

Addressing the Emerald Ash Borer and Spotted Lanternfly in West Newbury, MA



Report to West Newbury Select Board

March 2022

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I. INTRODUCTION

In fall 2021, the West Newbury Select Board requested a report as part of determining feasible options for combatting problems that are now or would be caused by infestations of the Emerald Ash Borer and the Spotted Lanternfly. The request was directed to the West Newbury Tree Committee.

Emerald Ash Borer (EAB): In light of individual observations made in different parts of West Newbury, discussions with local arborists, and the numerous inquiries from residents to the Tree Committee, it is clear that the EAB is well-established in the ash trees of West Newbury. No comprehensive survey of the ash trees in town has yet been conducted to better quantify the extent of EAB infestation. However, diseased and healthy ash trees are easy to observe throughout the town and its woods. Informal estimates are that perhaps 15% of the town's forest cover is comprised of either Green and White Ash trees, which are the prime targets of the EAB. In numerical terms, this likely means thousands of ash trees are or could be infested and lost. Options for addressing the EAB infestation are therefore both timely and necessary.

Spotted Lanternfly (SLF): No sightings of the SLF at any stage of insect development in West Newbury have been reported thus far. In parallel with state-wide alerts, the town has asked West Newbury residents beginning in mid-2021 to report any sightings of egg masses or immature or adult forms of the SLF. Nonetheless, several instances of finding the SLF in Massachusetts have recently occurred, the origins of which are probably transport from nearby states, especially Pennsylvania, where SLF infestation is significant. The SLF can be expected to increase in Massachusetts unless sufficient and significant preventive measures are taken. West Newbury has species of trees that are known hosts for the SLF and, therefore, it is both timely and necessary to evaluate options for West Newbury to limit problems that may be caused by the SLF.

II. EXECUTIVE SUMMARY

The Emerald Ash Borer and the Spotted Lanternfly represent significant threats to the ecological and aesthetic values of the town's trees and forests and, in the case of the EAB, to the survival of the ash trees are found throughout West Newbury.

Emerald Ash Borer

- The EAB infestation is well underway in West Newbury and threatens most if not all of its ash trees, which are primarily the Green and White Ash species. Black ash is present but not in great numbers. Significant mortality can be readily observed along the town's roadsides, at the Pipestave Hill-Mill Pond complex, and on private properties.

- The biology and ecology of the EAB are such that lethal damage to ash trees can occur before evidence of the EAB can be observed externally. The damage to tree health occurs under the outer bark in the cambium layer of the tree where EAB larvae spend 1-3 years feeding. As a result, landscape-level measures (broadcast spraying) to combat the EAB are not used. Potential biocontrols, such as parasitic wasps, that could be effective on a landscape-scale are still in the research stage and are not available for general use.
- Treatment Methods: In light of the EAB biology, potential approaches available now for addressing the EAB are on an individual, tree-by-tree basis and involve using systemic pesticides that are applied either by internal trunk injection, soil drench, or basal trunk spraying. Each of these approaches has different effectiveness, cost, and safety factors. The most effective and safest approach at this time is trunk injection. For this reason, trunk injection by professional pesticide applicators is the only recommended treatment method.
 - Trunk injection of a systemic insecticide is recommended for effectiveness, safety, and economy. The injection method would cost around \$200-300 per tree per year and would normally be effective for at least two years. Conversely, removal of a standing tree, whether dead or alive, can be expected to cost \$1500-3000 on average, the exact amount depending on a number of site-specific factors.
 - Soil drench and basal trunk spraying are potential treatment options in some circumstances and could conceivably be used by private individuals on their own property. However, both of these methods are not as uniformly effective against the EAB and also have significant safety and environmental drawbacks not present with trunk injection, including risk to the surrounding environment and to the health of property owners untrained in pesticide use and application. For these reasons, soil drench and basal trunk spraying are not recommended.
- Implementation: Implementation options for pesticide treatment to combat the EAB range from purely educational to a more broad-based municipal program of treatment. Taking into account many factors including budgetary constraints, the primary implementation options for future action being recommended are:
 - (1) Continued educational programs for property owners: Educational programs can take many forms, including but not limited to presentations at town meetings, distribution of informational pamphlets to all town property owners, and reminder notices to town property owners. Implementation of these programs can be assigned to the Tree Committee with only modest budget support along with only minor support from town personnel.

(2) Street-level survey of ash trees along public roadways: To get the most economic value out of any injection program suggested in #3 below, the first step would be to conduct a survey of all ash trees along town roadways. This survey will involve identifying the location of all ash trees (by GPS coordinates), the dead or dying ash trees, and the healthier ash trees that are appropriate candidates for an injection program. This survey would be instrumental in avoiding the waste of town funds on trees with low chances of survival. This bulk of this survey could be completed by a professional tree company after ash trees leaf out in spring 2022.

(3) Pesticide injection program for ash trees on public roadways: The most visible ash trees are along West Newbury's roadways and also at particular points on public property, e.g., Pipestave-Mill Pond complex. Given that trunk injection is 5-10 times less expensive than tree removal, the Town could set aside dedicated budget funds for pesticide treatment of ash trees that are on public roadways, especially targeting those that represent high hazards to the persons and property. Note that implementation of this type of program should occur after the street-level survey,

(4) Tree removal program: Ash tree mortality is now occurring on a community-wide basis and will continue to do so for some period of time. Dead ash trees can present significant hazards to persons and property and, therefore, changes to the current hazardous tree removal program should be evaluated. Various removal scenarios can be identified as follows:

- Removal of infected tree at early stages (desirable but infeasible): Removal at the early stage of EAB infestation is not practically feasible because it is very difficult to determine whether the EAB is present early in the infestation cycle.
- Removal of dead or dying ash trees on public roadways that present high hazard (recommended): Removal of high hazard ash trees on public roadways is already part of the responsibilities of the West Newbury DPW and Tree Warden. Depending on the results of the street-level survey, the funding level for this program may need to be revisited. Extending this removal program to dead trees on all public property in West Newbury, while desirable, is likely very costly and well beyond currently allocated resources. Individual homeowners may still choose to remove some or all of the dead or dying trees on their own properties.
- Removal of healthy, uninfected ash trees (not recommended): Occasionally, a suggestion is made advocating removal of healthy ash trees in order to decrease the number of host trees that can perpetuate

the spread of infestation from diseased trees to healthy trees. Large-scale removal of healthy trees by the town is not recommended because of substantial cost as well as the extensive, unpredictable, and potentially adverse change in the tree cover and forest ecology in West Newbury.

- Another issue to consider is the degree to which a large number of downed ash trees increases the risk of forest fire. No known data addresses the potential for increased risk of forest fires from dead ash trees. However, town officials may wish to consider further investigation by fire officials into this possibility.

Spotted Lanternfly

- The SLF infestation is not now underway in West Newbury and, therefore, consideration of preventive measures is still timely with the goal of preventing future tree damage and mitigating potential aesthetic and environmental problems.
- The SLF presents a major nuisance hazard to property owners and families in West Newbury, most notably from the inundation of tree trunks by feeding, adult SLFs. The SLF does not typically cause serious or fatal harm to host trees, of which there are over 150 species.
- Treatment Methods: None are needed or recommended at this time.
- Implementation: In light of the infestations in nearby states and the propensity of the SLF to spread, inexpensive and readily implementable preventive measures can be taken now and in the near future. Recommended options for preventive measures include:
 - Increased public education measures for residents on identifying the various stages of SLF, especially egg masses, and on identifying the species of plants and trees that are particularly susceptible to the SLF.
 - Increased dissemination of information for residents on what to do if any evidence of SLF presence is observed.
 - Increased dissemination of information for residents on ways in which the SLF can be imported into West Newbury, especially including any plant stock materials that are purchased or other materials that may be vectors for SLF (e.g., boats and cars coming from areas of known infestation).
 - Research to identify which local nurseries are importing plant stock from areas of known SLF infestation (e.g., Pennsylvania) and identification of nurseries that are

taking appropriate inspection measures to avoid spread of SLF, especially by egg masses. The results can be made available to West Newbury residents.

- Creating and distributing guidance and recommendations about SLF surveillance to any commercial entity in West Newbury that is raising plant crops of particular interest to the SLF, i.e., fruit orchards and vineyards.
- The education and information dissemination can be assigned to the Tree Committee as well as some town offices that may have information on property usage. Any research into local nursery practices would need to be contracted out.

III. DESCRIPTION OF WEST NEWBURY AND ITS FORESTS

The Town of West Newbury occupies 14.7 square miles on the North Shore of Massachusetts and has approximately 4,691 residents as of the last census. The town is bordered on the north by the Merrimac River and by the surrounding towns of Newburyport, Groveland, and Newbury. The town remains semi-rural in character with most of its land being used for residential housing set in large, wooded lots.

Land Use in West Newbury:

Based on land use classification records from the West Newbury Assessors Office, West Newbury's total area of 8,125.37 acres is characterized as follows:

<u>Use Classification</u>	<u>Acres</u>	<u>% of Total Area</u>
Residential (1608 parcels)	5218.16	64.2%
Commercial	23.06	0.3%
Industrial/Utilities	49.14	0.6%
Public and Exempt Lands		
State Park/Recreation Area	365.77	4.5%
Town Park/Conservation Area	548	6.7%
Other Municipal	491.32	6.0%
Ch. 61 Lands		
Forestry	32.87	0.4%
Agriculture/Horticulture	416.55	5.1%
Recreation	46.55	0.6%
Wetland	130.40	1.6%
Other	803.91	9.9%

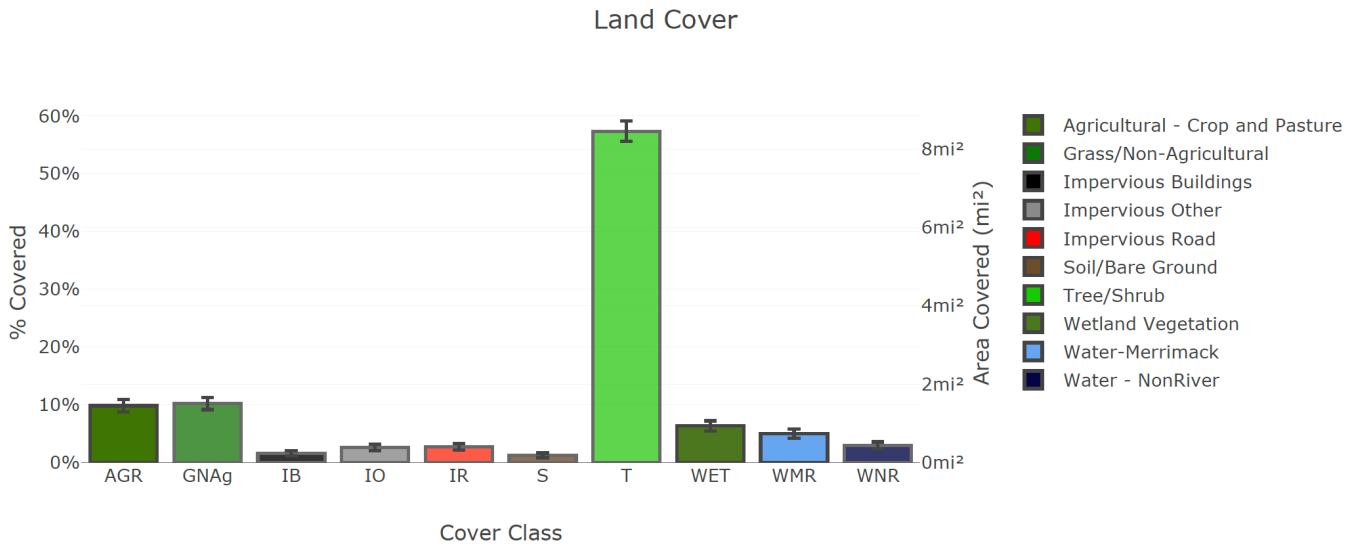
Forest Cover in West Newbury

West Newbury is characterized by a relatively mature forest canopy that is evident throughout the town, notwithstanding the various land uses that may be involved. For example, the tree canopy is significant in both residential areas as well as municipal recreational and park areas and state conservation lands.

Based on a USDA Forest Service iTree program survey conducted by the author in August 2021, which used over 1,000 randomly-selected GPS data points, the town's land cover is estimated to be:

Tree and Shrubs	58%
Grass - Nonagricultural	10%
Agriculture - Crop and Pasture	10%
Water - River and Non-River	8%

Impervious Surfaces - Building, Roads, Other	7%
Wetland Vegetation	6%
Soil and Bare Ground	1%



Results from survey conducted by Fred Chanania, Aug. 2021, showing the predominance of tree and shrub cover in West Newbury

Forest Characteristics in West Newbury

Unfortunately, to the author's knowledge, no species-level tree survey has been conducted in West Newbury, either along public roads or on public or private properties. Thus, information about the tree species that comprise the town forest canopy is based on the general forest type classification in the literature and the personal, anecdotal observations of the author. In general, the West Newbury tree cover is typical of North Shore forests, i.e., a mixed hardwood-conifer forest type.

Predominant hardwood species in West Newbury include:

- Red, black, scarlet, pin, and white oak (*Quercus spp.*)
- Hickory, especially shagbark (*Carya ovata*)
- Red, sugar, and silver maple (*Acer spp.*)
- Black cherry (*Prunus serotina*)
- Green and white ash (*Fraxinus spp.*)
- American basswood or linden (*Tilia americana*)
- Sweet (black) and grey birch (*Populus spp.*)
- American beech (*Fagus grandifolia*)
- Black locust (*Robinia pseudoacacia*)

Predominant conifer species in West Newbury based on personal observations include:

Eastern white pine (*Pinus strobus*)
Pitch pine (*Pinus rigida*)
Red pine (*Pinus resinosa*)
Eastern Redcedar (*Juniperus virginiana*)

Other Features of West Newbury Forests

In West Newbury, forests are generally between 100-150 years old, similar to other parts of eastern and central Massachusetts. This age cohort reflects the periods of forest clearing and intensive agriculture in West Newbury stretching from the 1800's into the 1900's. Natural and some limited, deliberate reforestation has occurred since early in the 20th century.

The forest understory is generally well-developed with species common to this area, including Eastern redcedar, American hornbeam, Eastern hophornbeam, Shadblow serviceberry, Highbush blueberry, Viburnums, and Buckthorns. Scattered remnants of tree species common in past eras are still found in West Newbury's woods, e.g., Eastern hemlock, American elm. However, these are either in decline or not present in significant numbers.

Residential landscaping has also introduced a significant number of other species into the West Newbury landscape, some of which are non-native. Common among these are Flowering dogwood (native), Northern white cedar (*Arborvitae*, native), Horsechestnut, European copper beech, Bradford (Callery) pear, and Norway spruce.

Three small commercial Christmas tree farms in West Newbury have planted seedlings of various species of spruces. However, the aggregate acreage of these tree farms (less than 100 acres) is quite small as contrasted to the vast majority of West Newbury's forests.

Finally, one West Newbury commercial orchard is comprised of 135.10 acres (which is not now fully planted in fruit trees) on which apples, pears, and peaches have been grown. No commercial vineyards are known to be present in West Newbury at this time. Because grape vines and these types of fruit trees are common hosts for the Spotted Lanternfly, these property owners may warrant special attention in terms of outreach.

IV. EMERALD ASH BORER - Biology and Management



Emerging adult Emerald Ash Borer



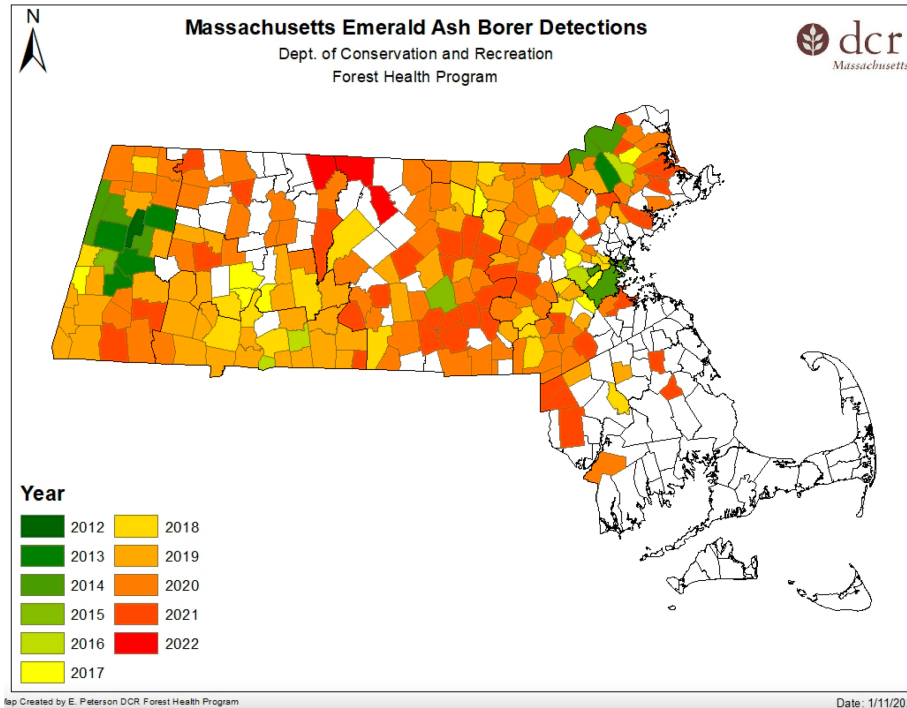
Adult Emerald Ash Borer - only 1/2" long



Larva under the bark destroying the cambium layer

The Emerald Ash Borer (EAB), *Agrilus planipennis*, is a non-native, invasive insect that was first discovered in North America in 2002 in Michigan. In Massachusetts, the primary host trees are white ash (*Fraxinus americana*), green ash (*Fraxinus pennsylvanica*), and black (or brown) ash (*Fraxinus nigra*). The highest percentages of ash in local forests are located in Berkshire County, but these trees are also found in forested areas throughout the state. Ash is also a popularly planted tree in the urban environment.

Since initial detection in Michigan, the EAB has spread to at least 35 U.S. states and 5 Canadian provinces, including bordering communities in New York, Connecticut, Vermont, New Hampshire, Maine, and Rhode Island. First detected in Massachusetts in 2012 in Berkshire County, the EAB is now found in 217 towns and cities and 11 counties in Massachusetts.



Life Cycle

Like all beetles, the emerald ash borer undergoes complete metamorphosis with four life stages: egg, larva, pupa, and adult. Adults are a dark green metallic color and approximately ½ inch long. Larvae are white, 1-1.25 inches long at maturity, have a small brown head, a pair of brown pincers at the end of the abdomen, and have bell-shaped abdominal segments. The fourth instar larvae overwinter in a pre-pupal stage in a J-shaped position (a diagnostic characteristic for this species). Pupae are present in the spring and look like cream-colored adults that begin to darken as they develop.

Most importantly, the larval and pupal stages are found beneath the bark of their host trees, as the larvae feed on the nutrient and water conducting tissues of the plant. Thus, detection is difficult, especially at the early stages of infestation. Adults emerge in May and June and mate and lay tiny, flat, oval shaped eggs that are initially whitish-yellow in color and turn reddish-brown as they develop. Eggs are difficult to see as they are approximately 1/32 of an inch and are laid in cracks and crevices of the bark. On average, females can lay 55 eggs in their lifetime, but some have been observed laying more than 150 eggs. Adult emergence creates D-shaped exit holes in the bark, which are an important sign of EAB infestation.

Damage

Although adult emerald ash borer will conduct some feeding on ash foliage, it is the larval stage of this insect that causes the most amount of damage to ash trees. The larvae feed in the nutrient- and water-conducting tissues beneath the bark, which can

lead to the eventual girdling and then death of the tree. This damage can be seen as S-shaped galleries when bark is removed. Vertical splits or cracks can also form in the bark over these larval galleries.



Green ash mortality due to EAB at Pipestave Hill (Summer 2020)

Heavily infested trees (readily apparent in areas of West Newbury as shown above) exhibit canopy dieback, beginning at the top of the tree. Some ash trees will push water-sprouts or epicormic shoots from their base or branches. As mentioned, D-shaped exit holes are created by the emerging adults. “Blonding,” or evidence of woodpecker feeding activity on emerald ash borer larvae, may also be visible on the bark. This occurs as the woodpeckers forage for the insects, leading to outer bark removal.



Blonding due to woodpecker feeding

Emerald ash borers attack healthy ash trees, although adult EAB may prefer to lay eggs on and feed on stressed trees. When emerald ash borer populations are high, small

trees can die within 1-2 years of initial infestation, while larger trees may take 3-4 years before succumbing.

Management

Management for emerald ash borer depends on whether or not the insect is present, the location of the ash tree(s), and what one wishes to achieve with the trees. If the objective is to protect a tree that is already showing signs of EAB infestation, chemical management (insecticide) options can be effective if applied before the crown exhibits more than 30% dieback. Given the relatively substantial EAB infestation in West Newbury, other management tools can be considered but using insecticides are the most promising avenue for saving important ash trees.

Infestation Present: Insecticides commonly used by area tree companies are Emamectin (a glycoside) and Imidacloprid (a neonicotinoid), both of which are systemic insecticides. Ash trees are primarily wind pollinated and the risk to pollinators from these systemic insecticides are therefore reduced. Insecticide application can be done before or after the ash tree has flowered. Another active ingredient, azadirachtin, may also be applied as a trunk injection and offers systemic management of the EAB. A comprehensive, research-based publication (*Insecticide Options for Protecting Ash Trees from Emerald Ash Borer* by Herms, et al.) discusses these and other active ingredients and how and when they may be applied to best manage an emerald ash borer infestation. The URL for this publication is provided below. A Massachusetts licensed pesticide applicator should be consulted when considering any of these options. Homeowner use of these and other EAB pesticides, while potentially legal in some circumstances if label instructions are followed, nevertheless presents risk to the surrounding environment and to the health of homeowners who are untrained and unlicensed. Misapplication can easily occur in such circumstances. For that reason, only insecticide application by trained professional is recommended.

Biological control as an EAB management tool, while very desirable, is still in the research stage among local state and federal agencies. Thus, it is not yet an available control option for West Newbury. Generally, biological control would involve release of tiny parasitoid wasps that attack EAB eggs and larvae (e.g., *Oobius agrili*, *Spathius agrili*, and *Tetrastichus planipennis*). The hope is that, given time, biological control organisms can catch up to the EAB populations and keep EAB density below our tolerance threshold, particularly in forested settings, which would allow the survival of some native ash trees. Woodpeckers have also been found to be significant predators of emerald ash borer larvae, but depending on woodpeckers for control of significant EAB infestations, like that in West Newbury, does not seem practical.

Prevention: Preventing the spread of egg-laying adults and egg masses is a big challenge. Female EAB adults are strong fliers and capable of moving large distances on their own, at least ½ mile from the tree they emerge. This occurs during a very short

period of time so intercepting the egg-laying females by landscape aerial spraying is likely to be hit or miss (probably mostly miss). Another significant vector for EAB spread is the movement of infested ash materials like firewood by humans. Many of our surrounding states have legislative bans on importing out-of-state firewood, and this practice is highly discouraged. Vermont, Maine, Rhode Island, and parts of New Hampshire are not thought to have emerald ash borer at this time. Permits and certificates from the USDA-APHIS are required for industries and businesses wishing to move ash materials and firewood to areas like these that are not yet quarantined.

Additional Resources: Other sources of information on the emerald ash borer and on insecticide options are:

- <https://massnrc.org/pests/pestFAQsheets/emeraldashborer.html>
- <https://ag.umass.edu/landscape/fact-sheets/emerald-ash-borer>
- <https://extension.entm.purdue.edu/EAB/PDF/PotentialSideEffectsofEABInsecticidesFAQ.pdf>
- *Insecticide Options for Protecting Ash Trees from Emerald Ash Borer*, (3rd edition).
URL:http://www.emeraldashborer.info/documents/Multistate_EAB_Insecticide_Fact_Sheet.pdf

V. SPOTTED LANTERNFLY - Biology and Management



SLF egg masses (younger on left, aged on right)

Adult SLF at rest

The Spotted Lanternfly (SLF), *Lycorma delicatula*, also known as a lanternmoth, is neither a fly nor a moth. This insect is a member of the Order Hemiptera (true bugs, cicadas, hoppers, aphids, and others) that are commonly known as planthoppers. This non-native, invasive species was first detected in 1914 in Berks County, Pennsylvania and was first found in Massachusetts in Fitchburg (Worcester County) in 2021. Very recently, an additional population of spotted lanternfly was detected in Shrewsbury, MA (Worcester County; January 2022).

In addition to Pennsylvania and Massachusetts, there are known established populations of SLF in Connecticut, Delaware, Indiana, Maryland, New Jersey, New York, Ohio, Virginia, and West Virginia. It seems likely that the SLF will spread into other areas of Massachusetts despite substantial prevention efforts by state agencies.

The spotted lanternfly attacks a wide variety of plants and trees, around 170 known so far. The damage to plants and trees is done by the immature insects as well as the adults (discussed below). Major targets for the SLF are: tree of heaven (*Ailanthus altissima*) (preferred host) and a number of fruit trees and vines found in West Newbury, including apple (*Malus spp*), plum, cherry, peach, apricot (*Prunus spp*), and grape (*Vitis spp*). The SLF also attacks various pines (*Pinus spp*).

Other known target species include American beech (*Fagus grandifolia*), American linden (*Tilia americana*), American sycamore (*Platanus occidentalis*), big-toothed aspen (*Populus grandidentata*), black birch (*Betula lenta*), black cherry (*Prunus serotina*), black gum (*Nyssa sylvatica*), black walnut (*Juglans nigra*), dogwood (*Cornus spp*), Japanese snowbell (*Styrax japonicus*), maple (*Acer spp*), oak (*Quercus spp*), paper birch (*Betula papyrifera*), pignut hickory (*Carya glabra*), sassafras (*Sassafras albidum*), serviceberry (*Amelanchier canadensis*), slippery elm (*Ulmus rubra*), tulip poplar (*Liriodendron tulipifera*), white ash (*Fraxinus americana*), and willow (*Salix spp*).

Life Cycle



Early immature stage (instars)



4th SLF instar



Adult SLF

Adults are 1 inch long and ½ inch wide at rest. The forewing is gray with black spots of varying sizes and the wing tips have black spots outlined in gray. Hind wings have contrasting patches of red and black with a white band. The legs and head are black, and the abdomen is yellow with black bands. Early immature stages (1st, 2nd, and 3rd instar) are black with white spots. By the last immature stage, the 4th instar, the SLF develops red patches in addition to the black color with white spots. This is the last immature stage before the SLF matures into an adult, typically in July in the northeastern United States. Both the immature insect and the adult are quite visually striking. Adults are especially so when they have been startled and expose the bright red coloration on the hind wings. When the adult is at rest, particularly on the trunk of

the tree of heaven, their gray, spotted color may actually cause them to blend in with their surroundings.

The adults have been described as weak fliers and they do have wings. Being a planthopper, however, the SLF is capable of jumping and may use its wings to aid this movement. Adults often gather in large numbers and create a substantial nuisance in homeowner backyards, orchards, vineyards, and in public parks.

In the fall, the adults are frequently found on tree of heaven; however, they disperse widely to lay eggs. The adult female spotted lanternfly lays brown/tan, seed-like eggs in rows on host plants and other smooth surfaces. These rows are often oriented vertically and are covered with a light gray, waxy secretion from the female. As the egg mass ages, the gray waxy coating often cracks, and the egg mass looks even more like dried mud (see photos above). Coated SLF egg masses have been described as “weird gypsy moth egg masses”, an insect well known in Massachusetts, but they are not.

The timing of the life cycle of the spotted lanternfly may differ locally in Massachusetts. Based on observations reported from Pennsylvania, there is one generation per year. Spotted lanternfly eggs are the stage that overwinter. These eggs hatch sometime in May and nymphs (immature instars) will feed on the various host plants (listed above) depending upon availability. These early instars have been found to move up and down the host plant on a daily basis as they feed. This makes it feasible to capture some of them using sticky bands placed around host plants.

Damage



Tree trunk inundation by feeding adult spotted lanternflies.

The adults and immatures of this species damage host plants by feeding on sap from stems, leaves, and the trunks of trees. Trees may be found with sap weeping from the wounds caused by the insect's feeding. The sugary secretions (excrement) created by this insect may coat the host plant, later leading to the growth of undesirable sooty

mold. Insects such as wasps, hornets, bees, and ants may also be attracted to the sugary waste created by the lanternflies or to the sap weeping from open wounds in the host plant. Host plants have been described as giving off a fermented odor when this insect is present.

Thus, this pest insect is more of a serious nuisance than a lethal threat to trees and vines. Certainly, fruit and grape crops may become unusable if sooty mold is present. In Pennsylvania vineyards, this insect has harmed or killed grape vines. Some evidence also shows greater vine susceptibility to winter damage to bud or vascular tissue. However, death of ornamental trees as a result of spotted lanternfly feeding is not a common or widely reported outcome even though some tree damage has been observed. Finally, the USDA states that dusk is the best time to inspect trees or other host plants for signs of this pest, as the insects tend to gather in large groups on the trunks and stems of plants at that time of day.

Management

At this early stage before SLF infestations have arrived, careful inspection of potential egg mass sites (tree trunks, bricks, stone, lawn furniture, recreational vehicles, play structures, gazebos, fencing, and other smooth surfaces) is the primary preventive measure along with immediate reporting of any sighting to Massachusetts authorities. The state authorities tell us that there is no reason to be preemptively treating for this insect at this time.

For now, the primary management measure is education of West Newbury residents and fruit growers on what to look for and who to alert if something looks suspicious. The state asks us to report any sightings of egg masses, immature stages, or adults immediately to Massachusetts Department of Agricultural Resources (MDAR).
URL: <https://massnrc.org/pests/slfreport.aspx>

Further options for education and outreach are contained in Section VII.B. of this Report.

Additional Resources

- For the current updates regarding where the spotted lanternfly has been reported in Massachusetts, visit:
<https://massnrc.org/pests/pestFAQsheets/spottedlanternfly.html>
- For educational materials, visit: <http://bit.ly/FPOMOrder>
- The Pennsylvania Department of Agriculture has been in the forefront of SLF research and information dissemination. Here are various helpful links:
 - https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/Entomology/spotted_lanternfly/Pages/default.aspx
 - <https://extension.psu.edu/spotted-lanternfly-what-to-look-for>

- The USDA also has helpful information, visit:
<https://www.aphis.usda.gov/aphis/resources/pests-diseases/hungry-pests/the-threat/spotted-lanternfly/spotted-lanternfly>

VI. ACTIONS TAKEN TO DATE IN WEST NEWBURY

Information Provided by the WN Tree Committee

To date, the West Newbury Tree Committee (WNTC) has taken a number of steps to inform residents and property owners about the threat posed by the EAB, including:

- posting numerous messages and information on the WNTC website about the EAB infestation and the importance of taking prompt action;
- arranging for a community-wide teleconference on the EAB in August 2020 featuring state officials and entomological experts; and
- making site visits on request to a number of private properties to help owners assess the status of their ash trees and to provide information on possible treatment options.

The Tree Committee also conducted a community-wide survey of residents about trees and forests. Survey results revealed the high value place by residents on the protection of West Newbury's trees.

Department of Public Works (DPW) Actions

The town DPW and the Tree Warden have the responsibility for removing high hazard trees on public property and along public roadways.

- Annual funding for tree removal: The DPW and Tree Warden receive \$50,000 per year in budget funds dedicated to removal of high hazard trees on public properties. These removals are not exclusively limited to ash trees. The current funding is not sufficient to cover the many more trees, including more ash, that warrant removal.
- Ash tree injection pilot program at the Pipestave-Mill Pond complex: In October 2020, 21 ash trees at this location were treated by a commercial tree company using the trunk injection. The cost was \$6,410 (\$256.10 per tree). The goal was to protect as many trees in this highly trafficked area as possible in the short-term with limited funds and then evaluate the results. Care was taken to inject trees that had a reasonable chance at survival. This pilot program will be continued in spring-summer of 2022 and will provide an opportunity to assess the response of the ash trees to the first injection and to help target the second round.

Homeowner Actions

Individual homeowners have contacted various tree companies to assess the health of their own ash trees and, as appropriate, treat the ash trees. Only minor, anecdotal information is available to the author on the locations or extent to which this has occurred. No information is available on other measures taken on private property.

VII. OPTIONS FOR FUTURE ACTION

A. EMERALD ASH BORER

To address the EAB infestation, which is well underway and threatens most if not all of the ash trees located in West Newbury, a limited number of options exist, primarily because of the insect's biology and ecology. Specifically, landscape-level control of EAB is very difficult because of larval feeding in the cambium layer underneath the bark. As noted in the previous sections, this occurs from 1-3 years before obvious external signs of EAB infestation are manifest. In other words, by the time one can see significant canopy die-back, the tree's survival is already severely compromised.

At this time and given that biocontrols are still in the research stage, options for successfully treating the EAB infestation prior to tree mortality are limited to a tree-by-tree approach. Too, treating trees on an individual basis is likely to be practical only for a small subset of ash trees that are viewed as important to the town or to individual homeowners.

The following options are appropriate for the town to consider both for public lands and along roadways as well as by individual landowners on their own properties.

1. Continued Educational Programs for Property Owners

Because the implementation of any treatment measure is on a tree-by-tree basis and because most ash trees in West Newbury are on private property, the town could increase its educational campaign to inform homeowners about the potential measures that can be taken and by whom. Specifically, the town could increase its efforts to educate and incentivize property owners on how to save ash trees. Readily feasible options include:

- (a) allocating time at the spring and fall town meetings to address the EAB issues and possible options for remediation;
- (b) creating a pamphlet to be mailed to all property owners about the EAB issues and possible options for remediation; and

- (c) issuing periodic reminders about the EAB to homeowners via social media and the town email system.

Actions (a)-(c) are fairly self-explanatory. Coordination with the Tree Committee would be useful in implementing any or all of them. Very minor support from town staff may be needed as well.

Also, actions (a)-(c) can be taken separately from or in conjunction with an incentive program to further encourage private property owners to assess their ash trees (for mortality and for hazard level) and to take appropriate control measures. The design of such an incentive program could be a next step for study by town officials but is beyond the scope of this report.

2. Treating Individual Trees with Pesticides

Currently, the most effective measure for combatting the EAB infestation in West Newbury is treatment of ash trees with systemic insecticides. Three established methods exist for treating ash trees with insecticides to kill the feeding larvae -- internal trunk injection, soil drench, and external basal trunk spraying.

Important considerations when using any pesticide treatment method include:

- how effective is the pesticide against a particular pest;
- how easy or hard it is to use the proper application method per label instructions;
- how easy or hard is it to get the correct pesticide dilution from a stock concentration;
- how easy or hard is it to follow safety and practical measures attendant to mixing and applying the specific pesticide.
- what are the known and suspected health risks to the applicator;
- what protective equipment is required during mixing and application;
- are surrounding environmental conditions being taken into account if spraying is used (e.g., to prevent adverse consequences from wind drift); and
- are soil conditions being analyzed before application if soil drench is used (e.g., soil moisture, soil type, pending rainstorms, etc.)

Trunk Injection Method (recommended):

Using trunk injection by professional licensed applicators, the expense of treating trees with insecticides effectively and safely is estimated by the author to be \$200-300 per tree per year, based on the pilot Pipestave program, other individual cases, and discussions with local tree companies. This expense would be incurred at least every other year and possibly more often, depending on the tree response. This expense is far less than the \$1500-3000 typically needed for removal of a dead ash tree.

A number of commercial products are readily available to professional applicators for controlling the EAB infestation and, when properly applied, do not threaten other biota or ecological systems. One commonly used is Emamectin benzoate (Emamectin), which has been shown to be relatively immobile in soil and undergoes rapid photolysis in an aqueous environment.

- See 2010 Emamectin Benzoate Human Health and Ecological Risk Assessment (SERA Report to USFS), URL:
https://www.fs.fed.us/foresthealth/pesticide/pdfs/052-23-03b_Emamectin-benzoate.pdf
- See also, 2009 Environmental Risk Assessment from EPA's Office of Pesticide Programs, URL:
https://www3.epa.gov/pesticides/chem_search/cleared_reviews/csr_PC-122806_13-Jan-09_a.pdf
- See also, 2011 Frequently Asked Questions Regarding the Potential Side Effects of Systemic Insecticides Used to Control Emerald Ash Borer, URL:
<https://extension.entm.purdue.edu/EAB/PDF/PotentialSideEffectsofEABInsecticidesFAQ.pdf>

Soil Drench and Basal Trunk Spraying (not recommended):

These methods of insecticide control of the EAB are potentially less costly, assuming use of proper formulations (difficult) and application by homeowners or non-professional DPW staff (highly problematic). As discussed above, many considerations should be taken into account related to the delivery of the insecticide at levels that will be effective while maintaining appropriate levels of safety for the applicator and the surrounding environment. For this reason, use of these methods only by trained and licensed professionals should be considered. This may, in turn, increase the cost to levels approximately equivalent to trunk injection.

In summary, for West Newbury, trunk injection of an approved systemic insecticide provides a method of EAB treatment that:

- (a) is the most targeted application method that, if properly applied, will avoid significant adverse effects on the surrounding environment;
- (b) presents the least risk to persons and surroundings when trunk injections are done by trained, professional pesticide applicators;
- (c) is unlikely to be done by untrained homeowners or DPW personnel due to the specialized equipment needed for injection; and
- (c) provides the most consistent level of effectiveness in combatting the EAB.

More information on the EAB, insecticide options, and treatment application methods is contained in the North Central IPM Center publication entitled *Insecticide Options for Protecting Ash Trees from Emerald Ash Borer*, (3rd edition). URL:

http://www.emeraldashborer.info/documents/Multistate_EAB_Insecticide_Fact_Sheet.pdf

3. Economic Considerations Related to an Injection Program for Ash Trees on Public Roadways

The most visible ash trees are along West Newbury's roadways and also on certain parts of public property, e.g., Pipestave-Mill Pond complex. Given that trunk injection is 5-10 times less expensive than tree removal, the Town could dedicate budget funds for trunk injection of ash trees that are on public roadways, especially those that could be classified as high hazard trees if they die. An injection program could also be extended to specific trees on other public lands if desired.

Devoting \$50,000 to trunk injection, for example, would treat and hopefully save up to 200 trees on public roadways, assuming a per-tree cost of \$250. Conversely, removal of 250 trees would cost in the neighborhood of \$375,000 (assuming an average cost of \$1500 per tree).

An injection program for ash trees on public roadways can be implemented through contracting mechanisms already used by the town DPW.

4. Prerequisite Street-Level Survey of Ash Trees on Public Property

To get the greatest economic value out of any injection program, one key prerequisite element is to conduct a survey of all ash trees along town roadways. This survey would identify with specificity the location of all ash trees by GPS coordinates, identify which trees are dying or dead and for which injection is not appropriate, and which trees might be saved by timely injection this coming 2022 summer or fall. Extending the survey to other public lands in West Newbury is not considered a feasible option at this time due to the far greater costs that would probably be involved.

A public roadway survey can be done by a local tree company with expertise, equipment, and trained personnel, which are otherwise not available in West Newbury. The cost of this survey is anticipated to be offset by the savings from injecting only those trees with a good chance of survival when contrasted with the cost of removing those trees when they die. The survey would also definitely sharpen the program for removal of other high hazard trees (whether diseased ash or not) by identifying them more clearly for any removal project bidders in the future. Currently, there is no data base or GPS-based mapping to guide such prospective bidders.

The bulk of a roadway survey could be begun when ash trees leaf out in spring 2022 with completion and final verification done after full leaf out. Getting the survey done would be in the purview of the DPW in terms of contracting with a local tree company.

5. Tree Removal Programs

Ash tree mortality is now occurring and will continue to plague West Newbury for years to come. Dead ash trees can present significant hazards to persons and property and can also detract from the aesthetic and authentic rural character of our town, the importance of which was emphasized in the recent Tree Committee survey.

At this point, the West Newbury DPW and Tree Warden are charged with the responsibility of protecting people and property from high hazard situations involving trees on public lands and along public roadways. The town has earmarked funds for removal of high hazard trees for many years. Currently, the town budgets \$50,000 per year for this effort. However, the EAB infestation has dramatically increased the number of dead trees and, therefore, changes to the current hazardous tree removal program should be evaluated, preferably in conjunction with a targeted treatment program for healthy ash trees preceded by a street-level survey. A more comprehensive and targeted plan to address the EAB community-wide infestation will, in the end, likely be more effective and efficient.

Various types of tree removal exist, but none are inexpensive or simple.

- Removal of infected tree at early stages: Removal at the early stage of EAB infestation is not practically feasible because it is very difficult to determine whether the EAB is present early in the infestation cycle. Clear evidence of infestation typically occurs after tree health is already substantially compromised.
- Removal of dead or dying ash trees: As noted above, letting a large number of ash trees die and then cutting and removing them would involve significant expense, given that each tree removal would probably cost \$1500-\$3000 based on site conditions (i.e., ease of access, location of the tree, and size of the tree).

A broad-scale program of dead tree removal on all public property (i.e., roadways, parks, recreational areas, etc.) seems not to be economically feasible at this time for the town to pursue. Rather, a more targeted approach limited to public roadways is recommended along with a street-level survey. The scope of this effort could be expanded to include a modest amount of ash trees on public property that are significant for other reasons, such as location near well-used public areas on Pipestave Hill. Of course, individual homeowners may also choose a removal option for dead or dying trees on their own properties where those trees present high hazards to people and property.

- Removal of healthy, uninfected ash trees: Occasionally, a suggestion is made advocating removal of healthy ash trees in order to decrease the number of host trees that can perpetuate the spread of infestation from diseased trees to healthy trees. Large-scale removal of healthy trees by the town seems unattractive by comparison to trunk injection option both because of the large cost involved as well as the extensive and unpredictable change in the tree cover in West Newbury that would likely result.

6. Other Issues and Options

- Protecting and saving trees is favored by the community at large and has quantifiable economic benefits: The community tree survey made it clear that town residents place an extremely high value on the forest cover in West Newbury, want the town to do more to protect trees in West Newbury, and have a significant level of concern about trees diseases and pests.

Keeping trees alive has recognized economic and environmental values over and above aesthetic benefits. These values include intercepting surface runoff to promote aquifer and reservoir recharge, reducing soil erosion and runoff into local waterbodies, reducing stormwater flows into treatment systems, increasing carbon storage to offset carbon emissions, lowering surface temperature and reducing energy needs for summer cooling, increasing habitat for wildlife, and increasing property values. For a good reference discussing the benefits and valuation of trees, visit URL:

https://www.fs.fed.us/nrs/pubs/jrnl/2017/nrs_2017_nowak_002.pdf

- Incentives to support an injection program for ash trees on private property: This option is based on the recognition that EAB presents an economically costly problem to the community at large. Since the majority of ash trees in West Newbury are on privately-owned land, it may be worthwhile to consider creating an incentive program designed to monetarily support homeowners who, with some type of subsidy, would be willing to pay for part of the cost for trunk injection of a number of ash trees on their own property. This program would likely need funding in the neighborhood of several hundred thousand dollars in light of the 1608 residential parcels in West Newbury. Implementation details will be important when considering this option, but these details are beyond the scope of this report.
- Additional survey to identify high hazard ash trees in other public areas, such as all town parks and conservation lands. In light of the extensive public acreage in West Newbury that is beyond public roadways, conducting some type of tree survey to determine the location of target trees and the extent of potential ash tree die-off could be beneficial for any injection or removal program. However, the cost of conducting this type of survey would likely be well beyond the historic

levels of funding for tree protection efforts. Nonetheless, the town may wish to consider this option in the future.

- **Increased Forest Fire Risk:** Finally, while no information currently exists on the increased possibility of forest fires from dead ash trees, town officials should be aware that a large number of downed, dead ash trees, such as those at the Pipestave-Mill Pond complex, conceivably may present an increased risk for forest fires. Further investigation by fire officials into this possibility may be warranted.

B. SPOTTED LANTERNFLY

As discussed in the above sections, current information indicates that the SLF infestation is not now underway in West Newbury. Since this information is based on individual sightings and the actual level of scrutiny by West Newbury residents is unclear, it is possible but certainly not probable that the SLF has a presence in West Newbury.

Fortunately, this allows West Newbury to consider a variety of preventive measures in a timely manner. Other jurisdictions, particularly Pennsylvania, have developed a number of approaches and tools that are designed to mitigate the damage caused by the SLF (see Additional Sources at end of this section). The following discussion incorporates some of these approaches and tools, all with the goal of preventing future tree damage and mitigating potential economic loss in West Newbury.

However, because of its biology and ecology, the SLF does represent a future problem for West Newbury property owners and their trees. Given the residents' emphasis on habitat preservation and enjoyment of West Newbury's trees and forested landscape, town officials may wish to consider near-term implementation of the following options for combatting the SLF. Note that the options below do not include control measures that might be considered if and when a significant infestation of SLF in West Newbury has occurred.

1. Education and Information Dissemination on Identifying the Presence of the SLF

- (a) Increasing the publicity to residents on identifying the various stages of SLF, especially egg masses, and on identifying the species of plants and trees that are particularly susceptible to the SLF. Much information is readily available on the internet, and simplified fact sheets can be developed for distribution either electronically or by mail. The Tree Committee is able to provide this additional publicity and any information needed.

- (b) Increasing the information for residents on what to do if any evidence of SLF presence is observed. Again, much information is readily available on the internet, and simplified fact sheets can be developed for distribution either electronically or by mail. The Tree Committee is able to provide this additional publicity and any information needed.

2. Education and Information Dissemination on Keeping the SLF Out of West Newbury

- (a) Increasing the information for residents on ways in which the SLF can be imported into West Newbury, especially on plant stock materials that are purchased or on other materials that may be vectors for SLF (e.g., boats and cars coming from areas of known infestation). To date, this type of information has not been provided to West Newbury residents and, with upcoming summertime travel to surrounding states, dissemination of this information would now be very timely. As noted in the discussion of the SLF above, egg masses can be found on many surfaces other than tree trunks (e.g., boats, firewood, campers, etc.). Reminders to West Newbury residents to be on the lookout for SLF egg masses can be handled by the West Newbury Tree Committee.
- (b) Further steps, such as considering a local ban on out of state firewood imports could ultimately be useful but is still premature. This type of preventive measure may be needed if and when the SLF problem becomes worse, but not at this point. West Newbury can wait and follow any state agency recommendations related to this type of option.

3. Surveying Local Nurseries and Creating Appropriate Informational Guidance

- (a) Research can be conducted to identify which local nurseries are taking appropriate inspection measures for SLF egg masses on any plant stock being imported from areas of known SLF infestation (e.g., Pennsylvania). The results of this research could be publicized in a manner that would help local residents make more informed purchasing decisions. The research into local nursery practices would need to be contracted out. This is a measure that, if handled carefully, would be timely in the near future and is another means to avoid importing the SLF problem into our area. The research results can be disseminated to West Newbury residents on the town website or by the Tree Committee.
- (b) Guidance can be developed with recommendations for increased surveillance by any commercial entity in West Newbury that is raising plant crops of particular interest to the SLF, i.e., fruit orchards and vineyards. Early detection is critical to any program for controlling SLF in our area as it is in any jurisdiction in

Massachusetts. If any evidence of SLF is found on these West Newbury properties, assistance from state agricultural agencies can easily be sought. The guidance for local property owners can be created by the Tree Committee. Dissemination of the guidance to appropriate property owners can be implemented by the town, for example, in conjunction with information from the planning board or the property tax office, either of which may be able to identify parcels that would be in the high SLF risk category.

VIII. CONCLUSION

West Newbury is fortunate to have many forested areas that residents enjoy and wish to protect. Threats to the health and enjoyment of West Newbury trees can come from many sources, but two insect pests, the Emerald Ash Borer and the Spotted Lanternfly, appear to be the major threats today and in the near future. Options for addressing both of these insect pests exist but, in the case, of the Emerald Ash Borer, delay in implementing a substantial treatment program will only result in a more expensive dead tree removal program in future years. A less serious situation is presented by the Spotted Lanternfly at this time, both because it has not yet reached West Newbury and also because the insect generally does not kill trees. An active program of education can be implemented at this stage to minimize the nuisance that the Spotted Lanternfly will present and to avoid potential damage to certain fruit crops (especially grapes).

Respectfully submitted,

Fred Chanania, MCA
Chairperson, West Newbury Tree Committee
March 2022



The Goal: Healthy Trees in West Newbury