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Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

Spotted Lanternfly Eradication Program in Select Counties of Pennsylvania

Supplemental Environmental Assessment
March 2018

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Agency Contact:
John Crowe
National Policy Manager
Plant Protection and Quarantine – Plant Health Programs
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 134
Riverdale, MD 20737

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I. Purpose and Need

Since publication of the "Spotted Lanternfly Eradication Program in Berks, Lehigh and Montgomery Counties, Pennsylvania Environmental Assessment" in May 2015, there were new quarantine areas established in those counties. Relying on that analysis, a March 2016 Finding of No Significant Impact (FONSI) allowed APHIS program activities to also occur in Cooperation with the Pennsylvania Department of Agriculture's work in Bucks and Chester Counties when outbreaks occurred. As APHIS conducts additional survey work, the quarantine areas continue to expand, consequently this Environmental Analysis (EA) evaluates the areas in Pennsylvania where new detections are most likely to occur. This Supplemental Environmental Assessment (SEA) incorporates the prior EA and FONSIs by reference[1], and adds new information documenting the expanding affected environment while explaining how efforts in these new areas would not change the significance associated with this program. This EA considers the potential impact in Carbon, Delaware, Lancaster, Lebanon, Monroe, Northampton, Philadelphia, and Schuylkill Counties. The County of Philadelphia is coterminous with the City of Philadelphia; this document analyzed information identified for the entire county.

This EA was prepared consistent with the National Environmental Policy Act of 1969 (NEPA) and 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 requirements to be considered for a categorical exclusion from NEPA analysis under the APHIS National Environmental Policy Act Implementing Procedures (7 CFR § 372.5) based on the non-routine combination of measures proposed for this eradication program.

In the field of plant health, an outbreak is considered to be a recently detected pest population, including an incursion, or a sudden significant increase of an established pest population in an area (ISPM, 2007). An incursion occurs when an isolated population of a pest was recently detected in an area, is not known to be established, but is expected to survive for the immediate future (ISPM, 2007).

Lycorma delicatula (White) (Hemiptera: Fulgoridae), called the spotted lanternfly (SLF), is an invasive insect primarily known to affect Tree-of-Heaven (*Ailanthus altissima*), grapevine (*Vitis vinifera*), stone fruits, and other tree species (see table 4). If allowed to spread, this pest could seriously harm the country's grape, apple, stone fruit, and logging industries in Pennsylvania and other states. Spreading SLF populations make it harder to eradicate this pest, and are associated with increased pesticide use that increases risks to human health and the environment.

[1] These documents are available at: https://www.aphis.usda.gov/plant_health/ea/downloads/2015/slf-berks-lehigh-montgomery-pa.pdf , https://www.aphis.usda.gov/plant_health/ea/downloads/2015/spotted-lanternfly-fonsi.pdf , and https://www.aphis.usda.gov/plant_health/ea/downloads/2016/fonsi-slf-march.pdf .

Increasing quarantine zones impact businesses and residents who handle regulated materials. APHIS does not have data on the level of tree mortality SLF causes; however, stress from attack by SLF could predispose native host trees and other plants to other pests and pathogens. The presence of SLF in Pennsylvania constitutes an outbreak that APHIS is meeting with a program that currently defines quarantine areas with the objective of SLF eradication.

A. Public Outreach

Public outreach efforts since 2015 occur through cooperative efforts with the Pennsylvania Department of Agriculture. They publish current quarantine maps (for example, see Appendix A) through their Spotted Lanternfly website at http://www.agriculture.pa.gov/protect/plantindustry/spotted_lanternfly/Pages/default.aspx where they also solicit qualified vendors to assist with pest control activities.

II. Alternatives

The alternatives considered for this EA are essentially the same as in the "Spotted Lanternfly Eradication Program in Berks, Lehigh and Montgomery Counties, Pennsylvania Environmental Assessment" prepared in May 2015, with an expansion of the program as the preferred alternative. Expansion would occur in both the number of treated areas and in the range of pesticides available for use.

A. No Action

Under the no action alternative APHIS would not provide funding or other support to eradicate SLF. Other government agencies and private landowners may work to eradicate SLF; however, there would be no cooperative or coordinated efforts among APHIS and other stakeholders.

B. Preferred Alternative

The SLF eradication program is proposing several measures to use in an integrated manner when SLF is detected in the following counties in the future: Berks, Bucks, Carbon, Chester, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Philadelphia, and Schuylkill. Eradication efforts may include any or all of the following: regulatory control, surveys, egg mass scraping, sanitation, tree removal, herbicide applications, and applications of insecticides (dinotefuran and imidacloprid on an as-needed basis).

The methods used in regulatory control, surveys, egg mass scraping, sanitation, tree removal, herbicide and insecticide applications for SLF eradication are described in the "Spotted Lanternfly Eradication Program in Berks, Lehigh and

Montogmery Counties, Pennsylvania Environmental Assessment" which is incorporated by reference. Additional methods used in herbicide and insecticide applications are described in the "Draft Programmatic Asian Longhorned Beetle Eradication Program Environmental Impact Statement" published in 2015. The methods and risk evaluations associated with the program uses described in Appendices E and F (including human health risk assessments and ecological risk assessments for all pesticides) are incorporated by reference.

Regulatory control consists of establishing quarantines that prohibit unpermitted host material movement. Surveys use visual inspections, sweep netting, and tree banding to detect infestations. Visual surveys from October to May involve volunteers and program personnel scraping egg masses from surfaces where they were laid, and then killing the eggs. Sanitation occurs within one-quarter of a mile from an SLF detection, and includes chipping or grinding of debris, followed by incineration or burning of this plant material. Contractors will remove the non-native, invasive host "Tree-of-Heaven" (*Ailanthus altissima*), and treat stumps, where practical. In cases where stumps can’t be physically removed, hand or backpack applications with an herbicide will be used to eliminate the possibility of sprouting.

The program intends to use pesticide application equipment mounted on backpacks, using ground equipment, or by hand, and will not make any aerial applications. Allowable application, personal protective equipment, exclusion, dosage, and entry restrictions will follow the label instructions for each pesticide. Applications of pesticides would occur only with landowner consent. The experimental use of other insecticide products (bifenthrin, pymetrozine, and *Beauveria bassiana* strain GHA) would continue as part of efficacy evaluations.

APHIS needs a range of herbicide options to treat stumps and control vegetation sprouting from stumps of SLF-host species. In the ALB program, APHIS gained experience with using a combination of the herbicides triclopyr, imazapyr, and metsulfuron-methyl, and finds these same chemicals and methods of application would be useful for the SLF program. The SLF program is also proposing to use aminopyralid and glyphosate to treat stumps and sprouting vegetation. Not all herbicides would be used at one site but depending on whether stumps or sprouts need treatment, one or a mixture of herbicides may be used. These herbicide treatments are needed as a way to prevent reinfestation of host trees removed as part of the SLF program. When possible, APHIS prefers to physically remove host trees along with the stumps to prevent reinfestation. When it is impractical to move stump removal equipment into an area, or there are restrictions for habitat protection making stump removal not feasible, APHIS would have the option to apply these herbicides to treat the remaining stumps and associated sprouts. All applications will be made either by hand painting undiluted material on the stump or directly spraying stumps and/or sprouting foliage using a backpack sprayer.

APHIS would also continue to use insecticides to treat a small number of trap trees that would be used to attract and kill SLF. Dinotefuran has previously been used in the program and imidacloprid would also be added as a trunk injection. Dinotefuran and imidacloprid are systemic neonicotinoid insecticides taken up by the root system, foliage, or through the bark. The chemicals are translocated upward throughout the plant. Their mode of action involves disruption of an insect's central nervous system by binding agonistically 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 Tree-of-Heaven to be exposed to a dose which kills them, but the presence of the chemicals only within the plant simultaneously minimizes exposure of non-target organisms (PA DOA, 2017a).

For dinotefuran, the SLF program will continue to use all the application methods previously described for SLF eradication efforts. The previous dosage for dinotefuran (0.54 lb ai/ac) will be increased to 1.62 lb ai/ac under a Section 24(c) Special Local Needs registration. Although three times the concentration will be applied, the actual treated acreage will be exceedingly small because specific male trees will be treated females will be preferencially removed. This will limit the long term application of pesticides. Trap trees would be created by leaving a number of live male Tree-of-Heaven (generally 10 inches dbh) on a property after host tree reduction. Removal of most potential hosts in an area means that when the late instar and adult SLF start searching for Tree-of-Heaven to feed on, their only nearby option is one of the insecticide-treated trap trees (PA DOA, 2017a). The program will not apply dinotefuran when trees are dormant, flowering, under drought stress, or while not actively taking up water from the soil. Use of a similar lethal trap tree strategy is part of the emerald ash borer (*Agrilus planipennis* Fairmaire) management options (McCullough et al., 2015).

Another insecticial option to treat high risk host trees as part of the SLF eradication program would be use of the insecticide imidacloprid. There are several different formulations available for soil, seed, and foliar applications. In the SLF eradication program imidacloprid would be applied through trunk injection at the base of the tree, which is then translocated upward (USDA APHIS, 2015). These application methods were previously used in the ALB eradication programs and are incorporated by reference (USDA APHIS, 2015).

III. Affected Environment

SLF is native to China and Vietnam, although initially described in 1845 from collected insect specimens in the British Museum (Wolgemuth et al., 2016). SLF is considered an invasive species in Japan, and in South Korea where it was first detected in 2004 (PA DOA, 2017b). On September 22, 2014, the Pennsylvania

Department of Agriculture, in cooperation with the Pennsylvania Game Commission, confirmed the presence of SLF in Berks County, Pennsylvania, which was the first detection of this non-native species in the United States (PA DOA, 2017b).

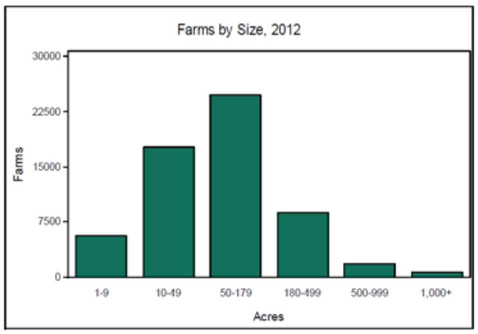
This chapter presents the baseline conditions of the affected environment that could be impacted by continued SLF outbreaks and/or eradication activities. This EA focuses on the 11 counties of the potential program area, but excludes Bucks and Chester Counties because a FONSI already determined activities in these counties are similar to those occurring in Berks, Lehigh, and Montgomery Counties. That is, current SLF quarantines in these five counties are in areas with similar environmental and agricultural characteristics. This section of the EA evaluates the areas in Pennsylvania where new detections are most likely to occur. APHIS uses this information as the basis to evaluate potential impacts of the program.

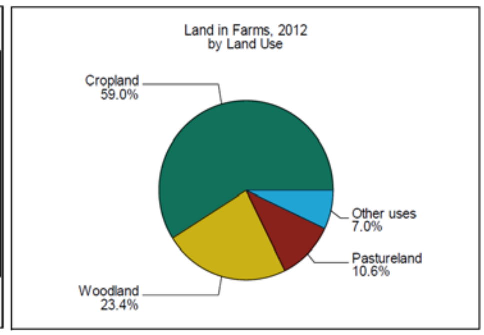
The alternatives in this EA include the same provisions as in the Alternatives examined in the 2015 SLF Eradication Program EA that is incorporated by reference, and increase the list of pesticides available as options. APHIS activities would remain focused on individual outbreaks as they are detected within any of the listed counties regardless of whether they occur on private or public lands. This is because potential hosts occur throughout the region and exploit a wide range of land, water, and air resources within the Commonwealth. The affected environment section of this EA presents brief descriptions of features in the 11 counties in the proposed program area. While eradication activities have the potential to impact this affected environment, the presence of invasive, uncontrolled SLF populations will impact those features over time.

A. Land, Climate, and Agricultural Characteristics

The eastern region of the Commonwealth of Pennsylvania consists of mountainous terrain mixed with a series of rolling hills, plateaus and ridges, and valleys (Worldatlas.com, 2016). The affected environment lies within three major geographic regions. Most of the affected area is part of the Piedmont Plateau, which extends 60 to 80 miles inland from the Atlantic Coastal Plain toward the Appalachian Mountains, and ranges from 100 to 500 feet in elevation. This area includes rolling or undulating uplands, low hills, fertile valleys and well-drained soils. The affected area also includes portions of the Ridge and Valley Province, which is northwest of the Piedmont, about 80 to 100 miles wide, and is characterized by parallel ridges and valleys orientated northeast-southwest. These mountain ridges vary from 1,300 to 1,600 feet above sea level, with local relief of 600 to 700 feet. Finally, a small portion of the affected area is part of the Coastal Plain, which is approximately 50 miles long and 10 miles wide in the southeastern corner of the Commonwealth. This land is low, flat, poorly drained, and is modified for industrial and commercial use (Pennsylvania State Climatologist, 2009).

There are a diversity of land uses ranging from agriculture and natural areas, to development for urban and industrial land use. In Pennsylvania, the median farm size is 50 to 179 acres, and farmland use averages 59 percent crops, 23.4 percent woodland, and 10.6 percent pastureland (see figures 1 and 2). A wide variety of agricultural production occurs in all of the counties, and includes potential SLF host plants, such as stonefruit and grape crops (see tables 1 and 4; USDA NASS, 2012). Although livestock are not a resource APHIS expects to experience impacts related to either SLF spread or eradication efforts, the table includes some livestock information to aid readers in making comparisons.





Figures 1 and 2. Farms by Size and Land in Farms by Land Use (USDA NASS, 2012).

Table 1. Select agricultural characteristics of the Pennsylvania counties in the affected area.

Pennsylvania County	Land in Farms (acres)[2]	Land in irrigated farms (acres)	Top 3 Agricultural Commodities in the County[1] Crops (rank[3])	Livestock inventory[5]	Value of Fruit Production[4]
Berks	233,744	15,702	Corn for grain (5), Forage (6), Soybeans for beans (3)	Layers, Broilers, Pullets	4,285
Carbon	21,162	2,120	Forage, Corn for grain, Cut Christmas trees	Layers, Cattle and calves, Pullets	115
Delaware	4,725	459	Forage, Corn for grain, Cut Christmas trees	Layers, Horses and ponies, Sheep and lamb	52
Lancaster	439,481	57,904	Corn for grain (1), Forage (1), Corn for silage (1)	Layers, Broilers, Pullets	4,385
Lebanon	121,413	5,349	Corn for grain (8), Forage, Corn for silage (4)	Broilers, Layers, Pullets	791
Lehigh	76,331	11,023	Corn for grain, Soybeans for	Turkeys, Pheasants,	2,616

Table 1. Select agricultural characteristics of the Pennsylvania counties in the affected area.					
Pennsylvania County	**Land in Farms (acres)[2]**	**Land in irrigated farms (acres)**	**Top 3 Agricultural Commodities in the County[1]** Crops (rank[3])	Livestock inventory[5]	**Value of Fruit Production[4]**
			beans (8), Forage	Cattle and calves	
Monroe	26,483	1,662	Corn for grain, Forage, Soybeans for beans	Pheasants, Chukars, Layers	620
Montgomery	30,780	4.429	Forage, Corn for grain, Soybeans for beans	Layers, Cattle and calves, Hogs and pigs	876
Northampton	65,744	3, 81	Corn for grain (7), Soybeans for beans, Forage	Cattle and calves, Layers, Horses and ponies	866
Philadelphia	285	45	Forage, Harvested vegetables, Floriculture	Broilers, Horses and ponies, Bees	---
Schuylkill	105,749	14,761	Corn for grain, Forage, Soybeans for beans	Layers, Meat-type chickens, Pullets	1,776

[1] Forage includes forage-land used for all hay and haylage, grass silage, and greenchop; Broilers include other meat-type chickens; Pullets are for laying flock replacement.
[2] Data is from the 2012 Census of Agriculture (USDA NASS, 2012).
[3] Rank is provided if the county is within the top ten in the Ranking of Counties in Crop Production, 2011 (within USDA NASS, 2012).
[4] Fruit includes apple, peach, tart cherry, pear, strawberry, and grape production value during 2011, in $1,000 dollars.
[5]Based on the number of head.

This information shows the wide diversity of Pennsylvania agriculture, and the closely allied natural resources near farm environments that could become affected by SLF or eradication activities. In any given year, the affected environment will form a discontinuous patchwork of farms and wooded areas primarily within the Piedmont and Ridge and Valley provinces. APHIS is not asserting all farms are alike, or that regional and local variations in agricultural production do not exist and will not be important. Instead, by focusing on the common features in the affected environment, APHIS is trying to increase the potential for preparedness throughout the region. APHIS anticipates discussions will occur with individual landowners and state and local officials as the need arises to accommodate the specific land, water, and air resources during SLF outbreaks.

Urban, residential, and industrial areas occur throughout the affected environment, with Delaware and Philadelphia Counties being the most developed (see table 2). Areas with extensive human development, such as cities and university campuses, may have potential SLF hosts planted as part of the urban environment (see section B, Vegetation and Wildlife). The Philadelphia port complex handles the largest volume of international shipping freight on the East Coast of the country. Close proximity to local parks, such as Fairmount Park in the City of Philadelphia, suggests escaping pests that hitchhike in imported commodities may find suitable host plants. SLF uses inanimate materials for egg laying (such as stones, fence-posts, and outdoor equipment in Pennsylvania) which would allow urban areas to add to the risk of SLF dissemination (Dara et al., 2015).

Table 2. Select characteristics of the Pennsylvania counties in the affected area Pennsylvania County.

Pennsylvania County	2010 Population Census[1]	Land area in square miles	Population per square mile	Cities[2]
Berks	411,422	856.51	480.4	Reading
Carbon	65,249	381.46	171.1	Jim Thorpe, Lehighton
Delaware	558,979	183.84	3,040.5	Haverford, Media, Upper Darby
Lancaster	519,448	943.81	550.4	Lancaster
Lebanon	133,568	361.83	369.1	Lebanon
Lehigh	349,497	345.17	1,012.5	Allentown, Bethlehem
Monroe	169,842	608.29	279.2	Stroudsberg
Montgomery	799,874	483.04	1,655.9	Abinton, Lower Merion, Norristown
Northampton	297,735	369.67	805.4	Bethlehem, Easton
Philadelphia	1,526,006	134.10	11,379.5	Philadelphia
Schuylkill	148,289	778.63	190.4	Pottsville

[1] U.S. Census Bureau, 2017.
[2] Worldatlas.com, 2016.

B. Vegetation and Wildlife

Using a mosaic of 16 Landsat Thematic Mapper scenes, the land cover in Berks, Lebanon, Lehigh, and Northampton Counties are predominantly pasture / hay with deciduous forest in the northern and southern areas bordering each county. Carbon, Monroe, and Schuylkill are mostly deciduous forest with pockets of planted or cultivated pasture / hay. Lancaster and Montgomery are predominantly pasture / hay with some deciduous forest areas. In contrast, Delaware and Philadelphia Counties consist of high and low intensity residential land cover with commercial, industrial, and transportation uses (Anonymous, 1986-1993).

In general, vegetation types vary based on natural site conditions and changes that occur as people clear land for development and agriculture. The Valley and Ridge Province forms a broad arc between the Blue Ridge Mountains and the Appalachian Plateau. The Ridge and Valley Province contains drought-tolerant species including eastern red-cedar, Virginia pine, Table Mountain pine, yellow oak, post oak, hackberry and sumac. Throughout most of the counties for the proposed action, the major forest type is the Appalachian oak forest. On lower slopes in Appalachian oak forest areas, the tree species include red and white oaks mixed with other types of hardwoods such as tulip poplar, red maple, and hickories. On drier upper slopes and along ridge tops, white, black, and chestnut oaks dominate over a dense layer of shrubs such as mountain laurel and black huckleberry. In southern Delaware and Lancaster counties, the forest species include pitch and Virginia pines with eastern red-cedar, sassafras, scrub and blackjack oaks. Coastal plain forests in the southeastern corner of the state (on a narrow sliver of the Atlantic Coastal Plain physiographic province that parallels the Delaware River), contain sweetgum, sweetbay magnolia, willow and southern red oak. River birch commonly occurs along rivers and streams in the eastern part of the state (PA NHP, 2017).

Periodically, each county creates inventories of rare plants and animals, and combines this information with other environmental data to rank their natural communities and support conservation decision-making. Although each county uses similar methodologies, they vary in how they identify and present their areas of environmental importance. Table 3 summarizes the highest-ranking sites within each county, as identified in their latest Natural Heritage County Inventory.

Table 3. Summary of Environmentally Important Areas

Pennsylvania County, date of inventory	**Highest Ranking Sites of Significance or Areas with Species of Concern within the County**
Berks, 2014	Blue Mountain, Hopewell Lake, Bieber Creek, Birdsboro Seeps, Boyers Junction, Kittatinny Ridge-Hawk Mountain, Mount Penn, Neversink Mountain, New Jerusalem Cemetery Wetlands, Schuylkill River – Ridgewood
Carbon, 2005	Fawn Run Wetlands, Mosey Wood Wetlands, Penn Forest / Wild Creek Reservoirs, Schoch Barrens Complex, Yellow Run Barrens
Delaware, 2011	Darby Creek Mouth Mudflat, John Heinz National Wildlife Refuge, Little Tinicum Island, Pink Hill Serpentine Barrens
Lancaster, 2008	Chiques Creek; Penryn Park, Walnut Run; Lower Middle Creek, Segloch Run Woods; Middle Creek Wildlife Management Area; Brunner (Lows) Island; Conejohela Flats; Fishing Creek at Scalpy Hollow Road; Conowingo Islands; Goat Hill, Rock Springs, and New Texas Serpentine Communities
Lebanon, 2003	Fort Indiantown Gap Macrosite, Indiantown Run Woods, Stracks Dam, Watnut Run Watershed
Lehigh-Northampton, 2013	Mount Bethel Fens; Delaware River in Northampton, and multiple watersheds flowing into the Delaware River; Lohman Wetlands; and the following watersheds: Bushkill Creek, Cooks Creek, Hokendauqua Creek, Hosensack Creek, Indian Creek, Little Lehigh Creek-Swabia Creek, Martins Creek, Mill Creek, Ontelaunee Creek, Perkiomen Creek-Swamp Creek, Saucon Creek, and Unami Creek
Monroe, 1999	Long Pond Macrosite Preserve, Lake Mineola Marsh, Big Offset Barren, Creek Fen, Tannersville Bog, Two Mile Run Swamp
Montgomery, 2008	Conservation Landscapes: Upper Perkiomen / Green Lane Reservoir, Spring Mountain, Mill Hill / Deep Creek, Pennypack Creek, Upper Schuylkill River, and the Unami Creek / Ridge Valley Creek Landscape
Philadelphia, 2008	John Heinz National Wildlife Refuge & Little Tinicum Island
Schuylkill, 2003	Bears Head Ridgetop Dwarf-Tree Forest, Black Creek / Indian Run Watershed, Swope Valley Run, Wolf Creek Watershed
Sources: National Heritage Inventories and Updates for the Counties and years as indicated; available through http://www.naturalheritage.state.pa.us/CNHI.aspx	

The Natural Heritage Program also inventories wildlife, and identifies Important Bird Areas (IBA) in each County as of the date of the report. Currently, there are 86 areas in the Commonwealth considered to provide critical bird habitat for both common and rare birds (Audubon, 2017). They include four of Global, and seven of Continental importance. For example, Hawk Mountain in Schuylkill County and the Hawk Mountain Sanctuary in Berks County are part of the Kittatinny Ridge IBA (a major migratory raptor corridor), and the John Heinz National

Wildlife Refuge IBA at Tinicum in Philadelphia hosts nearly 300 species of shorebirds, songbirds, and waterfowl during migrations (Audubon, 2017). The affected environment includes portions of the Eastern and Atlantic flyways, which are terrestrial and waterfowl migratory pathways that birds follow to cross the Continent (La Sorte et al., 2014). On August 2, 2012, APHIS and the FWS signed a memorandum of understanding to promote the conservation of migratory bird populations in compliance with Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds". To date, the potential for wild North American birds to overcome SLF prey defenses and use SLF as a food source (despite distasteful defensive alkaloids and layered behavioral responses) (Kang et al., 2016) is not known. Similarly, the extent of the ability of U.S. native hemipteran populations (*Arilus cristatus* (Linnaeus) and *Apoecilus cynicus* (Say)) to successfully prey on SLF is not yet known (Barringer and Smyers, 2016).

In addition to agriculturally important and native tree species, the PA Department of Conservation and Natural Resources (DCNR) recognizes many SLF hosts as invasive plants that are highly likely to establish in a variety of conditions, including highly disturbed or high human-density developed areas (see table 4; PA DCNR, 2017a). SLF damage to hosts includes release of sap down the exterior of tree trunks (Dara et al., 2016). As the tree weakens, this sap serves as a food source for fungi that may increase the decay rate leading to tree death. SLF inflicts the greatest degree of damage on Tree-of-Heaven (*Ailanthus altissima*), Virginia creeper (*Parthenocissus quinquefolia*) and Japanese angelica tree (*Aralia elata*) (PA DCNR, 2017a). SLF's broad host range suggests that any potential for biological control of these invasive plants using SLF must remain counterbalanced against the need to protect agriculturally important tree fruit crops.

Table 4. Select hosts of SLF reported to occur in Pennsylvania.

Host Plant[1]	**Common Name (Origin[2])**	**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 saccharinum 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.[3]	Japanese angelica tree (I)	Araliaceae	Nymph
Arctium lappa L.	Greater Burdock (I)	Compositae	Nymph; feeding
Elaeagnus umbellata Thunb.[3]	Autumn Olive (I)	Oleaceae	Feeding
Fagus grandifolia Ehrh.	American beech (N)	Fagaceae	Adult; egg laying

Table 4. Select hosts of SLF reported to occur in Pennsylvania.			
Host Plant[1]	**Common Name (Origin[2])**	**Family**	**SLF Life Stage or Activity**
Hibiscus syriacus L.	Rose of Sharon (I)	Malvaceae	---[4]
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
Malus pumila Mill.	Paradise Apple (I)	Rosaceae	---[4]
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
Pinus strobus L.	Eastern White Pine (N)	Pinaceae	---[4]
Pyrus calleryana Decne.[3]	Callery Pear (I)	Rosaceae	---[4]
Quercus acutissima Carruthers	Sawtooth oak (I)	Fagaceae	---[4]
Quercus spp. L.	Oak (I, N)	Fagaceae	Adult; egg laying on some species
Robinia pseudoacacia L.	Black Locust (N)	Fabaceae	Feeding
Rosa multiflora Thunb.[3]	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 vinifera L.	Wine Grape (I)	Vitaceae	Adult, nymph; feeding, egg laying
Zelkova serrata (Thunb.) Makino	Japanese Zelkova (I)	Ulmaceae	Egg laying

[1] Hosts as per Anonymous, 2015; plant distribution as per Anonymous, 2017a.
[2] Origins are I = Introduced, N = Native
[3] Considered as invasive by the PA DCNR, 2017a.
[4] SLF life history information not available on this host (Anonymous, 2015).

The diversity of land cover creates a variety of terrestrial and aquatic habitats for other types of wildlife. Many wildlife species are common throughout the region. The Pennsylvania Game Commission recognizes the Commonwealth as home to 480 species of wild birds and wild mammals. Of the 414 species of wild birds, 285 are regular denizens of the state and the remaining 129 species are less frequent visitors. There are 66 species of wild mammals including some that are relatively scarce and a few with ranges that marginally extend into Pennsylvania (PA Game Commission, 2017). Nevertheless, several species are rare, listed as state species of concern (PA Game Commission, 2017), or may be federally protected under the Endangered Species Act (ECOS, 2017). As changes to the SLF eradication efforts occur, APHIS reinitiates consultation with the FWS on the proposed program's potential to affect listed species and critical habitat in the program area. For the federally listed species currently within the proposed program area, see table 5.

Table 5. Summary of likely presence of Federally listed species in the proposed program area's counties.

Scientific Name	**Common Name**	**Status[1]**	**Counties where the specie is present or reported as likely to be present**
Alasmidonta heterodon (Lea)	Dwarf wedgemussel	E	Monroe
Bombus affinis	Rusty-patched bumblebee	E	Extirpated from Pennsylvania
Clemmys muhlenbergii (Schoepff)	Bog (Muhlenberg) turtle	T	Berks, Carbon, Delaware, Lancaster, Lebanon, Lehigh, Montgomery, Monroe, Northampton, Schuylkill
Myotis septentrionalis (Trouessart)	Northern long-eared Bat	T	Berks, Carbon, Delaware, Lancaster, Lebanon, Lehigh, Montgomery, Monroe, Northampton, Schuylkill
Myotis sodalis Miller and G.M. Allen	Indiana bat	E	Berks, Carbon, Delaware, Lancaster, Lebanon, Lehigh, Montgomery, Monroe, Northampton, Schuylkill
Scirpus ancistrochaetus Schuyler	Northeastern bulrush	E	Carbon, Lehigh, Monroe, Schuylkill

[1] Endangered = E; Threatened = T; there are no proposed or candidate species for listing present or reported as likely to be present in Pennsylvania (ECOS, 2017).

SLF outbreaks could shift natural plant succession on an uncultivated premise, and cultivated areas may shift away from host or tree fruit production to remain economically viable. While these types of shifts in land use could cause localized physical and chemical changes to the soil quality, these changes also may increase erosion and decrease water quality. This section's review of the interactions of SLF with vegetation and wildlife provides background for considering the potential for SLF and/or eradication activities to influence the water and air quality in the affected environment. The next section discusses aspects of water and air quality.

C. Water and Air Quality

As a pest with the potential to influence land cover, SLF may lead to successionary changes that alter water movement at the local level. Taken together, small changes to water quality and water flow could influence human health and agriculture in the region. The water basins in the affected area contain numerous lakes, rivers, and streams, several of which have good water quality while others may be impaired by various activities.

Waterways in Lancaster, Lebanon, and Schuylkill Counties feed into the Susquehanna / Chesapeake Basin; all others drain into the Delaware Basin (Grace, 2016). In Pennsylvania's Delaware Estuary there are 512 acres of tidal wetlands (PA DEP, 2014). At 6.4 percent, Monroe County has among the highest percentage of land covered by wetlands in the Commonwealth (PA DEP, 2014). The Commonwealth of Pennsylvania encompasses many natural and man-made lakes, waterways, and state parks. Table 6 identifies some examples in the various counties. APHIS expects the land in and around these areas to have populations of plants capable of serving as SLF hosts, which makes alterations to water quality a possibility as trees die.

Table 6. Examples of lakes, scenic rivers, and State Parks in the Pennsylvania counties in the affected area.			
Pennsylvania County	**Lakes (natural or man-made)[2]**	**Scenic Rivers (associated State Forest)[3]**	**State Parks[1]**
Berks	Blue-Marsh National Recreation Area; Ontelaunee Lake	Schuylkill River (Weiser State Forest), Tulpehocken Creek	French Creek, Nolde Forest
Carbon	Beltzville Lake	Lehigh River	Beltzville, Hickory Run, Lehigh Gorge
Delaware	Brinton Lake, Earles Lake	Lower Brandywine Creek	Ridley Creek
Lancaster	Speedwell Forge Lake	Octoraro Creek (Valley Forge State Forest), Tucquan Creek	Susquehannock
Lebanon	Marquette Lake	Stony Creek, Tulpehocken Creek	Memorial Lake, Swatara
Lehigh	Leaser Lake	---	Leaser Lake
Monroe	Gouldsboro Lake, Trout Lake	---	Gouldsboro, Tobyhanna, Big Pocono
Montgomery	Green Lane Reservoir	Schuylkill River (Weiser State Forest)	Evansburg, Fort Washington, Norristown
Northampton	Dutch Springs, Minsi Lake	---	Jacobsburg
Philadelphia	Belmont and East Park Reservoirs	Schuylkill River (Weiser State Forest)	Benjamin Rush, Nockamixon
Schuylkill	Lake Wynonah, Sweet Arrow Lake	Schuylkill River (Weiser State Forest)	Tuscarora, Locust Lake
[1] PA DCNR, 2017b. [2] U.S. EPA 303(d), 2005; Fishingnotes.com, 2016; Philadelphia Water Department, 2017; Dutch Springs, 2009; Lehigh County, Pennsylvania, 2008-2017. [3] Grace, 2016.			

States are required to report impaired waterways to the EPA under section 303(d) of the Clean Water Act (CWA) (water quality regulations are at 40 CFR § 130.7(b)). States identify all waters where required pollution controls are insufficient to attain water quality standards, and establish priorities for development of total maximum daily loads.

As of 2014, Pennsylvania recognized Watershed Implementation Planning areas in the following counties: Berks (abutting Upper Swatara Creek and Upper Schuylkill River), Carbon (along the Upper Schuylkill River), Lebanon (Conewago Creek), Lancaster (along Mill Creek and Conowingo Creek), and Schyulkill (along the Upper Swatara Creek and Upper Schuylkill River) (PA

DEP, 2014). Monitoring station data led to 31 stream miles of the Schuylkill River being assessed as attaining Recreational Use from the Berks County line downstream to the Valley Forge National Historic Park west of Route 422.

Similarly, 10 stream miles along Little Bushkill Creek were listed as attaining Recreational Use in 2014. There are Phase 1 MS4 permits for stormwater discharges issued to Philadelphia (Philadelphia) and Allentown (LeHigh County). Along the Schuylkill River, trends for tested nitrogen (NO3, NH4, Total N) and phosphorus (DIP, Total P) indicate long-term decreases over the last ten years, although short-term increases may be associated with drought years. Spill detection and emergency response networks for public water systems on the Schuylkill and Delaware Rivers include a variety of on-line detectors for real-time monitoring of raw water conditions (PA DEP, 2014).

The primary reasons listed for impairment to streams in the State are agriculture, mining drainage, unknown sources, and urban runoff. The causes for impairments to streams are varied, but some of the most common reasons for listing are siltation, metals, pH, and nutrients. Atmospheric deposition and agricultural runoff are two of the most common sources of impairment in lakes, but the causes of impairment to lakes may be unknown. In general, this region of Pennsylvania appears to receive higher levels of acid deposition (average exceeding 12 kg-N/ha total nitrogen deposition 2013-2015) than other regions of the northeast and western United States (National Atmospheric Deposition Program, 2016). Frequent causes of impairment for lakes can also include mercury, pH, nutrients, and pathogens (PA DEP, 2014).

Waterbodies within the potentially affected area may be managed for coldwater fish species, such as trout. The Southeast Region of the State (including Berks, Bucks, Chester, Delaware, Lancaster, Lehigh, Montgomery, Northampton, Philadelphia and Schuylkill Counties), reports stocking dates and locations, posted property advisories, and upcoming events to inform the public about the use of these local natural resources (PA FBC, 2017). Karst density mapping for the Pennsylvania counties in the affected environment shows many areas where sinkholes, surface depressions, and caves may be associated with direct recharge zones to local and regional aquifers, making these areas vulnerable to groundwater contamination (Kochanov and Reese, 2003). Naturally occurring dying or dead trees impact erosion in localized areas, which influences downstream water quality.

As trees die, there is a reduced capacity to recharge oxygen in the atmosphere. If the vegetation is replaced, then this type of short-term, indirect effect on air quality would be unnoticeable. The release of chemical agents into the air is another potential source of impact to air quality. In a larger context, impacts to air quality influence human health, and could lead to changes in the climate. For these reasons, it is necessary to consider the baseline air quality in the affected environment.

The Clean Air Act (CAA) (42 U.S.C. §§ 7401 et seq.) is the primary Federal legislation that addresses air quality (regulations are at 42 CFR parts 7401-7671). In any given region or area of the United States, air quality is measured by the concentration of pollutants in the atmosphere, and is influenced by surface topography and prevailing meteorological conditions. The Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (numerical concentration-based standards) for six criteria pollutants that impact human health and the environment (40 CFR part 50). These pollutants are common and accumulate in the atmosphere as a result of natural processes and normal levels of human activity. They include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), small particulate matter, and lead (Pb).

Evaluation of the potential for impacts from these types of pollutants uses an air quality index (AQI) which is a measurement of the level of pollutants in the atmosphere for a given area. An AQI above 100 indicates that air quality conditions exceed health standards, while values below 100 indicate pollutant levels are below air quality standards. An AQI that exceeds 100 suggests that air quality may be unhealthy for certain sensitive groups of people, with more groups being impacted as the AQI number increases. During 2016, there were no days in any of the counties where air quality was categorized as unhealthy (151<AQI<200), very unhealthy (201<AQI<300), or hazardous (301<AQI<500) (see table 7). The primary pollutants of concern in every county were ozone and particulate matter. From 2000-2015, there was a 16 percent decrease in the regional average for ozone in the northeastern United States (includes Pennsylvania). While ozone is not directly emitted, it forms when oxides of nitrogen and volatile organic compounds react in the presence of sunlight. Particulate matter can either be emitted, or it can form when emissions of oxides of nitrogen or sulfur, ammonia, organic compounds, and other gases react in the atmosphere. From 2000-2015, there was a 37 percent decrease in the regional average for particulate matter in the northeastern United States (U.S. Environmental Protection Agency, 2017).

Table 7. Summary of Air Quality the Pennsylvania counties in the affected area in 2016.

Pennsylvania County	Number of Days in 2016 [1]		
	Good (0<AQI<50)	Moderate (51<AQI<100)	Unhealthy for Sensitive Groups (101<AQI<150)
Berks	248	103	7
Delaware	198	105	5
Lancaster	221	139	5
Lebanon	221	137	7
Lehigh	186	105	6
Monroe	260	40	3
Montgomery	242	46	5
Northampton	247	105	9
Philadelphia	236	121	9

[1] Data not available for Carbon and Schuylkill Counties; Lehigh and Montgomery Counties reported data on fewer than 300 days in 2016 (U.S. Environmental Protection Agency, 2017).

This revised chapter on the affected environment as of 2018 considered the baseline conditions by focusing on the land, climate, vegetation, wildlife, water and air quality in the expanded list of counties of the potential program area. Despite differences between the Piedmont and Valley and Ridge areas, all the counties experience similar environmental and agricultural characteristics. The counties with Coastal Plain areas intergrade with respect to shared resources that will influence the establishment and spread of SLF.

IV. Environmental Impacts

The types of environmental impacts considered for this EA are the same as in the "Spotted Lanternfly Eradication Program in Berks, Lehigh and Montgomery Counties, Pennsylvania Environmental Assessment" of May 2015 which is incorporated by reference, except that the existing program is considered as a source of cumulative effects for the future. APHIS finds the environmental analysis in the 2015 SLF Eradication Program EA applies, except for the additional chemical exposures that would occur in the additional counties. Under both alternatives, APHIS anticipates SLF attacks on potential hosts on private and public lands, leading to changes in the affected environment. APHIS does not expect the range and extent of potential impacts to the affected environment to differ from those analyzed in the original EA for Berks, Lehigh, and Montgomery Counties based on surveys, egg mass scraping, sanitation, tree removal, and tree banding activities in the additional counties.

The types of potential environmental impacts associated with the program's use of pesticides (the insecticide imidicloprid, and herbicides triclopyr, imazapyr, and metsulfuron-methyl) are the same as in the "Asian Longhorned Beetle Eradication

Program, Draft Programmatic Environmental Impact Statement – March 2015" which is incorporated by reference. Based on their chemical similarities, the types of potential environmental impacts associated with the program's use of dinotefuron are expected to be similar to those of imidacloprid. The potential amount or quantity of environmental impacts associated with insecticidal treatment is expected to be very low at any specific site; and negligible overall within each county in comparison to other agricultural uses.

A. No Action

A lack of a cooperative eradication efforts would result in further SLF spread which increases the difficulty in achieving successful eradication. As SLF establishes in new areas, impacts would become widespread over the long-term. Impacts would occur where ever SLF hosts grow, such as urban plantings, orchards, and forested areas. Infested trees weaken over time and may become a fall hazard; they continue to provide habitat for SLF to spread. When hosts die, the environmental impacts associated with tree death or removal will vary with the intensity of SLF infestation at each site.

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 is likely to increase the rate of tree replacement if existing trees are not treated. It could take many years for regrowth or replantings to reach full productivity. Development of resistant stone fruit tree or grape varieties also would take a long time and incur many costs (Woodcock et al., 2017). In today's economy, less productive orchards are not economically sustainable as agricultural producers. Private entities are likely to increase their use of pesticides resulting in increased human health risks. Less productive infested trees in urban areas could increase the energy requirements for nearby buildings as reflected in increased use of heating in winter and air-conditioning in summer.

In natural ecosystems, reduced growth or the loss of SLF-host trees would create canopy gaps leading to increased establishment of invasive plants, particularly other shade-intolerant vegetation. 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 critical ecosystem processes such as nutrient cycling and retention; and increased ecosystem susceptibility to invasion by exotic plants and animals (Orwig, 2002). 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 risk of greatest concern for agroecosystem functioning. The growth of oak, pine, and walnut trees is likely to be reduced, but the level of tree mortality remains unknown. To date, the invasive growth of Tree-of-Heaven does not appear to be reduced by the presence of SLF.

Stress induced by SLF attacks could predispose hosts to invasion by other pests and infections by pathogens. The effects of natural and manmade stressors to tree populations (e.g., timber harvests, acid rain, weather-related air pollution, pests and diseases) can be additive or synergistic (Hodgson et al., 2017; Woodcock et al., 2017).

B. Preferred Alternative

In general, impacts of tree removal include increased erosion, alterations to the vegetative understory and soil microflora, soil compaction, compression of vegetation, reduced local carbon sequestration (Foote et al., 2015; Li et al., 2004), and the potential for introduction of weeds on equipment. Impacts of tree removal can be reduced by use of best management practices (Aust and Blinn, 2004; Warrington et al., 2017). Over time, natural succession and intentional planting would offset carbon dioxide release into the atmosphere from the removal of trees (Mikkelson et al., 2013).

Impacts associated bark beetle (*Dendroctonous ponderosae*) infestations (Mikkelson et al., 2013) in forested areas suggest the range of potential SLF impacts to alterations to ecosystem functioning and water resource effects that could occur. For example, changes in canopy cover, interception and evapotranspiration may alter streamflow and soil moisture (Mikkelson et al., 2013), while tree mortality or removal adjacent to aquatic resources could reduce shading and alter water temperatures. Degradation of water quality can negatively affect aquatic organisms through direct or indirect impacts to fish, aquatic insects, and crustaceans (Englert et al., 2017; Morrissey et al., 2015). These types of impacts would be be less in areas where the invasive Tree-of Heaven does not dominate the canopy.

The potential for impacts depends on the dominance of the host trees in the urban or forested areas. Urban areas would 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. In forested areas, impacts associated with tree removal vary with site-specific conditions and other activities occurring within the watershed. The program's removal of trees would result in temporary loss of wildlife habitat that resprouting and natural succession will restore over time.

Program removal of select trees would impact fewer trees than the no action alternative, where all hosts have the potential to become infested. Tree removal under the preferred alternative would occur faster than allowing SLF damage to accrue over time. Under the preferred alternative, urban areas are less likely to serve as refugia for orchard infestations.

As the areas under regulatory control (quarantine) expand, more personnel (APHIS, state, and volunteers) would become involved in the cooperative eradication efforts. Expanding areas under quarantine impacts additional businesses and residents who handle regulated materials, or have properties affected by the control efforts. The next two sections summarize pertinent aspects as related to increased pesticide use in larger areas.

1. Herbicide Considerations

Herbicide application directly on stump surfaces or sprouting vegetation according to label instructions, minimizes damage to nearby vegetation from drift or runoff. Impacts to human health and the environment from the proposed use of herbicides are anticipated to be incrementally minor in comparison to existing agricultural and non-agricultural (e.g., right-of-way and forestry) uses. The U.S. Forest Service uses triclopyr and, to a lesser extent, imazapyr and the other herbicides proposed for use in the SLF program, in many of its invasive weed control programs. The proposed use of herbicides in the SLF Eradication Program is not expected to contribute significantly to the overall use of herbicides by other entities. Herbicides will only be used when physical removal of stumps is not feasible and with direct treatment of stump or sprouting vegetation from a removed tree by hand or backpack sprayer.

USDA APHIS evaluated the potential human health and ecological risks from the proposed use of triclopyr, imazapyr, and metsulfuron-methyl for the ALB Eradication Program, and finds the same risk types and exposures would apply to the SLF program. The USDA Forest Service has evaluated human health and environmental risk for aminopyralid and glyphosate and found low risk based on the toxicity profile of both herbicides and their proposed application method in the SLF Eradication Program (USDA FS, 2007; 2011) The risks to human health are expected to be negligible based on limited exposure from the proposed use pattern of these herbicides (hand painting and backpack spraying). Exposure is greatest for workers who will apply the product. The potential exposure for workers is low with the proper use of required protective equipment. The potential exposure for the general public is also minimal. Risks are quantified for workers and the general public to represent extreme exposure scenarios including accidental conditions. The conservative risk evaluation results show that the hazard index for workers and the general public are very low indicating that the exposure is unlikely to cause adverse health effects. Therefore, APHIS use of triclopyr and triclopyr mixed with imazapyr and metsulfuron-methyl should pose minimal risk to human health. Similarly risk assessments for glyphosate and aminopyralid have shown low risk to workers and the general public for applications made by hand or backpack sprayer to stumps and sprouts (USDA FS, 2007; 2011).

The risks posed by herbicide use to non-target fish and wildlife is also minimal. The proposed use pattern reduces potential exposure to most non-target fish and wildlife. Wild mammals and birds are at very low risk from herbicide applications due to the low toxicity for all 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 for all three herbicides and expected residues that could occur in aquatic environments from the proposed applications. Non-target terrestrial plants are at the greatest risk from herbicide treatment; however, the method of application and selective use of herbicides as a treatment for stumps and sprouting vegetation will reduce the risk to terrestrial plants. The analysis supporting these findings is in Appendix E of the Draft ALB EIS for metsulfuron-methyl, imazapyr and triclopyr, which is incorporated by reference. Glyphosate and aminopyralid environmental risk summaries are available in the USDA Forest Service risk assessments. Risks to soil, water and air quality would also be minimal for all of the proposed herbicides based on the known chemical and environmental fate characteristics for each chemical and proposed method of application.

2. Insecticide Considerations

APHIS evaluated the potential human health and ecological risks of the proposed use of imidacloprid for the ALB Eradication Program, and finds the same risk types and exposures would apply to the SLF program. The potential impacts reported in Appendix F of the Draft ALB EIS are incorporated by reference.

Insecticide use will only occur on a small number of Tree-of-Heaven trap trees in a given area. Commodities for human consumption will not be harvested from dosed trees, consequently, there will be no dietary risk to humans. The risks to human health from these chemcials are expected to be negligible based on limited exposures from the proposed use pattern of trunk and soil injection. The risk of exposure would be greatest for the workers applying the product, but properties of the formulation and the requirement to use protective equipment result in a low potential for worker exposure.

Even though insecticidal concentrations are expected to be higher during this application than during broadcast uses, the total amount per acre will be lower due to the targeted application methodology.

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.

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.

The proposed program's use pattern will minimize potential impacts to honeybees based on the use of basal trunk sprays that minimize drift. There will be no pesticide applications to seeds during planting operations, so dust is not a source of bee exposure. The program will avoid applying insecticides when foliage is in bloom to decrease the potential for effects to beneficial insects associated with pollination.

Neonicotinoid insecticide toxicity is high for honeybees yet there is uncertainty regarding the impacts of residues from this class of systemic insecticides in pollen and nectar. The main dinotefuran metabolites in plants are toxic to bees, and exhibit higher mobility and durability (Li et al., 2017). The main imidacloprid metabolite in plants is also toxic to honeybees and mice, while another metabolite (6-chloronicotinic acid) may induce plant defenses against plant disease or drought (Simon-Delso et al., 2015). Studies measuring pollen and nectar residues in crops with imidacloprid show sublethal effects occuring above residues measured in the field. Sublethal effects from low-level chronic exposures to neonicotinoid pesticides in bee species vary with the species' sensitivity, life cycle, foraging behaviors, and colony development (Arce et al., 2017; Li et al., 2016); however, there are significant knowledge gaps concerning the impacts of neonicotinoids on bees (Lundin et al., 2015). Chronic exposure to imidacloprid at the higher range of field doses in pollen of certain treated crops could cause negative impacts on honeybee colony health and reduced overwintering success (Dively et al., 2015). Recent data suggests bees reduce total food consumption even though they cannot taste neonicotinoids in nectar, and chronic neonicotinoid exposures may impair olfactory learning and memory in honeybees leading to reductions in foraging efficiency (Kessler et al., 2017). Toxicological interactions with dinotefuran indicate risk assessments based on individual neonicotinoid pesticides may underestimate the realistic toxicity based on the observation of synergistic and additive effects (Liu et al., 2017). In general, declines in bees are due to chronic multiple interacting stressors that may act synergistically (David et al., 2016; Goulson et al., 2017; Lundin et al., 2015).

Neonicotinoid insecticides exhibit high water solubility and low soil adsorption, leading to movement of these chemicals in runoff and long half-lives in soil and water, even though individual metabolites may be shorter-lived and the presence of decreased pH and low turbidity can reduce chemical persistence (Morrissey et al., 2015). For example, dinotefuran is very sensitive to photolysis, and its degradates are less toxic to aquatic organisms than imidacloprid (USDA FS, 2009; EPA, 2015b). In addition to agricultural factors such as the application rate, non-agricultural factors that affect soil persistence – and therefore the likelihood of movement into waters – include temperature, presence of plant cover, soil type, and organic content at the site. There are reports of measurable and ecotoxicologically relevant concentrations of imidacloprid stable in water for more than one year (Morrissey et al., 2015). The acute toxicity of neonicotinoids to mammals, fish, and birds generally is lower than other insecticides, but extremely low water concentrations (below 1μg/L) can induce short-term lethal effects to some sensitive crustaceans (Branchiopoda) and insects, such as mayflies (Ephemeroptera), caddisflies (Trichoptera), and midges (Diptera) (Morrissey et al., 2015).

Drift of these chemicals into sensitive aquatic habitats and impacts to air quality are not expected based on the direct application to tree trunks which minimizes the potential for off-site transport. There may be an environmentally important concentration of neonicotinoids remaining in the leaves that drop in the autumn, are carried to water resources, and serve as a source of chemical leachate from the leaves (exposure) or are consumed (dietary) by aquatic organisms such as detritivorous macroinvertebrates (shredders) (Englert et al., 2017). The program's treatment of only trap trees effectively reduces the number of insecticide-bearing leaves that could follow this pathway.

Exposure and risk to aquatic organisms will be minimized by adherence to label requirements regarding applications near water. Risk is expected to be minimal to fish, with an increased risk to some sensitive aquatic invertebrates in very shallow water bodies immediately adjacent to treated trees. Ecological risks for terrestrial and aquatic non-target organisms also are expected to be low based on the method of application, toxicity, and environmental fate of these insecticides. The different species of host plants are not likely to vary these risks because they arise from the chemical properties of the dinotefuran or imidacloprid.

There is some risk to sensitive terrestrial invertebrates that consume vegetation from treated trees. Terrestrial invertebrate populations may consume a wide range of host plants, which would 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 specific host trees, the effects are expected to be localized and not widespread.

At one time, the insect called the Cynthia Moth (*Samia cynthia* (Drury) Lepidoptera: Saturniidae) or ailanthus silk moth, was considered as a potential biological control for the Tree-of-Heaven because its larval stage can quickly defoliate trees (Hartman, Pirone and Sall, 2000). However, its population is in decline reportedly due to due to parasitoids, pollution, and increasing habitat for avian predators of the moth (Thompson, 2008). The impact of dinotefuran within tree tissues while larvae feed (generally June to July, according to https://www.butterfliesandmoths.org/species/Samia-cynthia) is not known.

3. Other Environmental Considerations

In this section, the “other areas of concern” reflect legislatively mandated inquiries, such as the Endangered Species Act of 1973, as amended (ESA, P.L. 93-205; 16 U.S.C. §§ 1531-1544), Migratory Bird Treaty Act (16 U.S.C. §§ 703-712; 50 CFR § 21), National Historic Preservation Act of 1966, as amended (P.L. 89-665; 16 U.S.C. §§ 470 et seq.), and pertinent Executive Orders. APHIS complies with all applicable regulations, and the analyses in prior sections meet various requirements from the Clean Air Act of 1963, as amended (P.L. 88-206, 42 U.S.C. §§ 7401-7661), Clean Water Act of 1972, as amended (P.L. 92-500, 33 U.S.C. §§ 1251-1387), Coastal Zone Management Act of 1972, as amended (P.L. 92-583, 16 U.S.C. §§ 1451-1466), Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as amended (P.L. 80-104, 7 U.S.C. §§ 136-136y). Pennsylvania also may have applicable regulations regarding various proposed activities related to the SLF Eradication Program. APHIS works cooperatively with State agencies to identify applicable State regulations to ensure compliance, during implementation of any proposed pest control, and while conducting program monitoring. This section summarizes information used in consultations with other agencies and in APHIS analyses.

Section 7 of the ESA and its implementing regulations require Federal agencies to ensure their actions are not likely to jeopardize the continued existence of listed threatened or endangered species, or result in the destruction or adverse modification of critical habitat. If species or critical habitat is present in the proposed program area, APHIS conducts Section 7 consultation with the FWS and National Marine Fisheries Service (NMFS), on a site-specific basis for SLF eradication activities. SLF has the potential to affect listed species and their habitats where ever it establishes. APHIS would continue to consult with FWS or NMFS, as necessary, when there is confirmation of an SLF infestation. In addition, APHIS would implement measures prior to the initiation of program activities to protect federally listed species and critical habitat.

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. Each year there are reports of active and fledgling nests within the counties. During the breeding season (generally January to July in eastern Pennsylvania), bald eagles are sensitive to a variety of human activities. FWS recommends buffer zones from active nests, and APHIS will continue to meet the recommendations as described in the SLF EA for Berks, Lehigh, and Montgomery County which are incorporated by reference. APHIS does not intend to use clearcutting; APHIS will contact the FWS for locations of eagle nests in the program area, and contact FWS before tree removal begins during the breeding season within 660 feet of a nest to confirm that all eagles have left the nest.

The Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703–712) and Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," led APHIS to implement a memorandum of understanding (MOU) with the FWS which promotes the conservation of migratory bird populations. Tree-of-Heaven can provide shade and roosts for nesting birds (Wynne, 2002). During the nesting season, any Tree-of-Heaven plants targeted for removal will first be examined for active bird nests. If this is the case, they will not be removed until after the young have fledged.

A bird migration route follows the Atlantic Coast and the Appalachian Mountains. Pennsylvania receives a large number of songbirds and waterfowl that fly north along this Atlantic flyway. Every spring, the eastern half of the state receives many migrant birds that either nest within the state or continue their northward migration. IBAs exist in the afffected environment. The presence of SLF could create an additional food source for birds who overcome SLF prey defenses and consume the insects despite distasteful defensive alkaloids and layered behavioral responses over time.

Acute and chronic toxicity to birds from insecticides (dinotefuron and imidacloprid) and herbicides (triclopyr, imazapyr, and metsulfuron-methyl) are as discussed in Appendices E and F of the Programmatic ALB Eradication EIS (2015), and the SLF EA in Berks, Lehigh, and Montgomery Counties, Pennsylvania (2015) which are incorporated by reference. Depending on the chemical, toxicities range from low to moderate, and program treatments to select Tree-of-Heaven plants would not likely expose birds to these pesticides. Birds are unlikely to consume SLF, so dietary exposure from the consumption of SLF insects exposed to sub-lethal doses of the pesticides is highly unlikely. *Beauveria bassiana*, bifenthrin, and pymetrozine have low toxicity to birds. Therefore, these insecticides would not likely impact migratory birds. In general, the targeted spray of trap trees would not result in impacts on bird prey.

Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires Federal agencies to conduct their programs, policies, and activities so that Native American, minority, and low-income communities are not subjected to disproportionately high or adverse human health or environmental effects.

These counties in Eastern Pennsylvania reveal a relatively high percentage of whites and in general, very low percentages of blacks (except for Philadelphia); there is also a low relative percentage of Asian residents (except in Montgomery County). The percentage of Hispanics varies widely from 3.7 in Delaware to 23.3 in Lehigh Counties. The reported population of Native Americans in each county is less than the national average. All counties report having fewer children than the national average (U.S. Census Bureau, 2017). The population in Montgomery County tends to be wealthier with respect to income and the value of their homes;

residents are relatively less crowded and better educated than reported in the other counties. Philadelphia County appears very different from the populations in the other counties because its people are poorer, more crowded, more racially diverse, but not necessarily less educated (U.S. Census Bureau, 2017).

APHIS outreach in multiple languages does not appear to be necessary to reach most residents in any of the counties. Educational outreach on the purpose and methods of eradication efforts within densely populated areas (especially Philadelphia) would preemptively address public concerns about changes to the urban landscape, particularly if there are delays in replanting efforts. In rural areas, landowner cooperation will be essential to reach host trees that are not on public lands. Based on the program's proposed treatment methods, the pesticide exposure risk to humans will be very low regardless of rural or urban location. For these reasons, the proposed action does not appear to pose any disparately high and adverse impacts to Native American, minority, or low-income communities.

EO 13045, “Protection of Children from Environmental Health Risks and Safety Risks,” acknowledges that children, as compared to adults, may suffer disproportionately from environmental health and safety risks because of developmental stage, greater metabolic activity levels, and behavior patterns. Program activities will not occur on school properties. Children are not likely to see or hear program activities as they occur. Based on the proposed action’s pesticide application methods and storage precautions, it is extremely unlikely that children will be directly exposed to the pesticides. The presence of very few treated trees means movement of insecticide-containing leaves into the environment (particularly as they drop in the autumn) may lead to extremely dilute concentrations in mixed species of leaves on the ground. Unless the trap trees are near normal play areas and there is no leaf removal, children are unlikely to play in leaf piles that could expose them to residual program chemicals.

The National Historic Preservation Act of 1966, as amended (16 U.S. Code § 470 et seq.), requires Federal agencies to consider the impact on properties included in, or eligible for inclusion in the National Register of Historic Places (36 Code of Federal Regulations §§ 63 and 800). APHIS determined the proposed action is an undertaking with no potential to affect historic properties because the program activities do not affect human-made structures, and the pesticides will not be placed on listed buildings. Disturbances to the soil will be associated with landscape plants (and not the listed structures), extremely shallow (less than 2 feet deep), and ephemeral. They will not alter or impact the vistas of currently recognized historic places. Noises will consist of unamplified worker communications, and ephemeral sounds associated with the use of backpack sprayers and tree removal equipment. There will be no clear-cutting of trees in the landscape.

Many historic sites exist within the various counties. Treatments for SLF on historic properties are not anticipated at this time. APHIS contacted the State Historic Preservation Officer (SHPO) regarding the preferred alternative for eradicating SLF and provided additional information regarding the program when the initial EA was prepared (2015). In the event that future treatments could occur on historic properties, they would be coordinated with the SHPO and other appropriate contacts on an as-needed basis.

EO 13175, “Consultation and Coordination with Indian Tribal Governments,” calls for agency communication and collaboration with Tribal officials when proposed Federal actions have potential Tribal implications. The Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aamm), secures the protection of archaeological resources and sites on public and Tribal lands. Using the Native American Graves Protection and Repatriation Act Online Databases (NPS, 2017; 25 U.S.C. §§ 3001 et seq.), APHIS finds that the Federally listed Tribes with contacts in Pennsylvania (Seneca Nation of Indians and the Tonawanda Band of Seneca) do not have land interests in the Counties considered in this proposed action.

The proposed action is highly unlikely to affect Native American sites or artifacts because soil disturbances are likely to be associated with landscape plantings on already disturbed sites. Nevertheless, if APHIS discovers any archaeological or Tribal resources, it will notify the appropriate individuals.

4. 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, additivity, 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.

V. List of Agencies and Persons Consulted

Pennsylvania Department of Agriculture
Bureau of Plant Industry
2301 North Cameron Street
Harrisburg PA 17110

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Plant Health Programs
4700 River Road, Unit 134
Riverdale, MD 20737

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

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

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Appendix A.

Spotted Lanternfly Quarantine Map

Municipalities Under Quarantine as of September 22, 2017