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Spotted Lanternfly Eradication Program in Berks, Lehigh and Montgomery Counties, Pennsylvania

Environmental Assessment
May 2015

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I. Purpose and Need

The spotted lanternfly (SLF) is an invasive insect, primarily known to affect tree of heaven (*Ailanthus altissima*) and can spread rapidly. It has been detected on many host plants, including apples, plums, cherries, peaches, nectarines, apricots, almonds, and pine. It also feeds on oak, walnut, poplar, and grapes. The insect will change hosts as it goes through its developmental stages. Nymphs feed on a wide range of plant species, while adults prefer to feed and lay eggs on tree of heaven.

Both nymphs and adults of SLF cause damage when they feed, sucking sap from stems and leaves. This can reduce photosynthesis, weaken the plant, and eventually contribute to the plant's death. In addition, feeding can cause the plant to ooze or weep, resulting in a fermented odor, and the insects themselves excrete large amounts of fluid (honeydew). These fluids promote mold growth and attract other insects.

Adult SLF are approximately one inch long and one-half inch wide, and they have large and visually striking wings (see figures 1 and 2). 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. Egg masses are yellowish-brown in color, covered with a gray, waxy coating prior to hatching.

The SLF lays its eggs on smooth host plant surfaces and on non-host material, such as bricks, stones, and dead plants. Eggs hatch in the spring and early summer, and nymphs begin feeding on a wide range of host plants by sucking sap from young stems and leaves. Adults appear in late July and tend to focus their feeding on tree of heaven and grapevine (*Vitis vinifera*). As the adults feed, they excrete sticky, sugar-rich fluid similar to honeydew. The fluid can build up on plants and on the ground underneath infested plants, causing sooty mold to form.

SLF adults and nymphs frequently gather in large numbers on host plants. They are easiest to spot at dusk or at night as they migrate up and down the trunk of the plant. During the day, they tend to cluster near the base of the plant if there is adequate cover or in the canopy, making them more difficult to see. Egg masses can be found on smooth surfaces on the trunks of host plants and on other smooth surfaces, including brick, stone, and dead plants. SLF is invasive and can spread rapidly when introduced to new areas. While the insect can walk, jump, or fly short distances, its long-distance spread is facilitated by people who move infested material or items containing egg masses.

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) has the responsibility for taking actions to exclude, eradicate, and/or control plant pests under the Plant Protection Act of 2000 (7 United States Code (U.S.C.) 7701 et seq.). The SLF has a variety of host plants that it can attack. If allowed to spread, this pest could seriously harm the country's grape, apple, stone fruit, and logging industries in Pennsylvania and other states.

This environmental assessment (EA) has been 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.

Public Outreach

Extensive public outreach efforts regarding SLF have occurred from staff at the Pennsylvania Department of Agriculture. More than 40 presentations have been given since mid-October to a variety of stakeholders. Presentations to the public at city/township meetings, to the variety of growers and industries who may be impacted by SLF, and to other agencies and at professional meetings have occurred to educate stakeholders regarding the SFL infestation.

II. Alternatives

This EA analyzes the potential environmental consequences associated with the proposed action to eradicateSLF from Berks, Montgomery, and Lehigh Counties, Pennsylvania.

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 but there would be no cooperative or coordinated effort between APHIS and other stakeholders.

B. Preferred Alternative

The SLF eradication program is proposing several measures to address the recent detection in Berks County, Pennsylvania, as well as Montgomery and Lehigh counties if SLF is detected in those counties in the future. Eradication efforts may include any or all of the following: regulatory

control, surveys, egg mass scraping, sanitation, tree removal, and insecticide and herbicide applications.

Regulatory control

Regulatory control consists of a quarantine established to eliminate intrastate and interstate movement and reduce human-assisted spread of SLF. High-risk host material from within the quarantine area would be prohibited from moving outside the area, except under a permit issued by APHIS.

The Commonwealth of Pennsylvania has established a quarantine without a list of regulated species; however, tree of heaven and grapes are the primary hosts. SLF nymphs have a broad host range and will change hosts while going through developmental stages. They are trunk feeders like periodical cicadas. Adults also feed on a wide range of plants. The host list for SLF includes, but is not limited to: *Juglans*, *Malus*, *Pinus*, *Populus*, *Prunus*, *Quercus*, and *Vitis*.

Regulated Articles and Limitations Imposed:

- Any living life stage of the SLF
- Brush, debris, bark, or yard waste.
- Landscaping, remodeling or construction waste
- Logs, stumps or any tree parts
- Firewood of any species.
- Packing materials, such as wood crates or boxes.
- All plants and plant parts. This shall include, but is not limited to, all live, dead, infected or non-infected trees, nursery stock, budwood, scionwood, green lumber, firewood, perennial plants, garden plants and produce and other material living, dead, cut, fallen including stumps, roots, branches, mulch, and composted and uncomposted chips.
- Outdoor household articles including recreational vehicles, lawn tractors and mowers, mower decks, grills, grill and furniture covers, tarps, mobile homes, tile, stone, deck boards, mobile fire pits, any associated equipment and trucks or vehicles not stored indoors.
- Grapevines for decorative purposes or as nursery stock.
- Any other article or means of conveyance when it is determined by an inspector to present a risk of spread of SLF in any life stage, is in proximity to such articles, the articles present a high risk of artificial spread, and the person in possession of them has been notified.

Detection Survey

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

Visual Reconnaissance Survey and Egg Mass Scraping

Visual reconnaissance surveys identify locations that have feeding damage or presence of SLF on plants. The program is working with the local agricultural extension office to train local citizens to identify egg masses. The visual surveys will occur from October through May and volunteers and program personnel will scrape egg masses from plants with a stiff plastic card into bags with an alcohol solution to cause mortality.

Sanitation

Sanitation of all other greenwaste within a quartermile of SLF detections may include chipping or grinding the debris, and disposal through incineration or burning. Steaming, composting, and burial of greenwaste are options under consideration for the future.

Tree Banding

The program will place self-adhesive paper bands around tree of heaven trees from SLF hatch in May to death of the adult population in November to capture SLF while they move up the trunk or congregate to feed and mate. Volunteers or program personnel will replace tree bands on a bi-weekly basis and report the number of SLF captured to develop data on the infestation and control achieved. Used bands will be bagged and placed in a landfill.

Tree Removals

Contractors for APHIS and its cooperators will remove tree of heaven trees up to a quarter-mile radius from infested trees. Herbicide treatment of the stumps will be used during periods of the year when the phloem moves toward the root. The herbicide triclopyr will be applied on stumps, and foliar applications of glyphosate will be made to re-sprouts from stumps. Tree of heaven is a non-native, invasive tree.

Insecticide Treatments

The program will use pesticide application equipment mounted on backpacks or ground vehicles to treat clusters of tree of heaven. No aerial

applications are proposed. Allowable application, protective equipment, exclusion, dosage, and entry restrictions will follow the label instruction of the insecticide specified. Only licensed applicators or persons working under the supervision of a licensed applicator shall apply insecticides. Areas will be retreated at specified intervals based upon the label directions, persistence of the insecticide, and environmental conditions. Dinotefuran is the insecticide proposed for use in the eradication program, and would be used in conjunction with tree removal and banding,the two other primary non-chemical treatment options. The use of dinotefuran would only occur through landowner consent.

Three other insecticide products, bifenthrin, pymetrozine, and *Beauveria bassiana strain* GHA, are only proposed for use in small experimental plots to evaluate the efficacy of each in controlling SLF. Experimental treatments would only occur on private properties within the current quarantine area, and only with landowner permission. If these insecticides prove to be effective against SLF in experimental use, they may be added to the program in the future.

Dinotefuran

Dinotefuran is a systemic neonicotinoid insecticide that is taken up by the root system, foliage, or through the bark and translocated upward throughout the plant. Its mechanism of action involves disruption of the insect's nervous system by inhibiting nicotinic acetylcholine receptors. The SLF program will apply the insecticide through a basal trunk spray to approximately ten trap trees at a given site. Applicators spray bark on the root flare (buttress roots) and over the entire circumference of the tree trunk between soil surface and 60 inches above the soil surface. Treatments will wet the bark just to the point of saturation and avoid run off of the chemicals into adjacent soil. The applicators will use a low volume sprayer operated at 10 to 20 pounds of pressure per square inch and a spray nozzle that produces medium-sized droplets to prevent tree damage, bounce back and drift. A surfactant may be added to the spray solution to improve surface wetting and bark penetration. Dinotefuran treatments will not occur when the tree bark is wet, during rainfall, or if rain is expected within 12 hours after application. Only one application of the insecticide of 0.54 pounds active ingredient (lbs. a.i.) per acre will occur at a treatment site per year. The program will not apply dinoteuran when trees are dormant, under drought stress or not actively taking up water from the soil.

Bifenthrin/ Beauveria bassiana strain GHA/Pymetrozine

Experimental applications for each of the three insecticides are proposed to evaluate the efficacy of each product for SLF control. Current label

rates will be used for each insecticide to make treatments to a small number of trap trees in areas where the SLF has been detected. Applications may occur to the bark or foliage of trap trees. Expanded use of any of the three insecticides may occur in cases where it's proven to be effective against SLF; however, similar to dinotefuran, the use would be restricted to trap trees that would typically not exceed ten trees per site.

III. Affected Environment

This chapter describes general information regarding the three counties that are considered in this EA. The current quarantine exists within Berks County and includes the townships or burroughs: Bally, Bechtelsville, District, Earl, Hereford, Pike, Rockland, and Washington (Appendix A). The quarantine could expand as additional survey work is conducted; thus, the intent of this EA is to evaluate areas in Pennsylvania where new detections are most likely to occur.

A. Land Characteristics and Agricultural Production

The three counties represent a diversity of land uses ranging from urban, residential, industrial, natural areas, and agriculture. Recent census data shows Montgomery to the be most populated of the three counties followed by Berks and Lehigh (US Census Bureau, 2015). Larger population centers in each of the three counties include Reading, Allentown, and Norristown. A variety of agricultural production occurs in all three Counties; however Berks County has the largest amount of agricultural production and ranks third in the State based on value of agricultural commodities sold (USDA NASS, 2012a;b;c). A majority of the land in agricultural production in each of the three Counties is in cropland, with corn and soybeans being the predominant crops. Potential SLF host plants, such as stonefruit and grapes, are also produced in each of the three counties with Berks County having the largest amount of production (USDA NASS, 2012a;b;c).

Each of the three Counties contains urban and residential development as well as many city and county parks that contain plants and trees that could serve as hosts for the SLF. In addition, state parks exist within the three County area (PA DCNR, 2015) as well as state forests and state game lands (PA Game Commission, 2015). Tree of heaven may occur in any of these areas due to its ability to become established under a variety of conditions, including highly disturbed areas, such as those that may occur in developed areas. Other host trees such as oak, walnut, and pine as well as other host plants may also occur in natural and managed areas throughout each County.

B. Air Quality

The Clean Air Act (CAA) (42 U.S.C. §§ 7401 et seq.) is the primary Federal legislation that addresses air quality. 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 § 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).

The potential for impacts from these types of pollutants are evaluated using 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. Data for 2014 shows that Berks County had 225 days out of the year where air quality was good (AQI< 100), 132 days when it was considered moderate, and 8 days where it was considered unhealthy for sensitive individuals. Similar data for Lehigh County showed 348 days out of the year where the air quality was good, while in Montgomery County, there were 271 days out of the year where air quality was classified as good (EPA, 2015a). There were no days in any of the three Counties where air quality was categorized as unhealthy or very unhealthy. The primary pollutants of concern in each of the three Counties were ozone and particulate matter.

C. Water Quality

A majority of the three-County area considered in this EA lies within the Schuylkill and Lehigh watersheds. These watersheds contain numerous lakes, rivers, and streams, several of which have good water quality while others may be impaired by various activities. Impaired waterways are required to be reported and submitted to the EPA under section 303(d) of the Clean Water Act (CWA). 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 (TMDLs). The Pennsylvania Department of Environmental Protection

(PA DEP) has identified waterbodies that are listed as impaired under Section 303 (D) of the CWA within the State, including those in the Schuylkill and Lehigh watersheds (PA DEP, 2014). The primary reasons listed for impairment to streams in the State is agriculture, mining drainage, unknown sources, and urban runoff. The causes for impairments to streams is varied but some of the most common reasons for listing are siltation, metals, pH, and nutrients. Sources of impairment in lakes are varied as well with the most common sources being atmospheric deposition, unknown causes, and agriculture. The more frequent causes of impairment for lakes includes mercury, pH, nutrients, and pathogens (PA DEP, 2014). Several waterbodies within the three-County area are also managed for cold water fish species, such as trout (PA Fish and Boat Commission, 2015).

E. Vegetation and Wildlife

Vegetation types vary over the three Counties based on natural site conditions as well as man made changes that have occurred over time. Significant changes in vegetation type have occurred in each of the Counties as land has been cleared for development and agriculture. The Valley and Ridge province occurs in northern to middle Berks County as well as Lehigh County. The Valley and Ridge province is part of the Appalachian mountains and is defined by long wide ridges and valleys. The Piedmont province is more prevalent in the southern third of Berks and Lehigh Counties and all of Montgomery County (PA NHP, 2007; 2013; 2014). Forest types in these Counties are divided into upland and lowland forest types with several species of oak and maple, as well as sycamore, tuliptree, and beech being common. Many of the species that occur in these forest types are also hosts for SLF. Many natural communities exist within each of the three Counties representing mixed oak habitats, wetland, and floodplain forested areas (PA NHP, 2007; 2013; 2014). Many of these areas are natural heritage priority areas with several occurring within Berks, Lehigh, and Montgomery Counties (PA NHP, 2015). These areas represent natural communities that are uncommon and may support unique flora and fauna.

The diversity of habitat types results in a variety of terrestrial and aquatic plants and animals occurring in the State including Berks, Lehigh, and Montgomery Counties. Many of these species are very common throughout the state and region; however, several species are rare and are state species of concern or federally protected under the Endangered Species Act (PA NHP, 2007; 2013; 2014; PA Game Commission, 2011a;b) Several invasive species, including plants, also occur in each of the three Counties that have altered plant composition in natural and managed settings. More than 40 invasive plants occur in Berks County,

including tree of heaven (PA NHP, 2014). Many of these plants compete with native vegetation and have altered natural communities. In addition, invasive insect pests and pathogens occur in the three-County area adding additional stressors to native habitats.

IV. Environmental Impacts

A. No Action

A lack of a cooperative eradication effort between APHIS and other agencies would result in further spread of the SLF. As the insect spreads the likelihood of eradication would become more difficult to accomplish. The resulting expansion of the quarantine would impact businesses and residents who handle regulated materials. Increased pesticide use would also be anticipated and could result in increased risk to human health and the environment especially in cases where less qualified persons are making applications.

The SLF has a wide host range of trees, many of which are native to Pennsylvania. For example, oak, pine, and walnut trees could all be impacted with the spread of the SLF. The level of tree mortality is unknown; however, the stress from attack by SLF could predispose native host trees and other plants to other pests and pathogens.

B. Preferred Alternative

The quarantine, survey, egg mass scraping, sanitation and tree banding are not expected to have significant impacts to human health and the environment. Impacts to environmental quality such as air, soil, and water quality would not be anticipated. There is the potential for some air and noise pollution related to sanitation where regulated articles may be chipped/ground with disposal through incineration or burning. Noise related to chipping and grinding is expected to be short term. All chipping and grinding equipment would be used by trained personnel to minimize worker injury and the potential for injury to the public. Disposal of regulated material using incineration would be conducted at permitted facilities designed to accept the types of waste generated from SLF sanitation activities. Any other types of burning would be done in accordance with applicable Pennsylvania Department of Environmental Protection – Bureau of Air Quality requirements, as well as any County or Township requirements or ordinances.

Tree removal activities will only occur for tree of heaven trees within a quarter-mile radius of a positive SLF detection. These trees are non-native and are able to become established under a variety of conditions. They compete with native hardwoods and are considered allelopathic to 35 species of hardwoods and 34 species of conifers (Miller, undated). Allelopathy refers to the ability of a plant to inhibit establishment and growth of another plant species. In addition, cut stems or stumps from tree of heaven are able to sprout from the stump or roots making complete removal difficult. Stump treatments using triclopyr and glyphosate treatments of sprouts will be used to ensure that any cut stems will not resprout. This is an effective means of control for tree of heaven when applied between June and August (PA DCNR, undated). 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 stump. The risk to human health and the environment is expected to be low for triclopyr and glyphosate based on the available toxicity data, potential exposure pathways, and the proposed methods of application which would suggest minimal risk (USDA FS, 2003; USDA FS, 2011; USDA APHIS, 2015). There would be some risk to non-target terrestrial plants from herbicide treatments; however, the potential for effects would be restricted to areas immediately adjacent to any application. Any activities related to SLF, including tree of heaven removal on private property will only occur with landowner permission.

Risks related to insecticide use are summarized below for dinotefuran, the primary insecticide proposed for use at this time. Summaries of insecticide risk for the experimental applications of *Beauveria bassiana*, bifenthrin, and pymetrozine are also discussed. Proposed insecticide applications on private property will only occur with landowner permission and proper notification. Applications of insecticides will occur to trap trees that are left in areas where SLF has been detected. Trap trees that occur at a given site will typically be no more than ten trees that could receive a treatment. Therefore the amount of insecticide that will be used is reduced when compared to broadcast applications.

Dinotefuran

1. Human Health

Dinotefuran is a systemic neonicitinoid insecticide that has a variety of agriculture and non-agriculture uses. Dinotefuran has moderate acute toxicity to mammals, and low inhalation and dermal toxicity. It is not considered a skin irritant based on skin sensitization and irritation studies; however, it is considered an eye irritant. Based on sublethal study results, dinotefuran is not considered a carcinogen or mutagen; developmental effects only occur at doses that are maternally toxic. Immune- and endocrine-related effects have been observed in multiple studies (EPA, 2004). These effects were observed during prolonged exposures and are

not anticipated in this program. The primary immune system-related effect observed in the studies was altered thymus weights that may not be related to direct immune toxicity of dinotefuran. However, this may be a secondary effect due to overall reduced body size and weight gain during exposures that were 13 weeks or greater, depending on the type of study. Based upon EPA's evaluation of risk to different human population subgroups, including occupational exposures, it was determined that the dinotefuran risk alone, as well as aggregate risk when including other neonicitinoid insecticides, did not exceed agency levels of concern (USDA FS, 2009; EPA, 2004).

Due to the mobility and persistence of dinotefuran, there is the potential for surface and ground water residues to occur in areas that are vulnerable to runoff and leaching. Adherence to label requirements and avoidance of dinotefuran applications to permeable soils will reduce the possibility of contamination of any drinking water resources. Due to the systemic nature of dinotefuran, there is the possibility of residues in crops harvested for human consumption. No dietary exposures are expected in the SLF eradication programs because applications will occur to select clusters of tree of heaven trees that are not harvested for human consumption.

2. Ecological and Environmental Quality

Dinotefuran has low to moderate acute and chronic toxicity to nontarget wildlife, such as mammals and birds. Direct risk is not expected based on conservative estimates of exposure and the available toxicity data. 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 would be available as prey items. Dinotefuran toxicity is high for honey bees and, similar to other neonicotinoid insecticides, there is uncertainty regarding the impacts of residues from this class of systemic insecticides in pollen and nectar. Studies measuring pollen and nectar residues in other crops with imidacloprid, a neonicotinoid insecticide, have shown that sublethal effects occur above residues measured in the field. There are also concerns regarding this class of insecticides to honey bees in the presence of other stressors. The potential impacts to honey bees from the proposed use of dinotefuran will be minimized based on the proposed use pattern requiring basal trunk sprays to a small cluster of trees within a site. In addition the program will avoid making applications when foliage is blooming to avoid harming beneficial insects such as honey bees.

Dinotefuran has low toxicity to fish and most aquatic invertebrates with the exception of some marine invertebrates where it is considered highly toxic (USDA FS, 2009; EPA, 2015b). Available toxicity data indicate that degradates of dinotefuran are less toxic to aquatic organisms. Dinotefuran is susceptible to runoff however the method of application and label

requirements suggest that runoff to aquatic habitats would be minimal. Significant drift to sensitive aquatic habitats is not expected based on the method of application. 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.

The solubility and soil adsorption characteristics of dinotefuran suggest that it is highly mobile. Dinotefuran does not break down in water, but is somewhat susceptible to microbial degradation and is very sensitive to photolysis. Because of the high mobility and solubility of dinotefuran, there is the potential for leaching into ground water; however the direct application to the trunks of trees will minimize this type of off-site transport. Dinotefuran is not expected to impact air quality based on the method of application and chemical properties which suggest a low potential for volatilization.

Beauveria bassiana

1. Human Health

Beauveria bassiana is a naturally occurring fungus that has been shown to be pathogenic to certain insects. Spores from the fungus come into contact with an insect where they germinate and enter the insect eventually resulting in death from the release of enzymes that destroy insect tissues. This microbial insecticide has low toxicity to humans in oral, dermal, and inhalation exposures and is not pathogenic (EPA, 2000a). Formulations may result in some mild eye irritation; however, oral, dermal, and inhalation toxicity is low. Proposed applications will be to small experimental plots within the current quarantine to determine the efficacy of treatments for SLF. Applications could be expanded to other areas within the three Counties pending results from the efficacy tests and expansion of SLF. Treatments are made to host material using ground based equipment with no treatments to crops that would be used for human consumption. Applicators would be the subgroup at greatest risk from applications of *B. bassiana*; however, the risk is negligible due to low toxicity and the use of personal protective equipment designed to minimize exposure. Contamination of drinking water is also not expected based on label requirements prohibiting applications directly to water and other label information designed to reduce the potential for off-site drift and runoff.

2. Ecological and Environmental Quality

B. bassiana is not expected to result in significant risks to non-target fish and wildlife. The fungus is specific to certain insects and has low toxicity to wild mammals, birds, fish, and plants (EPA, 2000). Non-target insects that are sensitive to the effects of *B. bassiana* would be impacted but these

effects would be localized to the areas of treatment, up to ten trees within a given site.

Impacts to soil, water, and air quality are not expected from the use of *B. bassiana*. Label restrictions and the environmental fate of the fungus demonstrate it would not persist in the environment and would not occur off-site in aquatic resources in quantities that could result in impacts to human health and the environment. The fungus is not expected to volatilize into the atmosphere and impact air quality. Any material that would occur in the atmosphere would only occur during application, but based on the method of application this would be localized to the areas of treatment.

Bifenthrin

1. Human Health

Bifenthrin is a synthetic pyrethroid insecticide that acts on the peripheral and central nervous system impacting axons, and is effective as a contact or ingested compound. Bifenthrin has moderate acute oral toxicity but low dermal toxicity. The reported median lethality value (LD_{50}) in mammals ranges from 53.8 to 70.1 mg/kg. Bifenthrin is not considered to be a dermal sensitizer or an eye or skin irritant (Wassell *et al.* 2008). Bifenthrin is not considered to be a reproductive or developmental toxicant; however, it is considered a potential carcinogen, based on the formation of urinary bladder tumors when administered at high doses to mice (Wassell *et al.* 2008). Risk to ground and surface drinking water resources are not expected to be significant for the proposed use pattern, based on label restrictions regarding the protection of surface water and the environmental fate properties for bifenthrin which demonstrate low solubility and a high affinity for binding to soil.

2. Ecological and Environmental Quality

Bifenthrin has low to slight toxicity to birds, and moderate acute toxicity to wild mammals. Significant exposure and risk to nontarget terrestrial vertebrates are not expected due to low toxicity and the direct application to the bark of approximately ten trees per site. Any incidental contact by terrestrial invertebrates in these applications could result in effects because pyrethroid insecticides are toxic to most terrestrial invertebrates but these impacts would be localized. Bifenthrin is considered highly toxic to honey bees by oral and contact exposure.

Similar to other pyrethroid insecticides, bifenthrin is considered highly toxic to fish and aquatic invertebrates. Toxicity values for both groups of organisms range from the low parts per trillion (ppt) to the low parts per billion (ppb), depending on the test species and conditions (Solomon et al., 2001; Meléndez and Federoff, 2010). Significant offsite transport of bifenthrin to aquatic habitats is not expected to occur because treatments are restricted to a small cluster of trap trees within a given area where SLF

has been detected. Bifenthrin binds tightly to soil and has very low solubility, reducing the potential for transport and exposure to aquatic organisms.

Bifenthrin impacts to soil are not anticipated under the current use pattern because applications are directed to the trunks of a select number of trees within a site. Due to the method of application bifenthrin is also not expected to runoff or drift from the point of application in quantities that could impact aquatic resources because treatments occur to a small group of trap trees within an area where SLF has been detected. Any bifenthrin that could move offsite would not be expected to impact surface or groundwater. Bifenthrin has extremely low solubility and mobility in soil, suggesting that it would not be a threat to ground water (Meléndez and Federoff, 2010). Bifenthrin does degrade slowly in soil and sediment, based on field terrestrial and aquatic dissipation data (Gan et al., 2008; Meléndez and Federoff, 2010). Dissipation half-lives range from approximately 80 days to greater than one year under different soil and sediment conditions. Impacts to air quality from volatilization are not expected due to the low vapor pressure for bifenthrin. Some bifenthrin could occur in the atmosphere during application, but will be restricted to the area of treatment because applications are made using ground sprayers with a large coarse droplet size that will minimize drift.

Pymetrozine

1. Human Health

Pymetrozine is a selective insecticide that acts by interfering with the feeding mechanism in insects that are similar to the SLF. The selective mode of action results in low mammalian toxicity in oral, dermal, and inhalation exposures. Acute oral, dermal, and inhalation median lethality values are greater than the highest concentration tested, suggesting pymetrozine is practically non-toxic from these types of exposures (EPA, 2000b). Pymetrozine is not mutagenic or teratogenic but there is some evidence to suggest it may be carcinogenic due to the formation of liver tumors in mice dosed in long term studies. These types of exposures are not expected to occur in the SLF cooperative eradication program.

2. Ecological and Environmental Quality

Available terrestrial and aquatic ecological toxicity data show that pymetrozine is practically non-toxic to wild mammals, birds, and fish based on acute exposures (EPA, 2000b). Acute median lethality values were typically higher than the highest test concentration tested in various studies. The toxicity to aquatic invertebrates is considered moderate to slight depending on the test organism (EPA, 2000b). Pymetrozine is considered practically non-toxic to the honeybee based on acute exposure studies. Impacts to terrestrial invertebrates that share a similar feeding mechanism to the SLF would be anticipated; however, these impacts

would be localized because no more than 10 trap trees would be treated at a given site.

Effects to air, water, and soil quality are expected to be negligible for pymetrozine due to its favorable environmental fate profile and proposed method of application. Primary half-life values in soil and water are short but secondary half lives may be much longer (EPA, 2000b). Mobility is expected to be low based on available soil partitioning studies. The low application rate and environmental fate of pymetrozine in soil and water are not expected to have significant impacts to water quality. Air quality impacts are expected to be negligible because pymetrozine does not volatilize. Pymetrozine would occur in the atmosphere during applications from drift; however, the method of treatment, small number of trees being treated, and label requirements regarding the minimization of drift will not result in significant impacts to air quality.

C. Cumulative Effects

Cumulative impacts are those impacts on the environment which result from the incremental impact of a proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The cumulative impacts from the selection of the preferred alternative are considered incrementally negligible and would be less than those from the selection of the no action alternative. The quarantine, survey, tree banding, egg mass scraping would not result in any cumulative effects while tree removals and pesticide use would not be expected to result in significant impacts to human health and the environment. In the case of tree removals, the cumulative impacts would be positive because tree of heaven is a non-native tree that has negative impacts to natural flora. Proposed insecticide use is directed to clumps of trap trees that typically would number no more than ten trees per site. Label recommendations to protect human health and the environment and notification of the public and landowners prior to any treatments would further reduce potential cumulative impacts to human health.

Cumulative impacts from the no action alternative would allow for the spread of SLF into other areas of Pennsylvania over time as well as other states because it has a wide variety of hosts. The spread of SLF to other areas would have economic and environmental impacts that would be expected to be greater than those that would occur under the preferred alternative. The SLF would impact stonefruit and grape production as well as logging industries. These impacts would be in addition to other pests and diseases thay may impact these industries. The spread of SLF to

natural habitats would provide an additional stressor and could impact the management of these areas (Gandhi and Herms, 2010). In cases where a SLF host tree may be a keystone species (i.e., one that defines forest structure and controls ecosystem dynamics), the impacts from invasive forest pests will be more significant (Ellison et al., 2005). The spread of SLF could also result in increased insecticide use, and depending on the toxicity and use patterns, could result in greater risk to human health and the environment.

D. Threatened and Endangered Species

Section 7 of the Endangered Species Act (ESA) and its implementing regulations require Federal agencies to ensure their actions are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat. APHIS prepared and submitted to the U.S. Fish and Wildlife Service (FWS) a biological assessment, as part of its Section 7 requirements under ESA, that evaluates the potential for impacts to listed species that occur in Berks, Lehigh, and Montgomery Counties.

The current list of federally-listed species in Berks and Montgomery Counties include the endangered Indiana bat (*Myotis sodalis*), the threatened northern long-eared bat (*M. septentrionalis*), and the threatened bog turtle (*Glyptemys muhlenbergii*). The same species also occur in Lehigh County as well as the endangered plant, northeastern bulrush (*Scirpus ancistrochaetus*). APHIS determined that the proposed SLF eradication program may affect, but is not likely to adversely affect these federally-listed species and is awaiting concurrence from FWS.

E. 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. The act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle…[or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."
In Pennsylvania in 2013, the bald eagle breeding population continued to grow with 274 nesting pairs in 57 counties producing more than 317 fledglings (figure 1) (Barber and Gross, 2013). Nest success was 92.1%, producing 1.6 fledglings per nest (Barber and Gross, 2013). Wintering eagles were tracked and 171 eagles were found during surveys in 31 counties (Barber and Gross, 2013).

In Berks County, there are five active nests and all were successful, producing seven fledglings (an average of 1.4 fledglings per nest) (Barber and Gross, 2013). Montgomery County has only one active nest and it produced two fledglings in 2013 (Barber and Gross, 2013). Lehigh County has no reported bald eagle nests.

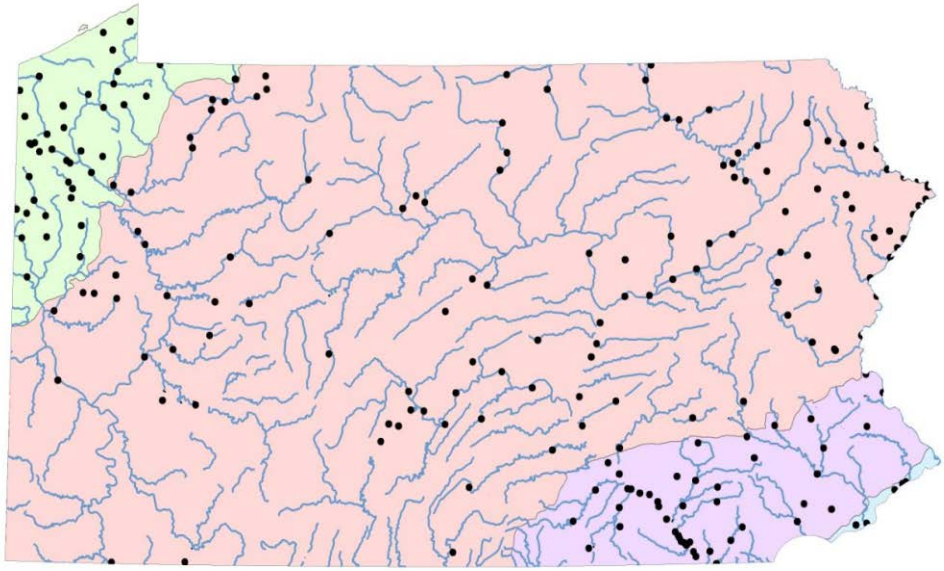

Figure 1. Bald eagle nests in Pennsylvania in 2013 (black dots). Bird Conservation Areas are shown from left to right: Lower Great Lakes (green), Appalachian Mountains (pink), Piedmont (purple), and Mid-Atlantic Coast (blue). (From Barber and Gross, 2013).

During the breeding season, bald eagles are sensitive to a variety of human activities, but not all react in the same way. Some pairs nest successfully despite nearby human activity, while others abandon nest sites (FWS, 2007). In eastern Pennsylvania, the breeding season lasts from January through July (FWS, 2007). Nest building activities begin in mid-October to the end of January. Egg laying and incubation starts at the beginning of January and continues to the end of April. Hatching and rearing of young can start at the beginning of February and can continue to the end of June. Fledging young begins at the start of May and is completed by the end of July.

FWS has recommended buffer zones from active nests which require different levels of protection (FWS, 2007). They are as follows:

1. Avoid clearcutting or removal of overstory trees within 330 feet of a nest at any time. (It should be noted that clearcutting will not be used

under any alternative discussed in this document.)

2. Avoid timber harvesting operations (including road construction, and chain saw and yarding operations) during the breeding season within 660 feet of the nest. The distance may be decreased to 330 feet around alternate nests within a particular territory—

   - including nests that were attended during the current breeding season but not used to raise young, and
   - after eggs laid in another nest within the territory have hatched.

According to FWS, the breeding season for bald eagles in eastern Pennsylvania is mid-January through July. As such—

- APHIS will contact the FWS for the locations of eagle nests in the program area; and
- APHIS will 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.

Outside of the breeding season, cutting may occur within the buffer zone around nests.

F. Migratory Birds

The Migratory Bird Treaty Act of 1918 (16 United States Code (U.S.C.) 703–712) established a Federal prohibition, unless permitted by regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird.

Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," directs Federal agencies taking actions with a measurable negative effect on migratory bird populations to develop and implement a memorandum of understanding (MOU) with the FWS which promotes the conservation of migratory bird populations. On August 2, 2012, an MOU between APHIS and the FWS was signed to facilitate the implementation of this Executive order.

Berks, Montgomery, and Lehigh Counties occur within the Atlantic flyway, a bird migration route that follows the Atlantic Coast and the Appalachian Mountains. Pennsylvania receives a large number of

songbirds and waterfowl that fly north along the 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.

A number of Pennsylvania ridges are Important Bird Areas (IBAs) due to the role they play in raptor migrations. Hawk Mountain Sanctuary in Berks County is one of the best places in northeastern North America to view the annual autumn hawk migration. Other IBAs in Berks County include Lake Ontelaunee, Blue Marsh Lake, and Glen Morgan. IBAs in Montgomery County include Green Lane Reservoir and Unami Creek IBA. No IBAs are identified in Lehigh County (PA ebird, 2015)..

Dinotefuran has low to moderate acute and chronic toxicity to birds, and program treatments to tree of heaven trunks would not likely expose birds to this insecticide. *Beauveria bassiana*, bifenthrin, and pymetrozine have low toxicity to birds. Therefore, these insecticides would not likely impact migratory birds. The targeted spray of trap trees would not result in impacts on bird prey.

Tree of heaven can provide shade and roosts for nesting birds (Wynne, 2002). Therefore, 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.

G. Other Considerations

Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," focuses Federal attention on the environmental and human health conditions of minority and low-income communities, and promotes community access to public information and public participation in matters relating to human health and the environment. This EO requires Federal agencies to conduct their programs, policies, and activities that substantially affect human health or the environment in a manner so as not to exclude persons and populations from participation in or benefiting from such programs. It also enforces existing statutes to prevent minority and low-income communities from being subjected to disproportionately high or adverse human health or environmental effects. The human health and environmental effects from the proposed applications are expected to be minimal and are not expected to have disproportionate adverse effects to any minority or low-income family.

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. This EO (to the extent permitted by law and consistent with the agency's mission) requires each Federal agency to identify, assess, and address environmental health risks and safety risks that may disproportionately affect children.

Consistent with the National Historic Preservation Act of 1966, APHIS has examined the proposed action in light of its impacts to national historic properties. Several historic sites exist within the current quarantine as well as the county. APHIS has contacted the State Historic Preservation Officer (SHPO) regarding the preferred alternative for eradicating SLF and is providing additional information regarding the program. Treatments for SLF on historic properties are not anticipated at this time. In the event that future treatments could occur on historic properties they would be coordinated with the SHPO and other appropriate contacts.

V. Listing 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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PA DCNR – See Pennsylvania Department of Conservation and Natural Resources

PA DEP – See Pennsylvania Department of Environmental Protection

PA Fish and Boat Commission - See Pennsylvania Fish and Boat Commission

PA Game Commission – See Pennsylvania Game Commission

PA NHP – See Pennsylvania Natural Heritage Program

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USDA NASS - See U.S. Department of Agriculture – National Agriculture Statistics Service
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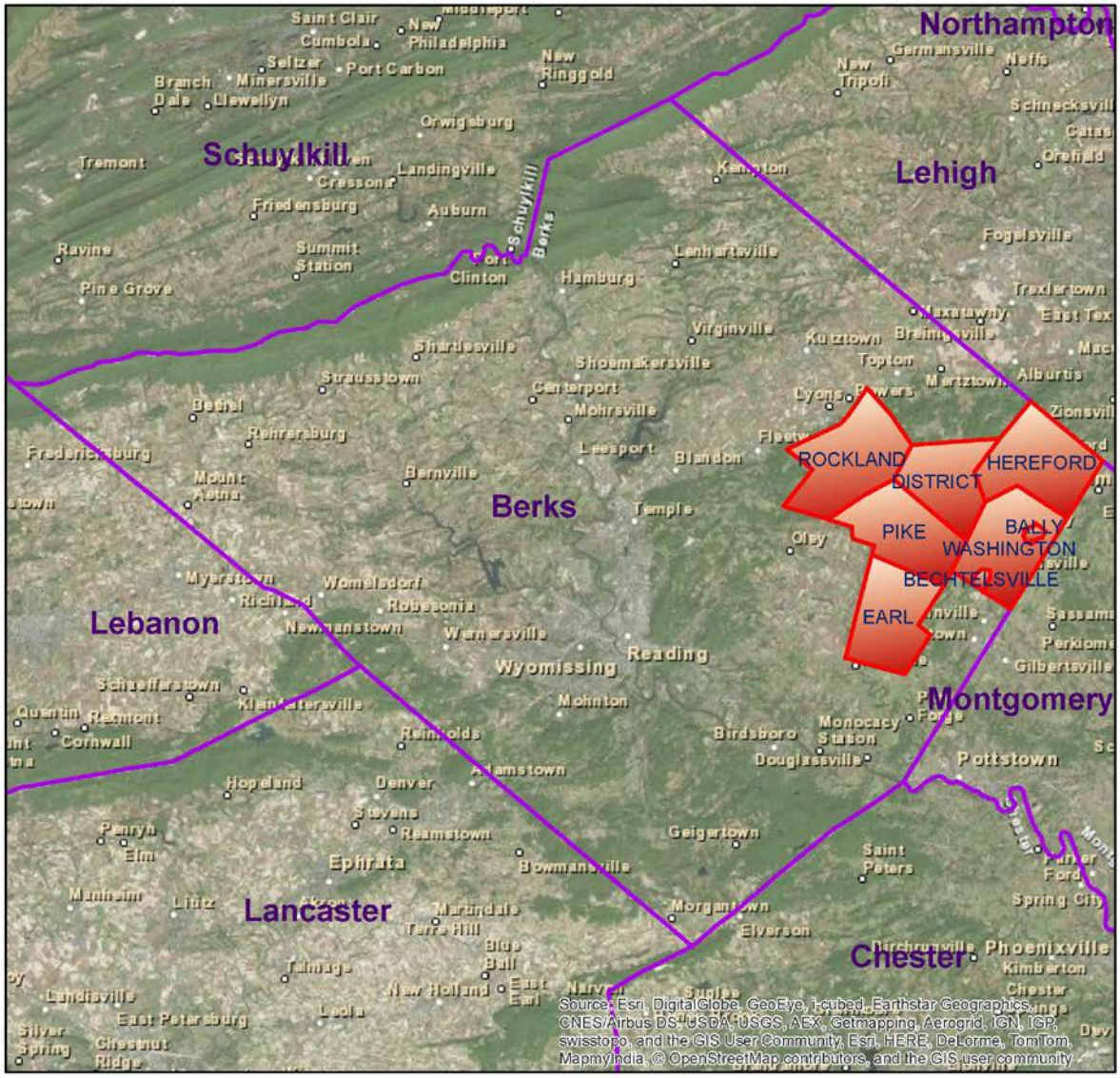
Appendix A.

Spotted Lanternfly Quarantine Map

Townships Under Quarantine As of December 13, 2014



Legend

- Township Under PDA Quarantine
- Pennsylvania County Border

pennsylvania
DEPARTMENT OF AGRICULTURE