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

Spotted Lanternfly Cooperative Control Program for the Conterminous United States

Draft Programmatic Environmental Assessment,

June 2023

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I. Introduction

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS, or "Agency") is considering actions that will assist with control and treatment of spotted lanternfly (SLF), *Lycorma delicatula*, to slow the spread of this invasive insect. SLF was first detected in the United States in 2014. SLF has many plant hosts and changes hosts at different developmental stages (Dara et al. 2015; USDA APHIS 2014; 2023a). Researchers continue to study the pest's biology and habitat, seeking effective ways to disrupt SLF population growth and spread (Cloonan 2023; USDA APHIS 2023a). APHIS implemented SLF control activities in 2015 to respond to this new pest threat and commenced an official SLF Program in 2019.

As required by the National Environmental Policy Act (NEPA), APHIS drafted this programmatic environmental assessment ("ProEA") in May 2023, to identify issues associated with federal actions to control SLF. The geographic scope of this ProEA includes the 48 conterminous United States and the District of Columbia. Should SLF spread to new areas not covered in prior NEPA analyses prepared by the Agency (see Appendix 1 for a list of prior environmental assessments (EAs)), APHIS would prepare site-specific EAs that tier to this ProEA. Tiering to a ProEA reduces the time to prepare environmental documentation to comply with NEPA, which enables the Program to respond quicker to a pest outbreak. This ProEA incorporates by reference the analysis in *Expanded Spotted Lanternfly Control Program in Select States in the Midwest, Northeast, and Mid-Atlantic Regions of the United States EA* (USDA APHIS 2023b) (hereinafter referred to as SLF Final EA). Subsequent environmental reviews of SLF Program projects would incorporate this ProEA's findings by reference.

A. Why is there a need to control SLF?

SLF is a significant economic and lifestyle pest for residents, businesses, tourism, forestry, and agriculture. SLF infestation has led to crop loss, agriculture exportation problems, and increased management costs (Cornell University 2023). APHIS is also concerned by the potential for long-distance movement of SLF within the United States, and by the continued risk of SLF introduction from other countries. SLF meets federal criteria for a Regulated Pest: it fits the International Plant Protection Convention's definition of a regulated pest; it is a quarantine pest for all or part of the United States, and it has been detected during United States port of entry inspections within the last five years (USDA APHIS 2023b).

The environmental and socioeconomic damage to SLF-affected regions can be substantial. For example, grape vineyards in South Korea and the United States appear to be particularly affected, jeopardizing an industry worth billions of dollars. One vineyard in the United States reportedly faced a crop yield loss of up to 90% (Osterloff 2021). An uncontained SLF infestation could drain Pennsylvania's economy of at least $324 million annually (PennState-CAS 2023). While SLF has not yet been found in western states, it has been intercepted in airplanes arriving from the eastern United States (CDFA 2023).

The State of California, a major agricultural producer and home to many state and federally listed threatened and endangered (T&E) species, gives SLF a high pest rating (rating details are provided in Appendix 2). California's rating is High because:

- SLF is likely to establish a widespread distribution in the state due to its host range and high dispersal potential of egg cases.
- SLF may lower crop yield and value of important crops and could trigger quarantine restrictions and market loss.
- SLF infestation could trigger additional pesticide treatments, and adversely impact cultivation and landscaping in rural and urban locations.

Suitable conditions for SLF establishment exist in large regions of the United States, giving the insect the potential to damage valuable host crops, forests, and critical habitat for listed species (see range maps in Appendix 3 and host list in Appendix 4). SLF could prove particularly harmful to the grape, apple, stone fruit, and logging industries throughout the country. Because eggs can be laid on almost any surface, quarantines for SLF may require a permit for businesses that move vehicles or materials; residents are cautioned to check for SLF eggs on outdoor items they plan to move out of a quarantine area and on their motor vehicles before and after they travel.

B. Who has authority to act?

APHIS has a broad mission area that includes protecting and promoting U.S. agricultural health, and protecting and promoting food, agriculture, natural resources, and related issues. Specifically, the Plant Protection Act of 2000 (7 United States Code (USC) 7701 et seq.) provides the authority for APHIS to take actions to exclude, eradicate, and control plant pests. Under this authority, APHIS is working to prevent introductions of SLF by restricting movement of potentially infested items from areas under quarantine for the insect and by conducting programs to reduce and eliminate SLF populations within U.S. borders. As a Federal Government agency required to comply with NEPA (42 USC 4321–4347), APHIS prepared this EA in accordance with the applicable implementing and administrative regulations (40 Code of Federal Regulations (CFR) §§1500–1508; 7 CFR §§1b, 2.22(a)(8), 2.80(a)(30), 372).

APHIS began SLF activities in 2015 after completing a site-specific EA with a Finding of No Significant Impact (FONSI). As improved control options became available and new SLF detections expanded the initial treatment area, APHIS adjusted the program and published additional EAs, supplemental EAs, and their related decision documents. This ProEA incorporates the Agency's previous SLF Program EAs and FONSIs by reference; those documents were published between May 2015 and April 2023, and are available at USDA APHIS (2023c). Summaries of the EAs are provided in Appendix 1.

Under NEPA, federal agencies are required to provide the public with a timeframe to comment on programs that may potentially affect the human environment. The draft EA will be available for a public comment period. APHIS considers all comments received and adjusts the ProEA as appropriate.

C. Why prepare a ProEA?

SLF populations have been confirmed in 14 states including Connecticut, Delaware, Indiana, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Virginia, and West Virginia. The current SLF quarantine area is given in Appendix 3, Map A; the map is regularly updated to reflect Program changes (USDA APHIS 2023a). SLF has not yet been reported in the District of Columbia. The expansion of SLF infestation across the United States despite federal and state control efforts led APHIS to conduct this programmatic review of the existing Program. The Council on Environmental Quality (CEQ) within the Executive Office of the U.S. President considers the programmatic level of NEPA review appropriate for the basic planning of a pest control program that is not restricted to a single activity or geographical area (CEQ 2014).

This ProEA offers a broad view of potential impacts and benefits resulting from federal cooperative action to monitor and control SLF presence in the United States. Broad federal actions may be implemented over large geographic areas or for a lengthy period (CEQ 2014). APHIS considered potential environmental impacts arising from implementation of both existing and proposed SLF policies, plans, programs, and projects. The proposed Program would employ adaptive management based on the findings of subsequent NEPA reviews (e.g., site-specific specific EAs or an environmental impact statement tiered to this ProEA). Tiering is a way "to relate broad and narrow actions and to avoid duplication and delay" (40 CFR § 1502.4(b)(2)).

D. About SLF

SLF is an invasive insect that was introduced into the United States in 2014. Native to China, this pest is primarily associated with the invasive tree-of-heaven (*Ailanthus altissima*) but in large numbers can cause significant damage to critical habitat and economically important plants. SLF is a plant stressor that, in combination with other stressors (e.g., other insects, diseases, weather), can cause significant damage to its hosts. Some plants are at more risk than others (e.g., grapevines, maple, black walnut). SLF pierces a plant's tissue for feeding; it does not bite or sting (State of Rhode Island 2022). Death from SLF has been noted in tree saplings, tree-of-heaven, and grapevines. Cornell University (2023) reports that SLF feeding may damage host plants in various ways causing oozing, wilting, defoliation, dieback, yield loss or quality reduction, reduction of cold hardiness, and plant death.

SLF excretions, referred to as honeydew, are deposited on plants and other surfaces such as equipment, decking, vehicles, pets, clothing, and hair. Left to accumulate, honeydew acts as a growth medium for thin, dark layers of sooty mold fungi. Though no life stage of SLF feeds directly on fruit, sooty mold growth on the skins of grapes and tree fruit can make produce unmarketable. Sooty mold can also inhibit the photosynthetic capacity of leaves. SLF honeydew can attract other nuisance insects such as bees and wasps. This creates an increased stinging risk around infested plant life (Cornell University 2023).

Figure 1 illustrates the SLF life cycle (Schafer 2021). In addition to its spotted patterning, the adult SLF's unique colors feature scarlet underwings, yellow markings on its abdomen, and tan semi-transparent forewings. Adults are about an inch in length and can be found late July into November. Adults die in winter, but SLF eggs can survive cold temperatures (State of Rhode Island 2022). It's not clear how warm summers need to be for the insects to complete their life cycle (Osterloff 2021). The nymph stage appears in June and July and feature strikingly bright red and black bodies with white spotting. Early-stage nymphs lack the red color and appear completely black. SLF is a strong jumper; both nymphs and adults often jump when prodded or approached. Although it can fly distances, SLF is mainly spread through human movement. Inconspicuous egg masses can be laid on pallets, vehicles, and other goods, requiring inspection of items moving outside an infested area (State of Rhode Island 2022).

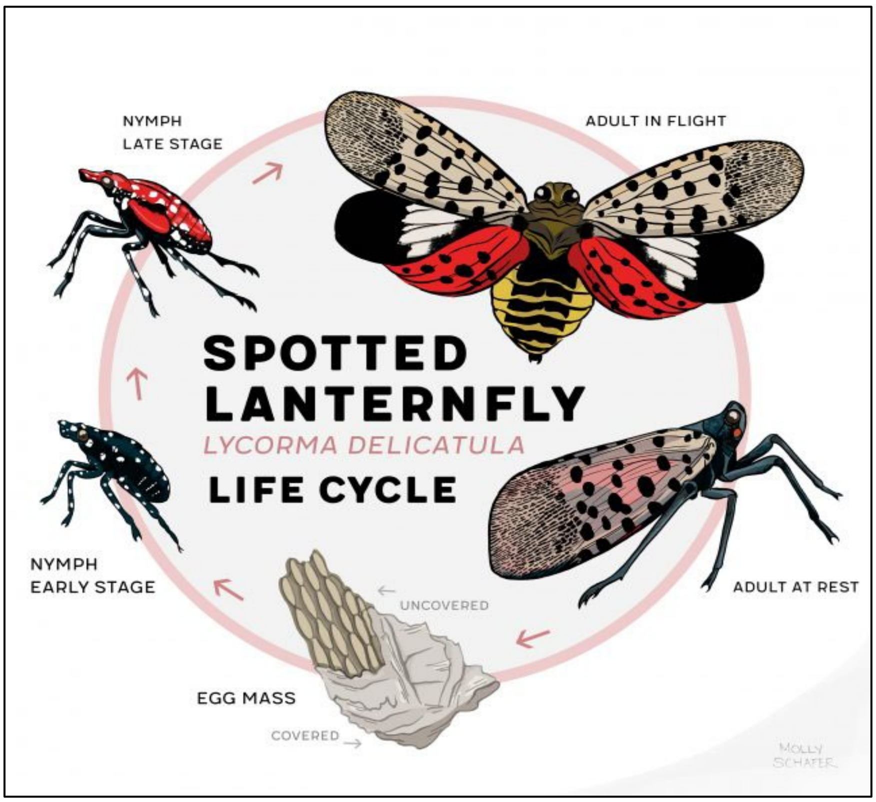


Figure 1. SLF life stages from egg to adult.
Source: Illustration by (Schafer 2021)

In their natural range of Asia, SLF are kept under control by native predators such as parasitic wasps (Malek et al. 2019). Fewer predators and natural diseases where they are introduced generally impact their numbers. In the United States, assassin bugs and stink bugs have been seen to attack spotted lanternflies. Birds, praying mantises, wasps and spiders appear to be frequent predators; research in this area is ongoing (Osterloff 2021).

The potential range for SLF distribution in the conterminous United States covers regions from the Atlantic coast to the Pacific coast, and to U.S. borders with Canada and Mexico (maps in Appendix 3). For more information about SLF biology and hosts, refer to the SLF Final EA (USDA APHIS 2023a). Images with additional information pertaining to SLF in the United States are provided in Appendix 5.

E. Public Involvement

APHIS conducts outreach to inform the public about SLF and SLF Program activities and provides opportunities for public involvement. SLF Program activities include:

- Providing media interviews for newspapers, radio, and television outlets.
- Issuing press releases.
- Conducting an annual advertising awareness campaign.
- Providing public service announcements on radio and television stations.
- Having a presence at industry shows, expos, and various outreach venues.
- Posting information on social media including Facebook, Twitter, Pinterest, and Flickr.
- Holding public meetings, meetings with federal and state officials, town administrators, and other potentially affected groups and persons.
- Providing informational materials and web sites to the public, including an online reporting function and the arrangement of a national hotline telephone number.

APHIS will publish a notice of this ProEA's availability for public comment in the *Federal Register* and will notify interested industry and trade partners. The standard comment period is 30 calendar days but can be extended if necessary.

F. Decision Framework

The alternatives discussed in the Agency's previous SLF EAs were used to develop three alternatives for further examination in this document. Chapter II of this ProEA describes the three alternatives in greater detail; Chapter III considers the potential environmental consequences of implementing the alternatives. APHIS also considered biological control and other options for reducing SLF populations, but dismissed them as their science, safety, and feasibility are still being researched.

<u>No Action:</u> This alternative represents the baseline against which a proposed action may be compared. Under this alternative, APHIS would maintain the SLF Program established from May 2015 through April 2023 for select states and the District of Columbia (USDA APHIS 2023a). This alternative includes methods to exclude, detect, prevent, and control SLF infestation (via nonchemical and chemical means), but would not expand the program area or add new treatment options.

No Treatment: Under this alternative, APHIS would not provide funding or other resources for SLF control. Any control efforts would be the responsibility of state and local governments, commercial producers, property owners, and individual citizens.

Adaptive Management: Under this alternative, APHIS would use methods to exclude, detect, prevent, and control (both nonchemically and chemically) SLF infestations. This alternative would update information and technologies that were analyzed in the SLF Final EA (USDA APHIS 2023a) and expand the potential program area to include 48 states and the District of Columbia. The prescribed control measures could be used individually or in combination with other SLF Program-approved methods. In a coordinated approach, SLF Program managers would make operational decisions in such a way as to protect human health, nontarget species including T&E species, sensitive areas, and other components of the environment within the potential program area.

The detection of SLF at levels determined to be sufficient for the pest's establishment would trigger federal involvement and a NEPA review of the proposed federal response. Site-specific SLF EAs tiered to this ProEA, if necessary, would discuss potential effects to the affected environment, factoring in socioeconomics, cultural and visual resources, Tribal lands, nontarget flora and fauna, T&E species, local agricultural production, waterbodies and critical habitat, environmental justice and equity, historic sites, greenhouse gases, and climate change, among other considerations, including Executive Orders. The site-specific EAs would also consider the potential cumulative effects from control activities targeting other pests in the program area.

This ProEA considers SLF program strategy and impact mitigations at a national planning level. Project level activities may require further environmental assessment under NEPA, depending on the project's location, timing, and potential impacts. SLF project EAs tiering to this ProEA will be submitted for agency, Tribal, and public review and comment before the proposed action is taken. Any site-specific EA tiering to this ProEA would have its own public involvement process and associated public comment period, to assist Program decisionmakers in achieving an effective and environmentally friendly outcome.

Under all the above alternatives, APHIS and its cooperators would decide on a case-by-case basis whether to implement SLF control projects. All necessary consultations including those with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) (for potentially affected plant and animal spp. and their essential habitats), state and local governments, Tribes, and other landowners or site managers will be undertaken.

G. Scope of this Document and NEPA Requirements

This document addresses the SLF Program carried out by APHIS directly or in conjunction with other federal agencies, states, and Tribes. The information and analysis contained in this ProEA can be incorporated by reference into EAs and other environmental documents prepared for SLF Program projects, in accordance with NEPA.

USDA APHIS considered variables such as introduction locations, control strategies, mitigation measures, and cumulative impacts (CEQ 2014). SLF regulated articles at the point of entry into the U.S. and SLF-related research and technology development are outside the scope of this document and were not examined.

H. Consultations

A primary consultation that is conducted to ensure impacts to T&E species are minimized or nullified is a Section 7 consultation with USFWS (and with NMFS, if necessary) under the Endangered Species Act (ESA). 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 T&E species or result in the destruction or adverse modification of critical habitat.

In anticipation of the continued spread of SLF across the United States, and because the proposed potential program area is the conterminous United States, APHIS is undertaking Section 7 consultations with USFWS on a regional basis, with each region containing multiple states to ensure that SLF control activities have minimal or no effect on T&E species.

APHIS will undertake site-specific biological assessments and conduct ESA Section 7 consultations, as necessary, for proposed control actions to ensure that SLF Program operations will not jeopardize the continued existence of a listed species, or adversely modify critical habitat in the Program area. APHIS will ensure the implementation of the protection measures for T&E species and critical habitat that result from such consultations.

Required consultations with federal, state, and Tribal governments will be made at the project level. APHIS will ensure that site-specific evaluations will be done, as necessary, to comply with the National Historic Preservation Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and any other laws, regulations, executive orders, and agency policies that apply to site-specific projects.

II. Alternatives

APHIS proposes to expand the potential SLF Program area to include the 48 conterminous states and the District of Columbia (the “preferred alternative”). Control measures in the current SLF Program would continue, under a strategy of adaptive management, and are listed in Table 1. APHIS would coordinate with SLF regulatory requirements of cooperating state and local governments. The “no treatment” alternative withdraws APHIS involvement in SLF control. The “no action” alterative keeps the Program as described in the SLF Final EA (USDA APHIS 2023a); current treatment strategies and regulated locations would not change. The alternative options vary in terms of their practicality or feasibility based on environmental, scientific, regulatory, economic, and logistical factors. They vary considerably concerning their effectiveness to control and eradicate SLF, capability to attain program objectives, and immediate applicability for large-scale SLF control programs.

This ProEA proposes prescribed chemical applications for all the action alternatives except No Treatment. All pesticide uses in APHIS programs comply with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1910, as amended (7 USC Chapter 6). To fulfill obligations under this statute, the Agency ensures that a full pesticide registration (i.e., a Section 3 Registration), a special local need registration (i.e., a Section 24I Registration) or an emergency quarantine exemption (i.e., a Section 18 Exemption) are approved by the U.S. Environmental Protection Agency (USEPA) for each pesticide use pattern in SLF applications.

SLF control treatments have increased, for the most part, under each EA that was completed from 2015 to 2023 (Table 1). The treatments that will be used throughout the U.S. will be as described in the SLF Final EA. Treatments by APHIS may be limited by Section 7 and other consultations. The goal will be to eliminate SLF infestations wherever they may occur in the conterminous United States with the methods necessary. Program methods may include, as discussed in the SLF Final EA:

- Quarantine and surveys
- Egg mass scraping, high-pressure water spray, and sanitation
- Tree banding and circle traps
- Manual and chemical tree removal
- Herbicides (triclopyr, glyphosate, imazapyr, metsulfuron-methyl, and aminopyralid)
- Insecticides (dinotefuran, imidacloprid, bifenthrin, beta-cyfluthrin, *Beauveria bassiana* strain GHA, soybean oil, and dichlorvos in circle traps)

These methods may be used singly or in combination to eradicate an infestation. All methods can be effective in certain situations or have drawbacks which, given the situation, may rise to the point of not being efficacious. The information and risks associated with these methods were discussed in the SLF Final EA.

Table 1. Summary of SLF control activities from 2015-2023.

Program Activity	May 2015	March 2018[1]	May 2018	June 2020	Oct. 2021	April 2023
State quarantine	X	X	X	X	X	X
Survey/egg mass scraping	X	X	X	X	X	X
High pressure water spray	--	--	--	--	--	X
Sanitation	X	X	X	X	X	X
Tree banding	X	X	X	X	X	X
Circle traps	--	--	--	X	X	X
Tree removal (manual)	X	X	X	X	X	X
Tree removal with herbicides	--	--	--	X	X	X
Herbicides	**May 2015**	**March 2018[1]**	**May 2018**	**June 2020**	**Oct. 2021**	**April 2023**
Triclopyr	X	X	X	X	X	X
Glyphosate	X	X	X	X	X	X
Imazapyr	--	X	X	X	X	X
Metsulfuron-methyl	--	X	X	X	X	X
Aminopyralid	--	X	X	X	X	X
Insecticides	**May 2015**	**March 2018[1]**	**May 2018**	**June 2020**	**Oct. 2021**	**April 2023**
Dinotefuran	X	X	X	X	X	X
Imidacloprid	--	X	X	X	X	X
Bifenthrin	*Exp.*	*Exp.*	--	X [2]	X [2&3]	X [4]
Pymetrozine	*Exp.*	*Exp.*	--	--	--	--
Beta-cyfluthrin	--	--	--	X [2]	X [2&3]	X [4]
Beauveria bassiana strain GHA	*Exp.*	*Exp.*	--	X	X	X
Soybean oil	--	--	--	X	X	X
Dichlorvos (circle traps)	--	--	--	X	X	X

Exp. = Experimental
1 APHIS published two environmental assessments in March 2018.
2 Includes high-pressure hydraulic sprayer (truck- or ATV-mounted) applications.
3 Includes the use of ground-based mist blowers, which are limited to select counties within the Program area to treat SLF at railways, train yards, and intermodal rail terminals.
4 Includes the use of ground-based mist blowers and high-pressure hydraulic spray treatments that may occur along rail and road rights-of-way throughout the Program area.

APHIS uses herbicides and pesticides as minimally as possible. A good benchmark is the applications by the SLF Program during the past three years. Table 2 provides the number of acres the Program treated with pesticides in 2020, 2021, and 2022. In 2022, 2,937 acres in nine states were treated with an herbicide or insecticide in Program pesticide treatments and retreatments. This increased to 4,755 acres in 12 states in 2021. In 2022, treatments decreased to 2,937 acres. At the highest level (2021) 400 acres per state on average were treated, illustrating the Program's minimal use of pesticides. The treatments are spot treatments where SLF is found.

Table 2. Acreage chemical applications to control SLF from 2020 to 2022.

Type of Treatments*	2020 Acreage (9 states)	2021 Acreage (12 states)	2022 Acreage (12 states)
Insecticide	**293.3**	**4,186.9**	**2,520.5**
Bifenthrin	46.9	995.8	1,661.7
Dinotefuran	246.4	3,112.3	812.4
Unknown	-	78.8	46.4
Herbicide	**763.4**	**567.9**	**416.2**
Garlon®/Triclopyr	763.4	559.1	399.1
Unknown	-	8.8	17.1
Total Acres Treated**	**1,056.7**	**4,754.8**	**2,936.7**

* Data for egg mass treatments (soybean oil application and egg mass scraping) is not shown in Table 2.
** In 2022 the SLF Program applied treatments with a hydraulic handgun sprayer on 83.3 acres and mist sprayer on 12 acres. All applications were made using ground-based equipment. Program treatments along eligible rights-of-way may be done using mist blowers and high-pressure hydraulic sprayers.

A. Adaptive Management (Preferred Alternative)

Under the Preferred Alternative, APHIS would expand the SLF Program to the conterminous United States, including the District of Columbia. The control measures under this Preferred Alternative are the same as the control measures described under the Preferred Alternative in the SLF Final EA (USDA APHIS 2023a) and summarized in Appendix 1 of this document.

B. What is adaptive management?

Adaptive management refers to the inclusion of new treatment options that may become available should it prove at least as effective and safe as an existing, approved treatment. The selection of a new treatment or control method for a specific site will depend on local circumstances, urgency of need, availability, affordability, and efficacy as a substitute method. In particular, the availability of chemical control methods is subject to change, based on: (1) new information relative to environmental consequences, (2) planned phase-outs of some chemicals, (3) new limitations placed on their usages, and (4) the availability of new replacement controls.

C. What Activities Could Occur Under This Alternative?

The SLF Program would use several strategies to control SLF. One control measure alone may not be effective, as found with insecticide treatments to crops that are reinfested by SLF from wild hosts (Canaday 2020).

The Preferred Alternative applies the principles of integrated pest management to the SLF Program, using the following components singly or in combination: regulatory control (quarantines), surveys, egg mass scraping, high-pressure water egg removal, sanitation, herbicide treatments to tree-of-heaven (SLF's preferred host), removal of tree-of-heaven where it presents a fall hazard, tree banding, circle traps, trap trees, green waste disposal, and insecticide applications targeting SLF. National surveillance for SLF helps identify probable routes of SLF spread, allowing the Program to deploy personnel and other resources quickly where they are most needed.

APHIS' selection of Program components would continue to be done on a site-specific basis, taking into consideration economic (the cost and the cost effectiveness of various components in both the short and long term), ecological (the impact on nontarget organisms and the environment), and sociological (the acceptability of various integrated control methods to cooperators, or the potential effects on land use) factors. Selection would also depend on the availability of control technology, the nature and location of the outbreak, the technological and logistical capabilities of cooperators, and the availability of funding, personnel, and other federal resources. APHIS would maintain regulatory efforts; commercial producer groups and individuals would be required to comply with regulations designed to reduce the potential spread of pest species.

The development of new and safer insecticides may result in proposals for their inclusion in the SLF Program. The SLF Program would be allowed to add treatment(s) that become available in the future to the existing treatment options for managing SLF, under certain conditions. A new treatment would only be approved for use upon APHIS finding that the treatment is USEPA-registered (or exempted) for use on SLF and that it poses no greater risks to human health and nontarget organisms than those disclosed in prior SLF EAs published by the Agency (May 2015 through April 2023). The protocol for making the necessary finding that adaptive management authorizes a treatment is as follows:

1. Conduct a human health and ecological risk assessment (HHERA). In this risk assessment, review scientific studies for toxicological and environmental fate information relevant to effects on human health and nontarget organisms. Use this information and the exposure evaluation based on the use pattern of a pesticide in the program to estimate the risk to human health and nontarget organisms. Include these four elements in the HHERA: (a) hazard evaluation, (b) exposure assessment, (c) dose response assessment, and (d) risk characterization. Preparation of the HHERA will require the following:

- Identifying potential use patterns, including formulation, application methods, application rate, and anticipated frequency of application.
- Reviewing hazards relevant to the human health risk assessment, including acute and chronic toxic effects via oral ingestion, inhalation, and dermal absorption, skin and eye irritation, allergic hypersensitivity, allergic hypersensitivity, systemic and reproductive effects, developmental effects, carcinogenicity, neurotoxicity, immunotoxicity, and endocrine disruption.
- Estimating exposure of workers applying the chemical.
- Estimating exposure to members of the public.
- Characterizing environmental fate and transport, including drift, leaching to ground water, and runoff to surface streams and ponds.

- Evaluating the dose levels for potential human health effects including acute and chronic toxicity.
- Reviewing available eco-toxicity data, including hazards to mammals, birds, reptiles, amphibians, fish, and aquatic invertebrates.
- Estimating exposure of terrestrial and aquatic wildlife species.
- Characterizing risk to human health and wildlife.

2. Conduct a risk comparison of the human health and ecological risks of a new treatment with the risks identified for the currently authorized treatments. This risk comparison will evaluate quantitative expressions of risk (such as hazard quotients), and qualitative expressions of risk that put the overall risk characterizations into perspective. Qualitative factors include scope, severity, and intensity of potential effects, as well as temporal relationships, such as reversibility and recovery.

3. If the risks posed by a new treatment fall within the range of risks posed by the currently approved treatments, APHIS would list the new treatment on its web page and prepare a Record of Categorical Exclusion for the proposed action (adding the new treatment option to the SLF Program).

Decisions to use any of the approved treatments in SLF projects (including new treatments authorized under adaptive management) are outside the scope of this ProEA and occur after APHIS conducts and documents site-specific EAs, in accordance with APHIS NEPA implementing procedures.

D. No Treatment Alternative

Under the No Treatment alternative, APHIS would no longer provide funding or other resources for SLF control. State or local governments, commercial producers, producer groups or individuals may act to protect potential hosts and reduce SLF populations. APHIS cannot predict whether these entities would have the resources or the authority to exclude or control SLF.

E. No Action Alternative

Under the No Action alternative, APHIS would continue the current Program actions, as discussed in previous EAs of the SLF Program (USDA APHIS 2021; 2023a). The control measure options would be the same as those described in the Preferred Alternative in Section A of this chapter, except that the Program would not expand beyond the region currently under quarantine for SLF (14 states and the District of Columbia). The program includes methods to exclude, detect, prevent, and control SLF infestations. This alternative would not add treatment options. This alternative represents the baseline against which to compare a proposed alternative action.

F. Alternatives Considered and Dismissed

APHIS and its cooperators successfully use sterile insect release, species-specific attractants, and biological control agents in several insect and weed control programs. Biological control, appropriately applied and monitored, can be an environmentally safe and desirable form of long-term management of pest species. Biological control usually has limited application to emergency eradication programs. Scientists are investigating biological control of SLF by natural predation, and SLF attraction to species-specific attractants; none of these methods is a viable control option at this time (Gruber 2017; Kaplan 2019; USDA APHIS 2023a).

Although the USDA Agricultural Research Service has mapped one SLF genome (Kaplan 2019) no biotechnological solution for use against SLF has yet been found. Reasons for this could be: (a) control techniques of this type take time to develop; (b) crop characteristics like SLF resistance would take time to establish, as the replacement of perennial crops such as grapevines and trees requires years; (c) control techniques may be variable in their effectiveness or cost prohibitive; and (d) the information relative to the environmental impacts of bioengineered organisms may be incomplete or unavailable. The Program reserves the right to develop and employ biotechnological and bioengineering procedures in future SLF projects, after the development of effective control techniques and appropriate environmental and risk evaluations.

III. Potential Environmental Consequences

The environmental consequences of the SLF Program result from its actions. This chapter considers potential impacts to the human environment from three alternatives: No Treatment, No Action, and Adaptive Management (the Preferred Alternative).

If APHIS discontinues its support of SLF Program control activities (the No Treatment Alternative), SLF infestations are likely to spread outside the program area, damaging host plant growth and disrupting host-dependent natural habitat, host commodity production, and host-dependent commerce.

If the SLF Program continues unchanged (the No Action Alternative) there are likely to be higher costs to SLF-affected growers and governments affected by SLF outside the defined Program area (14 States and the District of Columbia). Appendix 6 contains additional information about potential environmental consequences for this alternative as considered in the SLF Final EA (USDA APHIS 2023a) which the ProEA incorporates by reference.

The Adaptive Management Alternative (Preferred Alternative) is an adaptive pest management approach that combines quarantine, chemical treatments, and pest survey. Under the Adaptive Management Alternative, where SLF outbreaks occur in the conterminous United States, APHIS would work with those affected—including states, Tribes, the agriculture industry, and local communities—to ensure SLF Program actions do not adversely affect the environment. APHIS finds the environmental consequences of this Adaptive Management Alternative would be similar to the Preferred Alternative described in the SLF Final EA (see Appendix 6). Should potential significant environmental impacts be identified, APHIS will address them in an environmental impact statement.

Under the Adaptive Management Alternative, the SLF Program would continue to minimize herbicide and insecticide applications by using trap trees, green waste sanitation, physical host removal, and nonchemical treatments. Broadcast chemical applications have a greater potential for off-site drift and runoff. Increased pesticide loading into the environment could result in increased risk to human health and the environment.

Table 3 summarizes some consequences of implementing Program control measures. Because impacts from the proposed SLF Program may occur over a large geographic region or time span, the depth and detail in this ProEA reflect major impacts that might result from making broad programmatic decisions. The geographic scope of the ProEA covers 48 states and the District of Columbia. Previous NEPA review and public comment on the expanded SLF Program proposed for 14 states and the District of Columbia resulted in the SLF Final EA (USDA APHIS 2023a) which this ProEA incorporates by reference in its entirety.

The greatest potential for adverse impacts to the human environment is associated with the Program's prescribed herbicide and insecticide applications. Under the Adaptive Management Alternative, the extent of a treatment area would depend on the distribution of SLF during an outbreak and the type of location (e.g., urban, rural, conservation areas, Tribal land, forests, commercial premises). This ProEA was prepared with the assumption that up to 48 states and the District of Columbia could become infested with SLF. APHIS estimates the Agency would need to increase the human and financial resources it allocates to the Program to at least three times its current allocation, assuming all locations are similarly infested with SLF. However, APHIS expects, over time, a reduction in the total amount of pesticides used by the Program under the Adaptive Management Alternative: the coordinated use of pesticides and other methods that are effective in SLF control across jurisdictions, and the flexibility of adaptive management, would "stamp out" infestations and not allow them spread uncontrollably.

Environmental impacts from SLF Program materials, equipment, and activities are expected to be minimal, whether they occur in the 14 currently quarantined states or nationwide, so long as program mitigations and treatment protocols are correctly performed. This ProEA incorporates the SLF Final EA and Finding of No Significant Impact by reference with the analyses of each active ingredient of pesticides and SLF management practices anticipated to be used, and the SLF Final EA analyses of the potential effects of Program actions on nontarget species and the physical environment (see Appendix 6).

Cumulative Impacts. Cumulative impacts result from the incremental impact of a program action when added to other past, present, and reasonably foreseeable future actions. At present, APHIS has no means to achieve the complete eradication of SLF in the United States, but the Program is reducing SLF populations where they occur, slowing SLF spread, and helping to prevent establishment of this regulated pest. The Program's use of herbicides and insecticides present the most potential to result in cumulative impacts to the human environment. Pesticide use can result in various potential cumulative impacts, regardless of the pest program. Issues that may have cumulative impacts when using pesticides in a pest management or eradication program include:

- pest resistance
- chemical mixture effects on human health and the environment
- persistence of chemicals in the environment; and
- bioaccumulation.

Cumulative impacts related to potential SLF pesticide resistance are not anticipated due to the targeted manner of Program applications. The Program selects application methods that address the spatial and temporal factors of each SLF outbreak and does not follow one strategy for all SLF outbreaks. Spot applications are used instead of broadcast where possible; this is covered in more detail in the SLF Final EA (USDA APHIS 2023a). The varying strategy makes it difficult to predict the Program's potential overall pesticide usage.

Similar pesticides, as well as pesticides not used by the Program, may be applied by state and local governments to eradicate SLF and other types of pests; some applications could be near in time or location to Program applications. Also, other APHIS programs may plan chemical applications in areas where SLF has been detected in the past and could be detected in the future. Estimating the potential for overlap between SLF Program pesticide use and that of other programs is difficult due to uncertainty about where pests may occur, what new pests may be detected in the future, and which ones will require pesticide treatment. Due to cooperative relationships between APHIS and other entities participating in the SLF Program, increased pesticide loading during the outbreak relative to other pesticide usage in the Program area is expected to be minor and not result in a significant cumulative impact.

Cumulative acute or chronic impacts to human health, for anyone in the potential nationwide program area, are not expected based on how and where treatments would be made by the Program. In residential areas, SLF Program treatments would be made using methods and formulations that minimize the potential for exposure to the public, including people who may be sensitive to chemicals. To minimize potential intrusion and disruption, SLF treatments would occur after public notification, further reducing exposure and risk. Residents and property owners in the Program area would be provided with contact information for the appropriate federal and state agencies should any questions or concerns arise.

Table 3. Comparison of SLF control measures under the three action alternatives.

SLF Control Measure	No Treatment (Discontinue APHIS support of SLF control)	No Action (Continue the Program in 14 states and the District of Columbia)	Preferred (Expand the Program to 48 States and the District of Columbia)
Overall	Lower cost to APHIS than No Action or Preferred. Higher cost to affected host spp. growers, and to state and local governments. Less adaptive management	The SLF Program would not assist in SLF control efforts outside the 14 states – this could facilitate SLF introduction to new areas.	Higher cost to APHIS than No Action or No Treatment. Greater opportunity for overall coordination of activities and adaptive management.
High-pressure Water Treatment	Viable SLF eggs could result in increased SLF population and potential spread to new areas.	Reduction of viable SLF eggs within the Program area; no impacts if used as prescribed.	Same as No Action.
Herbicides Prescribed by Program	Potentially increased use of herbicides by commercial producers and individuals. Potential loss of desirable plant spp. due to proximity of other SLF hosts.	Minimal to no impact if products are used according to USEPA label and Program mitigations.	Like No Action but increasing the program area brings greater risk of human or mechanical error.
Program-prescribed Insecticides	Potentially greater use of insecticides by commercial producers and individuals than under No Action and Preferred. Potential loss of natural resources due to uncontrolled SLF.	Minimal to extremely low impacts if products are used according to USEPA label and Program mitigations.	Possible increase in impacts if more areas are treated. Impacts might be reduced by limiting size of treatment area and by increasing no-treatment buffers around sensitive sites.
Surveys and Egg Mass Scraping	Potentially fewer impacts than No Action since there would cease to be surveys and possibly greater impacts to plant life if less egg scraping is done.	Extremely low impact to human health and environment if site-specific protocols are followed.	Extremely low impact like No Action.
Traps	Less impact than No Action due to the likely deployment of fewer traps by other governments and the private sector.	Extremely low impact on human health and environment if used according to Program protocols.	Extremely low impact like No Action.

IV. Agencies Consulted

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

U.S. Department of Agriculture
Animal and Plant Health Inspection Services
Plant Protection and Quarantine Plant Health Programs, APHIS, USDA
4700 River Road, Unit 150
Riverdale, MD 20737

Appendix 1. Previous SLF Program EAs published by APHIS (2015-2023)

May 2015 "Spotted Lanternfly Eradication Program in Berks, Lehigh, and Montgomery Counties, Pennsylvania Environmental Assessment"

This was the first EA that APHIS prepared for the SLF Program. The EA described the Program's eradication activities in Berks, Lehigh, and Montgomery Counties, Pennsylvania and expanded to include Bucks and Chester Counties. Eradication activities included:

- Regulatory control - consists of a state 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 of the area, except under a permit issued by the appropriate department of agriculture.
- Survey/Egg mass scraping – Detection survey uses visual inspection and sweep netting to determine if SLF is present. Egg mass scraping consists of scraping egg masses from plants with a stiff plastic card into bags with an alcohol solution to cause mortality.
- Sanitation – Sanitation of all other green waste within a quarter mile of SLF detections that may include chipping or grinding the debris, and disposal through incineration or burning.
- Tree banding - 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 are bagged and placed in a landfill.
- Tree removal – the invasive species, tree-of-heaven, will be removed 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 towards the root. The herbicide triclopyr will be applied on stumps, and foliar applications of glyphosate will be made to re-sprouts from stumps.
- Insecticide applications – insecticide treatments for select tree-of-heaven trees will be made using ground equipment by certified applicators. 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. Dinotefuran is applied through a basal trunk spray to a small number of trap trees (about 10 trees at a given site) that serve to attract and kill SLF. 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.

March 2018 "Spotted Lanternfly Eradication Program in Select Counties in Pennsylvania Supplemental Environmental Assessment"

The Program area expanded to include Carbon, Delaware, Lancaster, Lebanon, Monroe, Northampton, Philadelphia, and Schuylkill Counties in Pennsylvania. Program eradication activities remain as outlined in the 2015 EA but added the insecticide imidacloprid applied through trunk injection to trap trees and three additional herbicides, imazapyr, metsulfuron-methyl and aminopyralid, to treat remaining stumps and associated sprouts applied by hand painting the stump or directly spraying the stumps or sprouting foliage using a backpack sprayer.

March 2018 "Spotted Lanternfly Eradication Program in Frederick County, Virginia"

The Program continued the eradication activities described in previous EAs but included Frederick County, Virginia to the Program area.

May 2018 "Spotted Lanternfly Control Program in the Mid-Atlantic Region"

In this EA, the Program considered programmatic control efforts through the Mid-Atlantic States including Connecticut, Delaware, Maryland, New York, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia, and District of Columbia. Some of these states were covered in prior EAs. The control activities were the same as described in the prior EAs. The Program changed from an eradication program to a control program. This EA did not mention the use of bifenthrin, pymetrozine, and *Beauveria bassiana* strain GHA, for use in small experimental plots to evaluate the efficacy of each in controlling SLF; the Program was not doing any additional experimental plot testing.

June 2020 "Spotted Lanternfly Control Program in the Mid-Atlantic Region, North Carolina, Ohio, and Kentucky

This EA expanded treatment locations to include the states of Ohio and Kentucky. The Program moved from cutting and felling tree-of-heaven trees located within a ¼-mile radius of a SLF find to using herbicides to remove trees. The Program may manually remove dying tree-of-heaven trees if they are a fall hazard. This EA also added circle traps to its detection survey for SLF and five insecticides to the Program: bifenthrin, beta-cyfluthrin, *B. bassiana*, soybean oil, and dichlorvos. The use patterns for Program insecticides were as follows:

- dinotefuran or imidacloprid on trap trees (same use pattern as prior EAs);
- bifenthrin, beta-cyfluthrin, or B. bassiana on ornamental and tree-of-heaven tree trunks in commercial and residential areas, perimeter areas and surfaces in and around train yards, airports, seaports, trucking depots, railway and powerline easements;
- soybean oil on SLF eggs attached to various surfaces including trees, ground litter, firewood, nursery stock, rocks, vehicles, or on other articles moved in interstate commerce; and,
- dichlorvos (DDVP) strips placed within circle traps attached to tree trunks.

October 2021 "Spotted Lanternfly Control program in the Mid-Atlantic Region, North Carolina, Ohio, and Kentucky" Supplemental EA

Despite Program control efforts, the population of SLF continued to spread. The Program determined that rail lines and intermodal areas are a high-risk pathway for long distance spread of SLF. In addition, recently hatched SLF nymphs can climb to a height of more than five meters (16.5 feet) within trees (Kim et al. 2011) warranting new application methods. Chemical application types previously considered include hand-held backpack and truck-mounted sprays (also referred to as high-pressure hydraulic sprays) that cannot reach these heights. In this EA, USDA APHIS proposed to use ground-based mist blowers that can treat SLF nymphs and adults. Mist blowers are sprayers that use a fan to blow insecticide emitted through nozzles into a directed mist. They are useful for the treatment of large areas and applying insecticide into areas of dense foliage where SLF is present. This EA added ground-based mist blowers as an application method for bifenthrin and beta-cyfluthrin and expands the use sites for these two insecticides to include railways, train yards, and intermodal rail terminals. However, the use of mist blowers is geographically restricted to the following:

- Maryland - Alleghany, Frederick, and Washington County.
- Ohio - Belmont, Carroll, Columbiana, Harrison, and Jefferson County.
- Pennsylvania - statewide.
- Virginia - Albemarle, Augusta, Bath, Clarke, Frederick, Highland, Loudoun, Nelson, Page, Rockbridge, Rockingham, Shenandoah, and Warren County.
- West Virginia - Berkeley, Brooke, Hancock, Jefferson, Morgan, and Ohio County.

April 2023 "Expanded Spotted Lanternfly Control Program in Select States in the Midwest, Northeast, and Mid-Atlantic Regions of the United States" Final EA

This EA incorporated the six prior EAs and their FONSIs. APHIS expanded the SLF Program area to include Indiana, Massachusetts, Michigan, and Rhode Island, and added three modifications to the Program's control measures:

1) Expanded uses of ground-based mist blowers and high-pressure hydraulic spray treatments of bifenthrin and beta-cyfluthrin to tree-of-heaven growing in road rights-of-way in addition to tree-of-heaven along railways, in train yards, and at intermodal rail terminals that were considered in the 2021 EA;
2) expanded use of mist blowers and high-pressure hydraulic spray treatments of tree-of-heaven along rail rights-of-way without the geographical restrictions imposed in the 2021 EA (where applications were limited to rail rights-of-way within select counties in the Program area); and
3) an option for high-pressure water treatment to remove egg masses from tree-of-heaven trees, inanimate objects, and equipment. Otherwise, the control measures continue as prescribed by the 2021 EA.

Appendix 2. California Department of Food and Agriculture Pest Rating Proposal for SLF

Spotted Lanternfly Pest Rating: A[1]

The California Department of Food and Agriculture experts analyzed pests and rated them. These ratings are based on biological parameters of the pests.

Part 1. Consequences of SLF Introduction to California

Climate/Host Interaction: Host plants are commonly grown in California and spotted lanternfly is likely to establish wherever they are found. *Lycorma delicatula* receives a **High (3)** in this category.

Score:

- **Low (1)** Not likely to establish in California; or likely to establish in very limited areas.
- **Medium (2)** may be able to establish in a larger but limited part of California.
- **High (3)** likely to establish a widespread distribution in California.

Known Pest Host Range: *Lycorma delicatula* feeds on at least 41 species of plants in at least 14 families. These include multiple agriculturally important crops and common ornamentals in California. It receives a **High (3)** in this category.

Score:

- **Low (1)** has a very limited host range.
- **Medium (2)** has a moderate host range.
- **High (3)** has a wide host range.

Pest Dispersal Potential: *Lycorma delicatula* has only one generation per year and tends to move by walking but oothecae [mass of eggs protected by a cover impervious to many predators, weather, and other problems] may be dispersed long distances by the movement of infested nursery stock or other items. Spotted lanternfly receives a **Medium (2)** in this category.

Score:

- **Low (1)** does not have high reproductive or dispersal potential.
- **Medium (2)** has either high reproductive or dispersal potential.
- **High (3)** has both high reproduction and dispersal potential.

Economic Impact to California: Infestations of *Lycorma delicatula* may lower crop yields and increase production costs in economically important crops such as grape, stone fruit, and nursery stock. Since it entered Korea, the insect has caused considerable damage in vineyards. Although

[1]The "A"-rating is for pests of agriculture or environment that score high under Section 3162 (b) analysis and that are or may be placed under official control in the State of California or are not known to occur in California (CCR 2023).

it is not yet under official control in any states or nations, the presence of this pest in agricultural commodities may cause trade disruptions due to its limited range in North America. Spotted lanternfly is not expected to change normal cultural practices, vector other organisms, or interfere with water supplies. *Lycorma delicatula* receives a **High (3)** in this category, using the criteria below.

A. The pest could lower crop yield.
B. The pest could lower crop value (includes increasing crop production costs).
C. The pest could trigger the loss of markets (includes quarantines).
D. The pest could negatively change normal cultural practices.
E. The pest can vector, or is vectored, by another pestiferous organism.
F. The organism is injurious or poisonous to agriculturally important animals.
G. The organism can interfere with the delivery or supply of water for agricultural uses.

Score:

- **Low (1)** causes 0 or 1 of these impacts.
- **Medium (2)** causes 2 of these impacts.
- **High (3)** causes 3 or more of these impacts.

Environmental Impact on California: Spotted lanternfly is not expected to lower biodiversity, disrupt natural communities or change ecosystem processes. It is not expected to directly affect endangered species or disrupt critical habitats. It may trigger new treatments in vineyards and stone fruit orchards and by residents who find infested plants unsightly. Spotted lanternfly may also significantly affect home and urban gardening by feeding on grapes and trees. *Lycorma delicatula* receives a **High (3)** in this category, using the criteria below.

A. The pest could have a significant environmental impact such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.
B. The pest could directly affect threatened or endangered species.
C. The pest could impact threatened or endangered species by disrupting critical habitats.
D. The pest could trigger additional official or private treatment programs.
E. The pest significantly impacts cultural practices, home and urban gardening, or ornamental plantings.

Score:

- **Low (1)** causes none of the above to occur.
- **Medium (2)** causes one of the above to occur.
- **High (3)** causes two or more of the above to occur.

Consequences of Introduction to California for *Lycorma delicatula*: High (14)
Add up the total score to determine overall rating.

- **Low** = 5-8 points
- **Medium** = 9-12 points
- **High** = 13-15 points

Post Entry Distribution and Survey Information: *Lycorma delicatula* has not been found in California and receives a **Not established (0)** in this category.

Score:

–**Not established (0)** Pest never detected in California or known only from incursions.
–**Low (-1)** Pest has a localized distribution in California or is established in one suitable climate/host area (region).
–**Medium (-2)** Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.
–**High (-3)** Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.

Part 2. Final Score

The final score is the consequences of introduction score minus the post entry distribution and survey information score: **High (14)**

Uncertainty:

To date there have been no formal surveys for *Lycorma delicatula* in California. It may already be present in some localities.

Part 3. Conclusion and Rating Justification

Spotted lanternfly has never been found in California and is likely to have significant economic and environmental impacts. An A-rating is justified.

This pest rating was posted by the California Department of Food and Agriculture on 07-April-2015 at https://blogs.cdfa.ca.gov/Section3162/?p=726.

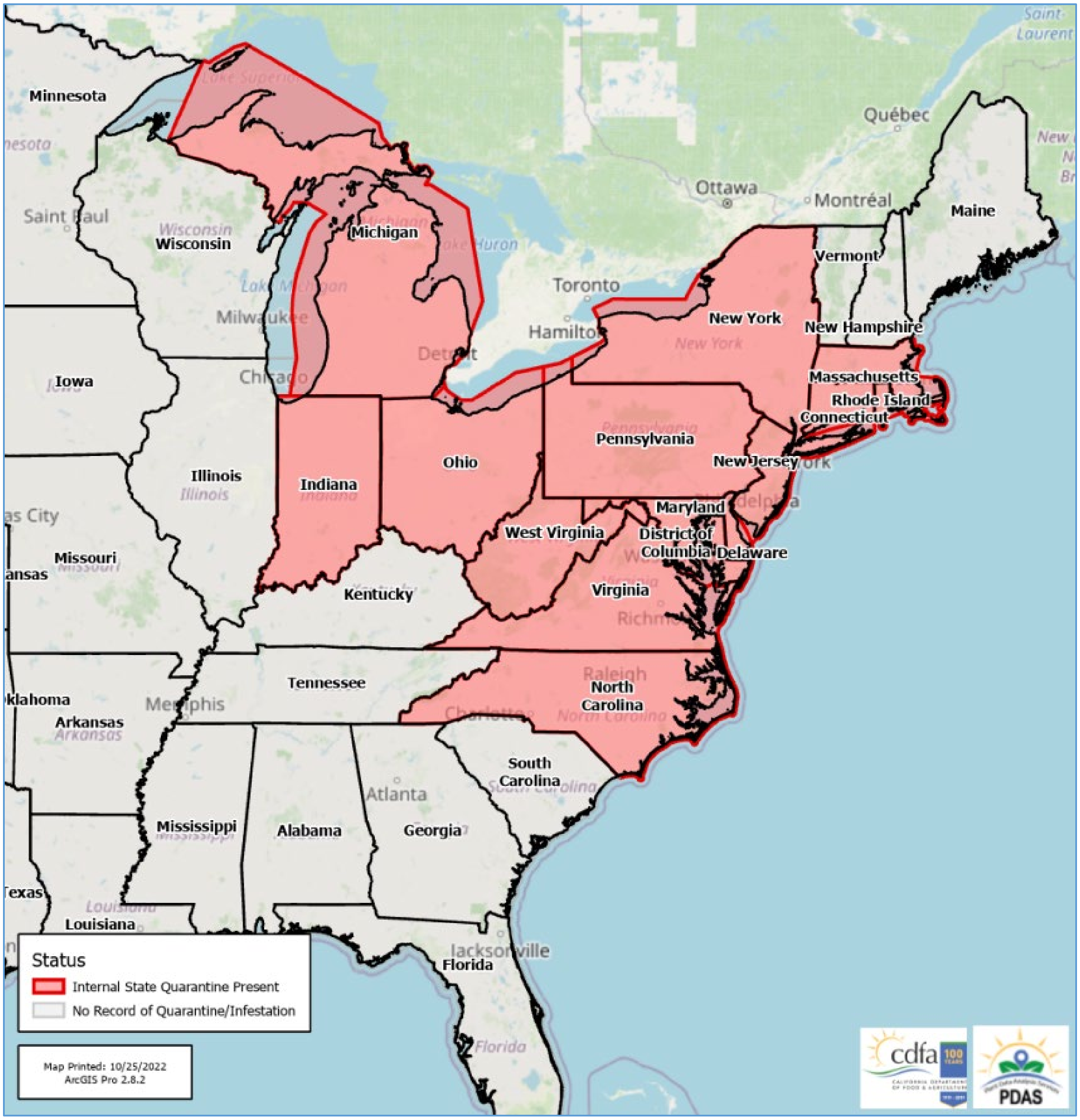
Reference:

Kim, Jae Geun, Eun-Hyuk Lee, Yeo-Min Seo, and Na-Yeon Kim. Cyclic Behavior of Lycorma delicatula (Insecta: Hemiptera: Fulgoridae) on Host Plants. J Insect Behav (2011) 24: 423-435. http://ag.udel.edu/delpha/7969.pdf

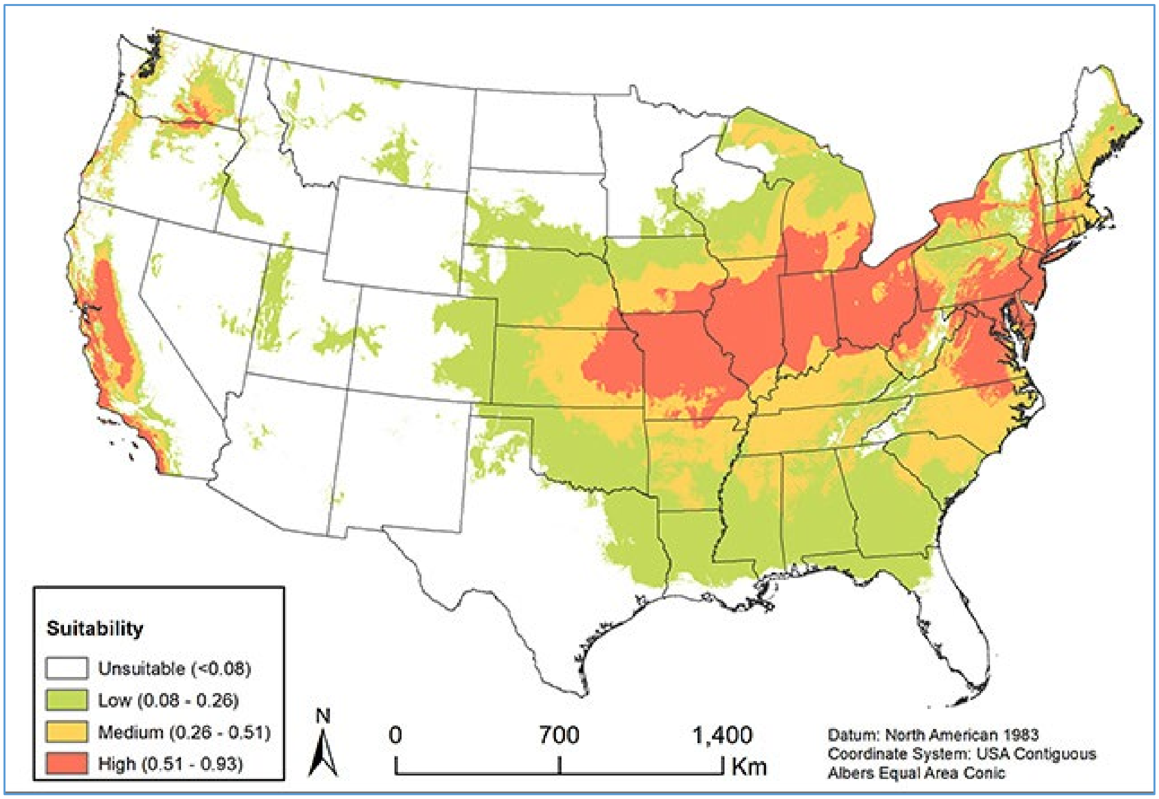
Responsible Party:

Jason Leathers, 1220 N Street, Sacramento, CA, 95814, (916) 654-1211, plant.health[@]cdfa.ca.gov

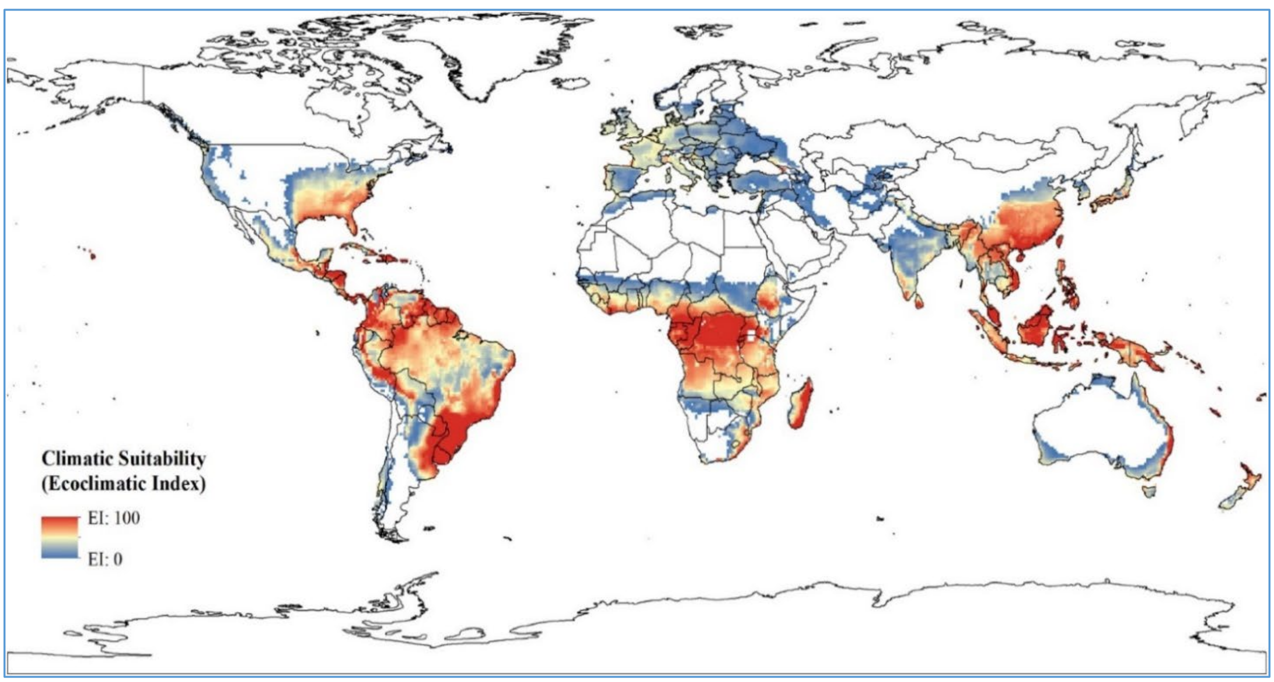
Appendix 3. SLF quarantines in North America and potential for SLF establishment in the conterminous United States and worldwide



Map A. SLF quarantines in North America
Source: (CDFA 2022)



Map B. U.S. locations suitable for SLF establishment. Areas shaded in orange, yellow, and green indicate high, medium, and low suitability, respectively. White color indicates areas that are unsuitable for SLF establishment (Wakie et al. 2020).



Map C. Potential global distribution of SLF. Darker red colors represent more favorable locations for SLF establishment, darker blue colors represent less favorable regions (Jung et al. 2017).

Appendix 4. Plant species that serve as hosts for SLF

Plant	Common Name	Family	SLF Life Stage or Activity
Acacia sp. Mill.	Acacia	Fabaceae	Unknown
Acer buergerianum Miq.	Trident maple	Sapindaceae	Unknown
Acer negundo L.	Boxelder	Sapindaceae	Egg, nymph
Acer palmatum Thunb.	Japanese maple	Sapindaceae	Egg, nymph, adult
Acer pictum ssp. *mono* (Maxim.) H. Ohashi	Painted maple	Sapindaceae	Unknown
Acer platanoides L.	Norway maple	Sapindaceae	Egg, nymph, adult
Acer pseudoplatanus L.	Sycamore maple	Sapindaceae	Nymph
Acer rubrum L.	Red maple	Sapindaceae	Egg, nymph, adult
Acer saccharinum L.	Silver maple	Sapindaceae	Egg, nymph, adult
Acer saccharum Marshall	Sugar maple	Sapindaceae	Adult, nymph
Actinidia chinensis Planch	Kiwi	Actinidiaceae	Nymph, adult
Ailanthus altissima (Mill.) Swingle	Tree-of-heaven	Simaroubaceae	Egg, nymph, adult
Albizia julibrissin Durazz.	Persian silk tree	Fabaceae	Nymph
Alcea sp. L.	Hollyhocks	Malvaceae	Nymph
Alnus incana (L.) Moench	Grey alder	Betulaceae	Nymph
Amelanchier canadensis (L.) Medik.	Canadian serviceberry	Rosaceae	Unknown
Amelanchier sp. Medik.	Serviceberry	Rosaceae	Nymph
Angelica daburica (Fisch.ex Hoffm.) Benth. ex. Hook.	Dahurian angelica	Apiaceae	Nymph
Aralia cordata Thunb.	Japanese spikenard	Araliaceae	Nymph
Aralia elata (Miq.) Seem.	Japanese angelica tree	Araliaceae	Nymph
Arctium lappa L.	Greater burdock	Asteraceae	Nymph
Armoracia rusticana G. Gaertn, B. Mey. & Scherb	Horseradish	Brassicaceae	Nymph, adult
Betula alleghaniensis Britt.	Yellow birch	Betulaceae	Egg
Betula lenta L.	Sweet birch	Betulaceae	Egg, nymph, adult
Betula nigra L.	River birch	Betulaceae	Egg, nymph, adult

Plant	**Common Name**	**Family**	**SLF Life Stage or Activity**
Betula papyrifera Marshall	Paper birch	Betulaceae	Egg, nymph, adult
Betula pendula Roth	European white birch	Betulaceae	Nymph
Betula platyphylla Sukaczev	Asian white birch	Betulaceae	Egg, nymph, adult
Broussonetia papyrifera (L.) L'Her. Ex Vent.	Paper mulberry	Moraceae	Unknown
Buxus microphylla Siebold & Zucc.	Japanese boxwood	Buxaceae	Unknown
Buxus sinica (Rehder & E.H. Wilson) M. Cheng	Chinese boxwood	Buxaceae	Egg
Callistephus chinensis (L.) Nees	China aster	Asteraceae	Unknown
Camellia sinensis (L.) Kuntze	Tea	Theaceae	Unknown
Cannabis sativa L.	Hemp	Cannabaceae	Unknown
Carpinus caroliniana Walter	American hornbeam	Betulaceae	Egg
Carya glabra (Mill.) Sweet	Pignut hickory	Juglandaceae	Nymph/adult
Carya ovata (Mill.) K. Koch	Shagbark hickory	Juglandaceae	Egg, nymph, adult
Castanea crenata Seibold & Zucc.	Japanese chestnut	Fagaceae	Egg
Catalpa bungei C.A. Mey.	Manchurian catalpa	Bignoniaceae	Unknown
Cedrela fissilis Vell.	Argentine cedar	Meliaceae	Nymph
Celastrus orbiculatus Thunb.	Oriental bittersweet	Celastraceae	Nymph, adult
Chamerion angustifolium (L.) Holub	Fireweed	Onagraceae	Unknown
Colutea arborescens L.	Bladder senna	Fabaceae	Unknown
Cornus controversa Hensl. Ex Prain	Wedding cake tree	Cornaceae	Nymph, adult
Cornus florida L.	Flowering dogwood	Cornaceae	Egg
Cornus kousa Hance	Kousa dogwood	Cornaceae	Nymph, adult
Cornus officinalis Siebold & Zucc.	Asiatic dogwood	Cornaceae	Nymph, adult
Cornus sp. L.	Dogwoods	Cornaceae	Nymph, adult
Corylus americana Walter	American hazelnut	Betulaceae	Adult
Diospyros kaki L. f.	Japanese persimmon	Ebenaceae	Egg, nymph, adult
Elaeagnus umbellata Thunb.	Autumn olive	Elaeagnaceae	Nymph, adult
Euphorbia pulcherrima Willd. Ex Klotzsch	Poinsettia	Euphorbiaceae	Adult
Fagus grandifolia Ehrh.	American beech	Fagaceae	Egg, nymph

Plant	Common Name	Family	SLF Life Stage or Activity
Ficus carica L.	Edible fig	Moraceae	Unknown
Firmiana simplex (L.) W.E. Wight	Chinese parasoltree	Sterculiaceae	Nymph
Forsythia sp. Vahl	Forsythia	Oleaceae	Nymph
Fraxinus americana iL.	White ash	Oleaceae	Egg, nymph, adult
Glycine max (L.) Merr.	Soybean	Fabaceae	Unknown
Hibiscus sp. L.	Hibiscus	Malvaceae	Nymph
Humulus japonicus Siebold & Zucc.	Hops	Cannabaceae	Nymph
Humulus lupulus L.	Hops	Cannabaceae	Nymph, adult
Juglans cinerea L.	Butternut	Juglandaceae	Nymph, adult
Juglans hindsii (Jeps.) Jeps. Ex R.F. Sm.	Northern California walnut	Juglandaceae	Nymph, adult
Juglans major (Torr.) A. Heller	Arizona walnut	Juglandeaceae	Nymph, adult
Juglans mandshurica Maxim	Manchurian walnut	Juglandaceae	Nymph, adult
Juglans microcarpa Berl.	Texas walnut	Juglandaceae	Nymph, adult
Juglans nigra L.	Black walnut	Juglandaceae	Nymph, adult
Juglans sp. L.	Walnuts	Juglandaceae	Unknown
Juglans x sinensis (D.C.) Rehd.	English walnut	Juglandeaceae	Nymph
Juniperus chinensis L.	Chinese juniper	Cupressaceae	Nymph, adult
Ligustrum lucidum W.T. Alton	Glossy privet	Oleaceae	Unknown
Lindera benzoin L.	Northern spicebush	Lauraceae	Egg
Liriodendron tulipifera L.	Tuliptree	Magnoliaceae	Egg, nymph, adult
Lonicera sp. L.	Honeysuckle	Caprifoliaceae	Nymph
Luffa sp. Mill.	Sponge gourd	Cucurbitaceae	Nymph
Maackia amurensis Rupr. & Maxim.	Amur Maackia	Fabaceae	Nymph
Magnolia kobus D.C.	Kobus magnolia	Magnoliaceae	Nymph
Magnolia obovata Thunb.	Japanese bigleaf magnolia	Magnoliaceae	Nymph
Mallotus japonicus Muell. Arg.	East Asian mallotus	Euphorbiaceae	Adult
Malus pumila Mill.	Paradise apple	Rosaceae	Egg, nymph, adult
Malus spectabilis (Aiton) Borkh.	Asiatic apple	Rosaceae	Unknown
Malus sp. Mill	Apple	Rosaceae	Adult

Plant	Common Name	Family	SLF Life Stage or Activity
Melia azedarach L.	Chinaberry tree	Meliaceae	Nymph, adult
Metaplexis japonica (Thunb.) Makino	Rough potato	Apocynaceae	Nymph
Monarda sp. L.	Bee balm	Lamiaceae	Nymph
Morus alba L.	White mulberry	Moraceae	Nymph
Morus bombycis Koidz.	Korean mulberry	Moraceae	Nymph
Nicotiana sp. L.	Tobacco	Solanaceae	Unknown
Nyssa sylvatica Marshall	Blackgum	Cornaceae	Nymph, adult
Ocimum basilicum L.	Basil	Lamiaceae	Nymph
Osmanthus sp. Lour.	Devilwoods	Oleaceae	Unknown
Ostrya virginiana K. Koch	American hophornbeam	Betulaceae	Egg
Parthenocissus quinquefolia (L.) Planch.	Virginia Creeper	Vitaceae	Nymph, adult
Paulownia kawakamii Ito	Sapphire dragon tree	Paulowniaceae	Unknown
Paulownia tomentosa (Thunb.) Siebold & Zucc. Ex Steud.	Princesstree	Paulowniaceae	Unknown
Phellodendron amurense Rupr.	Amur corktree	Rutaceae	Egg, nymph, adult
Philadelphus schrenkii Rupr.	Mock orange	Hydrangeaceae	Nymph
Phyllostachys heterocycla (Carriere) Matsum.	Tortoiseshell bamboo	Poaceae	Unknown
Picrasma quassioides (D. Don.) Benn.	Nigaki	Simaroubaceae	Nymph, adult
Pinus strobus L.	Eastern white pine	Pinaceae	Egg
Platanus orientalis L.	Oriental plane tree	Platanaceae	Nymph, adult
Platanus occidentalis L.	American sycamore	Platanaceae	Egg, adult
Platanus x *acerifolia* (Aiton) Willd.	London plane tree	Platanaceae	Egg
Platycarya strobilacea Siebold Zucc.	Platycarya	Juglandaceae	Unknown
Platycladus orientalis (L.) Franco	Oriental arborvitae	Cupressaceae	Nymph, adult
Populus alba L.	White Poplar	Saliaceae	Egg
Populus grandidentata Michx.	Bigtooth aspen	Salicaceae	Nymph/adult
Populus koreana J. Rehnder	Korean poplar	Salicaceae	Adult
Populus simonii Carriere	Simon's poplar	Salicaceae	Unknown

Plant	**Common Name**	**Family**	**SLF Life Stage or Activity**
Populus tomentiglandulosa T. Lee	Korea poplar	Salicaceae	Adult
Populus tomentosa Carriere	Chinese white poplar	Salicaceae	Unknown
Prunus armeniaca L.	Apricot	Rosaceae	Egg, nymph, adult
Prunus avium (L.) L.	Sweet cherry	Rosaceae	Egg
Prunus cerasus L.	Sour cherry	Rosaceae	Unknown
Prunus mume Siebold & Zucc.	Japanese apricot	Rosaceae	Nymph, adult
Prunus persica (L.)	Peach/nectarine	Rosaceae	Nymph, adult
Prunus salicina Lindl.	Japanese plum	Rosaceae	Nymph, adult
Prunus serotina Lindl.	Black cherry	Rosaceae	Egg, nymph, adult
Prunus serrulata Lindl.	Japanese flowering cherry	Rosaceae	Egg
Prunus x yedoensis Matsum.	Hybrid cherry	Rosaceae	Egg
Pseudocydonia stenoptera C. DC.	Chinese wingnut	Juglandaceae	Nymph
Punica granatum L.	Pomegranate	Lythraceae	Egg, nymph, adult
Pyrus sp. L.	Pear	Rosaceae	Nymph
Quercus acutissima Carruthers	Sawtooth oak	Fagaceae	Egg, nymph, adult
Quercus aliena Blume	Oriental white oak	Fagaceae	Nymph
Quercus montana Willd.	Chestnut oak	Fagaceae	Egg, nymph
Quercus rubra L.	Northern red oak	Fagaceae	Egg, nymph
Quercus sp. L.	Oak	Fagaceae	Unknown
Rhus chinensis Mill.	Chinese sumac	Anacardiaceae	Nymph
Rhus typhina L.	Staghorn sumac	Anacardiaceae	Adult, nymph
Robinia pseudoacacia L.	Black Locust	Fabaceae	Egg, nymph, adult
Rosa hybrida L.	Hybrid rose	Rosaceae	Nymph
Rosa multiflora Thunb.	Multiflora rose	Rosaceae	Nymph
Rosa rugosa Thunb.	Rugosa rose	Rosaceae	Nymph
Rosa sp. L.	Rose	Rosaceae	Nymph
Rubus crataegifolius Bunge	Korean raspberry	Rosaceae	Nymph
Rubus sp. L.	Blackberry and raspberry	Rosaceae	Nymph
Salix babylonica L.	Weeping willow	Salicaceae	Nymph, adult

Plant	Common Name	Family	SLF Life Stage or Activity
Salix koreensis Andersson	Korean willow	Salicaceae	Nymph, adult
Salix matsudana Koidz.	Corkscrew willow	Salicaceae	Nymph, adult
Salix sp. L.	Willow	Salicaceae	Egg, nymph, adult
Salix udensis Trautv. & C.A. Mey	Willow	Salicaceae	Nymph, adult
Salvia sp. L. (annual excluded)	Perennial salvia	Lamiaceae	Nymph
Sassafras albidum (Nutt.) Nees	Sassafras	Lauraceae	Egg, nymph, adult
Sorbaria sorbifolia (L.) A. Braun	False spiraea	Rosaceae	Nymph
Sorbus commixta Hedl.	Japanese rowan	Rosaceae	Nymph
Styphnolobium japonicum (L.) Schott	Japanese pagoda tree	Fabaceae	Egg
Stynax japonicus Siebold & Zucc.	Japanese snowbell	Styracaceae	Egg, nymph, adult
Styrax obassia Siebold & Zucc.	Fragrant snowbell	Styracaceae	Nymph, adult
Syringa vulgaris L.	Common lilac	Oleaceae	Egg
Tamarix chinensis Lour.	Five-stamen tamarix	Tamaricaceae	Unknown
Tetradium daniellii (Benn.)	Bee-bee tree	Rutaceae	Egg, nymph, adult
Tetradium spp. Lour.	Tetradium	Rutaceae	Adult
Thuja occidentalis L.	Arborvitae	Cupressaceae	Nymph
Tilia americana L.	American basswood	Meliaceae	Egg, nymph, adult
Toona sinensis (A. Juss.) M. Roem.	Chinese mahogany	Meliaceae	Egg, nymph, adult
Toxicodendron radicans (L.) Kuntze	Poison ivy	Anacardiaceae	Nymph
Toxicodendron vernicifluum (Stokes) F.A. Barkley	Chinese lacquer	Anacardiaceae	Nymph
Ulmus pumila L.	Siberian elm	Ulmaceae	Unknown
Ulmus rubra Muhl.	Slippery elm	Ulmaceae	Nymph, adult
Ulmus sp. L.	Elms	Ulmaceae	Egg
Vaccinium angustifolium Aiton	Lowbush blueberry	Eriacaceae	Nymph
Viburnum prunifolium L.	Blackhaw	Adoxaceae	Egg
Vitis amurensis Rupr.	Amur grape	Vitaceae	Nymph, adult
Vitis labrusca L.	Fox grape	Vitaceae	Egg
Vitis riparia Michx.	Riverbank grape	Vitaceae	Adult
Vitis sp. L.	Wild grape	Vitaceae	Nymph, adult

Plant	**Common Name**	**Family**	**SLF Life Stage or Activity**
Vitis vinifera L.	Wine Grape	Vitaceae	Egg, nymph, adult
Zanthoxylum simulans	Chinese pepper	Rutaceae	Egg, nymph, adult
Zelkova serrata (Thunb.) Makino	Japanese zelkova	Ulmaceae	Egg

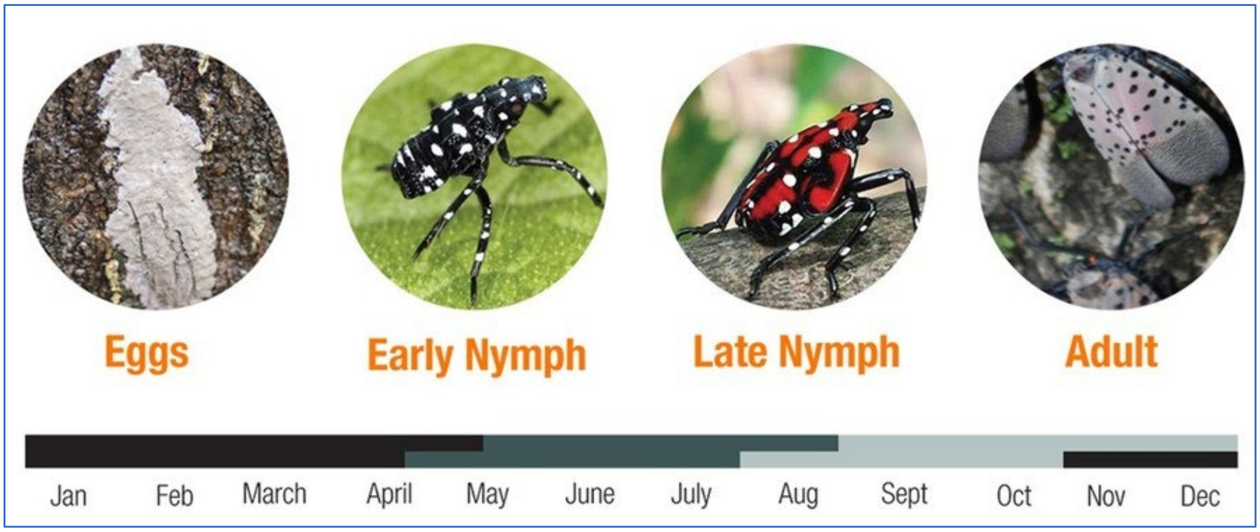
Source: (Barringer and Ciafré 2020)

Appendix 5. SLF in the United States: photos and other images

Adult SLF swarming a backyard to cover a tree.
[Picture from L. Barringer, PA Dept Of Agriculture and Bugwood Org.]

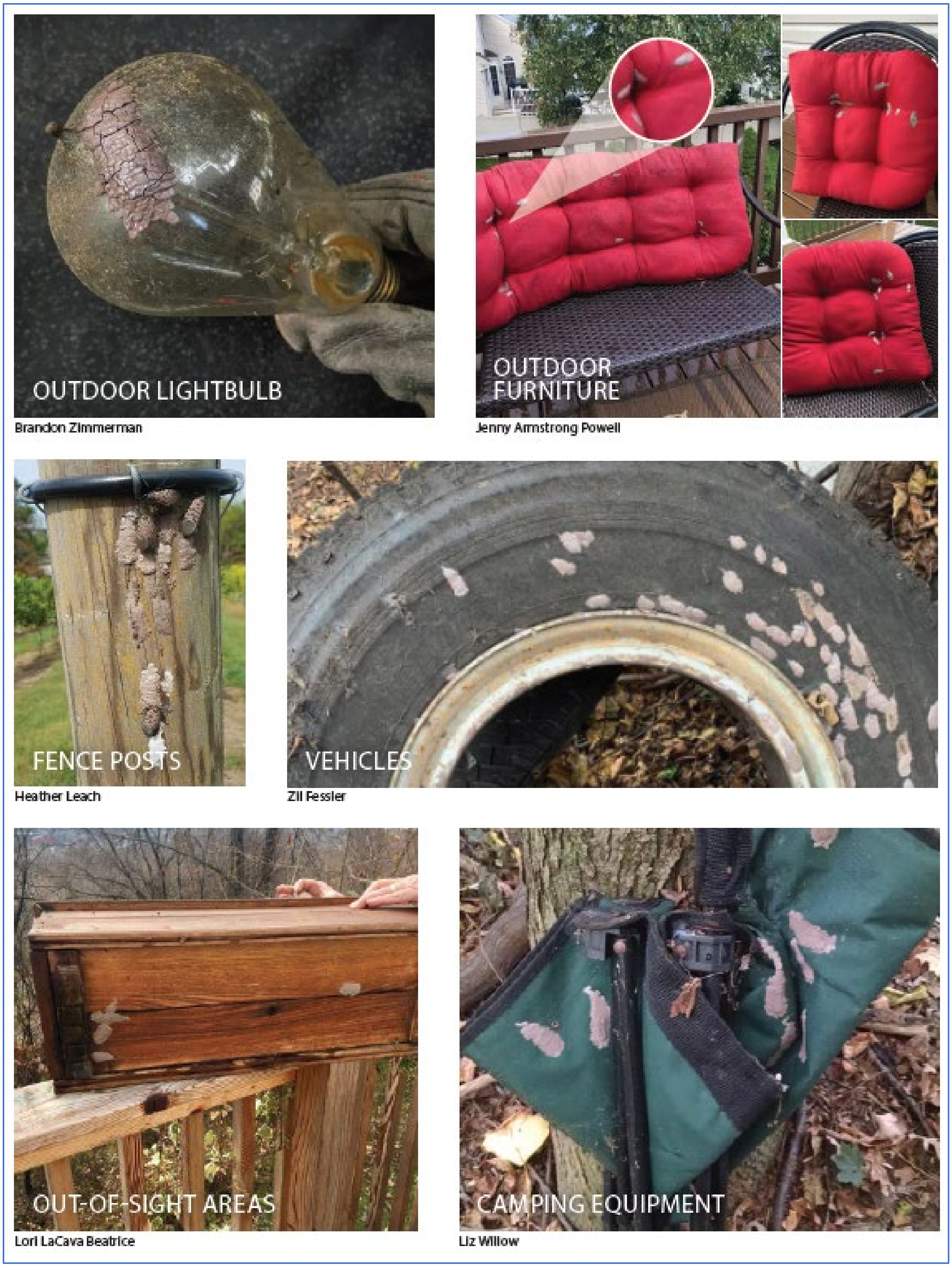
SLF on a grape vine.
[Picture from E. Smyers, Penn State University]

Black sooty mold growing on honeydew secreted by SLF feeding on a grapevine.
[Picture from S. Ausmus, USDA-Agricultural Research Service]



Timeline for SLF development in Pennsylvania.
[Source: https://www.springfieldmontco.org/information/environment/spotted-lanternfly/]

Praying mantis consuming SLF.
[Picture from D. M. Duffy, Penn State University]



Examples of SLF egg masses on surfaces and underneath portable objects.
[Source: https://massnrc.org/pests/blog/wp-content/uploads/SLF-eggs-collage.png]

News Release

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

Media Contacts: Steve Lyle (CDFA), 916-654-0462 , officeofpublicaffairs@cdfa.ca.gov

CALIFORNIA ESTABLISHES QUARANTINE TO PROHIBIT THE INTRODUCTION OF THE SPOTTED LANTERNFLY INTO CALIFORNIA

Release #21-077

Español

SACRAMENTO, July 16, 2021 – A state exterior quarantine has been declared to prohibit the introduction of the spotted lanternfly (SLF), Lycorma delicatula, into California. Spotted lanternfly was first detected in North American in 2014 in Pennsylvania and has now spread to nine states.

The quarantine prohibits the entry into California of SLF, its host plants, and a variety of articles, including conveyances, originating from any area where an SLF infestation exists. Specifically, articles and commodities covered by the quarantine include the following:

• Spotted lanternfly, a harmful invasive species that threatens California's agriculture and natural resources,
• All plants and plant parts including firewood, if exposed to the environment,
• Outdoor industrial and construction materials, equipment, and waste,
• Shipping and storage containers including personal moving containers,
• Outdoor household articles,
• Conveyances of any type including but not limited to, cars, trucks, recreational vehicles, boats, and trailers,
• Agricultural equipment including but not limited to, tractors, harvesting equipment, and rigid containers,
• Any other article, object, materials, or means of conveyance when it is determined by a California State Plant Quarantine Officer to present a risk of carrying or spreading any life stage of SLF.

All the articles and commodities covered above are prohibited entry into California from areas under SLF quarantine with the following exceptions:

Part of a July 2021 news release in English about the SLF quarantine in California.
[California Department of Agriculture News Release #21-077]

News Release

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

Media Contacts: Steve Lyle (CDFA), 916-654-0462 , officeofpublicaffairs@cdfa.ca.gov

Release #21-078

CALIFORNIA ESTABLECE CUARENTENA PARA PROHIBIR LA INTRODUCCIÓN DE LA MOSCA LINTERNA CON MANCHAS EN CALIFORNIA

Sigue a @CDFAnoticias por Twitter

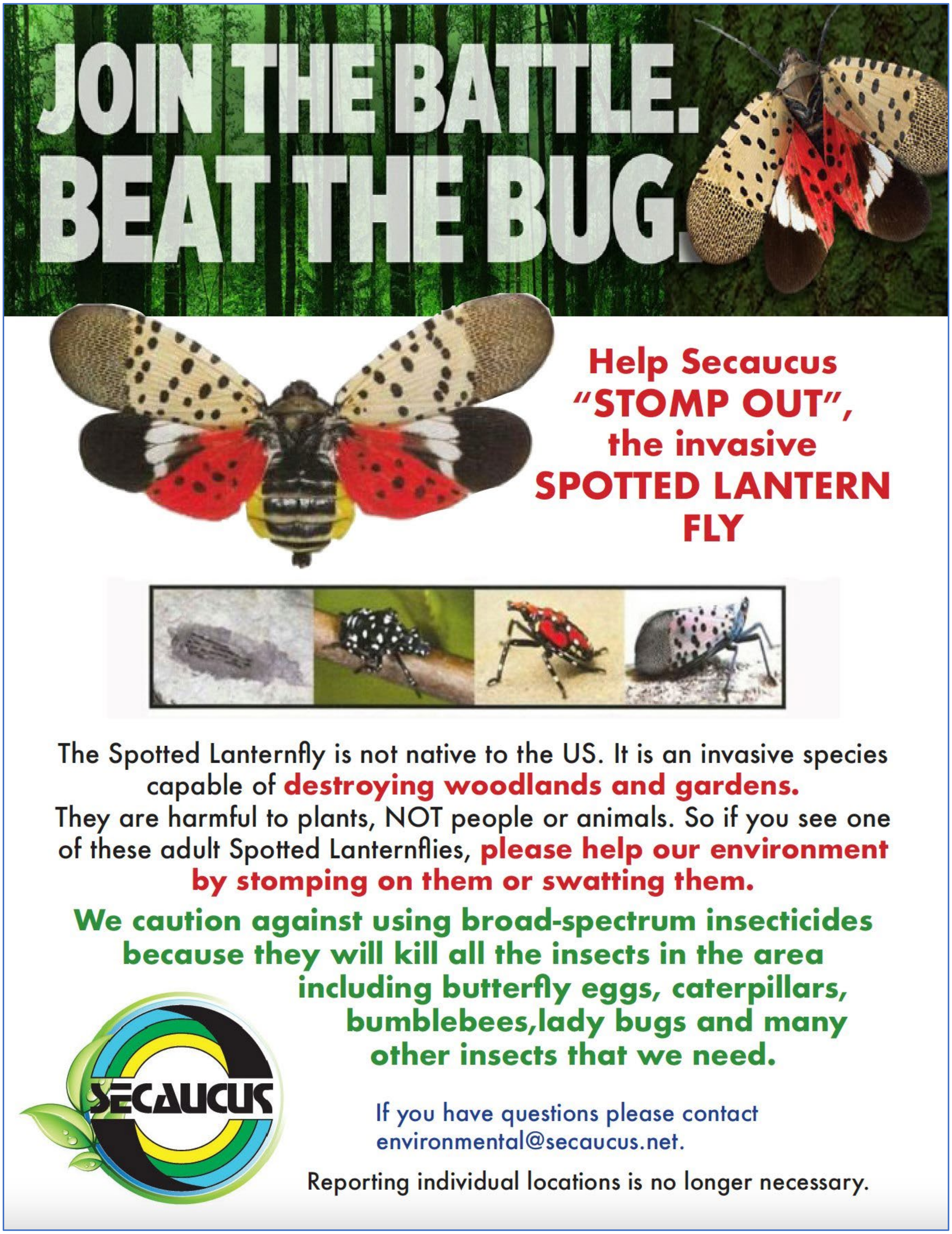
English

SACRAMENTO, 16 de julio de 2021 - Se ha declarado una cuarentena exterior estatal para prohibir la introducción de la mosca linterna con manchas (SLF), Lycorma delicatula, en California. La mosca linterna con manchas se detectó por primera vez en América del Norte en 2014 en Pensilvania y ahora se ha extendido a nueve estados.

La cuarentena prohíbe la entrada a California de la SLF, sus plantas huéspedes y una variedad de artículos, incluidos los medios de transporte, que se originan en cualquier área donde exista una infestación de la mosca. Específicamente, los artículos y productos cubiertos por la cuarentena incluyen los siguientes:

• La mosca linterna con manchas, una especie invasora dañina que amenaza la agricultura y los recursos naturales de California,
• Todas las plantas y partes de plantas, incluida la leña, si están expuestas al medio ambiente,
• Materiales, equipos y desechos industriales y de construcción al aire libre,
• Contenedores de envío y almacenamiento, incluidos contenedores de mudanza personal,
• Artículos para el hogar mantenidos al aire libre,
• Transportes de cualquier tipo, incluidos, entre otros, automóviles, camiones, vehículos recreativos, botes y remolques,
• Equipo agrícola que incluye, entre otros, tractores, equipo de cosecha y contenedores rígidos,
• Cualquier otro artículo, objeto, material o medio de transporte cuando un funcionario de cuarentena vegetal del estado de California lo determine que presenta un riesgo de portar o propagar cualquier etapa de la vida de SLF.

Part of a July 2021 news release in Spanish about the SLF quarantine in California.
[California Department of Agriculture News Release #21-078]



Public warning about SLF posted on Facebook by the Town of Secaucus, NJ in September 2021.

Appendix 6. Potential environmental consequences under the existing SLF Program

A. SLF Program for 14 states and the District of Columbia (Existing Program)

This section considers the potential environmental consequences for the existing Spotted Lanternfly (SLF) Program, implemented by APHIS in April 2023 and discussed as the preferred alternative in the SLF Final EA (USDA APHIS 2023a). The existing SLF Program area includes 14 states and the District of Columbia.

Potential impacts from tree bands and circle traps, detection and visual reconnaissance surveys, egg mass scraping, and manual removal of tree-of-heaven have extremely low risks. The impacts of these Program actions are discussed in prior Program EAs (listed in Appendix 1 of the ProEA) and are incorporated by reference. These Program actions are not discussed further in this appendix except for the insecticide dichlorvos, which is in the insecticidal strips used in circle traps.

Potential negative environmental consequences from the spread of SLF, namely impacts to vegetation (e.g., weakening of grape vines) and subsequent indirect impacts to humans (economic losses incurred due to decreased grape production), are expected to be fewer within an active SLF Program area. Expanding the Program area and adding new options for effective treatment should reduce the likelihood of SLF populations becoming fully established across the United States, minimizing further impacts of SLF on the environment, the public, and program operating costs.

1. Herbicide Considerations

Environmental Fate and Toxicity of Program Herbicides

This section summarizes the environmental fate and toxicity of the herbicides prescribed for use by the SLF Program. The information for triclopyr, imazapyr, and metsulfuron-methyl comes from Appendix E in USDA APHIS (2015) Asian Longhorned Beetle Eradication Program Programmatic Environmental Impact Statement (EIS), which is incorporated by reference (USDA APHIS 2015). The information for aminopyralid and glyphosate comes from U.S. Forest Service's risk assessments (USDA FS 2007; 2011a). Consult these documents for additional details.

Triclopyr (Triclopyr Butoxyethyl Ester (BEE))

The herbicide triclopyr BEE imitates a plant hormone (indoleacetic acid) that is used to control woody plants and broadleaf weeds (USDA FS 2011c). The triclopyr formulation (triclopyr butoxyethyl ester (BEE) (Garlon® 4 Ultra), can cause slight temporary eye irritation during application as well as some skin irritation in cases of prolonged exposure (USDA FS 2011c). Acute oral median lethal concentrations are 1,000 milligrams (mg)/kilogram (kg) with acute inhalation and dermal toxicity median lethality values greater than the highest test concentration suggesting low acute mammalian toxicity under various exposure pathways. Triclopyr BEE is not considered carcinogenic or mutagenic and in cases where developmental and reproductive studies demonstrate effects, doses were at levels considered to be maternally toxic (USEPA 1998).

Triclopyr BEE is slightly toxic to birds, moderately toxic to highly toxic to freshwater fish and estuarine and marine invertebrates, slightly to moderately toxic to freshwater invertebrates, and highly toxic to estuarine and marine fish (USEPA 1998). The primary metabolite of triclopyr BEE, triclopyr acid, is considered practically non-toxic to aquatic organisms, based on available toxicity data (USEPA 1998).

Triclopyr BEE vapor pressure indicates it can volatize. The Program uses backpack sprayers or hand painting to apply herbicides; for spraying, the Program uses large coarse droplets. Drift is not anticipated to be significant. Mobility studies are not required for Triclopyr BEE because it degrades rapidly in soils (USEPA 1998).

Aminopyralid

The following information about aminopyralid is taken directly from (USDA FS 2007):

> *Aminopyralid is a systemic selective carboxylic acid herbicide that affects plant growth regulators, or auxins, and has multiple non-agricultural uses. The mammalian toxicity of aminopyralid is relatively well-characterized in experimental mammals in a series of toxicity studies that are required for pesticide registration. In standard experimental toxicity studies in rats, mice, rabbits, and dogs, aminopyralid has low acute and chronic oral toxicity. It seems reasonable to assume the most sensitive effects in wildlife mammalian species will be the same as those in experimental mammals (e.g., changes in the gastrointestinal tract, weight loss, and incoordination).*
>
> *Results of acute exposure studies in birds indicate that avian species appear no more sensitive than experimental mammals to aminopyralid in terms of acute lethality. In terms of non-lethal effects, however, birds may be somewhat more sensitive than mammals to aminopyralid after gavage exposures. In developmental studies involving gavage dosing, no observed adverse effect level (NOAEL) values for mammals are in the range of 200 mg acid equivalent (a.e.)/kg body weight (bw)/day. In birds, the single dose gavage NOAEL is 14 mg a.e./kg bw. Birds are much less sensitive to dietary exposures compared to gavage exposures with NOAEL values for 5-day dietary exposures of over 1,000 mg a.e./kg bw/day.*
>
> *A standard set of toxicity studies are also available on terrestrial plants. Dicots are substantially more sensitive to aminopyralid than monocots. Relatively little information is available on the toxicity of aminopyralid to terrestrial invertebrates or terrestrial microorganisms. Based on bioassays in honeybees, earthworms, and soil microorganisms, aminopyralid does not appear to be very toxic to terrestrial invertebrates or soil microorganisms.*
>
> *There is no indication that aminopyralid is likely to be toxic to aquatic animals based on standard acute and chronic bioassays in fish and invertebrates as well as one acute toxicity*

study in a species of frog. As would be expected from an herbicide, some aquatic plants are more sensitive than aquatic animals to the effects of aminopyralid. Duckweed, the one macrophyte on which a bioassay of aminopyralid has been conducted, does not appear to be sensitive to aminopyralid.

In chronic exposure studies on birds, aminopyralid did not result in detectable adverse effects. The NOAEL in the bobwhite quail and mallard duck is 2,500 mg/kg diet and 2,623 mg/kg diet, respectively (USEPA 2020c).The NOAEL in the bobwhite quail and mallard duck is 2,500 mg/kg diet and 2,623 mg/kg diet, respectively (USEPA 2020c).

The USEPA (2020c). has classified aminopyralid as practically non-toxic to aquatic-phase amphibians, practically non-toxic to freshwater invertebrates, practically non-toxic to the estuarine and marine mysids and slightly toxic to the estuarine and marine mollusks (USEPA 2020c).

In a U.S. Forest Service risk assessment (USDA FS 2007), no risks to workers or members of the public were anticipated based on the toxicity of aminopyralid and the potential exposure to aminopyralid. The risk assessment evaluated the highest application rate and three application methods: direct ground spray, broadcast ground spray, and aerial spray. The SLF Program primarily makes direct ground spray applications using backpack sprayers and does not use aerial spray. Although aminopyralid environmental fate properties indicate it is mobile to highly mobile in soil, non-persistent to persistent in soil and is expected to reach off-target water bodies via spray drift, runoff, and leaching (USEPA 2020c), the Program's use pattern reduces the potential for off-site movement of this herbicide.

<u>*Imazapyr and Metsulfuron-methyl*</u>

Imazapyr is a systemic, non-selective imidazolinone herbicide used for the control of a broad range of terrestrial and aquatic weeds that works by inhibiting an enzyme involved in the biosynthesis of amino acids such as leucine, isoleucine, and valine (USDA FS 2011b; WDNR 2012). Metsulfuron-methyl is a sulfonylurea herbicide that inhibits the enzyme that catalyzes the biosynthesis of branched-chain amino acids (valine, leucine, and isoleucine) which are essential for plant growth (USDA APHIS 2015; USDA FS 2004).

Imazapyr and metsulfuron-methyl are a common tank mix partner with triclopyr in the control of woody vegetation. The toxicity of imazapyr and metsulfuron-methyl is considered low for mammals. The formulation containing metsulfuron-methyl, Escort® XP, is considered practically nontoxic to mammals via inhalation, dermal, and oral exposures. All toxicity values were reported as greater than the highest test concentration. In addition, metsulfuron-methyl is not considered to be carcinogenic, nor has it been shown to be a reproductive, teratogenic, or developmental hazard (USDA FS 2004). Escort® XP is considered a slight eye irritant but is not considered a skin irritant or sensitizer. Arsenal®, containing the active ingredient imazapyr, has a similar mammalian toxicity profile to metsulfuron-methyl, and is considered practically nontoxic in acute inhalation, dermal, and oral exposures. Imazapyr is not considered to be a carcinogen or mutagen, and is not known to be a reproductive, teratogenic, or developmental hazard (USDA FS 2011b).

The toxicity of imazapyr and metsulfuron-methyl is low to all nontarget organisms, except for some aquatic and terrestrial plants (USDA FS 2004; 2011b). Both products are considered practically nontoxic to wild mammals, birds, and terrestrial invertebrates, based on the available acute and chronic toxicity data (USDA FS 2004; 2011b). Toxicity to fish and aquatic invertebrates is very low with median lethal acute concentrations typically exceeding 100 mg/Liter (L) for both chemicals (USDA FS 2004; 2011b). Chronic toxicity to fish and aquatic invertebrates is also considered low, based on the available no observable effect concentration (NOEC) values that have been reported from standardized toxicity studies.

Imazapyr is water soluble and does not appear to bind readily to soil, based on soil adsorption coefficient values that range from 30 to 100 (USDA FS 2011b). Imazapyr degradation and dissipation half-lives are variable, ranging from approximately 25 days to greater than 300 days. Metsulfuron-methyl half-lives in soil range from 17 to 180 days. Reported soil adsorption and water solubility values suggest that metsulfuron-methyl has some mobility. Off-site transport of these two herbicides is not expected as the products are being applied directly by hand. Material is applied using a large droplet size under low volume to minimize drift and ensure application and uptake directly to the sprouting plants.

Glyphosate

Glyphosate is a non-selective post-emergent systemic herbicide that works by inhibiting essential aromatic amino acids important to plant growth (USDA FS 2011a). Glyphosate has a variety of agricultural and non-agricultural uses.

Glyphosate adsorbs strongly to soil and is not expected to move vertically below the six-inch soil layer; residues are expected to be immobile in soil. Glyphosate is readily degraded by soil microbes to aminomethylphosphonic acid (AMPA), which is degraded to carbon dioxide. Glyphosate and AMPA are not likely to move to ground water due to their strong adsorptive characteristics. However, glyphosate does have the potential to contaminate surface waters due to its aquatic uses permitted with some formulations, and through erosion, as it adsorbs to soil particles suspended in runoff.

Glyphosate is low in toxicity to mammals via oral, dermal, and inhalation routes. Glyphosate is no more than slightly toxic to birds and is practically nontoxic to fish, aquatic invertebrates, and honeybees. Fish, amphibians, and most aquatic invertebrates appear to be about equally sensitive to the toxicity of technical grade glyphosate and glyphosate formulations, and any differences in response to exposure are more likely attributable to experimental conditions, particularly pH, than to species differences. The sensitivity of algae to glyphosate and glyphosate formulations varies among species; however, the data regarding differences among species of aquatic macrophytes are less complete (USDA FS 2011a).

Impacts of Herbicide Use in the Program

The Program treats tree-of-heaven with herbicides. The herbicides triclopyr BEE, imazapyr, metsulfuron-methyl, aminopyralid, and glyphosate are applied following label instructions. Applications to stumps are by hand painting, physically wounding the stump and injecting the herbicide, or spraying the stump using a backpack sprayer. Applications to small trees are by injection into girdling wounds or applied using a backpack sprayer to bark at the base of the tree. Herbicide treatments usually occur June through September, although stump and trunk applications may occur during winter months. Foliar applications of glyphosate or aminopyralid are made to re-sprouts from stumps outside of wetland areas from June through September.

The Program's herbicide use pattern and herbicide label instructions, minimize damage to nearby vegetation from drift and runoff. Impacts to human health and the environment from the Program's 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 in many of its invasive weed control programs (USDA FS 2011c). The prescribed use of herbicides in the SLF Program is not expected to contribute significantly to the overall use of herbicides by other entities.

APHIS evaluated the potential human health and ecological risks from the use of triclopyr, imazapyr, and metsulfuron-methyl for the Agency's Asian Longhorned Beetle Eradication Program and finds the same risk types and exposures would apply to the SLF Program (USDA APHIS 2015). The U.S. Forest Service evaluated human health and environmental risk for aminopyralid and glyphosate and found low risk based on the toxicity profile of both herbicides (USDA FS 2007; 2011a). The SLF Program's use pattern for aminopyralid and glyphosate indicates similar low risks to human health and the environment.

The risks to human health are expected to be negligible; there is limited human exposure from the Program's use pattern of these herbicides (hand painting, backpack spraying, injection). The risk of exposure is greatest for workers who apply the product. The potential exposure to Program workers is low with proper use of required personal protective equipment. The potential for exposure to other people is also minimal provided the Program adheres to the prescribed use patterns. Risks were quantified for workers and the general public and shown to be low even in extreme exposure scenarios such as accidental spills, indicating exposure is unlikely to cause adverse health effects (USDA APHIS 2015; USDA FS 2007; 2011a). Any activities on private property related to SLF, including herbicide treatment of tree-of-heaven, would only occur with landowner permission.

The risks posed by Program herbicide use to nontarget fish and wildlife also are minimal. The prescribed use pattern reduces potential exposure to most nontarget fish and wildlife. Wild mammals and birds are at very low risk from herbicide applications due to the low toxicity of SLF Program herbicides and the lack of anticipated effects to food sources that they use. Aquatic organisms are also at low risk based on the favorable toxicity profile and expected low residues that could occur in aquatic environments from the herbicide applications. There is some risk to nontarget terrestrial plants from herbicide treatments. However, the potential for effects is restricted to areas immediately adjacent to any application.

2. Insecticide Considerations

Methods of Insecticide Application

Tree injections of insecticides can mean lower rates of active ingredients, decreased amount of overall chemical product used, and increased length of protection from pests. Drift on and into surrounding vegetation and water bodies is not an issue with tree injections. The use of hand-held, backpack and truck-mounted sprayers still allows applicators to have good control over the distribution of the insecticides applied. Treatments can be relatively exact, drift and the unintentional spraying of nontargets is minimized.

The use of mist blowers and high-pressure hydraulic sprays to apply bifenthrin or beta-cyfluthrin can be more effective than hand-held and backpack sprayers for treating SLF. Mist blowers and high-pressure hydraulic sprays can treat large outdoor areas quickly, disperse the insecticide into areas of dense foliage, and reach higher branches and foliage than other spray options. However, this increased efficacy comes at a potential cost to the environmental health. The ability for the insecticide to be sprayed over a greater area also means an increased chance for spray drift. To ensure minimal impacts from mist blowers and high-pressure hydraulic sprays, it is extremely important to adhere to label mitigations. In addition, the following measures are applicable for all insecticide use in the SLF Program to protect waterbodies from drift and runoff:

- Do not apply when wind direction favors downwind drift towards nearby water bodies.
- Do not apply when wind velocity exceeds 5 mph.
- Do not treat areas to the point of run-off.
- Do not make applications during rain.

When applying insecticides with a mist blower or high-pressure hydraulic spray, the Program establishes a minimum 150-foot no-treatment buffer around any aquatic habitat to protect surrounding waterbodies and aquatic species. The Program establishes a 500-foot no-treatment buffer in treatment areas that are in proximity to federally listed threatened and endangered (T&E) species and their critical habitats.

The existing Program expands mist blower and high-pressure hydraulic spray applications of bifenthrin and beta-cyfluthrin to include rail and road rights-of-way throughout the Program area where human-mediated movement of SLF is likely. The Program only treats rights-of-way segments that are likely to contribute to SLF spread.

Environmental Fate, Toxicity, and Impacts of Program Insecticides

Bifenthrin

The bifenthrin product used for knock-down treatments is Talstar® P (7.9% active ingredient (a.i.)). Bifenthrin is a synthetic pyrethroid insecticide made to mimic natural pyrethrins that are refined from chemicals found in chrysanthemum flowers. Pyrethroids alter insect nerve function, causing paralysis in target insect pests, eventually resulting in death (USEPA 2020i). Bifenthrin controls a broad-spectrum of insects and mites in agricultural and residential settings, both indoor and outdoor on trees, shrubs, foliage plants, non-bearing fruit and nut trees, and flowers in greenhouses, indoor and outdoor plant displays.

Bifenthrin has low acute toxicity via the dermal and inhalation routes of exposure and has high acute toxicity via the oral route (USEPA 2020h). 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 (USEPA 2008). Acute effects of the formulation appear to be similar or less than the technical active ingredient, based on available data on the safety data sheet. Bifenthrin is not considered 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 (USEPA 2020h). Human incident (poisoning) data indicate health effects were primarily neurological, respiratory, dermal, and gastrointestinal; were mild or minor to moderate and resolved rapidly. Most incidents occurred in residential settings, with 33 percent of exposures resulting from homeowner mixing and loading or applying the product (USEPA 2020h).

Humans may be exposed to bifenthrin in food and drinking water; bifenthrin may be applied to crops and applications may result in residues of bifenthrin reaching drinking water (USEPA 2020h). However, risk to ground and surface drinking water resources are not expected to be significant for the Program's use pattern, based on label restrictions regarding the protection of surface water and the environmental fate properties for bifenthrin that demonstrate low solubility and a high affinity for binding to soil (USEPA 2010a; 2016c).

Bifenthrin has low to slight toxicity to birds, moderate acute toxicity to wild mammals, and slight toxicity to terrestrial-phase amphibians and reptiles on an acute basis (USEPA 2010b; 2016b). Aquatic vascular plants are not sensitive to pyrethroids (USEPA 2016c). Significant exposure and risk to nontarget terrestrial vertebrates are expected to be minimal due to its toxicity profile and prescribed use pattern. Any incidental contact by terrestrial invertebrates could result in toxicity because pyrethroid insecticides are toxic to most terrestrial invertebrates. Bifenthrin is very highly toxic to honeybees (USEPA 2016b). The USEPA has identified potential acute risks of concerns to bees and other terrestrial invertebrates from use of pyrethroids (USEPA 2016c). To reduce potential impact to pollinators, the label indicates plants in bloom may be hand sprayed at times when pollinating insects are not present, such as early morning or late evening.

Like 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; USEPA 2010a). Bifenthrin binds tightly to soil and has very low solubility, reducing the potential for transport and exposure to aquatic organisms (USEPA 2010a; 2016c). The high octanol and water partition coefficient suggests that bifenthrin is highly bioaccumulative in fish with relatively slow depuration (process of freeing impurities). This is confirmed by the bioaccumulation in fish studies. Risks to all aquatic animals are a dominate concern with pyrethroids (USEPA 2016c). Due to the method of application, the Program's use pattern, and its environmental fate properties, bifenthrin is not expected to runoff or drift from the point of application in quantities that could impact aquatic resources because treatments occur to materials in a localized area. Any bifenthrin that could move offsite would not be expected to impact surface or groundwater. Bifenthrin is not identified as a cause of impairment for any water bodies listed as impacted under section 303(d) of the Clean Water Act; however, pyrethroids as a group have been identified as cause for impairment for three water bodies in Central Valley, California, none of which are in current Program treatment areas (USEPA 2010b).

Bifenthrin degrades slowly in soil and sediment, based on field terrestrial and aquatic dissipation data (USEPA 2010a). 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 from water and soil surfaces is not expected due to the low vapor pressure for bifenthrin (USEPA 2010a). Bifenthrin strongly adsorbs to soil particles and organic matter, further reducing volatilization (USEPA 2010a).

Potential impacts of bifenthrin to human health and the environment from basal tree trunk sprays are expected to be low, provided all label use directions are followed. Bifenthrin label requirements to protect human health and the environment include:

- not applying when wind speed exceeds 5 miles per hour.
- no more than one treatment every seven days.
- no applications to food crops.
- all treatments will be made outdoors.
- humans and pets may not re-enter treated area until the area is dry.
- applicators must wear a long-sleeved shirt and long pants, socks, shoes, chemical-resistant gloves, and a respiratory device and protective eyewear when working in non-ventilated spaces.

The product manufacturer recommends the use of an alternate class of chemistry in the treatment program to prevent or delay pest resistance.

The application of bifenthrin with a mist blower or high-pressure hydraulic spray can increase the potential for impacts to the environment and human health due to the increased height of the spray application and the increased risk of spray drift and runoff. Pesticide label application rates and SLF Program mitigations outlined in Section A.2.c (“Methods of insecticide application”) must be followed to minimize impacts. The SLF Program establishes a minimum 150-foot no-treatment buffer around any aquatic habitat to protect surrounding waterbodies and aquatic species. The Program establishes a 500-foot no-treatment buffer in treatment areas that are in proximity to federally listed T&E species and their critical habitats. The buffers will also mitigate the likelihood of runoff from applications of bifenthrin.

<u>*Beta-cyfluthrin*</u>

The beta-cyfluthrin product used for high-pressure hydraulic spray and mist blower treatments is Tempo® SC Ultra 11.8%. Like bifenthrin, beta-cyfluthrin is synthetic pyrethroid compounds made to mimic natural pyrethrins that are refined from chemicals found in chrysanthemum flowers. Pyrethroids alter insect nerve function, causing paralysis in target insect pests, eventually resulting in death (USEPA 2016c; 2020i). Beta-cyfluthrin controls a broad-spectrum of insects and mites in agricultural and residential settings, both indoor and outdoor on trees, shrubs, foliage plants, non-bearing fruit and nut trees, and flowers in greenhouses, indoor and outdoor plant displays.

The acute oral median lethal toxicity of cyfluthrin is considered low to moderate for mammals (USEPA 2010c). Inhalation and acute dermal toxicity are considered low. There is no evidence of genotoxic potential, delayed neurotoxicity, carcinogenic potential, or reproductive effects (FAO 2016). Beta-cyfluthrin is classified as "not likely to be carcinogenic to humans" (USEPA 2020e).

Beta-cyfluthrin is an isomeric enriched form of cyfluthrin. Cyfluthrin is considered practically nontoxic to birds with acute oral median lethal toxicity values greater than 2,000 mg/kg (USEPA 2010c). Pyrethroids do not pose a risk to terrestrial and aquatic plants (USEPA 2016b).

The broad-spectrum activity of cyfluthrin results in high toxicity to most insects, including pollinators. The 48-hour contact median lethal dose for honeybees is 0.037 micrograms (µg)/bee (USEPA 2010c; 2016b). Adherence to cyfluthrin label requirements regarding the protection of honeybees will reduce exposure and risk to honeybees and other pollinators. USEPA has determined that incident reporting will be added to labels to encourage users to report bee kill incidents to USEPA (USEPA 2020g). Cyfluthrin has low toxicity to earthworms and other soil macro- or micro-organisms (FAO 2016).

Cyfluthrin is highly toxic to fish and very highly toxic to most aquatic invertebrates (USEPA 2016b). The greatest risk to aquatic resources is through drift from cyfluthrin applications. Off-site transport from drift to aquatic resources is minimized with ground-based equipment, adherence to application buffers and Program mitigations.

Cyfluthrin half-lives in soil are variable depending on pH and organic matter. Laboratory and field dissipation half-lives range from approximately 30 to 94 days. Once cyfluthrin reaches the soil, it binds very tightly to soil particles and is not considered to be water-soluble (USEPA 2016c). The high affinity for soil and low solubility suggests that any cyfluthrin that reaches an aquatic resource will be soil bound or partition very rapidly to the sediment (USEPA 2016c). The lack of mobility suggests that ground water contamination will not be a concern. Surface water quality could be impacted from drift during applications; however, several mitigation measures are stated on the label to protect surface water quality. Cyfluthrin will only occur in the atmosphere during application; however, it will dissipate rapidly and is not expected to volatilize back into the atmosphere, based on its chemical properties. Beta-cyfluthrin is non-volatile under field conditions and slightly volatile from a water surface or wet surface (USEPA 2016c). Its tendency to bind to organic matter reduces the potential to volatilize in the environment (USEPA 2016c).

Application of beta-cyfluthrin to sewers and drains is prohibited, as well as to any site where drainage to sewers, storm drains, water bodies, or aquatic habitat can occur. The Program follows the label's application buffer requirements and imposes all required buffers to protect water resources.

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

The application of beta-cyfluthrin with a mist blower or high-pressure hydraulic spray can increase the potential for impacts to the environment and human health due to the increased height of spray application and increased beta-cyfluthrin drift. Pesticide label application rates and SLF Program mitigations outlined in this Appendix ("Methods of insecticide application") must be followed to minimize impacts. There is a minimum 150-foot no-treatment buffer around aquatic habitats to protect surrounding waterbodies and aquatic species. The Program establishes a 500-foot no-treatment buffer around habitats, including critical habitats, of federally listed T&E species. The buffer also mitigates the likelihood of runoff from applications of beta-cyfluthrin.

Beauveria bassiana

B. bassiana is a fungus found naturally in soil that can be used as a biochemical pesticide or biopesticide to kill or control various insects. The live fungal spores attach to the surface of the insect, germinate, penetrate the exoskeleton, and rapidly grow within the insect, resulting in death of the insect (USEPA 2020f).

B. bassiana is as a broad-spectrum insecticide used against a range of insect pests; the Program uses *B. bassiana* for knock-down treatments. The product used is *Beauveria bassiana* Strain GHA (BoteGHA™ ES, BotaniGard® ES, Mycotrol® ESO). Treatments are made to host material using ground-based equipment, including high-pressure hydraulic treatments. This microbial insecticide has low toxicity to humans in oral, dermal, and inhalation exposures and is not pathogenic (USEPA 2000). Formulations may result in some mild eye irritation.

Very minimal impacts to human health and the environment are expected from the use of *B. bassiana*; it has low toxicity and pathogenicity (USEPA 2000; 2020f). Residues are not expected to remain on treated food or feed and available information indicates that use of the fungus as a pesticide is not expected to have adverse effects on human health or the environment (USEPA 2000; 2020f). Special precautions should still be taken for applicators, such as personal protective equipment (PPE), all of which are outlined on the product labels. *B. bassiana* products can be reapplied as necessary. Intense pest outbreaks may require a combination of the product with a compatible insecticide.

Based on its low toxicity potential, it is not likely to have adverse effects on the environment, and the potential ecological risk due to exposure to *B. bassiana* is likely to be minimal (USEPA 2020f). *B. bassiana* is not expected to result in significant risks to nontarget fish and wildlife.

The fungus is specific to certain insects and has low toxicity to wild mammals, birds, fish, and plants (USEPA 2020f). Nontarget insects that are sensitive to the effects of *B. bassiana* could be impacted but these effects would be localized to the areas of treatment.

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 indicate it will not persist in the environment and will not occur off-site in aquatic resources in quantities that could result in impacts to the environment. The fungus is not expected to volatilize into the atmosphere and impact air quality.

Dichlorvos

The Program uses dichlorvos insecticidal strips in circle traps. In 2017, APHIS evaluated potential impacts from the use of dichlorvos strips in the APHIS Fruit Fly Program. APHIS found that, provided strips were used according to their label, the probability of exposure to people and the environment (including nontarget organisms) were low and risks to human health and the environment (including nontarget organisms) were negligible (USDA APHIS 2017). The SLF Program uses dichlorvos in a similar manner as the Fruit Fly Program and expects its use to have similar potential impacts.

Dichlorvos volatizes readily in air, has a half-life of 1.5 to 57 days in water, is not known to bioaccumulate in animals or plants, and does not bind to the soil (USEPA 2007).

Dichlorvos is moderately to highly toxic to mammals in oral, inhalation, and dermal acute exposures(USEPA 2005). It is highly toxic to birds on an acute oral toxicity and moderately to practically non-toxic to birds in subacute dietary exposures (USEPA 2005). Dichlorvos is highly toxic to many terrestrial invertebrates due to its broad-spectrum activity, including pollinators (honeybees, butterflies, and moths) (Hoang and Rand 2015; Stanley et al. 2015). Dichlorvos is moderately to highly toxic to fish in acute exposures and has high chronic toxicity for fish (USEPA 2005). It has acute and chronic toxicity to aquatic invertebrates (USEPA 2005). There is no data on its toxicity to terrestrial plants; studies on aquatic plants indicate low toxicity (USEPA 2005).

Dichlorvos has been shown to inhibit acetylcholinesterase and cholinesterase activities in the human nervous system, and effects on nerve functions following dichlorvos exposure during development have been reported (USEPA 2007). However, there is very little risk of human exposure based on the Program's use pattern. Only certified pesticide applicators handle circle traps in the SLF Program. Applicators should avoid contact with eyes and mouth while handling dichlorvos strips and avoid breathing vapors. The strips are difficult for a small child to access: the dichlorvos strips are contained within a chamber would need to be opened, and the circle traps are placed at a height on the tree trunk that is difficult for small children to reach. Additionally, a warning message is placed on the trap.

Dinotefuran

The Program applies dinotefuran to trap trees. The solubility and soil adsorption characteristics of dinotefuran suggest that it is highly mobile (USEPA 2004). 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 (USEPA 2004).

Dinotefuran has low toxicity to fish (USDA FS 2009). No effects were observed for freshwater, estuarine and marine fish, and aquatic plants (USEPA 2020b). Risks of concerns were identified to freshwater invertebrates on acute and chronic basis (USEPA 2020b); it is considered highly toxic to some invertebrates (USDA FS 2009). Available toxicity data indicate that degradants of dinotefuran are less toxic to aquatic organisms. Dinotefuran is susceptible to runoff (USEPA 2004); 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. Bioaccumulation in aquatic organisms is negligible. Dinotefuran is persistent in aquatic environments except for conditions that favor aqueous photolysis (USEPA 2020b).

According to the USEPA, dinotefuran is practically non-toxic to moderately toxic to birds, terrestrial-phase amphibians, and reptiles and practically non-toxic to mammals on an acute basis. The chemical is highly toxic to adult bees on an acute contact and oral basis (USEPA 2020b). No risks were identified for terrestrial plants.

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.

Minimal impacts to human health and the environment are expected from tree injections or hand-held and backpack spraying of dinotefuran on trap trees. Dinotefuran is classified as “not likely to be carcinogenic to humans” (USEPA 2020b). Dinotefuran has low acute toxicity by oral, dermal, or inhalation exposure routes to humans (USEPA 2020b). While human incidents from the use of dinotefuran are reported to the USEPA, they are of low severity and are not a concern to the agency at this time (USEPA 2020b).

Imidacloprid

Human health and environmental impacts from imidacloprid are as discussed in Appendix F of the Programmatic ALB Eradication EIS (USDA APHIS 2015), which is incorporated by reference. The Program’s use pattern for imidacloprid in the SLF Program is similar to its use pattern in the Asian Longhorned Beetle Program. The Program injects imidacloprid, a neonicotinoid insecticide, into trap trees.

The technical material and several formulations are also considered practically nontoxic to mammals in dermal and inhalation exposures (USDA FS 2016; USEPA 2020a). Acute lethal median toxicity values are typically greater than 2,000 mg/kg and 2.5 mg/L for dermal and inhalation exposures, respectively. Imidacloprid has high oral lethality (USEPA 2020a). Available data for imidacloprid and associated metabolites suggest a lack of mutagenic, carcinogenic, or genotoxic effects at relevant doses. Developmental, immune, and endocrine related effects have been observed in some mammal studies. In all developmental studies the effects to the offspring occurred at doses that were maternally toxic (USDA FS 2016).

Imidacloprid is considered non-carcinogenic for humans. The chemical exhibits high oral lethality and low dermal and inhalation lethality; however, most occupational handler risk estimates were not of concern with appropriate baseline PPE (log-sleeved shirt, long pants, shoes, socks, and possibly gloves) (USEPA 2020a). Human health incidents recorded from January 2016 until August 2019 included 252 reports: 19 were classified as major severity, 233 classified as moderate severity. The 19 severe cases included dermal and neurological symptoms (i.e., headaches, numbness, tingling, and one person reported seizures) (USEPA 2020a). The reported human health incidents were not from APHIS program applications.

Imidacloprid is moderately toxic to mammals on an acute exposure basis; highly toxic to birds on an acute oral exposure basis and slightly toxic on a subacute dietary exposure basis; and very highly toxic to adult honeybees. The chemical was not found to be toxic to terrestrial plants (USDA FS 2016; USEPA 2020a).

Imidacloprid is readily soluble in water and volatilization and bioaccumulation in aquatic organisms is negligible; it is considered persistent in aquatic environments except for conditions that favor aqueous photolysis (USEPA 2020a).

Imidacloprid has low toxicity to aquatic organisms including fish, amphibians, and some aquatic invertebrates. Acute toxicity to fish and amphibians is low with acute median lethal concentrations typically exceeding 100 mg/L (USDA FS 2016; USEPA 2016a). Chronic toxicity to fish is in the low parts per million range, depending on the test species and endpoint. Imidacloprid presents risk of concern to freshwater and saltwater invertebrates on a chronic basis (USEPA 2016a; 2020a). Aquatic invertebrates are more sensitive to imidacloprid when compared to fish, depending on the test species (USDA FS 2016; USEPA 2016a).
APHIS has yet to use imidacloprid in the SLF Program as imidacloprid is not as effective as dinotefuran, and future use is expected to be negligible. Imidacloprid treatments by injection would be highly targeted: injection means no drift and eliminating direct contact of the insecticide on surrounding vegetation, soil, and vulnerable animals, including pollinators. All mitigations on imidacloprid product labels such as treatments per year are followed to protect the environment and human health.

Soybean oil

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

The SLF Program may use a 50% soybean oil solution to treat SLF egg masses via spot treatment to trees and nursery stock. Product labels for vegetable oils have precautionary language that is followed by the Program to protect human health and the environment. Because soybean oil and oil vapor are flammable, PPE is required when handling the product. The usage label requires that the oil cannot be applied to water or in areas where surface water is present, and all disposal directions must be followed. No one may re-enter treated areas for four hours unless wearing appropriate protective gear. Since soybean oil is safe for most people to consume, human health impacts are expected to be minimal when used according to the product label. Notification is made in advance of treatment to protect individuals with soy allergies.

Although soybean oil is of low acute toxicity and employs a non-toxic mode of action, all precautionary label statements are followed by Program applicators to protect human health and the environment.

3. Physical Environment

Air

USEPA sets National Ambient Air Quality Standards to protect public health for five major air pollutants: ground-level ozone, particular pollution (also known as particulate matter), carbon monoxide, sulfur dioxide and nitrogen dioxide. USEPA uses the Air Quality Index (AQI) values to indicate overall air quality. AQI considers all the air pollutants measured within a geographic area. Air quality for the existing Program area was covered in prior Program EAs. Air quality data for each state for every year can be found online at https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report (last accessed September 13, 2022).

Some of the herbicides and insecticides approved for use in the SLF Program have the potential to impact air quality; however, impacts are expected to be short term, localized, and minor. The application of herbicides and insecticides when an area is in exceedance of air quality standards could lead to cumulative effects in air quality. However, the air quality index in the existing Program area (14 states and the District of Columbia) is rarely classified as 'very unhealthy' or 'unhealthy'(USEPA 2022a). Most of the Program herbicides and insecticides have low to no volatility, or strongly absorb to soil and organic matter, indicating minimum impact to air quality. The insecticide dichlorvos is highly volatile; however, the use pattern of dichlorvos as an insecticidal strip in traps and its rapid degradation in the atmosphere suggest that impacts to air quality are negligible (USDA APHIS 2017; USEPA 2020d).

Mist blowers and high-pressure hydraulic sprays have the greatest potential for impacting surrounding air quality. To ensure that impacts from mist blowers/hydraulic sprays are minimal, it is extremely important to adhere to label mitigations, such as labeled use restrictions for wind direction, wind velocity, rates of application, and spray droplet size. The SLF Program's applications of bifenthrin, beta-cyfluthrin, *B. bassiana*, and soybean oil with basal tree trunk sprays, as well as use of dichlorvos in circle traps, all have minimal impacts to air quality, provided labels are followed. Boom sprays are used as per the label, low to the ground, with appropriate nozzle size and facing the appropriate direction to minimize spray drift. While dichlorvos has harmful vapors, the strips are used in well-ventilated areas and handlers will ensure they avoid breathing in vapors.

Control of tree-of-heaven could induce impacts to air quality, but impacts will be short term, localized, and minor. Tree death can decrease local carbon sequestration; however, over time, natural succession will offset carbon dioxide release into the atmosphere.

Water

The Clean Water Act (CWA), the Safe Drinking Water Act, and the Water Quality Act are the primary federal laws protecting the Nation's waters. Federal activities also must seek to avoid or mitigate actions that will adversely affect areas immediately adjacent to wild and scenic rivers (National Wild and Scenic Rivers Act of 1968, as amended (16 USC §§ 1271-1287)). Section 402 of the CWA addresses the National Pollutant Discharge Elimination System (NPDES) including those permits related to the discharge of pesticides to waters of the United States. The USEPA and the states issue Pesticide General Permits under the NPDES program for specific types of pesticide applications. These uses typically include applications for mosquito control, various weed and algae pest control, animal pest control activities in or near water, and forestry canopy pest control where a portion of the pesticide will be applied over and deposited to water. Other pesticide application sites may be subject to individual permits based on recommendations from either the USEPA or respective state agency. States have responsibility for administration of their respective NPDES permitting programs.

Surface water runoff can affect streams and other water bodies' quality by depositing sediment, minerals, or contaminants. Meteorological factors such as rainfall intensity and duration, and physical factors such as vegetation, soil type, and topography influence surface water runoff (USGS 2018b). Groundwater (e.g., aquifer) levels vary seasonally and annually depending on hydrologic conditions. Groundwater is ecologically important because it supplies water to wetlands, and through groundwater-surface water interaction, groundwater contributes flow to surface water bodies (USGS 2018a). Polluted runoff, known as nonpoint source pollution, occurs when rainfall picks up contaminants such as pesticides, sediment, nutrients, or bacteria on its way to lakes, rivers, wetlands, coastal waters, and ground water. Nonpoint source pollution occurs from activities such as fertilizing a lawn, road construction, pet waste, and improperly managed livestock, crop, and forest lands. States have reported that nonpoint source pollution is the leading cause of water quality problems (USEPA 2022b).

The ecoregions for the existing SLF Program area are described in prior EAs. Surface water statistics for the existing Program area are summarized in prior EAs. Site-specific EAs will be prepared for environments outside the existing Program area that may be affected by SLF Program actions.

APHIS considers impacts to water resources as significant if they exceed federal or state water quality standards. Insecticides and herbicides, when used improperly, can end up in surrounding water bodies. The chemicals can reach waterways from direct spray, drift, spills, via run-off in solution, or on soil particles that are moved by hydraulic forces. All program uses of insecticides and herbicides must be away from surface water and follow label directions that eliminate or greatly reduce runoff.

Mist blowers and high-pressure hydraulic spray treatments have the greatest potential for impacting surrounding water quality. In addition, the expanded use sites to include rail and road rights-of-way may increase the number of treatment sites that are in proximity to water resources. The existing Program's geographic area encompasses a cumulative large area of surface waters, although not all surface water will be in proximity to treatment areas. To protect surrounding water bodies from spray drift and runoff, it is extremely important to adhere to label mitigations and follow SLF Program protocols. Per the label, bifenthrin may not be applied over an impervious surface, drainage or other conditions that could result in runoff into storm drains, drainage ditches, gutters, or surface water. Bifenthrin insecticide treatments are restricted: they may not occur when wind direction favors downwind drift towards nearby water bodies; may not occur when wind velocity exceeds 5 mph; may not occur to the point of run-off; and they may not occur during rain. The Program follows the same application restrictions for beta-cyfluthrin. When applying bifenthrin or beta-cyfluthrin by mist blower and high-pressure hydraulic spray treatments, there must be a minimum 150-foot no-treatment buffer around all waterbodies. Waterbodies include, but are not limited to lakes, reservoirs, rivers, permanent streams, wetlands, natural and manmade ponds, and estuaries. APHIS also requires a 500-foot no-application buffer from habitat, including designated critical habitat, for all federally listed T&E aquatic species that may occur within a proposed action area (USDA APHIS 2023a).

The SLF Program's applications of bifenthrin and beta-cyfluthrin, *B. bassiana*, and soybean oil with basal tree trunk sprays have minimal impacts to water quality, provided labels are followed. Truck-mounted sprays are used as per the label, low to the ground, with appropriate nozzle size to minimize spray drift. The methods of application that include spot treatments using backpack sprayers must not oversaturate bark; this reduces the likelihood of off-site transport of the insecticide due to drift.

APHIS conducts environmental monitoring with the use of spray drift card samples and water or sediment samples, to assess whether SLF Program measures are effective in reducing off-site bifenthrin and beta-cyfluthrin deposition. APHIS requires additional mitigation measures if bifenthrin and beta-cyfluthrin residues may occur adjacent to, or in waterbodies, to prevent adverse effects to aquatic nontarget organisms.

There is negligible impact to water resources from dichlorvos because of the Program's use pattern and adherence to label instructions (e.g., do not apply directly to water, to areas where surface water is present, or to intertidal areas) (Hercon Environmental 2022; Plato Industries Incorporated 2013). Should a trap dislodge and fall into a waterbody, the small amount of dichlorvos in the strip and its rapid degradation through hydrolysis make significant impacts to surface water and groundwater unlikely (USEPA 2006).

Tree-of-heaven occurs throughout the existing SLF Program area. Control of tree-of-heaven may induce impacts to water quality, but those impacts are likely to be short term, localized, and minor. Changes in canopy cover and evapotranspiration due to tree-of-heaven control measures may alter stream flow (Mikkelson et al. 2013), while tree mortality adjacent to aquatic resources could reduce shading and alter water temperatures. Degradation of water quality might negatively affect aquatic organisms (Englert et al. 2017; Morrissey et al. 2015). These impacts are expected to be offset over time via natural succession.

Soil

Soil health or soil quality is the ability of soil to function as a vital ecosystem, sustaining plants, animals, and humans (USDA NRCS 2022). Soil is an ecosystem that provides nutrients for plant growth, absorbs and holds rainwater, filters and buffers potential pollutants, serves as a foundation for agricultural activities, and provides habitat for soil microbes to flourish (USDA NRCS 2022).

Many of the activities associated with the SLF Program can result in temporary soil surface disturbance or compaction. The most frequent ground disturbance is caused by vehicle and pedestrian activity. Soil impacts, however, are localized to areas where the Program occurs. APHIS considers that the long-term benefits of controlling SLF outweigh any short-term impacts to soil. Tree-of-heaven control could result in some impacts to soil including erosion, alterations to soil microflora, and soil compaction (Foote et al. 2015; Li et al. 2004). Best management practices, such as minimizing activities that expose bare soil to assist in rapid revegetation, can reduce impacts (Aust and Blinn 2004; Warrington et al. 2017).

Potential negative effects of herbicide and insecticide application can include decreased or altered microbial populations in the soil (Adomako and Akyeampong 2016); adverse impacts from SLF Program treatments are expected to be short-term and reversible. Tree trunk injections, spot treatment applications using backpack sprayers, and hand painting pesticide on stumps all reduce off-site transport of insecticides and herbicides into the soil. Similarly, the application of dichlorvos via strips in traps is expected to prevent the insecticide from contacting soil. Should a trap dislodge, the strip will likely remain inside the trap and not fall out. Should the strip encounter soil, the small amount of dichlorvos in the strip and its rapid volatilization and degradation make significant impacts unlikely (USEPA 2006). Boom sprays and spot treatments using backpack sprayers must not oversaturate bark, reducing the likelihood of off-site transport of insecticides from runoff. Mist blowers and high-pressure hydraulic spray treatments have the greatest potential for impacting soil quality because of the possibility of drift resulting in a larger impacted area. Mist blower and high-pressure hydraulic spray applications occur in industrial sites and other disturbed areas where soil quality is already impacted; they may also occur at railroad and road rights-of-way adjacent to natural and managed habitats. To protect soil quality from spray drift and runoff the Program does not treat areas to the point of run-off and does not make applications during rain. Should insecticide residues occur in soil due to mist blower and high-pressure hydraulic spray treatments, the impacts to soil invertebrates and microorganisms are expected to be minimal (USDA APHIS 2023a).

Residues that may occur in soil are subject to degradation reducing exposure over time. Bifenthrin degradation in soil is expected to be slower than beta-cyfluthrin based on longer soil photolysis and microbial degradation half-lives (USEPA 2016b). Bifenthrin residues may accumulate in soil due to slower degradation half-lives when multiple applications occur at a site. Available studies evaluating the acute and chronic effects of bifenthrin and beta-cyfluthrin show moderate to low toxicity to soil dwelling-organisms.

APHIS considers impacts to soil resources as significant if Program activities result in substantially increased erosion and sedimentation or adversely affected unique soil conditions. APHIS does not expect the existing SLF Program to have this type of impact. None of the control actions, when performed as prescribed in the SLF Final EA (USDA APHIS 2023a) are likely to increase the potential for erosion or sedimentation.

4. Biological Resources

Biological resources include plant and animal species and the habitats where they live. In assessing the existing SLF Program APHIS focused on impacts to vegetation, nontarget wildlife, and protected species. Both native and non-native species were considered. “Protected species” refers to migratory birds protected under the Migratory Bird Treaty Act of 1918 (MBTA), as amended, T&E species and their critical habitats as protected under the Endangered Species Act (ESA), and bald and golden eagles protected under the Bald and Golden Eagle Protection Act.

The Program implements control activities at sites where SLF is found. The removal of tree-of-heaven with herbicide occurs within a ¼-mile radius of positive finds. The Program uses trap trees within a ¼-mile radius of a positive find. The Program also treats railway lines, intermodal facilities and public road rights-of-way that are considered high risk for spreading SLF. The treatment area along railways and public roads consists of highly managed and disturbed locales with routine rail and vehicular traffic; these sites often receive other mechanical and chemical treatments to manage unwanted vegetation. Although flora and fauna within rights-of-way may be exposed to mowing, herbicides, pollution, as well as the facilitated spread of invasive competitors, the remaining green space may accommodate a high level of species richness, including biota of conservation concern (Gardiner et al. 2018). Public land use areas (including city, county, state and federal parks, refuges, and wildlife management areas) may occur within one-half mile of some treatment areas where the Program applies mist blower and high-pressure hydraulic spray treatments. Biological resources in these areas, as well as surrounding urban areas, need to be considered and protected.

Vegetation

Tree-of-heaven, the primary host of SLF, is a rapidly growing deciduous tree, native to Taiwan and northeast and central China. The tree was first introduced into Philadelphia in 1784 and then again on the west coast in the 1850s as a valued urban street tree. Tree-of-heaven has since been widely planted. Tree-of-heaven in forested areas typically occurs in small patches as canopy trees but can also occupy the understory.

Traits that allow tree-of-heaven to be so invasive are: its ability to grow almost anywhere; rapid growth in dense colonies; prolific seed production; its ability to continuously send up root suckers (i.e., shoots that grow from the roots of a plant) as far as 50 feet from the parent tree, even when injured; sprouts as young as two years produce seeds; and, the production of chemicals in its leaves, roots, and bark that can limit or prevent the growth of other plants in the area (Jackson et al. 2020). Tree-of-heaven presents minor human health concerns. As a high pollen producer and moderate source of allergies in some people, skin irritation or dermatitis have been reported; symptoms vary depending on sensitivity of the individual, the extent of contact, and condition of the plant (Jackson et al. 2020).

SLF has many other plant hosts in addition to tree-of-heaven. Host species provide SLF with food, shelter, and egg laying sites. SLF changes hosts as it goes through various developmental stages (PDA 2022). Nymphs feed on a wide range of plant species, while adults prefer to feed and lay eggs on trees-of-heaven. Appendix 4 provides a list of confirmed SLF hosts (Barringer and Ciafré 2020).

The combination of favorable climate and presence of potential hosts indicates that the existing SLF Program area is highly likely to support the establishment of SLF populations. SLF host spp. grow in a wide range of soils (dry to medium moisture), shade conditions (full sun to part shade), and in the presence of urban pollutants (Missouri Botanical Garden 2020).

Actions associated with the control of SLF temporarily increase the presence or level of human activity in the program area, which can, to varying degrees, impact ground vegetation. By utilizing best management practices (e.g., limit exposing bare soil), the Program minimizes these impacts.

SLF Program tree bands, traps, and surveys have minimal impacts to vegetation. There is some risk to nontarget terrestrial plants from herbicide treatments. However, the potential for effects is restricted to areas immediately adjacent to an herbicide application. Herbicides are applied directly to the tree surface or to exposed areas under the bark (which requires the applicator to wound the bark) according to label instructions to minimize damage to nearby vegetation from drift or runoff. Applications are made by hand to sprouts using a backpack sprayer or to cut stumps using injection, hack and squirt, or other hand applied methods directly to the tree. These methods minimize impacts to surrounding vegetation.

Reduction of tree-of-heaven may cause limited alterations to vegetative understory; however, impacts are expected to be local and short-term. By utilizing best management practices during trees-of-heaven control, such as minimizing activities that expose bare soil to assist in rapid revegetation, the Program minimizes these impacts. The use of dinotefuran, imidacloprid, bifenthrin, beta-cyfluthrin, *Beauveria bassiana*, and soybean oil using tree injection or basal tree trunk sprays will have minimal impacts to surrounding vegetation. While mist blowers and high-pressure hydraulic spray treatments have the potential to reach the greatest area of vegetation, impacts of bifenthrin and beta-cyfluthrin on vegetation will be extremely low. SLF Program insecticides are not harmful to terrestrial and aquatic plants.

Wildlife

The SLF Program's herbicide treatment of tree-of-heaven may result in temporary loss of habitat for wildlife; natural succession provides alternate habitat over time. Tree-of-heaven in forested areas typically occurs in small patches as a canopy tree but can also occupy the understory. Changes in canopy cover due to tree control or removal can degrade surrounding water quality, in turn affecting aquatic organisms through direct or indirect impacts to fish, aquatic insects, and crustaceans (Englert et al. 2017; Morrissey et al. 2015). Potential impacts to terrestrial and aquatic systems are expected to be localized and transient since tree-of-heaven is not a dominant tree species in large, forested areas of the United States.

Actions associated with the existing Program may temporarily increase the presence or level of human activities (noise and visual disturbance) in the Program area. Temporary adverse effects to animals can include increased levels of stress hormones, disturbance or flushing of young broods, and decreased fitness. APHIS expects the adverse effects associated with this concern to be localized and temporary.

Wild mammals and birds are at very low risk from herbicide applications due to the low toxicity of Program herbicides and the lack of anticipated effects to food sources that they use. Aquatic organisms are also at low risk based on the favorable toxicity profile and expected low residues that occur in aquatic environments from the prescribed herbicide applications (USDA APHIS 2015).

B. bassiana and soybean oil are of such low toxicity they pose few additional risks to nontarget wildlife. The limited use and method of application of dinotefuran and imidacloprid to tree trunks of trap trees keeps effects localized with minimal exposure risks. Additionally, dinotefuran has low to moderate acute and chronic toxicity to nontarget wildlife, such as mammals and birds (for more information, see SLF Final EA (USDA FS 2009)). Since imidacloprid is only applied via tree injection, insects must feed on the treated plants to be exposed to a lethal dose; therefore, exposure of nontarget organisms is minimized. There are some risks to sensitive terrestrial invertebrates that consume vegetation from imidacloprid-treated trees. However, terrestrial invertebrate populations consume a wide range of plants, which should limit the percentage of exposure through their diet.

The lack of significant exposure to terrestrial vertebrates from dichlorvos applications in the SLF Program suggests negligible risk to this group of nontarget organisms. Similarly, there is a lack of significant exposure to nontarget terrestrial invertebrates due to the formulation of dichlorvos, and its use in traps. Dichlorvos is toxic to pollinators such as honeybees and butterflies; however, the lack of significant exposure due to the use pattern reduces the risk to these groups of invertebrates. There is the possibility of some risk for terrestrial invertebrates that may encounter the strip; however, these effects are incidental and localized to individual traps.

Program use of mist blower and high-pressure hydraulic spray treatments increases risks to wildlife that consume pyrethroid-treated vegetation and invertebrates. Indirect impacts to wildlife populations through the loss of invertebrate prey is 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. Despite the expanded geographical area of the existing Program, cumulative impacts to terrestrial invertebrates are not anticipated as SLF treatments only occurs at sites with active SLF infestation and not all sites are treated at the same time or with the same insecticide. Although it has not been observed within the existing SLF Program, there is a potential for migrating or foraging animals to alter their patterns or expand their ranges if invertebrate prey becomes limited or unavailable (USDA APHIS 2018).

Bifenthrin is highly toxic to freshwater fish, aquatic-phase amphibians, and terrestrial invertebrates, including beneficial insects such as honeybees and pollinators. The chemical is very highly toxic to freshwater aquatic invertebrates; has very high acute toxicity to estuarine and marine fish and invertebrates; moderate acute toxicity to small mammals; and slight acute toxicity to birds, terrestrial-phase amphibians, and reptiles (USEPA 2010b; 2016c; 2016b; 2020i). Beta-cyfluthrin is highly toxic to fish, aquatic invertebrates, and most terrestrial invertebrates; moderately toxic to algae; highly toxic to honeybees and other arthropod species (USEPA 2016b; 2020i). The Program's 150-foot no treatment buffer adjacent to waterbodies reduces the risk to aquatic species (USDA APHIS 2023a). "Waterbodies" include, but are not limited to lakes, reservoirs, rivers, permanent streams, wetlands, natural and manmade ponds, and estuaries. Label instructions for Program pesticides limit the number of treatments and utilize application methods that limit or reduce drenching and chemical runoff into soil and nearby water, further minimizing impacts to aquatic species. Pesticide application rates also reduce risks. SLF Program risk mitigations include the following: do not apply when wind direction favors downwind drift towards nearby water bodies; do not apply when wind velocity exceeds 5 mph; do not treat areas to the point of run-off; and do not make applications when soils are saturated, during rain, or when rain is expected within 12 hours of application.

Pollinators

The use pattern of basal trunk injections and hand-held or backpack sprayers and truck mounted boom sprays reduces potential impacts to pollinators, and other sensitive terrestrial invertebrates, because they minimize spray drift or are directed to individual trees (as with basal trunk injections). Dichlorvos toxicity to pollinators such as honeybees is high (USEPA 2006). Dichlorvos has also been shown to be highly toxic to butterflies and moths (Hoang and Rand 2015). There is a lack of significant exposure to nontarget terrestrial vertebrates and invertebrates, including pollinators, due to the formulation of dichlorvos and its use in traps. USEPA (2020f) noted some concern for nontarget beneficial insects from *B. bassiana* based on the entomopathogenic nature of the fungi. USEPA requires labeled instructions for mitigating the potential effects of *B. bassiana* to honeybees. The application of bifenthrin and beta-cyfluthrin using mist blowers and high-pressure hydraulic spray treatments increases the potential for impacts to pollinators due to the increased height of spray application and the increased risk of spray drift and runoff. Bifenthrin and beta-cyfluthrin are considered very highly toxic to honeybees based on either acute oral or acute contact studies (USEPA 2016c). Beta-cyfluthrin product labels state that applications made directly to crops or weeds are highly toxic to pollinators, such as bees. The labels also state not to make applications or allow drift to crops or weeds where bees are actively foraging. Various plant species may occur in the use sites for SLF treatments; blooming may occur throughout the treatment season for SLF. Treatment sites are evaluated prior to application to determine if bees and other pollinators are actively foraging. Per label requirements, applications are avoided at sites where pollinators are foraging, or when conditions are favorable for pesticide drift to areas where pollinators are foraging.

Bifenthrin kills bees on contact during application and will continue to kill bees for one or more days after treatment (Krupke et al. 2021). USEPA(2016c) reported residual contact lethal effects to honeybees 10 days after application using a formulation of beta-cyfluthrin. USEPA(2017) evaluated the acute risks to pollinators using a screening level analysis and determined application rates for various insecticides that would be considered safe for pollinators. The application rates for bifenthrin and beta-cyfluthrin that were considered safe to honeybees by USEPA's risk assessment were substantially lower than the rates proposed for the SLF Program's use of mist blower and high-pressure hydraulic spray treatments, suggesting the potential for direct acute risk to honeybees from SLF Program treatments. Bifenthrin and beta-cyfluthrin are broad spectrum insecticides and are also considered toxic to other invertebrate pollinators such as butterflies and moths. Krueger et al. (2021) studied the 72-hour toxicity of bifenthrin and beta-cyfluthrin and their effects on the growth and diet consumption of Monarch butterfly caterpillars. They found the toxicity of bifenthrin to Monarch caterpillars was lower than beta-cyfluthrin.

The risks to pollinators from mist blower and high-pressure hydraulic spray treatments are reduced with the implementation of risk mitigation measures designed to reduce exposure. Applications range from 0.5 to 50 acres in size at intermodal areas, distribution centers, truck depots, airports, seaports, and railway and public road rights-of-way. Some of these treatment areas occur in industrial areas where pollinating plants are not prevalent, reducing insecticide exposure and risk to pollinators. Risks to pollinators in railway and public road rights-of-way that are not in industrial areas may be greater due to the presence of pollinating plants and habitat for pollinators. Certain rights-of-way associated with roads, power lines and rail lines have been identified as having an important ecological function to support pollinators in fragmented habitats and to serve as corridors for pollinators between larger foraging resource habitats (Davis et al. 2008; Gardiner et al. 2018; Moron et al. 2017; Moron et al. 2014; Twerd et al. 2021; Villemey et al. 2018; Wrzesień and Denisow 2016). In areas where railway and public road rights-of-way provide the predominant habitat for pollinators, rights-of-way may act as an ecological trap, concentrating populations in these habitats and making them more susceptible to disturbance (Gardiner et al. 2018). Such habitats could contain different plant species pollinating throughout the season for SLF control activities and pesticide treatments.

In 2014, a Presidential Memorandum was signed that created a federal strategy to promote the health of honeybees and other pollinators. A product of the memorandum was to create a pollinator health task force and develop a document entitled "National Strategy to Promote the Health of Honeybees and other Pollinators." The memo also directed USEPA to work with state agencies to develop pollinator protection plans. Prior SLF EAs summarize the availability of pollinator protection plans for states within the existing Program area.

Most of the protection measures described in these plans refer to protection of honeybees but some of the measures may also provide protection for native pollinators. APHIS follows best management practices, where applicable and feasible, for protecting honeybees and native pollinators from SLF Program insecticide applications. USEPA(2017) has also developed labeling recommendations focusing on the protection of acute risks to honeybees in managed areas that may have some applicability to native pollinators. Many of the measures USEPA describes refer to avoiding applications in and around plant blooming. Doing this can be difficult for non-agricultural pesticide applications (like those made by the SLF Program) due to variability in blooming times for the diversity of plant species that occur in railroad and public road rights-of-way and adjacent natural habitats.

The SLF Program uses risk reduction measures to reduce impacts to adjacent habitats that support pollinators from Program activities occurring in rights-of-way. Wind speed restrictions during applications reduce drift that may pose a risk to off-site pollinators. Applying insecticides in the evening, when fewer pollinators will be foraging, may provide a level of protection; however, the SLF Program has limited flexibility regarding treatment times. Treatment times along rail rights-of-way are mainly determined by railway availability. In addition, the insecticides released during mist blower and high-pressure hydraulic spray applications have residual toxicity lasting greater than 24 hours; there may be a risk to pollinators from residues, especially to those foraging within the treatment areas. Limiting the number of treatments applied to no more than four treatments per year is expected to reduce risks to pollinators at treatment sites and adjacent off-site areas.

Another measure designed to protect pollinators is the Monarch Candidate Conservation Agreement with Assurances (CCAA) that was developed by the U.S. Fish and Wildlife Service (USFWS) and dozens of entities from the energy and transportation sectors (Cardno, Inc. 2020). The CCAA encourages transportation and energy partners to participate in Monarch butterfly conservation by protecting habitat in rights-of-way and associated lands in the lower 48 states. More than 45 energy and transmission companies and state departments of transportation provide funding and other resources for Monarch-friendly management practices on millions of acres in rights-of-way in the United States. These efforts not only benefit the Monarch butterfly but other native pollinators as well. (USFWS maintains the Monarch butterfly conservation database that tracks ongoing and proposed projects) (USFWS 2022). APHIS works with stakeholders to identify locations of Monarch butterfly conservation projects so that SLF Program mist blower and high-pressure hydraulic spray treatments do not result in significant impacts to this endangered pollinator species.

Migratory Bird Treaty Act

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

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 USFWS which promotes the conservation of migratory bird populations. On May 6, 2022, an MOU between APHIS and the USFWS was signed to facilitate the implementation of this Executive Order (USDA APHIS and USFWS 2022).

Two types of anticipated disturbance associated with SLF Program activities are the use of off-road vehicles and noise. However, some of the treatment areas, particularly those along rail and public road rights-of-way, are subject to train noise, vehicular traffic, and human activity, indicating Program control activities in these areas are unlikely to cause additional disturbance. Beta-cyfluthrin is considered practically non-toxic to birds based on available acute, sub-acute, and chronic toxicity values (USEPA 2013). Bifenthrin is considered slightly toxic to birds based on oral and dietary short-term toxicity testing (USEPA 2010b). Chronic toxicity to birds from both pyrethroid insecticides is considered low based on available data. The toxicity profiles and use patterns for the herbicides, soybean oil, *B. bassiana*, dichlorvos, dinotefuran, and imidacloprid indicate low risk to migratory birds.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668–668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. During their breeding season, bald eagles are sensitive to a variety of human activities. The USFWS recommends buffer zones from active nests which require different levels of protection (USFWS 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.

If bald or golden eagles are discovered near a Program action area, the state agency responsible for the area contacts the USFWS and implements recommendations for avoiding disturbance at nest sites. For bald eagles, APHIS follows the guidance provided by the National Bald Eagle Management Guidelines (USFWS 2007) to determine if the Program must use the 330 to 660-foot buffer from an active nest, depending on the visibility and level of activity near the nest, or if the Program will need a permit to proceed with activities and in accordance with federal law.

Endangered Species Act

Section 7 of the Endangered Species Act (ESA) and ESA's implementing regulations require federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed T&E species, or result in the destruction or adverse modification of critical habitat. APHIS initiates or reinitiates consultation with USFWS regional offices, as appropriate, regarding Program actions. Federally listed T&E spp. in the Program area may include mammals, birds, amphibians, reptiles, fish, mussels, arthropods, and plants. APHIS also initiates or reinitiates consultation with the National Marine Fisheries Service (NMFS) if Program activities are proposed for sites within NMFS jurisdiction. APHIS implements protection measures for federally listed T&E species and critical habitat in the Program area prior to the initiation of Program activities. No Program activities occur at proposed action sites until consultation has been completed with the USFWS and NMFS.

The SLF Program requires a minimum 500-foot no-treatment buffer adjacent to aquatic habitats occupied by federally listed T&E species to reduce the potential of off-site runoff and drift of bifenthrin and beta-cyfluthrin insecticides applied via ground-based mist blower and high-pressure hydraulic spray applications. APHIS considers the no-treatment buffers, and other SLF Program measures designed to reduce exposure from drift, adequate mitigation of risk to aquatic habitats (USDA APHIS 2023a).

5. Human Health and Safety

Some people, particularly SLF Program workers, may be impacted by the Program's application of herbicides and insecticides. APHIS evaluated the potential human health risks from the use of the herbicides triclopyr, imazapyr, and metsulfuron-methyl by the Asian Longhorned Beetle Eradication Program and found those risks to be low (APHIS 2015). Based on similar use patterns, the same human health risks apply to the SLF Program (USDA APHIS 2015). For a complete assessment of the risks to human health from the application of triclopyr, imazapyr, and metsulfuron-methyl, see the Asian Longhorned Beetle Programmatic EIS (USDA APHIS 2015) at https://www.aphis.usda.gov/plant_health/ea/downloads/2015/alb-eradication-program-eis.pdf. Human health risks are also low from the use of glyphosate and aminopyralid based on risk assessments prepared by the U.S. Forest Service. These risk assessments consider similar use patterns to those prescribed for the SLF Program (USDA FS 2007; 2011a).

SLF Program insecticides must be applied in a way that minimizes significant exposure to soil, water, air, and vegetation, to minimize exposure risks. Human health risks from Program insecticides applied using the prescribed trunk injection, hand-held sprayer, and backpack sprayer methods are expected to be negligible based on limited exposure. APHIS evaluated the human health risks for dichlorvos used in the Agency's exotic fruit fly traps and finds the same human health risks apply to the SLF program traps (USDA APHIS 2017). Dichlorvos can be toxic to humans (USEPA 2006). Technical dichlorvos has high acute toxicity via dermal exposure, and moderately acute toxicity from oral and inhalation exposures (USEPA 2006). However, exposure of the public to dichlorvos is negligible due to public notification about SLF control activities and the method of application, which eliminates off-site movement of dichlorvos from drift or runoff. Volatilization of dichlorvos from the trap occurs, but the potential for inhalation exposure is low due to the small quantities used in each trap and the outdoor placement of the traps. Trap placement is above the normal reach of children. If traps were accidently dislodged, there could be potential exposure mainly via dermal contact and incidental ingestion through hand-to-mouth contact with the dichlorvos-treated strip. The SLF Program does not allow commodities to be harvested from treated trees, minimizing potential dietary risks to humans.

B. bassiana, soybean oil, and dinotefuran are of low toxicity to humans. Imidacloprid has greater risks, but Program treatments are limited to injections on trap trees, so risk exposures are minimized. Bifenthrin has low acute toxicity via the dermal route of exposure, moderate acute toxicity via the oral route, and is considered a possible human carcinogen (USEPA 2020h). Low amounts of bifenthrin can cause adverse human health effects, including dermal and respiratory tract irritation and neurological symptoms (e.g., dizziness and altered sensations) (USEPA 2010b). Beta-cyfluthrin has high oral and inhalation toxicity.

The use of mist blowers and high-pressure hydraulic spray treatments to apply bifenthrin and beta-cyfluthrin poses the greatest risk to humans when compared to other SLF Program actions. Workers applying pesticides as well as people in public areas that are in proximity to the treatment sites, may be exposed. APHIS personnel and contractors are required to comply with all USEPA pesticide label use requirements and meet all recommendations for PPE during insecticide application. Adherence to label requirements, PPE requirements for Program workers (e.g., wearing a long-sleeved shirt, long pants, and shoes plus socks) and additional measures to protect the public (e.g., mitigations to protect water sources, mitigations to limit spray drift, and restricted-entry intervals) all help to decrease risk of exposure.

Pesticide drift and runoff increase potential exposure to the public outside treatment sites. To ensure minimal impacts to people in proximity to mist blower and high-pressure hydraulic spray treatment areas, APHIS requires close adherence to label instructions and Program protocols. In addition, these previously mentioned restrictions are applied when applying mist blowers or hydraulic spray treatments, to decrease human health risks:

- Do not apply when wind direction favors downwind drift towards nearby water bodies.
- Do not apply when wind velocity exceeds 5 mph.
- Do not treat areas to the point of run-off.
- Do not make applications when soils are saturated, during rain, or when rain is expected within 12 hours of application.

To further protect the public, Program activities on private property only occur with the permission or awareness of the property owner and resident. Notification of all property owners and residents within one mile of a Program treatment area is made in person or via phone call, text, email, doorhanger, or a combination of these methods. Where possible the SLF Program adjusts the treatment time, so applications are made when few or no people are in the vicinity. This adjustment is done on a case-by-case basis. The SLF Program must work with the various railroad companies to obtain access to the railroads; therefore, treatment dates and times are not necessarily determined by the Program.

Pesticide Hypersensitivity

Applications with mist blowers and high-pressure hydraulic sprays, which spread droplets of insecticide further than the other application methods in the SLF Program, have the potential to impact surrounding individuals that have pesticide hypersensitivity. Additional buffers may be necessary to protect these individuals. The SLF Program standard protocol to notify all property owners and residents within one mile of the treatment area allows any pesticide hypersensitive individuals to contact the Program or take any protective measures necessary to protect themselves from nearby pesticide treatments. The SLF Program uses available state data to locate these individuals so Program personnel can adjust where treatments are made and notify the potentially affected people and businesses.

Pesticide application businesses may be required to notify individuals listed in a state's pesticide notification registry in advance of a pesticide application that occurs within a certain distance on an adjacent property. For example, The Michigan Department of Agriculture and Rural Development (MDARD 2023) maintains a pesticide notification registry which has a physician-recommended distance of not more than 100 feet from a linear boundary line. If unable to find this type of information online, the SLF Program contacts the state's environmental protection agency or agriculture agency. The SLF Program complies with all State, County, and Local ordinances and authorities when providing notifications to address the needs of potentially affected individuals with hypersensitivity to a Program pesticide.

6. Commercial Organic Production and Beekeeping

Organic Production

The control of SLF around organic fields is important, while traditional orchards and vineyards have various options for chemically treating trees and grape vines against SLF, effective treatment options for organic producers are minimal. *B. bassiana* is allowed for use by USDA as an organic pesticide (AgDaily 2019) and 7 CFR part 205, National Organic Program) and has been shown to be effective against SLF (Clifton et al. 2020).
Prior SLF EAs summarize organic production information for states in the Program area. To protect organic production in a treatment area, the SLF Program must follow all labeled requirements that attempt to ensure the reduction of spray drift and runoff of the pyrethroids into organic fields, including using the appropriate nozzle size and sensitive-site buffers, and not applying when wind direction or velocity is not ideal. Even if all prescribed measures are followed pesticide drift onto organic fields could still occur; the Program will notify organic producers within a 1-mile distance of a treatment area prior to any SLF mist blower and high-pressure hydraulic spray treatments. The Program provides notifications through state level registries, local media, or at association meetings with organic and apiary associations. Some states endorse the use of the online registry FieldWatch® (FieldWatch 2022). This registry is free and voluntary. Pesticide and herbicide applicators can notify registered growers and beekeepers about upcoming spray applications.

Apiaries

The SLF Program must protect local apiaries from chemical exposure within treatment areas. The location and timing of bifenthrin and beta-cyfluthrin applications are of particular concern to honeybees; both insecticides are toxic to pollinators and the use of mist blowers and high-pressure hydraulic spray treatments may result in insecticide drift. Bee colony information for states in the Program area is covered in prior SLF EAs. Some states have voluntary registration of apiaries using BeeCheck™, a system that facilitates communication between beekeepers, agricultural producers, and pesticide applicators (IN DNR 2022). The SLF Program works with state agriculture departments to notify beekeepers of treatment activities, especially those beekeepers located within one mile of a proposed treatment site where mist blower and high-pressure hydraulic spray treatments will be used. The Program also provides notifications of Program treatments via online apiary registration sites, local media, and apiary association meetings.

Bifenthrin kills bees on contact during application and will continue to kill bees for one or more days after treatment (Krupke et al. 2021). Beta-cyfluthrin product labels state that applications made directly to crops or weeds are highly toxic to pollinators, such as bees. The label also states not to make applications or allow drift to crops or weeds where bees are actively foraging. Various plant species may occur in the use sites proposed for SLF treatments blooming may occur at different times throughout the treatment season for SLF. These sites are evaluated prior to application to determine if bees and other pollinators are actively foraging. Per label requirements, applications are avoided at sites where pollinators are foraging, or when conditions are favorable for drift to areas where pollinators are foraging.

The Program considers chemically treating with hand-held or backpack sprayers when treatment areas are in proximity to apiaries. If target spot treatment is not possible, bee populations should be moved from areas where bifenthrin or beta-cyfluthrin are used and that contain plants the bees are visiting. A new site must be at least 3 miles away to prevent bees from returning to the old site (Krupke et al. 2021). Applying insecticides in the evening, when fewer bees are foraging, provides some protection to honeybees. However, the SLF Program has limited flexibility regarding treatment times; for example, treatment times along rail lines are mainly determined by railway availability.

7. Equity and Underserved Communities

In Executive Order (EO) 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*, each agency must assess whether, and to what extent, its programs and policies perpetuate systemic barriers to opportunities and benefits for people of color and other underserved groups. In EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* federal agencies must identify and address disproportionately high and adverse human health or environmental impacts of proposed activities. Federal agencies also comply with EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO requires each federal agency, consistent with its mission, to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure its policies, programs, activities, and standards address the potential for disproportionate risks to children.

The existing SLF Program expects a possible increase in the number of treatment areas along railways and public road rights-of-way. While homes near commuter train stations may fetch higher sale prices, general online comments indicate home values tend to be less by railways due to noise, dangers surrounding pets and children being hit by trains, and diesel fuel and air pollution. A study in Memphis, Tennessee indicated residential properties exposed to 65 decibels or greater of railroad noise origin resulted in a 14 to 18 percent lower property value (Walker 2016). It is reasonable to assume underserved populations may be more prevalent around certain railways and public road rights-of way (Boehmer et al. 2013), and this needs to be considered when planning and applying SLF treatments. A study by the Mayo Clinic connects existing health issues for populations near railways, specifically increases in children's asthma along railroads (Juhn et al. 2005). Similarly, studies indicate populations near major roads experience adverse health effects (Boehmer et al. 2013; McConnell et al. 2006).

According to EO 13985, SLF Program personnel must have meaningful engagement with locally impacted people whenever possible. APHIS utilizes various databases and mapping tools to identify the locations of underserved populations in the Program area. APHIS routinely uses the USEPA environmental justice screening and mapping tool, EJSCREEN (available online at https://www.epa.gov/ejscreen), which can highlight areas that may require additional thought, research, and outreach regarding Program activities. Using ECSCREEN, APHIS identified regions where implementation of the SLF Program could have potential environmental impacts to underserved populations. Special consideration needs to be given when outreach to communities in these regions begins.

EJSCREEN results must be supplemented with local demographic and environmental data. Other databases that APHIS uses provide detailed maps that may be more meaningful to the public, such as one developed by the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) using the Social Vulnerability Index (SVI) (available online at https://www.atsdr.cdc.gov/placeandhealth/svi/index.html). "Social vulnerability" refers to the potential negative effects on communities caused by external stresses on human health. CDC's SVI uses 15 social factors that are grouped into four major themes: socioeconomic status, household composition and disability, minority status and language, and housing type and transportation. Like EJSCREEN, maps generated by the CDC's SVI database can highlight areas that may require additional thought, research, and outreach regarding Program activities.

With APHIS' oversight and guidance, state and local agencies reach out to all landowners and residents in or adjacent to spraying areas. Every property owner and resident, regardless of whether they have been identified as being part of an underserved population, is notified via phone, text, email, doorhanger, in person communication, or some combination of these methods. With the assistance of local authorities, special consideration is given by the SLF Program to any underserved populations in Program treatment areas to ensure meaningful engagement about treatments occurs.

Protective measures on pesticide labels are meant to safeguard not only the applicator, but the public as well, including children. All Program pesticide labels are followed. Previously mentioned restrictions (such as limiting applications when wind speed is above 5 mph, limiting applications due to wind direction, not treating vegetation to the point of runoff) decrease potential exposure of underserved communities and children through drift and runoff. The

Program is aware that schools may be located within one-half mile from where mist blowers and high-pressure hydraulic spray treatments could be used. There will also be playgrounds and parks in or near areas treated with mist blowers and high-pressure hydraulic spray treatments. The use of mist blowers and high-pressure hydraulic treatments to spray bifenthrin and beta-cyfluthrin poses the greatest potential impact to children. Wherever possible, the SLF Program uses hand-held or backpack sprayers when treatment areas are in proximity to schools, parks, and playgrounds.

Treatments are made primarily during summer months when most school children are not on school grounds. Regardless of application method or when treatments occur, the SLF Program does not apply pesticides during school hours and notifies each school regarding upcoming applications. The SLF Program works closely with school officials to mitigate impacts to school aged children. The SLF Program works with ground staff of city and municipal authorities prior to treatments at parks to limit access to treated areas or schedule applications during off-hours. Sections of park may require temporary closure.

8. Tribal Consultation and Coordination

Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments," calls for agency communication and collaboration with Tribal officials for proposed federal actions with potential Tribal implications. The Archaeological Resources Protection Act of 1979 (16 USC §§ 470aa-mm) secures the protection of archaeological resources and sites on public and Tribal lands. APHIS provided each federally recognized Tribe in the geographic scope of the EA with a letter explaining the preparation of the EA, detailing the action alternatives, and stating that the Agency believed the preferred alternative is unlikely to affect Native American sites and artifacts. Tribes are provided with APHIS contact information should they have any questions or concerns regarding the SLF Program.

APHIS hosted a webinar on January 23, 2023, with interested Tribes concerning the previous SLF Program in ten states and the District of Columbia. The intent of the webinar was to explain the SLF program and allow input from any potentially affected Tribes. A recording of the webinar is available for Tribes to view upon request. APHIS offers each Tribe the opportunity to consult with the Agency. Consultation with local Tribal representatives occur priors to the onset of SLF Program activities, to fully inform the Tribes of possible actions the Agency may take on or near Tribal lands. If APHIS discovers any archaeological Tribal resources in a Program area, it will notify the appropriate authorities.

9. Historic and Cultural Resources

The National Historic Preservation Act of 1966, as amended (16 USC §§ 470 et seq.), requires federal agencies to consider the potential for impacts to properties included in, or eligible for inclusion in the National Register of Historic Places (36 CFR §§ 63 and 800) through consultation with interested parties where a proposed action may occur. This includes districts, buildings, structures, sites, objects, and landscapes. Prior SLF EAs summarize historic properties in the existing Program area. APHIS ensures that Program actions do not alter, change, modify, relocate, abandon, or destroy any historic buildings, edifices, or nearby infrastructure. Certain insecticidal oils can stain dark-colored house paints (Cranshaw and Baxendale 2013) and high-pressure water may not be recommended for some surfaces. APHIS anticipates that herbicides and insecticides applied in the vicinity of historic buildings and other anticipated program actions will not directly affect the buildings or their properties. The Program may apply bifenthrin and beta-cyfluthrin to the exterior surface of buildings within three feet above grade (generally, where ground level meets a building at its exterior walls), according to label instructions. However, the Program's application of pesticides to buildings occurs at locations considered high risk for human-mediated movement of SLF (e.g., truck depots, rail yards, etc.) and not to public, residential, or commercial buildings. The Program does not treat buildings or structures on the historic registry with insecticides or high-pressure water treatments. The Program only makes treatments on historic properties with pre-approval from the State Historic Preservation Officer.

B. No Action, No Treatment, and the Existing SLF Program

If APHIS did not act to control SLF (the no treatment alternative) or include additional states and effective treatments in the Program (the no action alternative), other government agencies and private landowners might act to prevent harm to local plant life. Under the no treatment and no action alternative, it is possible that environmental impacts could increase if actions taken by others are not well advised or properly coordinated. Additionally, not expanding the treatment options and use sites when appropriate could lower the Program's ability to slow the spread of SLF. Under the no action and no treatment alternatives, impacts from SLF damage to naturally occurring and cultivated host spp. would be expected to increase.

Implementation of the preferred alternative (the existing SLF Program) expanded treatment options and increased the level of SLF control activities in four additional states, which could, to varying degrees, impact ground vegetation, soil compactions, and noise levels. By utilizing best management practices, APHIS minimizes these impacts on humans and the environment.

Under the preferred alternative, there are thousands of miles of railways and public road rights-of-way that could potentially be treated with bifenthrin or beta-cyfluthrin using mist blowers and high-pressure hydraulic spray treatments. The Program focuses treatments on rights-of-way that are considered high risk for human-mediated movement of SLF. As such, the Program expects to treat only a fraction of the total rail and road miles.

There are various places of concern that may be in proximity to treatment areas, e.g., waterbodies and wetlands, public land use areas, schools, organic producers, homes, honeybee hives, and historic properties. Spray drift and runoff into these areas must be minimized to protect air, water, soil quality; human health; and wildlife. If mist blowers and high-pressure hydraulic spray treatments are used per the pesticide label, along with the additional protective mitigations described in the SLF Final EA (USDA APHIS 2023a), Program impacts to soil, water, and air quality are not expected to be significant. Soil disturbance related to program activities is short-term.

Potential treatment areas may include highly managed and disturbed sites that receive routine railway and vehicular traffic and other mechanical and chemical treatments (e.g., to manage unwanted vegetation). Current and future activities at these locations—due, for example, to urbanization, agricultural activities, logging, and roadway construction—appear more likely to significantly impact environmental quality than SLF Program activities.

Vehicle emissions associated with getting to and from Program sites are minor relative to the ongoing and future emissions from U.S. urbanization, highway traffic, and agricultural production. Any increases in air pollutants associated with Program treatments and vehicle emissions ceases upon completion of program activities at each site. The contribution from the existing SLF Program is minor compared to the overall emissions in the Program area.

APHIS expects human health impacts resulting from SLF Program activity to be minimal, as with the no action alternative. The greatest sector of the human population at risk of exposure to herbicides and insecticides are SLF Program workers and commercial pesticide applicators; however, these risks are minimized with PPE and adherence to label instructions. Under the no treatment alternative, human health would not be at risk from pesticide exposure but might be adversely affected by socioeconomic impacts resulting from SLF infestation and host damage.

To preserve environmental quality for ecological resources, potentially negative cumulative impacts are minimized throughout the existing Program by following best management practices and by training personnel to reduce or avoid adverse impacts to pollinators, eagles, migratory birds, threatened and endangered species, and the surrounding environment.

[Cited References are listed in Appendix 8, *References*.]

Appendix 7. Acronyms and Glossary

Absorption	The taking up of liquids by solids, or the passage of a substance into the tissues of an organism as the result of several processes (diffusion, filtration, or osmosis); the passage of one substance into or through another (e.g., an operation in which one or more soluble components of a gas mixture are dissolved in a liquid).
Active ingredient	In any pesticide product, the component which kills, or otherwise controls, target pests; pesticides are regulated primarily on the basis of their active ingredients.
Adaptive management	The inclusion of a new treatment option that may become available should it prove at least as effective and safe as an existing, approved treatment.
Adverse impact	An undesired harmful effect.
APHIS	Animal and Plant Health Inspection Service; an agency within the United States Department of Agriculture.
Application rate	The amount of pesticide product applied per unit area.
ARS	Agricultural Research Service; an agency within the United States Department of Agriculture
Attractant, insect	A natural or synthesized substance that lures insects by stimulating their sense of smell; sex, food, or oviposition attractants are used in traps or bait formulations.
Bioaccumulation	Uptake and temporary storage of a chemical in or on an organism; over time a higher concentration of chemical may be found in the organism than in the environment.
Biodiversity	The relative abundance and frequency of biological organisms within ecosystems.
Biological control	The reduction of pest populations by means of living organisms encouraged by humans; utilizes parasites, predators, or competitors to reduce pest populations (also called biocontrol).
Biotechnological control	Use of genetic engineering to control a pest; may involve genetic engineering of host plants, biocontrol agents, or the pest itself to achieve control.

Buffer zone	An area where treatments do not occur or are modified to protect an adjacent environmentally sensitive area.
CDFA	California Department of Food and Agriculture
CEC	Commission for Environmental Cooperation
Certified applicator	Commercial or private applicator certified as competent to apply SLF Program pesticides.
CEQ	Council on Environmental Quality; in the Executive Office of the President of the United States
CFR	U.S. Code of Federal Regulations
Critical habitat	Habitat designated as critical to the survival of an endangered or threatened species and listed in 50 CFR 17 or 226.
Cumulative effects or impacts	Those effects or impacts that result from incremental impact of a program action when added to other past, present, and reasonably foreseeable future actions.
Drift	The airborne movement of a pesticide away from the targeted site of an application.
EA	Environmental assessment (see definition under this)
Endangered species	A plant or animal species identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act, as amended, that is in danger of extinction throughout all or a significant portion of its range.
Environment	The sum of all external conditions affecting the life, development, and survival of an organism; all the organic and inorganic features that surround and affect a particular organism or group of organisms (see Human Environment).
Environmental assessment	A concise public document that provides sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement or Finding of No Significant Impact. It aids in compliance with the National Environmental Policy Act (NEPA) when no Environmental Impact Statement is needed.
Environmental fate	The result of natural processes acting upon a substance; including transport (e.g., on suspended sediment), physical transformation (e.g., volatilization, precipitation), chemical transformation (e.g.,

photolysis), and distribution among various media (e.g., living tissues); the transport, accumulation, or disappearance of a chemical in the environment.

Environmental impact statement	A document prepared by a Federal agency in which anticipated environmental effects of alternative planned courses of action are evaluated; a detailed written statement as required by section 102(2)(C) of the National Environmental Policy Act (NEPA).
Eradication	The complete elimination of a pest species; for some agricultural pests, this may mean the reduction of the pest populations to nondetectable levels.
ESA	Endangered Species Act; the Act establishes protections for fish, wildlife, and plants that are listed as threatened or endangered.
Exposure	The condition of being subjected to a substance that may have a harmful effect.
FAO	Food and Agriculture Organization; an agency of the United Nations
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act; the Act establishes procedures for the registration, classification, and regulation of pesticides.
Finding of no significant impact	A document prepared by a federal agency that presents the reasons why a proposed action would not have a significant impact on the environment and thus would not require preparation of an Environmental Impact Statement. A FONSI is based on the results of an Environmental Assessment.
FONSI	Finding of No Significant Impact (definition under this)
Formulation	The way in which a basic pesticide is prepared for practical use; includes preparation as wettable powder, granular, or emulsifiable concentrate; a pesticide preparation supplied by a manufacturer for practical use; a pesticide product ready for application; also, refers to the process of manufacturing or mixing a pesticide product in accordance with a USEPA-approved formula.
FS	U.S. Forest Service; an agency within the United States Department of Agriculture.
Genome	The complete set of genes or genetic material present in a cell or organism.

Habitat	The place occupied by wildlife or plant species; includes the total environment occupied.
Hazard	Anything that could cause harm. See RISK.
Herbicide	Chemical designed to kill or inhibit unwanted plants or weeds.
HHERA	Human Health and Ecological Risk Assessment (see definition under this)
Host	Any plant or creature inhabited or attacked by another organism.
Human environment	As defined by the Council on Environmental Equality, "Human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment."
Human health and ecological risk assessment	A process to estimate the nature and probability of adverse health effects in humans and on nontarget organisms that may be exposed to chemicals.
IN DNR	Indiana Department of Natural Resources
Insecticide	A pesticide compound specifically designed to kill or control the growth of insects.
Integrated pest management	The selection, integration, and implementation of pest control actions based on predicted economic, ecological, and sociological consequences; the process of integrating and applying practical methods of prevention and control to keep pest situations from reaching damaging levels while minimizing potentially harmful effects of pest control measures on humans, nontarget species, and the environment.
IPM	Integrated Pest Management (see definition under this)
Knock-down treatment	SLF Program chemical treatment intended to kill most SLF larva and adults but retreatment may be necessary if eggs hatch.
Listed species	Listed species are species, subspecies, or distinct vertebrate population segments that have been added to the federal lists of endangered and threatened species.
Lycorma delicatula	Spotted lanternfly scientific name
MDARD	Michigan Department of Agriculture and Rural Development

Mitigation	A means of lessening the effect; making less harsh or harmful.
NEPA	The National Environmental Policy Act of 1969 and subsequent amendments.
NMFS	National Marine Fisheries Service; an office of the National Oceanic and Atmospheric Administration within the Department of Commerce
Nontarget organisms	Those organisms that are not the focus of control efforts.
NRCS	Natural Resource Conservation Service; an agency within the United States Department of Agriculture
Organism	Any living thing.
PDA	Pennsylvania Department of Agriculture
Persistence	The quality of an insecticide or a compound to persist as an effective residue; persistence is related to volatility, chemical stability, and biodegradation.
Pest	An insect, rodent, nematode, fungus, weed, or other form of terrestrial or aquatic plant or animal life, or virus, bacterial, or microorganism that is injurious to health or the environment.
Pesticide	Any substance or mixture of substances designed to kill insects, rodents, fungi, weeds, or other forms of plant or animal life that are considered pests; see Herbicide, Insecticide.
PPE	Personal protective equipment
ProEA	Programmatic Environmental Assessment (see environmental assessment)
Program	[if the P is capitalized] The Spotted Lanternfly Cooperative Control Program
Risk	The chance that a particular hazard will cause harm and how serious that harm could be (see hazard definition)
SLF	Spotted lanternfly, *Lycorma delicatula*
SLF Program	The Spotted Lanternfly Cooperative Control Program
spp.	Species [plural]

T&E	Threatened and endangered
Technical dichlorvos	"Technical" refers to the grade of the active ingredient itself (in this case dichlorvos), which is not pure (generally >90% active ingredient) but a grade that is good for industrial and commercial operations.
Threatened species	A plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
Tribe	According to the Federally Recognized Indian Tribal List Act of 1994, "any Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe."
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service; a bureau within the U.S. Department of the Interior
USGS	U.S. Geological Survey; an agency of the U.S. Department of the Interior
WDNR	Wisconsin Department of Natural Resources

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