wrapped around the tree trunk at about chest height. SLF crawl up the tree, are trapped under the mesh, and funneled in to an enclosed container containing DDVP.

Potential locations of the SLF program will include the Mid-Atlantic States (includes Connecticut, Delaware, Maryland, New York, New Jersey, Pennsylvania, Virginia, West Virginia, and the District of Columbia) as well as North Carolina, Ohio, and Kentucky. Potential program applied insecticides may include the following: dinotefuran or imidacloprid on trap trees; bifenthrin, beta-cyfluthrin, or *B. bassiana* on ornamental and *A. altissima* tree trunks in commercial and residential areas, perimeter areas and surfaces in and around train yards, airports, seaports, trucking depots, railway and powerline easements; soybean oil on SLF eggs attached to various surfaces including trees, ground litter, firewood, nursery stock, rocks, vehicles, or on other articles moved in interstate commerce; and, DDVP strips placed within circle traps attached to tree trunks.

Under this alternative, USDA-APHIS will continue to use a combination of measures in an integrated manner on an as-needed basis when there are SLF detections. Control efforts will continue to include any or all of the following: herbicide applications, tree bands and traps (including circle traps), insecticide applications, detection and visual reconnaissance surveys, and egg mass scraping.

1. *Ailanthus altissima* Control with Herbicides

USDA-APHIS employees, contractors, and its cooperators will use herbicides to control *A. altissima* up to a 1/4-mile radius from SLF infested trees. USDA-APHIS will apply triclopyr or a combination of the herbicides triclopyr, imazapyr, and metsulfuron-methyl on tree wounds or small tree trunks. The SLF program will also use foliar applications of aminopyralid and glyphosate to treat sprouting *A. altissima*. One or a mixture of several herbicides may be used. All applications will be made either by hand painting undiluted material on the trunk of the *A. altissima* seedling or sapling or directly spraying sprouting foliage using a backpack sprayer.

The herbicide triclopyr imitates a plant hormone (indoleacetic acid) that is used to control woody plants and broadleaf weeds (USDA-FS, 2011a). Imazapyr is a systemic, non-selective imidazolinone herbicide used for the control of a broad range of terrestrial and aquatic weeds that works by inhibiting an enzyme involved in the biosynthesis of amino acids such as leucine, isoleucine and valine (WDNR, 2012; USDA-FS, 2011b). Metsulfuron-methyl is a sulfonylurea herbicide that inhibits the enzyme that catalyzes the biosynthesis of branched-chain amino acids (valine, leucine, and isoleucine) which are essential for plant growth (USDA-APHIS, 2015a; USDA-FS, 2004). Aminopyralid is a systemic selective carboxylic acid herbicide that affects plant growth regulators, or auxins, and has multiple non-agricultural uses. (USDA-FS, 2007). Glyphosate is a non-selective post-emergent systemic herbicide that works by inhibiting essential aromatic amino acids important to plant growth (USDA-FS, 2011c). Glyphosate has a variety of agricultural and non-agricultural uses.

On rare occasions, the SLF Program may need to manually remove dying *A. altissima* that are treated with herbicides if the tree poses a risk to human safety or to the physical environment, such as powerlines. Because very few trees will be removed, there is a low potential for impacts; therefore, potential impacts from tree removal will not be discussed further.

2. Tree Bands and Circle Traps

Tree bands are a form of sticky wrapping that is placed around the tree trunk and act as a trap, preventing SLF from moving up the tree. There are various types of tree bands. The bands contain either an inward or outward-facing sticky band. SLF crawl up the tree, run into the bands, and are caught in the adhesive. The SLF program and its cooperators will use sticky tree band traps on *A. altissima* from May (when SLF hatch) to November (when adult SLF populations die) to capture SLF while they move up the trunk or congregate to feed and mate. The bands will be removed and replaced every two weeks.

Additionally, circle traps will be used on *A. altissima*. Circle traps are recommended over sticky traps because of their greater effectiveness at capturing SLF as well as their relative ease-of-use and reusability (Francese et. al., 2020). A vapor-releasing dichlorvos (DDVP) insecticide strip will be placed in the insect trapping container in order to kill captive SLF (DDVP will be discussed further under the section on insecticides). Both the inward-facing tree bands and circle traps are designed to reduce by-catch (i.e., other insect and animal species that are caught unintentionally) relative to outward-facing sticky tree band traps.

3. Insecticide Treatments

Only licensed applicators or persons working under the supervision of a licensed applicator will apply insecticides. Application of insecticides on private land will occur only with landowner consent. Applicators will follow the product container label instructions regarding the use of protective equipment, use limitations, dosage, and entry restrictions, unless the use is approved under an alternate registration type, such as a Federal Insecticide, Fungicide, Rodenticide Act (FIFRA) section 24(c) approval (see the following EPA website for additional information on section 24(c) https://www.epa.gov/pesticide-registration/guidance-fifra-24c-registrations).

Table 1 summarizes the potential insecticides that may be used in the SLF program, as well as each insecticide's proposed use sites and application methods.

Table 1.

Summary of Chemical Treatments, Treatment Use Sites, and Application Methods		
Chemical	**Use site**	**Application method**
dinotefuran	Tree trunks of trap trees	hand-held or backpack sprayers
imidacloprid		tree injection
bifenthrin beta-cyfluthrin *Beauveria bassiana*	Ornamental and *A. altissima* tree trunks in commercial and residential settings Perimeter areas and surfaces such as hedges, fences, light poles, buildings, or other structural elements in and around ports of entry, train yards, airports, seaports, and trucking depots.	hand-held or backpack sprayers
	Rocks, plants, debris along railways and powerline easements	truck-mounted boom sprays for railways and powerline easements
soybean oil	SLF eggs on trees and other surfaces	hand-held and backpack sprayers
dichlorvos	Within circle trap containers placed on *A. altissima* tree trunks	vapor releasing strips

<u>Trap tree treatment</u>

Dinotefuran and imidacloprid are systemic neonicotinoid insecticides that are taken up by the root system, foliage, or through the bark and translocated upward throughout the plant. Their mode of action involves disruption of an insect's central nervous system by binding to the post-synaptic nicotinic acetylcholine receptors, thereby competing with the natural neurotransmitter acetylcholine (Simon-Delso et al., 2015). This long-lasting receptor binding has delayed lethal effects such that repeated or chronic exposure can lead to cumulative effects over time (Simon-Delso et al., 2015). Insects must feed on the treated plant in order to be exposed to a lethal dose, but the presence of the chemicals only within the plant simultaneously minimizes exposure of non-target organisms.

The SLF program will apply either dinotefuran through a basal trunk spray or imidacloprid through trunk injection to approximately 10 trap trees at a given site. Trap trees will be created by leaving a number of live male *A. altissima* (generally 10 inches in diameter at breast height (dbh)) on a property after *A. altissima* control efforts. The reduction of *A. altissima* in an area means that when the late instar and adult SLF start searching for *A. altissima* to feed on, their only nearby option is one of the insecticide-treated trap trees (PDA, 2020).

Dinotefuran treatments will not occur when the tree bark is wet, during rainfall, or if rain is expected within 12 hours after application. Applicators will wet, but not saturate, the tree bark so that ample product is applied while avoiding excess product that could runoff into adjacent soil. The program will not apply dinotefuran when trees are dormant, flowering, under drought stress, or while not actively taking up water from the soil. Since imidacloprid is used as an injection, it does not have the same limitation as dinotefuron. Any use restrictions appearing on the imidacloprid label, such as a limit on the number of treatments per year, will be followed.

Ornamental and *A. altissima* insecticide treatment and perimeter spray in residential and commercial settings, booms spray in nonresidential

The SLF program will apply either a bifenthrin, beta-cyfluthrin, or *B. bassiana* products according to the product label for the treatment of ornamentals and *A. altissima* or as a perimeter spray on surfaces such as hedges, fences, light poles, buildings, or other structural elements in and around train yards, airports, seaports, and trucking depots. The chemicals will be applied with a low pressure, hand-held or backpack sprayer. Treatments can also be made with a boom sprayer along railway and electric line easements. A boom sprayer is a truck-mounted insecticide tank with plumbing that feeds a series of flow regulated nozzles mounted on a horizontal metal frame.

Bifenthrin and beta-cyfluthrin are synthetic pyrethroid compounds made to mimic natural pyrethrins that are refined from chemicals found in chrysanthemum flowers. Pyrethroids alter insect nerve function, causing paralysis in target insect pests, eventually resulting in death (USEPA, 2020a). While there is the potential for impacts to human health, as will be discussed in chapter 3, risk to human health is low provided all labeled use directions are followed. The chemicals control a broad-spectrum of insects and mites in agricultural and residential settings, both indoor and outdoor on trees, shrubs, foliage plants, non-bearing fruit and nut trees, and flowers in greenhouses, indoor and outdoor plant displays.

B. bassiana is a biochemical pesticide or biopesticide, a naturally occurring substance that control pests. *B. bassiana* is a fungus found naturally in soil that can be used as an insecticide to kill or control various insects. The live fungal spores attach to the surface of the insect, germinate, penetrate the exoskeleton, and rapidly grow within the insect, resulting in death of the insect (EPA, 2011).

<u>SLF Egg Treatment</u>

Soybean oils used as insecticides are derived from soybean seeds. Insecticide oils can block the air holes through which insects breathe, causing them to die from asphyxiation; act as poisons by interacting with the fatty acids of the insect and interfering with normal metabolism; and, disrupt how an insect feeds (Cranshaw and Baxendale, 2013). The SLF program will apply a soybean oil insecticide directly to egg masses during winter and early spring, wherever those masses may be, as long as allowed by the product label. Product label use sites include trees, ground litter, outdoor household articles, recreational vehicles, firewood, nursery stock, rocks, transportation vehicles, or on other articles moved in interstate commerce. Treatment with oil will prevent SLF eggs from hatching. Although soybean oil is of low acute toxicity and employs a non-toxic mode of action, all precautionary label statements will be followed by the applicator to protect human health and the environment.

<u>DDVP Strips in Circle Traps</u>

A vapor-releasing dichlorvos (DDVP) insecticide strip will be placed in the insect trapping container in order to kill captive SLF. DDVP is an organophosphate that is widely used in treating domestic animals and livestock for internal and external parasites, to control insects commercially and in homes, and to protect crops from insects. DDVP is also found in dog and cat flea collars. The chemical is currently used in traps by USDA-APHIS in the agency's Fruit Fly Program. DDVP has been shown to inhibit acetylcholinesterase and cholinesterase activities in the human nervous system; therefore, handlers of the DDVP insecticide strip follow all labeled precautions to reduce exposure risks (DDVP risks to human health will be discussed further in the potential impacts section).

4. Detection Survey

Detection survey will use visual inspection and sweep netting to determine if SLF is present. SLF crawl up trees and structures each day and can be observed visually or can be collected by sweep netting. Tree bands and circle traps (discussed above) will also be used to detect infestations.

5. Visual Reconnaissance Survey and Egg Mass Scraping

Visual reconnaissance surveys identify locations that have feeding damage or presence of SLF on plants. USDA-APHIS will work with cooperators to train local citizens to identify egg masses. The visual surveys occur from October through May and volunteers and program personnel scrape egg masses from plants and other objects with a stiff plastic card into bags with an alcohol solution to cause mortality.

Table 2

Summary of SLF Control Actions Taken by APHIS under Each Alternative			
	No Action	**No Treatment***	**Preferred Alternative**
Treatment Areas	Includes Mid-Atlantic States and NC Tree trunks of trap trees	None	Includes Mid-Atlantic States, NC, OH, and KY Tree trunks of trap trees; Ornamental trees in residential and commercial settings; Perimeter spray on surfaces such as hedges, fences, light poles, buildings, or other structural elements in and around ports of entry, train yards, airports, seaports, and trucking depots; Rocks, plants, debris along railways and powerline easements Eggs on trees and other surfaces
Herbicides	Triclopyr Imazapyr Metsulfuron-methyl Aminopyralid Glyphosate	None	Triclopyr Imazapyr Metsulfuron-methyl Aminopyralid Glyphosate
Insecticides	Dinotefuron Imidacloprid	None	Dinotefuron Imidacloprid Bifenthrin Beta-cyfluthrin *B. bassiana* Soybean oil Dichlorvos (within circle traps)
Traps	Inward-facing sticky band Outward-facing sticky band	None	Inward-facing sticky band Outward-facing sticky band Circle traps
Surveys and Egg Mass Scraping	YES	None	YES, same protocol as in the no action alternative

*While APHIS will not take actions under this alternative, other government agencies and private landowners can take action.

III. Potential Environmental Consequences

The below sections consider and compare the potential environmental consequences under the no action, no treatment, and preferred alternatives by summarizing information associated with the physical environment, biological resources (including nontarget species), human health and safety, environmental justice, Tribal consultation, and any potential historic and cultural resources. The no action alternative presents a description of the environmental baseline, the current situation, for each environmental resource analyzed, followed by an analysis of the potential environmental impacts of two other alternatives to those resources. The potential impacts may be direct, indirect, or cumulative, and of short or long duration. The impacts may also be either beneficial or adverse.

The potentially affected environment is within the Mid-Atlantic States and North Carolina, as well Ohio, and Kentucky. At the most general level, the Mid-Atlantic States fall into the eastern temperate forest ecoregion. Ecoregions designate areas that are generally similar in ecosystems and environmental resources (such as soil, water, and trees). Ecoregions serve as a valuable framework for research, assessment, management, and monitoring ecosystems (USEPA, 2018a). The region is distinguished from other regions by having moderate to mildly humid climate, relatively dense and diverse forest cover, and high density of human inhabitants. Urban industries, agriculture, and some forestry are major activities (CEC, 1997).

A. No Action Alternative

Under the no action alternative, USDA-APHIS will not make any changes to the current SLF Program. USDA-APHIS will continue to take actions against SLF in the manner that is currently taking place, as outlined in the May, 2018 SLF EA. The SLF program will use a combination of measures in an integrated manner on an as-needed basis when there are SLF detections. The environmental consequences for the no action alternative was previously analyzed in the May, 2018 EA (https://www.aphis.usda.gov/plant_health/ea/downloads/2018/mid-atlantic-region-slf-ea.pdf; chapter IV, Environmental Consequences, section B, preferred alternative. Note the no action alternative in this EA is equivalent to the preferred alternative in the May, 2018 EA).

In summary, impacts to the environment and human health were and still are considered to be minimal under this alternative. Urban areas will experience incrementally minor impacts to environmental quality in comparison to other activities, such as residential and business development that increases impervious surfaces and allows transport of a variety of pollutants to surface and ground water. Use of herbicides and insecticides is minimal and use methods are very controlled, therefore, minimal impacts are expected. Potential impacts associated with *A. altissima* control will be small, local, and short-term. Lastly, the no action alternative is expected to reduce the likelihood of SLF populations establishing in the country, and minimize further impacts of SLF on the environment, the public, and program operating costs.

1. Physical Environment

Air

EPA uses Air Quality Index (AQI) values to indicate overall air quality. AQI takes into account all the air pollutants measured within a geographic area. In 2018, cities within the proposed treatment states of Connecticut, Delaware, District of Columbia, Maryland, New Jersey, New York, North Carolina, Pennsylvania, Virginia, West Virginia all reported no days with very unhealthy air quality. New York, New Jersey, and North Carolina reported no days with unhealthy air quality; Virginia, and District of Columbia reported one day; Delaware, Maryland, and West Virginia with three days; Connecticut with six days; and Pennsylvania with seven days of unhealthy air quality (USEPA, 2019). Air quality data for each states in the Mid-Atlantic can be found at https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report.

There is the potential for impacts to air from insecticide application, herbicide application; however, impacts are expected to be short term, localized, and minor. USDA-APHIS will implement mitigation measures to reduce or avoid any minor or temporary negative impacts to air quality by ensuring the proper use of insecticides and herbicides.

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 will 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 streams and other water bodies’ quality by depositing sediment, minerals, or contaminants. Meteorological factors such as rainfall intensity and duration, and physical factors such as vegetation, soil type, and topography influence surface water runoff (USGS, 2020a). 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, 2020b).

Polluted runoff, known as nonpoint source pollution, occurs when rainfall picks up contaminants such as insecticides, 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, road construction, 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, 2018b).

The eastern temperate forest ecoregion is characterized by an abundance of perennial streams and rivers, small areas with high densities of lakes, and a diversity of wetland communities rich in maritime ecosystems (CEC, 1997). EPA analyzed long-term trends in non-tidal streams and rivers in the Mid-Atlantic. Water quality parameter values across the Mid-Atlantic region such as aluminum and calcium were reviewed, as well as hardness, alkalinity, temperature, and total suspended soils. Broad-scale, long-term trends indicate some recent improvements in water quality in the area. Specifically, phosphorus and organic carbon concentrations have decreased significantly, which allows streams and rivers to recover from eutrophication. Recent short-term trends in some water quality parameters, however, are leveling off or reversing. EPA suggests earlier improvements are being overwhelmed by continued population growth in the region. Higher levels of total dissolved solids, chloride, and specific conductance reflect impacts of landscape disturbance, road salt application, and possible hydraulic fracturing for natural gas. (USEPA, 2017).

USDA-APHIS will consider impacts from the no action alternative to water resources as significant if they exceeded Federal or State water quality standards. Insecticides and herbicides, when used improperly, can end up in surrounding water bodies. The chemicals can reach waterways from spray, drift, or spills or via run-off in solution or on soil particles that are moved by hydraulic forces. All program uses of insecticides and herbicides should be away from surface water and follow additional label directions that eliminate or greatly reduce runoff. The methods of application that include spot treatments using backpack sprayers and not oversaturating bark will reduce off-site transport of insecticides and herbicides from drift.

Soil

Soil health or soil quality is the ability of soil to function as a vital ecosystem, sustaining plants, animals, and humans (USDA-NRCS, 2020). Soil is an ecosystem that provides nutrients for plant growth, absorbs and holds rainwater, filters and buffers potential pollutants, serves as a foundation for agricultural activities, and provides habitat for soil microbes to flourish (USDA-NRCS, 2020). It is important to manage soils so they are sustainable for future generations.

The Mid-Atlantic States, as well as North Carolina, have diverse soils with six of the 12 dominant soil orders present: alfisols, entisols, histosols, inceptisols, ultisols, and spodosols (USDA-NRCS, 2016). Alfisols are fertile soils with high base saturation and a clay-enriched subsoil horizon; entisols are young soils with little or no profile development; histosols are soils that formed in decaying organic material; inceptisols are young soils with a weak degree of profile development; ultisols are soils with low base status and clay-enriched subsoil; and, spodosols are acid soils with low fertility and accumulations of organic matter and iron and aluminum oxides in the subsoil (USDA-NRCS, 2015).

USDA-APHIS considers impacts from the no action alternative 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 the no action alternative to have this type of impact. Potential negative effects of insecticide and herbicide application could include decreased or altered microbial populations in the soil, but these potential negative effects are expected to be short-term and reversible. Chemical application methods used in the Program include tree trunk injection, spot treatment applications using backpack sprayers, and hand painting the chemical on stumps; all reduce off-site transport of insecticides and herbicides via drift and runoff.

Many of the activities associated with the Program will result in temporary soil surface disturbance or compaction. The most frequent types of ground disturbance will be from vehicles and pedestrians. These impacts, however, are localized to areas where the program occurs.

In summary, significant impacts to air, water, or soil quality are not anticipated under the no action alternative. Any impacts to the physical environment from applications of dinotefuran and imidacloprid, or herbicides using hand held and backpack sprayers will be minimal and temporary. Treatments will be made so as to protect surface water, per labeled directions. Disposal of products will also be done according to the label directions so as to minimize potential to impact physical environment. Because insecticide use under this alternative is only on trap trees infested with SLF, the amount of chemical treatments is expected to be low in any given area. For more details, see the preferred alternative impacts section within May, 2018 SLF EA at https://www.aphis.usda.gov/plant_health/ea/downloads/2018/mid-atlantic-region-slf-ea.pdf in chapter IV, Environmental Consequences, section B. Preferred Alternative (the no action alternative in this EA is equivalent to the preferred alternative in the May, 2018 EA).

Control of *A. altissima* trees could induce impacts to the physical environment, but impacts will be small, local, and short-term. Tree death can decrease local carbon sequestration; however, over time, natural succession will offset carbon dioxide release into the atmosphere. Changes in canopy cover and evapotranspiration due to *A. Altissima* control measures may alter stream flow (Mikkelson et al., 2013), while tree mortality adjacent to aquatic resources could reduce shading and alter water temperatures. Degradation of water quality can in turn negatively affect aquatic organism (Englert et al., 2017; Morrissey et al., 2015). These impacts are expected to be offset over time with natural succession. *A. Altissima* control could account for some impacts to soil including erosion, alterations to soil microflora, and soil compaction (Foote et al., 2015; Li et al., 2004). Best management practices, such as minimizing activities that expose bare soil to assist in rapid revegetation, can reduce impacts (Aust and Blinn, 2004; Warrington et al., 2017).

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, threatened and endangered species and their critical habitats as protected under the Endangered Species Act (ESA), and bald and golden eagles under the Bald and Golden Eagle Act.

Vegetation

A. altissima, the primary host of SLF, is a rapidly growing deciduous tree, native to Taiwan and northeast and central China. The tree was first introduced into Philadelphia in 1784 and then again on the west coast in the 1850s as a valued urban street tree. *A. altissima* has since been widely planted in the Baltimore and Washington D.C. areas. The tree spread from these areas and has become a common invasive plant in urban, agricultural, and forested areas (PennState Extension, 2018). *A. altissima* in forested areas typically occurs in small patches as canopy trees but can also occupy the understory.

Traits that allow *A. altissima* to be so invasive are: ability to grow almost anywhere; rapid growth in dense colonies; prolific seed production; ability to continuously send up root suckers (i.e., shoots that grow from the roots of a plant) as far as 50 feet from the parent tree, even when injured; sprouts as young as two years produce seeds; and, the tree produces chemicals in its leaves, roots, and bark that can limit or prevent the growth of other plants in the area (PennState Extension, 2018). There are minor human health concerns of the tree. As a high pollen producer and moderate source of allergies in some people, skin irritation or dermatitis have been reported; symptoms vary depending on sensitivity of the individual, the extent of contact, and condition of the plant (PennState Extension, 2018).

SLF host trees provide food, shelter, and egg laying sites to SLF. SLF changes hosts as it ages through its developmental stages (PDA, 2018). Nymphs feed on a wide range of plant species, while adults prefer to feed and lay eggs on *A. altissima*. Table 3 provides a list of some SLF hosts (Dara et al., 2015). The table also indicates whether the plant is native or introduced into the United States.

Table 3. Example SLF Hosts

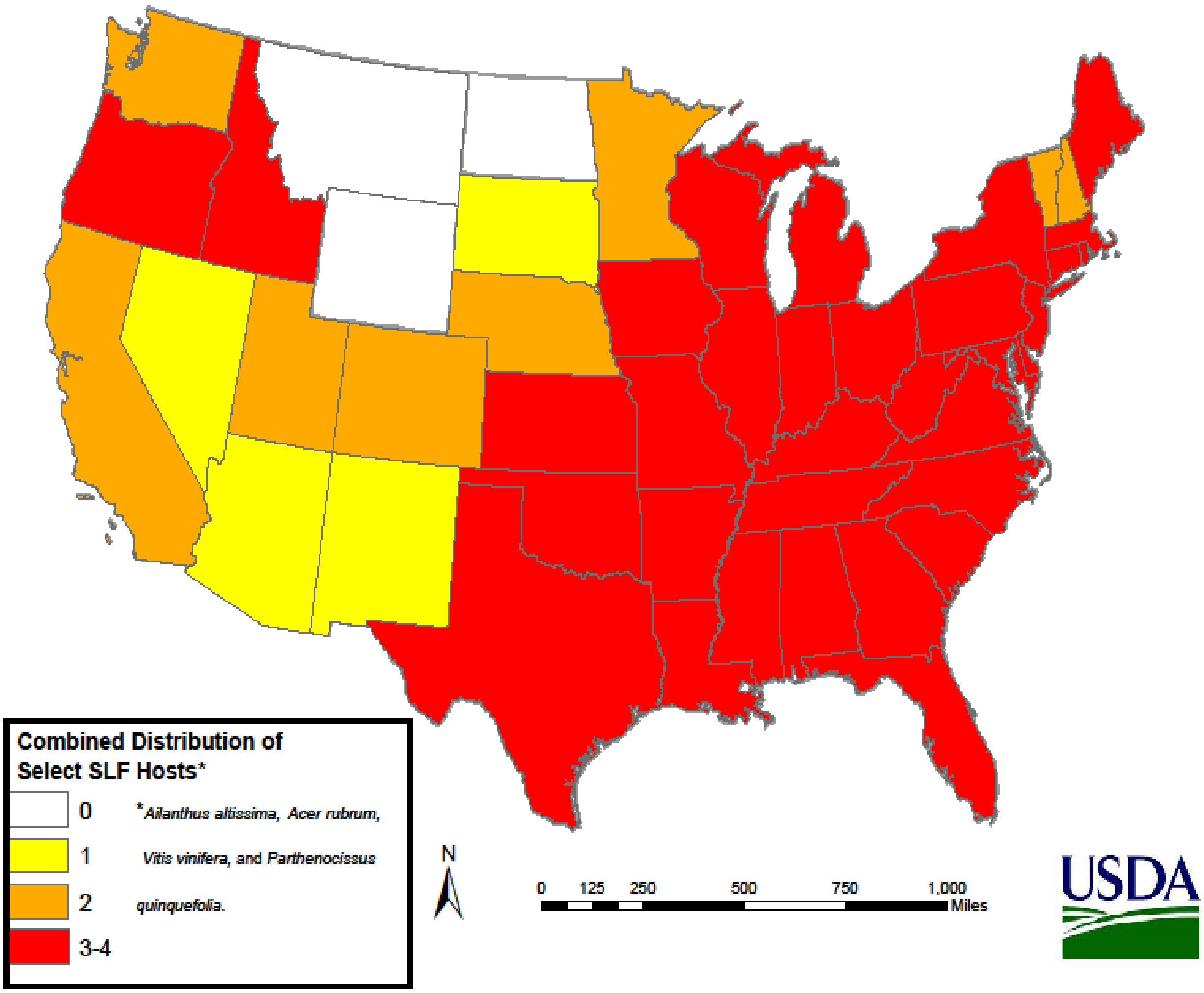
Host Plant	**Common Name (Origin)**	**Family**	**SLF Life Stage or Activity**
Acer palmatum Thunb.	Japanese Maple (I)	Aceraceae	Feeding
Acer rubrum L.	Red maple (N)	Aceraceae	Adult; feeding, egg laying
Acer saccharum L.	Silver Maple (N)	Aceraceae	Feeding
Ailanthus altissima (Mill.) Swingle[3]	Tree-of-Heaven (I)	Simaroubaceae	Adult, nymph; feeding, egg laying
Aralia elata (Miq.) Seem.	Japanese angelica tree (I)	Araliaceae	Nymph
Arctium lappa L.	Greater Burdock (I)	Compositae	Nymph; feeding
Fagus grandifolia Ehrh.	American beech (N)	Fagaceae	Adult; egg laying
Juglans nigra L.	Black walnut (I)	Juglandaceae	Nymph
Liriodendron tulipifera L.	Tuliptree (N)	Magnoliaceae	Adult; egg laying

Magnolia kobus D.C.	Kobus magnolia (I)	Magnoliaceae	Nymph; feeding
Malus spp. Mill.	Apple (I, N)	Rosaceae	Feeding
Morus alba L.	White Mulberry (I)	Moraceae	Nymph; feeding
Parthenocissus quinquefolia (L.) Planch.	Virginia Creeper (N)	Vitaceae	Adult, nymph; feeding
Platanus occidentalis L.	American sycamore (N)	Platanaceae	Adult; egg laying
Populus alba L.	White Poplar (I)	Saliaceae	Egg laying
Prunus serotina Ehrh.	Black cherry (N)	Rosaceae	Adult; egg laying
Quercus acutissima Carruthers	Sawtooth oak (I)	Fagaceae	Unknown
Quercus spp. L.	Oak (I, N)	Fagaceae	Adult; egg laying on some species
Robinia pseudoacacia L.	Black Locust (N)	Fabaceae	Feeding
Rosa multiflora Thunb.	Multiflora Rose (I)	Rosaceae	Nymph; feeding
Salix spp. L.	Willow (I, N)	Saliaceae	Adult; feeding
Sorbaria sorbifolia (L.) A. Braun	False spiraea (I)	Rosaceae	Nymph; feeding
Syringa vulgaris L.	Common Lilac (I)	Oleaceae	Egg laying
Styrax japonicus Siebold & Zucc.	Japanese snowbell (I)	Styracaceae	Adult, nymph; feeding
Vitis amurensis Rupr	Amur grape (I)	Vitaceae	Adult/nymph
Vitis vinifera L.	Wine Grape (I)	Vitaceae	Adult, nymph; feeding, egg laying
Vitis spp.	Wild grape (N)	Vitaceae	
Zelkova serrata (Thunb.) Makino	Japanese Zelkova (I)	Ulmaceae	Egg laying

I= introduced; N= native

The combination of favorable climate and presence of hosts allows the inference that the Mid-Atlantic region of the United States is highly likely to support the establishment of SLF populations. SLF hosts grow in a wide range of soils (dry to medium moisture), shade conditions (full sun to part shade), and in the presence of urban pollutants (Missouri Botanical Garden, 2020). Red maple tends to grow in moist, slightly acid conditions, while grape hosts grow best in deep, loamy, humus-rich, medium moisture, well-drained soils (Missouri Botanical Garden, 2020). The combined conditions favorable to SLF hosts indicate plants growing in a wide range of soil types and shade conditions could become infested by SLF where ever they occur. Figure 2 depicts the combined distribution of four hosts, *Acer rubrum, Ailanthus altissima, Vitis vinifera*, and *Parthenocissus quinquefolia* (USDA-NRCS, 2018) that support multiple life stages of SLF, and therefore are highly likely to provide suitable habitat.

Figure 2. Distribution of Four SLF-hosts



Under the no action alternative, insecticide use, tree bands and traps, and surveys, will have minimal, if any, impacts to vegetation. There will be some risk to non-target terrestrial plants from herbicide treatments. However, the potential for effects will be restricted to areas immediately adjacent to the application. Herbicides will be applied directly to the tree surface and applicator inflicted wounds, according to label instructions in order to minimize damage to nearby vegetation from drift or runoff. Applications are made by hand to sprouts using a backpack sprayer or to cut stumps using injection, hack and squirt, or other hand applied methods directly to the tree. These methods minimize impacts to surrounding vegetation. Reduction of *A. altissima* may cause some limited alterations to vegetative understory; however, impacts are expected to be local and short-term.

Treatment options under the no action alternative will increase the level of human activities around the treatment area, which can, to varying degrees, impact ground vegetation. By utilizing best management practices that limit exposing bare soil, USDA-APHIS can minimize these impacts.

Wildlife

Potential impacts to terrestrial and aquatic non-target organisms from insecticide use is expected to be low based on the method of application, toxicity, and environmental fate of the products. Insects must feed on the treated plants to be exposed to a lethal dose of dinotefuron and imidacloprid; therefore, exposure of non-target organisms is minimized. Potential impacts to fish are expected to be minimal, with an increased risk to some sensitive aquatic invertebrates in very shallow water bodies immediately adjacent to treated SLF host trees. Exposure and risk to aquatic organisms will be minimized by adherence to label requirements.

There is some risk to sensitive terrestrial invertebrates that consume vegetation from treated trees. Terrestrial invertebrate populations may consume a wide range of plants, which will limit the percentage of exposure through their diet. There are different terrestrial invertebrate populations at each location, and at the present time, areas that might be treated for ALB and SLF do not overlap. Risks to terrestrial invertebrates, including pollinators, are expected to be negligible based on available data collected from ALB-specific applications of imidacloprid. Impacts to susceptible insects that feed on treated trees are expected, but due to the method of application and the treatment of specifically *A. altissima* trees, the effects are expected to be localized and not widespread (for more information, see USDA-APHIS, 2018a).

Dinotefuran has low to moderate acute and chronic toxicity to nontarget wildlife, such as mammals and birds. Direct risk to nontarget wildlife is not expected based on conservative estimates of exposure and the available toxicity data. An increase in the acreage containing treated hosts does not change the toxicity; however, animals migrating through counties with treated acreage have the potential for more exposure incidents (for more information, see USDA-APHIS, 2018a).

Indirect impacts to wildlife populations through the loss of invertebrate prey are also not expected to be significant because only sensitive terrestrial invertebrates that feed on treated trees will be impacted while other insects remain available as prey items. An increase in the acreage containing treated hosts does not change this balance; it only increases the acreage where this may occur. Although it has not been observed, there is a potential for migrating or foraging animals to alter their patterns or expand their ranges if invertebrate prey becomes limiting in their current areas. (USDA-APHIS, 2018a)

The no action alternative use pattern will minimize potential impacts to honey bees, and other sensitive terrestrial invertebrates, based on the use of basal trunk sprays that minimize drift. Under this alternative, the program will continue to avoid applying insecticides when foliage is in bloom to decrease the potential for effects to beneficial insects associated with pollination. For additional information on potential impacts to bees, see the preferred alternative section in the May, 2018 EA (USDA-APHIS, 2018a).

Wild mammals and birds are at very low risk from herbicide applications due to the low toxicity of the proposed herbicides and the lack of anticipated effects to food sources that they use. Aquatic organisms are also at low risk based on the favorable toxicity profile and expected low residues that could occur in aquatic environments form the proposed herbicide applications (USDA-APHIS, 2018a).

The SLF Program's control of *A. altissima* will result in temporary loss of wildlife habitat that natural succession will restore over time. *A. altissima* in forested areas typically occur in small patches as canopy trees but can also occupy the understory. Changes in canopy cover due to tree control, can degrade surrounding water quality, in turn affecting aquatic organisms through direct or indirect impacts to fish, aquatic insects, and crustaceans (Englert et al., 2017; Morrissey et al., 2015). Any potential for impacts to terrestrial and aquatic systems will be localized and transient since *A. altissima* is not considered to a dominant tree species over large forested areas.

Actions associated with the no action alternative will temporarily increase the presence or level of human activities (noise and visual disturbance) in the program area. 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.

(1) 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). Some examples of anticipated disturbance associated with Program activities under the no action alternative include the use of off-road vehicles and noise. To minimize impacts to migratory birds, 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.

(2) Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668–668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. During their breeding season, bald eagles are sensitive to a variety of human activities. The U.S. Fish and Wildlife Service (USFWS) recommends buffer zones from active nests. USDA-APHIS will continue to meet the recommendations as described in the 2015 SLF EA for Berks, Lehigh, and Montgomery County (USDA-APHIS, 2015b) in every area where Program activities may occur. If bald or golden eagles are discovered near a Program action area, the State agency responsible for the area will contact the USFWS and implement recommendations for avoiding disturbance at nest sites. For bald eagles, USDA-APHIS will 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.

(3) 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 in the Program area include bats, birds, reptiles, mussels, arthropods, and plants. USDA-APHIS has consulted with USFWS field offices in the Program area and implements protection measures for Federally-listed species and their critical habitats. APHIS will continue to consult with USFWS on Program activities discussed under this alternative as the Program area expands with the spread of SLF into new areas and states.

3. Human Health and Safety

Under the no action alternative, potential human health impacts (both to workers applying the products and the surrounding general public) from the use of herbicides and insecticides are expected to be minimal, assuming all label use directions are properly followed. Chemicals used under this alternative are limited to treatment on trap trees when SLF is discovered. No commodities will be harvested from the treated trees, so there will be no dietary risks to humans.

The potential human health risks from use of imidacloprid under this alternative will be the same as established in the ALB eradication Program and are reported in Appendix F of the EA (USDA-APHIS, 2015a). USDA-APHIS evaluated the potential human health and ecological risks from the proposed use of the herbicides triclopyr, imazapyr, and metsulfuron-methyl for the ALB Eradication Program, and found the same human health risks will apply to the SLF Program (USDA-APHIS, 2018a). The risk of exposure is greatest for workers applying the product.

Human health risks from herbicides and insecticides are expected to be negligible based on limited exposure from the proposed use pattern (trunk hand held spray and injection for insecticides; hand painting and backpack spraying for herbicides). The potential for workers to be exposed is low, provided that they properly use required personal protective equipment (PPE), as outlined on the labels. Risks to the general public are also minimal. In order to protect the general public, any activities on private property will only occur with landowner permission and awareness (USDA-APHIS, 2018a).

For complete assessment of risks to human health from application of triclopyr, imazapyr, and metsulfuron-methyl, see the ALB 2015 EA (USDA-APHIS, 2015a). Risks will also be low to human health and the environment for glyphosate and aminopyralid based on risk assessments prepared by USDA-Forest Service that have similar use patterns to those proposed for the SLF Program (USDA-APHIS, 2018a; USDA-FS, 2007; USDA-FS, 2011b).

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 has considered the potential environmental impacts of implementing the no action alternative on minority and/or low-income communities. The Agency expects the distance from areas to environmental justice communities to influence if there are direct adverse impacts to those communities. In general, each State agency will reach out to landowners prior to implementing the Program. USDA-APHIS will encourage local Program personnel to engage with locally impacted people in collaborative decisions about the Program whenever possible.

The no action alternative is not likely to pose any highly disproportionate adverse effects to children. Children will not be present while treatments of herbicides and insecticides are occurring. Additionally, protective measures on labels are meant to protect not only the applicator, but the public, including children. All labels will be followed.

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 will provide the Federally-recognized Tribes in the region with information about the Program, and will offer 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

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 impacts 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 should not pose adverse effects to these resources. If actions may in any way impact properties under NHPA, the appropriate consultations will occur and/or the appropriate mitigations will be applied.

B. No Treatment Alternative

USDA-APHIS will not provide funding for SLF control under the no treatment alternative. USDA-APHIS will not apply herbicides, use insecticide treatments, use tree traps, or conduct surveys under this alternative. Other government agencies and private landowners may work to control SLF; however, there will be no cooperative or coordinated efforts among USDA-APHIS and other stakeholders. State workers, Federal District workers, and volunteers will be the primary providers of control efforts.

SLF will most likely become established in more areas than under the no action and preferred alternative and impacts from SLF will become widespread over the long-term. Stress induced by SLF attacks could predispose hosts to invasion by other pests and infections by pathogens. Impacts will occur wherever SLF hosts grow, such as urban plantings, orchards, and forested areas. The environmental impacts associated with the death of SLF hosts will vary with the intensity of SLF infestation at each site.

In natural ecosystems, reduced growth or the loss of SLF-host trees will create canopy gaps leading to increased establishment of invasive plants, particularly other shade-intolerant vegetation (USDA-APHIS, 2018a). Ecosystem impacts from SLF infestation are likely to be similar to impacts from other causes of tree mortality, which are known to include changes to forest composition, structure, and microenvironments; alterations to ecosystem processes such as nutrient cycling and retention; and increased ecosystem susceptibility to invasion by exotic plants and animals (Orwig, 2002). The vitality of oak, pine, and walnut trees is likely to be reduced, but the level of tree mortality remains unknown. To date, the invasive potential of *A. altissima* does not appear to be reduced by the presence of SLF.

Historically, outbreaks of introduced pests and pathogens led to shifts in harvesting strategies of host trees (Orwig, 2002). For SLF, the presence of an invasive tree host serving as a reservoir for infestations to agricultural crops poses the greatest risk for agroecosystem functioning.

SLF-host orchard crops and urban trees could sustain damage to the point of needing replanting. Although tree removal in orchards regularly occurs as producers replace less productive trees over time, SLF infestation could increase the rate of tree replacement if existing trees are not treated. Development of resistant stone fruit tree or grape varieties also will take time and may force producers to incur these costs prematurely (Woodcock et al., 2017).

It is expected that fewer chemical treatments will occur by States and private groups then by USDA-APHIS under the no action and preferred alternatives, so there is the potential for fewer impacts from these chemicals to the physical environment (air, water, and soil). However, should States and private groups heavily apply inappropriate chemicals, environmental impacts could actually be greater than potential impacts from the no action and preferred alternative.

C. Preferred Alternative

This section 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. Potential negative environmental impacts from the spread of SLF, namely impacts to vegetation and subsequent indirect impacts to humans, are expected to decrease, when compared to the no action and no treatment alternatives. The preferred alternative is expected to further reduce the likelihood of SLF populations becoming well-established across the country when compared to the no action alternative, minimizing further impacts of SLF on the environment, the public, and program operating costs. Similar to the no action, potential impacts to soil, air, and water; vegetation; wildlife; and, human health from implementing the preferred alternative actions are all expected to be minimal.

Potential impacts from treatment with dinotefuran and imidacloprid; herbicides; tree bands; detection surveys; and egg mass scraping will be the same under the preferred alternative as was described under the no action alternative and will not be discussed in detail in this section. While the above actions could potentially take place across more areas (Ohio and Kentucky) under the preferred alternative than the no action alternative, the same potential impacts discussed under the no action alternative are expected to occur in those areas, and the same mitigations will apply.

The insecticides bifenthrin, beta-cyfluthrin, *Beauveria bassiana*, and soybean oil, as well as circle traps with DDVP were not used and were not considered under the no action alternative, but will be considered in this section for the preferred alternative.

<u>Bifenthrin</u>
Bifenthrin is immobile, very persistent in laboratory and field studies, stable to hydrolysis and photolysis, very lipophilic, and bioaccumulative. The chemical absorbs strongly to soil particles

and to organic matter, and accumulates in sediment (USEPA, 2010a). Bifenthrin is not identified as a cause of impairment for any water bodies listed as impacted under section 303(d) of the Clean Water Act; however, pyrethroids as a group have been identified as cause for impairment for three water bodies, none of which are in the proposed treatment area.

Bifenthrin is highly toxic to freshwater fish, aquatic-phase amphibians, and terrestrial invertebrates, including beneficial insects such as honey bees. The chemical is very highly toxic to freshwater aquatic invertebrates; has very high acute toxicity to estuarine/marine fish and invertebrates; moderate acute toxicity to small mammals; and, slight acute toxicity to birds, terrestrial-phase amphibians and reptiles (EPA, 2010a).

There were 1,295 case reports of bifenthrin incidents from 2002 until 2009; most incidents were of low severity. Low amounts of bifenthrin can cause adverse human health effects, including dermal and respiratory tract irritation and neurological symptoms (e.g., dizziness and altered sensations). Potential impacts to human health and the environment are still expected to be low, provided all labels use directions are followed.

Bifenthrin label limitations which protect human health and the environment include: no more than one treatment every seven days; no applications to food crops; humans and pets may not re-enter treated area until area it is dry; and, applicators must wear a long-sleeved shirt and long pants, socks, shoes, chemical-resistant gloves, and a respiratory device and protective eyewear when working in non-ventilated spaces. The treatments will all be made outdoors. The product manufacturer recommends the use of an alternate class of chemistry in the treatment program to prevent or delay pest resistance.

<u>Beta-cyfluthrin</u>

Beta-cyfluthrin is hydrophobic and ranges from hardly mobile to immobile in four different soil types (USEPA, 2010b). Primary routes of dissipation are aqueous and soil photolysis and hydrolysis in alkaline (pH > 7) media (USEPA, 2010b).

Beta-cyfluthrin risks to birds and mammals are considered low; however, the chemical has high toxicity to fish and aquatic invertebrates; moderate toxicity to algae; high toxicity to honey bees and other arthropod species; and, low toxicity to earthworms and other soil macro- or micro-organisms. Oral toxicity to humans is high, dermal toxicity is low, and inhalation toxicity is high as an aerosol. There is no evidence of genotoxic potential, delayed neurotoxicity, carcinogenic potential, or reproductive effects (FAO, 1999). Beta-cyfluthrin is classified as “not likely to be carcinogenic to humans” (USEPA, 2010b).

Potential impacts of beta-cyfluthrin to human health and the environment are all expected to be low, provided all label use directions are followed. Humans and pets may re-enter treatment area only after the insecticide is dry. The product cannot be applied to food crops in order to protect human health. In order to protect surrounding water, applications may not be made during rain and the treated area may not be watered to the point that run-off occurs. Plants in bloom may be sprayed at times when pollinating insects are not present, such as early morning or late evening. Applicators must avoid contact of the product with eyes, skin, or clothing and avoid breathing spray mist.

Beauveria bassiana

Very minimal impacts to human health and the environment are expected from the use of *B. bassiana*. As previously mentioned in chapter 2, *B. bassiana* is a naturally occurring substance found in soil. *B. bassiana* strains are of low toxicity and pathogenicity (USEPA, 2020b). Residues are not expected to remain on treated food or feed and available information indicates that use of the fungus as a pesticide is not expected to have adverse effects on human health or the environment (USEPA, 2020b). Special precautions should still be taken for applicators, such as PPE, all of which are outlined on product labels. *B. bassiana* products can be reapplied as necessary. Intense pest outbreaks may require a combination of the product with a compatible insecticide.

Soybean oil

Very minimal impacts to human health and the environment are expected from the use of soybean oil. Vegetable oils (except for oil of mustard) are of low acute toxicity and are Generally Recognized as Safe by the Food and Drug Administration, which means the ingredient is considered safe for consumption, and exempted from FDA's usual food additive tolerance requirements. Vegetable oils employ a non-toxic mode of action. The oils are formulated in low concentrations into products that are used at low volumes in the United States, so exposure to humans and the environment is expected to be low (USEPA, 1993). EPA has received no incident reports of adverse effects for vegetable oil pesticides.

The SLF Program intends to use a 50% soybean oil solution to treat SLF egg masses via spot treatment. Egg masses on trees, ground litter, rocks, and articles moved interstate, may all be treated. Product labels for vegetable oils have precautionary language that will be followed by the Program in order to protect human health and the environment. The label requires PPE when handling the product, the oil cannot be applied to water or in areas where surface water is present, and all disposal directions will be followed. Per product label, no one is allowed to re-enter treated areas for four hours unless wearing appropriate protective gear. Since soybean oil is safe to consume, impacts are expected to be minimal when used in a responsible manner as approved by the product label.

DDVP

DDVP volatizes readily in air, has a half-life of 1.5 to 57 days in water, is not known to bioaccumulate in animals or plants, and does not bind to the soil (USEPA, 2007). DDVP has been shown to inhibit acetylcholinesterase and cholinesterase activities in the human nervous system, and effects on nerve functions following DDVP exposure during development have been reported (USEPA, 2007). However, there is very little risk of human exposure. Handlers of the DDVP insecticide strip should avoid contact with eyes and mouth and avoid breathing vapors. The strips will be difficult for a small child to access because not only are the DDVP strips contained within a chamber that would need to be opened, the circle traps are placed at a height on the tree trunk that will be difficult for small children to reach. Additionally, a warning message will be placed on the trap.

In 2018, USDA-APHIS evaluated potential impacts from the use of DDVP strips in the fruit fly program. USDA-APHIS found that, provided strips were used according to their label, the probability of exposure to people and the environment were low and risks to human health and the environment were negligible (USDA-APHIS, 2018b). The SLF Program will be using DDVP in a similar manner as the Fruit Fly Program, and expects to have similar potential impacts.

<u>Methods of insecticide application</u>

Application methods of the four new chemicals are expected to keep potential human health and environmental impacts to a minimum. Use of hand-held backpack sprayers increases control of the distribution of the chemical. Treatments are more exact, drift and the unintentional spraying of nontargets is minimized. Use of boom sprayers slightly increases risks from drift and spraying nontargets; however, the downward facing nozzles are low to the ground and additional label instructions for minimizing drift, such as limiting nozzle size will be followed.

1. Physical Environment

USDA-APHIS anticipates that the Program's use of the insecticides bifenthrin, beta-cyfluthrin, *Beauveria bassiana*, and soybean oil, as well as use of DDVP in circle traps will all have minimal impacts on the physical environment, provided labels are followed.

<u>*Air*</u>

USDA-APHIS does not anticipate additional impacts to air when compared to the no action alternative. AQI values for 2018 in the two additional states that will be treated under the preferred alternative, Ohio and Kentucky, reported none and one day with unhealthy air quality, respectively. AQI values of the other states were already mentioned under the no action alternative analysis. USDA-APHIS will consider impacts to air resources as significant if they exceeded the NAAQS for particulate matter, ozone precursors. There is the potential for impacts to air from herbicide and insecticide application; however, impacts are expected to be short term, localized, and minor. USDA-APHIS will implement mitigation measures to reduce or avoid any minor or temporary negative impacts to air quality by ensuring the proper use of herbicides and insecticides.

Boom sprays have the greatest chance of impacting surrounding air quality. Booms sprays will be used as per the label, low to the ground, with appropriate nozzle size and facing the appropriate direction so as to minimize spray drift. While DDVP has harmful vapors, the strips will be used in well ventilated areas and handlers will ensure they avoid breathing in vapors.

Water

USDA-APHIS does not anticipate additional impacts to water when compared to the no action alternative. USDA-APHIS will consider impacts from the preferred alternative to water resources as significant if they exceeded Federal or State water quality standards. Herbicides and insecticides, when used improperly, can end up in surrounding water bodies. The chemicals can reach waterways from spray, drift, or spills or via run-off in solution or on soil particles that are moved by hydraulic forces. All Program uses of herbicides and insecticides should be away from surface water and follow additional directions that eliminate or greatly reduce runoff. Excess herbicides or insecticides will not be sprayed, so as to minimize runoff. Appropriate methods of chemical applications, as per labeled instructions, will reduce off-site transport of herbicides and insecticides to water.

Soil

Soil types found in the Mid-Atlantic States have already been outline in the no action alternative section. Similar to the Mid-Atlantic States, Ohio and Kentucky have diverse soils with six of the 12 dominant soil orders present: alfisols, entisols, inceptisols, utisols, mollisols and vertisol (USDA-NRCS, 2016). Alfisols are fertile soils with high base saturation and a clay-enriched subsoil horizon; entisols are young soils with little or no profile development; inceptisols are young soils with a weak degree of profile development; ultisols are soils with low base status and clay-enriched subsoil; mollisols are very dark-colored, very fertile soils of grasslands; and, vertisols are very clayey soils that shrink and crack when dry and expand when wet (USDA-NRCS, 2015).

USDA-APHIS does not anticipate additional impacts to soil when compared to the no action alternative. USDA-APHIS considers impacts from the preferred alternative to soil resources as significant if proposed activities resulted in substantially increased erosion and sedimentation or adversely affected unique soil conditions. None of the actions proposed under the preferred alternative would increase the potential for erosion, sedimentation, or are expected to change the soils in any unique way.

Potential negative effects of herbicide and insecticide application could include decreased or altered microbial populations in the soil (Adomako and Akyeampong, 2016); this potential negative effect is expected to be short-term. The application of bifenthrin, beta-cyfluthrin, *B. bassiana,* and soybean oil are all expected to have minimal impacts to soil based on limited drift and runoff due to the proposed use patterns.

As under the no action alternative, many of the activities associated with the Program will result in mild and temporary soil surface disturbance or compaction. The most frequent types of ground disturbance will be from vehicles and pedestrians. These impacts, however, are localized to areas where the Program occurs, and the long-term benefits of controlling SLF should outweigh any short-term impacts to soil. Similarly, *A. altissima* control will have the same impacts as discussed under the no action alternative. Potential impacts previously discussed include potential for an increase in soil erosion, alterations to soil microflora, and soil compaction. Impacts of controlling *A. altissima* can be reduced by use of best management practices to minimize soil disturbance.

2. Biological Resources

Vegetation

Similar to the no action, potential impacts to vegetation from the preferred alternative are expected to be minimal. The use of bifenthrin, beta-cyfluthrin, *Beauveria bassiana*, and soybean oil will have minimal impacts to surrounding vegetation. The use of circle traps has minimal impact to the SLF host tree and vegetation in the immediate area.

As under the no action alternative, most actions under the preferred alternative will increase the level of human activities around the treatment area, which can, to varying degrees, impact ground vegetation. Similarly, there will be alterations in the understory from *A. altissima* control and herbicide impacts to vegetation directly surrounding treated stumps. By utilizing best management practices, USDA-APHIS can minimize these impacts.

Wildlife

Potential impacts to wildlife from the preferred alternative are expected to be minimal. Impacts discussed in the no action alternative, such as risks from dinotefuran and imidacloprid still apply. *B. bassiana* and soybean oil pose few additional risks to wildlife. As mentioned previously, bifenthrin is highly toxic to freshwater fish, aquatic-phase amphibians, and terrestrial invertebrates, including beneficial insects such as honey bees. The chemical is very highly toxic to freshwater aquatic invertebrates; has very high acute toxicity to estuarine/marine fish and invertebrates; moderate acute toxicity to small mammals; and, slight acute toxicity to birds, terrestrial-phase amphibians and reptiles. USDA-APHIS will follow insecticide labels in order to minimize exposure to wildlife. Label instructions limiting the number of treatments applied, limiting the spraying of blooming plants (in order to protect pollinators), and utilizing applications methods that limit or reduce drenching and chemical runoff into soil and nearby water, will protect local wildlife.

Actions associated with the preferred alternative will temporarily increase the presence or level of human activities (noise and visual disturbance) in the program area. 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.

(1) Migratory Bird Treaty Act

Potential impacts to migratory birds are not expected to increase, when compared to the no action alternative. To minimize impacts to migratory birds, agencies will establish buffer zones around ground-nesting breeding birds until nestlings have fledged or breeding behaviors are no longer observed and establish site-specific migratory bird conservation measures, as needed, prior to beginning any Program activities.

(2) Bald and Golden Eagle Protection Act

Potential impacts to bald and golden eagles are similar to the no action alternative. If bald or golden eagles were discovered near a Program action area, the State agency responsible for the area will contact the USFWS and implement recommendations for avoiding disturbance at nest sites. For bald eagles, USDA-APHIS will 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.

(3) 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. USDA-APHIS initiated consultation with USFWS field offices in Delaware, Maryland, New Jersey, Ohio, Pennsylvania, Virginia, and West Virginia for the proposed SLF Control Program. To date, USDA-APHIS has received concurrence from USFWS offices in Delaware, Maryland, New Jersey, and Pennsylvania. USDA-APHIS will continue to consult with USFWS on Program activities discussed under this alternative as the Program area expands with the spread of SLF into new areas and states. USDA-APHIS will implement protection measures for Federally-listed species and critical habitat in each Program state prior to the initiation of Program activities. No program activities will occur in a state until consultation has been completed with the USFWS. USDA-APHIS will also complete consultation for any species under the jurisdiction of the National Marine Fisheries Service, as necessary.

3. Human Health and Safety

The SLF Program applies insecticides in a way that minimizes significant exposure to soil, water, and air, which in turn, minimize subsequent exposure to the general public. USDA-APHIS personnel and contractors are required to comply with all USEPA use requirements and meet all recommendations for PPE during pesticide application. Adherence to label requirements and additional Program measures designed to reduce exposure to workers (e.g., PPE requirements include wearing a 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.

B. bassiana and soybean oil are of low toxicity to humans. Bifenthrin treatments will be limited to no more than one treatment every seven days; no applications to food crops; humans and pets may not re-enter the treated area until area it is dry; and, applicators must wear a long-sleeved shirt and long pants, socks, shoes, chemical-resistant gloves, and a respiratory device and protective eyewear when working in non-ventilated spaces. The treatments will all be made outdoors. After beta-cyfluthrin treatments, humans and pets may re-enter the treatment area only after it is dry; the product cannot be applied to food crops in order to protect human health; applications may not be made during rain and the treated area may not be watered to the point that run-off occurs; and, applicators must avoid contact of the product with eyes, skin, or clothing and must avoid breathing spray mist.

4. Environmental Justice

USDA-APHIS has considered the potential environmental impacts of implementing the preferred action alternative on minority and/or low-income communities. Similar to the no action alternative, USDA-APHIS expects the distance from areas to environmental justice communities to influence if there are direct adverse impacts to those communities. In general, each State agency will reach out to landowners prior to implementing the program. USDA-APHIS will encourage local program personnel to engage with locally impacted people in collaborative decisions about the program whenever possible. Additionally, the preferred alternative is not likely to pose any highly disproportionate adverse effects to children. Children will not be present while treatments of herbicides and insecticides are occurring. Protective measures on labels are meant to protect not only the applicator, but the public, including children. All labels will be followed.

5. Tribal Consultation and Coordination

Federally-recognized Tribes were notified via a mailed letter of the proposed SLF Control Program. While APHIS believes the proposed SLF Program is unlikely to affect Native American sites and artifacts, APHIS requested Tribes contact the APHIS if the agency overlooked or failed to anticipate any ways their Tribe may be affected by the SLF Program. 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 expects that the preferred alternative will not alter, change, modify, relocate, abandon, or destroy any historic buildings, edifices, or nearby infrastructure. Herbicides and pesticides will not be applied to historic buildings and other anticipated program actions will not directly affect the buildings or their properties. If herbicide or pesticide treatments, in any way impact properties under NHPA, the appropriate consultations will occur and/or the appropriate mitigations will be applied.

7. Uncertainty and Potential Cumulative Impacts

Uncertainty in this evaluation arises whenever there is a lack of information about the effects of a pesticide's formulation, metabolites, and properties in mixtures that have the potential to impact non-target organisms in the environment. These uncertainties are not unique to this assessment, and are consistent with uncertainties in human health and ecological risk assessments with any environmental stressor. There is uncertainty in where an SLF infestation may occur in the United States, the extent of pesticide use during a given infestation, and the influence of site-specific factors. Uncertainty arises from the potential for cumulative impacts from using multiple pesticides, having repeat exposures, and co-exposure to other chemicals with similar modes of action. Theoretically, cumulative impacts may result in synergism, potentiation, additive, or antagonistic effects. From a human health perspective, the SLF program use of pesticides is expected to pose negligible cumulative impacts based on the targeted modes of application which make it unlikely for the pesticides to enter the food chain or drinking water.

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 alternatives. Soil disturbance related to program activities will be short-term. Current and future activities related to urbanization, agricultural activities, logging, and roadway construction appear more likely to significantly impact environmental quality than the 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 will be negligible.

Vehicle emissions associated with getting to and from project sites will be minor relative to the ongoing and future emissions from urbanization, highway traffic, and agricultural production. Any increases in air pollutants associated with program activities and vehicle emissions will 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 will still remain minor compared to the overall emissions in the program area.

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 will be incrementally minor. The greatest sector of the human population at risk of exposure to herbicides and pesticides are program workers and applicators; however, these risks are minimized through the use of PPE. The lack of significant routes of exposure to human health and the environment, suggest cumulative impacts will not occur.

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, migratory birds, threatened and endangered species, and the surrounding environment.

D. Comparison of Three Alternatives

Table 4 summarizes the potential human health and environmental impacts from each of the three alternatives for a quick comparison.

Table 4.

Comparison of Potential Human Health and Environmental Impacts From Three Alternatives			
	No Action	**No Treatment**	**Preferred Alternative**
Herbicides	Minimal impact to human health and environment if labels followed	Potentially less use of herbicides than no action and preferred alternative and less impacts	Similar to no action, minimal impacts expected if labels followed. Use in two additional states is not expected to change impacts.
Insecticides	Dinotefuran and imidacloprid - minimal impacts to human health and environment if labels followed.	Potentially less use of insecticides than no action and preferred alternative and less impacts	Similar to no action, minimal impacts expected if labels followed. Use in two additional states is not expected to change impacts. Soybean oil and *B. bassiana* - extremely low potential for impacts. Bifenthrin and beta-cyfluthrin- potential for toxicity issues. Minimal impacts if products are used according to label.
Traps	Extremely low impact to human health and environment (does not include circle traps).	Extremely low impact since use of fewer traps is anticipated	Extremely low impact to human health and environment. Even less impacts than no action since circle traps shown to catch less nontargets.

Comparison of Potential Human Health and Environmental Impacts From Three Alternatives			
	No Action	**No Treatment**	**Preferred Alternative**
	Minimal impacts to nontargets that get trapped in sticky band.		
Surveys and Egg Mass Scraping	Extremely low impact to human health and environment	If any surveys taken, will have minimal impacts	Extremely low impact to human health and environment

All proposed actions will increase the level of human activities around the treatment area, which can, to varying degrees, impact ground vegetation, soil compactions, and noise levels. By utilizing best management practices, USDA-APHIS can minimize these impacts on humans and the environment.

While USDA-APHIS will not take actions against SLF under the no treatment alternative, other government agencies and private landowners may take action. The agency anticipates less actions under the no treatment alternative; however, it is possible that impacts could increase if actions taken by others are not well advised or properly coordinated.

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
Plant Health Programs
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 150
Riverdale, MD 20737

U.S. Fish and Wildlife Service
West Virginia Ecological Services Field Office
90 Vance Drive
Elkins, WV 26241-9475

U.S. Fish and Wildlife Service
Pennsylvania Field Office
110 Radnor Road, Suite 101
State College, PA 16801-4850

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

U.S. Fish and Wildlife Service
New Jersey Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, NJ 08205

U.S. Fish and Wildlife Service
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410

U.S. Fish and Wildlife Service
Ohio Ecological Services Field Office
4625 Morse Road
Columbus, OH 43230

V. References

Adomako, M.O. and S. Akyeampong, 2016. Effect of some commonly used herbicides on soil microbial population. Journal of Environment and Earth Science. Vol 6, No 1.

Aust, W. M. and C. R. Blinn. 2004. Forestry best management practices for timber harvesting and site preparation in the eastern United States: an overview of water quality and productivity research During the Past 20 years (1982-2002). Water, Air, and Soil Pollution: Focus 4:5-35.

CEC – Commission for Environmental Cooperation

CEC, 1997. Ecological regions of North America: toward a common perspective.

Cranshaw, W.S. and Baxendale, B. 2013. Insect control: horticultural oils. Colorado State University Extension. Fact Sheet No. 5.569. https://extension.colostate.edu/docs/pubs/insect/05569.pdf.

Dara, S.K., Barringer, L. and S.P. Arthurs. 2015. *Lycorma delicatula* (Hemiptera: Fulgoridae): a new invasive pest in the United States. Journal of Integrated Pest Management 6(1): 20-25.

Englert, D., Zubrod, J.P., Link, M., Mertins, S., Schulz, R. and M. Bundschuh. 2017. Does waterborne exposure explain effects caused by neonicotinoid-contaminated plant material in aquatic systems? Environmental Science and Technology 51(10): 5793-5802.

FAO- Food and Agriculture Organization of the United Nations

FAO, 1999. FAO specifications and evaluations for plant protection products: beta-cyfluthrin. http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/Specs/beta-cyfluthrin_2017_09_30.pdf

Foote, J.A., Boutton, T.W. and D.A. Scott. 2015. Soil C and N storage and microbial biomass in U.S. southern pine forests: influence of forest management. Forest Ecology and Management 355: 48-57.

Francese, J.A., Cooperband, M.F., Murman, K.M., Cannon, S.L., Booth, E.G., Devine, S.M., Wallace, M.S. 2020. Developing traps for the spotted lanternfly, *Lycorma delicatula* (Hemiptera: Fulgoridae). Environmental Entomology, January 28, 2020.

Harper, J.K., W. Stone, T.W. Kelsey, and L.F. Kim, 2019. Potential economic impact of the spotted lanternfly on agriculture and forestry in Pennsylvania. Pennsylvania State University. December, 2019.

Li, Q., Allen, H.L. and A.G. Wollum. 2004. Microbial biomass and bacterial functional diversity in forest soils: effects of organic matter removal, compaction, and vegetation control. Soil Biology and Biochemistry, 36(4): 571-579.

McGarvey, J.C., Thompson, J.R., Epstein, H.E. and H.H. Shugart. 2015. Carbon storage in old-growth forests of the Mid-Atlantic: toward better understanding the eastern forest carbon sink. Ecology 96(2): 311-317.

Mikkelson, K.M., Bearup, L.A., Maxwell, R.M., Stednick, J.D., McCray, J.E. and J.O. Sharp. 2013. Bark beetle infestation impacts on nutrient cycling, water quality and interdependent hydrological effects. Biogeochemistry 115(1-3): 1-21.

Missouri Botanical Garden. 2020. Plant finder. http://www.missouribotanicalgarden.org/

Morrissey, C.A., Mineau, P., Devries, J.H., Sanchez-Bayo, F., Liess, M., Cavallaro, M.C. and K. Liber. 2015. Neonicotinoid contamination of global surface waters and associated risk to aquatic invertebrates: A Review. Environment International 74: 291-303.

Orwig, D.A. 2002. Ecosystem to regional impacts of introduced pests and pathogens: historical context, questions and issues. Journal of Biogeography 29(10-11): 1471-1474.

PDA – Pennsylvania Department of Agriculture

PDA. 2018. Spotted lanternfly program information. 2018 Mar. 22. https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/Entomology/spotted_lanternfly/program-information/Pages/default.aspx

PDA. 2020. Guidelines for the control of spotted lanternfly. https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/Entomology/spotted_lanternfly/Documents/Spotted%20Lanternfly%20%20Property%20Management.pdf

PennState Extension, 2018. Tree-of-Heaven. October 8, 2018. https://extension.psu.edu/tree-of-heaven.

Simon-Delso, N., Amaral-Rogers, V.A., Belzunces, L.P., Bonmatin, J.M., Chagnon, M., Downs, C., Furlan, L., Gibbons, D.W., Giorio, C., Girolami, V., Goulson, D., Kreutzweiser, D.P., Krupke, C.H., Liess, M., Long, E., McField, M., Mineau, P., Mitchell, E.A.D., Morrissey, C.A., Noome, D.A., Pisa, L., Settele, J., Stark, J.D., Tapparo, A., Van Dyck, H., Van Praagh, J., Van der Sluijs, J.P., Whitehorn, P.R. and M. Wiemers. 2015. Systemic insecticides (neonicotinoids and fipronil): trends, uses, mode of action and metabolites. Environmental Science and Pollution Research 22: 5-34.

USDA-APHIS – United States Department of Agriculture-Animal and Plant Health Inspection Services

USDA-APHIS, 2018a. Spotted lanternfly control program in the Mid-Atlantic region, environmental assessment. May 2018. https://www.aphis.usda.gov/plant_health/ea/downloads/2018/mid-atlantic-region-slf-ea.pdf

USDA-APHIS, 2018b. Final human health and ecological risk assessment for dichlorvos (DDVP) in exotic fruit fly applications. November, 2018.

USDA-APHIS, 2015a. Draft programmatic Asian Longhorned Beetle Eradication Program Environmental Impact Statement March, 2015. 2018 Mar. 22 https://www.aphis.usda.gov/plant_health/ea/downloads/2015/Draft-Programmatic-ALB-Eradication-Program-EIS.pdf

USDA-APHIS, 2015b. Spotted lanternfly eradication program in Berks, Lehigh and Montgomery Counties, Pennsylvania: Environmental Assessment. May 2015. https://www.aphis.usda.gov/plant_health/ea/downloads/2015/slf-berks-lehigh-montgomery-pa.pdf

USDA-FS – U.S Department of Agriculture - Forest Service

USDA-FS, 2011a. Triclopyr - human health and ecological risk assessments, Final Report. SERA TR-052-25-03a, May 24, 2011 with revisions as of October 20, 2011.

USDA-FS, 2011b. Imazapyr – Human health and ecological risk assessment, final report. SERA TR-052-29-03a. December 16, 2011.

USDA-FS, 2011c. Glyphosate - Human health and ecological risk assessment, final report. SERA TR-052-22-03b.

USDA-FS, 2007. Aminopyralid - Human health and ecological risk assessment, final report. SERA TR-052-04-004a.

USDA-FS, 2004. Metsulfuron Methyl - Human health and ecological risk assessment, final report. SERA TR 04-43-17-01c. February 28, 2004.

USDA-NRCS – United States Department of Agriculture- National Resource Conservation Service

USDA-NRCS, 2020. Soil health. https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/

USDA-NRCS. 2018. Plants database. 2018 Mar. 23. https://www.plants.usda.gov/java/

USDA, NRCS, 2016. Distribution maps of dominant soil orders. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/maps/?cid=nrcs142p2_053589

USDA NRCS, 2015. Illustrated guide to soil taxonomy. Version 2.0. September, 2015. https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1247203&ext=pdf

USEPA, 2020a. Pyrethrins and pyrethroids. https://www.epa.gov/ingredients-used-pesticide-products/pyrethrins-and-pyrethroids

USEPA, 2020b. Beauveria bassiana strain GHA (128924) Fact Sheet. https://www3.epa.gov/pesticides/chem_search/reg_actions/registration/fs_PC-128924_01-Nov-99.pdf

USEPA, 2019. Outdoor air quality data: air quality index report. https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report

USEPA, 2018a. Ecoregions. https://www.epa.gov/eco-research/ecoregions

USEPA, 2018b. Polluted runoff: nonpoint source (NPS) pollution. Basic information about nonpoint source (NPS) pollution. August 10,2018. https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution

USEPA, 2017. Long-term water quality trends in the USEPA region 3 (Mid-Atlantic). USEPA, Region 3, Water Protection Division. September 27, 2017.

USEPA, 2011. Final work plan: *Beauveria bassiana* strains 447 447 (PC Code 128815 ATCC 74040 (PC Code 128818) GHA (PC Code 128924) and HF23 (PC Code 090305). September 20, 2011.

USEPA, 2010a. Bifenthrin summary document registration review: Initial docket. June, 2010. https://www.regulations.gov/document?D=EPA-HQ-OPP-2010-0384-0003

USEPA, 2010b. Cyfluthrins summary document registration review: Initial docket. September, 2010. https://www.regulations.gov/document?D=EPA-HQ-OPP-2010-0684-0002

USEPA, 2007. Dichlorvos: TEACH chemical summary. https://archive.epa.gov/region5/teach/web/pdf/dichlorvos_summary.pdf

USEPA, 1993. RED facts: flower and vegetable oils. December, 1993. https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/fs_G-114_1-Dec-93.pdf

USFWS- United States Fish and Wildlife Service

USFWS, 2007. National Bald Eagle Management Guidelines. May, 2007. https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf

USGS- United States Geological Survey

USGS, 2020a. Runoff: Surface and overland water runoff. https://www.usgs.gov/special-topic/water-science-school/science/runoff-surface-and-overland-water-runoff?qt-science_center_objects=0#qt-science_center_objects

USGS, 2020b. Groundwater flow and the water cycle. https://www.usgs.gov/special-topic/water-science-school/science/groundwater-flow-and-water-cycle?qt-science_center_objects=0#qt-science_center_objects

Wakie, T.T., Neven, L.G., Yee, W.L., Lu, Z., 2019. The establishment risk of *Lycorma delicatula* (Hemiptera: Fulgoridae) in the United States and Globally. Journal of Economic Entomology, Vol 20, No 20, p 1-9.

Warrington, B.M., Aust, W.M., Barrett, S.M., Ford, W.M., Dolloff, C.A., Schilling, E.B., Wigley, T.B. and M.C. Bolding. 2017. Forestry best management practices relationships with aquatic and riparian fauna: a review. Forests 8(9): 331-347.

WDNR- Wisconsin Department of Natural Resources

WDNR, 2012. Imazapry Chemical Fact Sheet. https://dnr.wi.gov/lakes/plants/factsheets/ImazapyrFactsheet.pdf

Woodcock, P., Cottrell, J.E., Buggs, R.J. and C.P. Quine. 2017. Mitigating pest and pathogen impacts using resistant trees: a framework and overview to inform development and deployment in Europe and North America. Forestry: An International Journal of Forest Research 16pp. 2017 Oct. 30.

Appendix 1. Response to Comment to Draft Spotted Lanternfly Environmental Assessment

APHIS received 1 comment on the Draft Spotted Lanternfly Environmental Assessment during the 30-day public comment period.

A commenter was concerned that controlling *Ailanthus altissima* with herbicides would not effectively kill the tree without subsequent cutting and removing treated trees; the treated trees would simply re-sprout and persist. The commenter referenced the PennState Extension website (found at: http://extension.psu.edu/tree-of-heaven) and the Connecticut Invasive Plant Working Group (http://cipwg.uconn.edu/tree-of-heaven/#).

Response: USDA APHIS has worked closely with states to determine effective measures at controlling *A. altissima* and is confident in the control methods outlined in this document. The PennState Extension website that the commenter referenced (http://extension.psu.edu/tree-of-heaven) states the following, which is consistent with the measures outlined in this EA,

> "Mechanical methods, such as cutting or mowing, are ineffective, as the tree responds by producing large numbers of stump sprouts and root suckers…Herbicides applied to foliage, bark, or frill cuts on the stem are effective at controlling tree-of-heaven."

While the Connecticut Invasive Plant Working Group (at http://cipwg.uconn.edu/tree-of-heaven/#) indicates cutting is an option for controlling *A. altissima*, the group also indicates herbicides may be used. The Working Group does not indicate a preference for the various treatment options listed. USDA APHIS is confident in the control methods outlined, but should an occasional *A. altissima* treated with herbicide re-sprout, the overall effectiveness of SLF control will not be diminished.