

CITY OF MONTPELIER

EMERALD ASH BORER PREPAREDNESS PLAN

VERSION 2.0
Winter 2014-2015

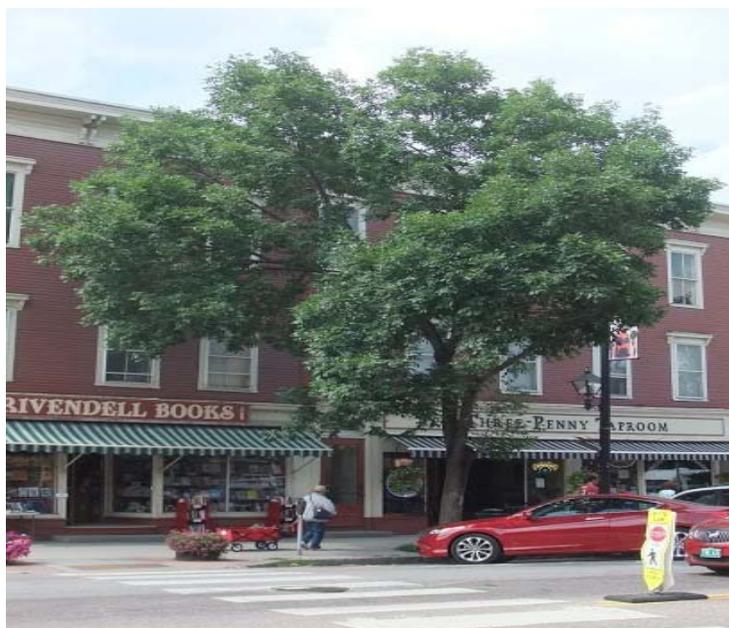


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ACKNOWLEDGEMENTS

Vermont EAB Preparedness Plan Incentive Program - Grant received from UVM
Extension-Vermont Urban and Community Forest Program

Special Thanks to Caitlin Cusack, Kate Forrer, Rhonda Mace and Jay Lackey for
their encouragement and assistance in developing this plan

Also Special Thanks to Members of the Montpelier Tree Board and Volunteers who
have assisted in the development of this Plan

VT ANR – Department of Forests, Parks and Recreation

Minnesota DNR (cover EAB photo); Bob Troester (cover Main Street Ash)

Penn State University Cooperative Extension

University of Iowa Extension

Vtinvasives.org

INTRODUCTION

The Emerald Ash Borer was first detected in the Detroit, Michigan area in 2002 and surveys quickly revealed that almost every ash tree in the Detroit area was affected. It is believed that the detection went unnoticed for ten or more years with the insect having been transported in pallet wood or packing material.

EAB has now spread to 25 states (Michigan, Arkansas, Colorado, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin, and two Canadian provinces, Ontario and Quebec. The latest detections in the Northeast US were made in Concord, New Hampshire in March-April, 2013.

EAB has killed tens of millions of ash trees and will kill millions more. It is believed that 8 billion ash trees in the United States are at risk. Vermont has over 100 million ash trees and the EAB is present in all surrounding states and the province of Quebec. The arrival of EAB in Vermont is not a question of if but when.

In a recent comparative analysis of the risk of Vermont communities to infestation by EAB, Montpelier was judged to have among the highest rating for potential arrival of EAB based on the number of introduction pathways including nurseries carrying ash, sawmills processing ash, campgrounds, firewood dealers, log trucking transportation routes, major roads, chip plants, wood pellet dealers, importers, airports, tourist attractions, recreational sites, rest areas, weigh stations, seasonal residences, and rail lines. On a scale of 0 to 7 where the higher the value, the greater the maximum risk class, Montpelier was ranked as a Maximum Risk Class 7 [See Attachment #1]

Lessons learned from communities in Ohio and Michigan point out the need for preparedness planning as those communities which have planned for the arrival of EAB have had the funds to deal with the problem and those which waited and did nothing found themselves dealing with an emergency situation. A preparedness plan outlines the activities that must be performed to address the threat of EAB to Montpelier's urban forest resource. Developing, communicating and implementing a management plan is the responsible thing to do in the face of this challenge. Experience from other communities has shown that the costs associated with dealing with EAB can be spread over a longer period of time by being proactive and will, in fact, reduce overall costs. Finally, we are not in this alone. Having a plan available for Montpelier can provide a mechanism for coordinating with other neighboring communities and sharing resources.

PURPOSE OF PLAN

Montpelier Ordinance: Section 13-304 Montpelier Tree Board

It shall be the responsibility of the Board to study, investigate, counsel, and develop and/or update annually, and administer a written plan for the care, preservation, pruning, planting, removal, or disposition of trees and shrubs in parks, along streets and in other public areas.

The purpose of the City of Montpelier EAB Preparedness Plan is to:

- (1) Determine the extent of the vulnerability of Montpelier to EAB by updating the Montpelier tree inventory of ash trees;
- (2) Create community awareness of the EAB problem;
- (3) Develop multiple systems to facilitate the early detection of EAB;
- (4) Develop procedures for preemptively replacing poor condition street ash trees with other diverse tree species;
- (5) Develop procedures for reduction of hazards to public safety and infrastructure posed by dead or dying ash trees by removing trees as they become infested;
- (6) Initiate a community discussion over the use of insecticides to save high value ash trees in accordance with **SLow Ash Mortality (SLAM)** principles;
- (7) Maximize the time available to the Montpelier community to deal with EAB and distribute the associated costs over a longer period of time by being proactive rather than reactive.

SCOPE OF THIS EAB PREPAREDNESS PLAN

The City of Montpelier EAB Preparedness Plan addresses all ash trees located on public properties within the city limits and all private ash trees considered high risk adjacent to public land. This plan is a living document which will be subject to modification based on updated scientific information regarding the EAB and its distribution as well as reflecting the evolving community vision for addressing the threat posed by EAB. The City Council, with advice and counsel from the Tree Board and the City Tree Warden, will have final oversight of the plan implementation and will engage Montpelier Department of Public Works staff and outside contractors (as necessary) to conduct the work.

AUTHORITY

The City of Montpelier has sufficient authority embedded in city ordinances to address the infestation of ash trees by EAB [See Attachment #2].

Montpelier Ordinance 13-312. Public Tree Care.

The City shall have the right to plant, prune, maintain and remove trees, plants and shrubs within the lines of all streets, alleys, avenues, lanes, squares and public grounds, as may be necessary to insure public safety or to preserve or enhance the symmetry and beauty of such public grounds.

The City Tree Warden may remove or cause to be removed any tree or part thereof which is in an unsafe condition or which by reason of its nature presents a hazard to the general public, is injurious to sewers, electric power lines, water lines or other public improvements, or is affected with any injurious fungus, insect or other pests.
(emphasis added)

Montpelier Ordinance 13-316 Dead or Diseased Tree Removal on Private Property

The City shall have the right to cause the removal of any dead or diseased tree on private property within the city, when such tree constitutes a hazard to life and property, or harbor insects or disease which constitutes a potential threat to other trees within the city. The City Tree Board will notify in writing the owners of such trees. Removal shall be done by said owners at their own expense within sixty days after the date of service of notice. In the event of failure of owners to comply with such provisions, the City shall have the authority to remove such trees and charge the cost of removal on the owner's property tax notice.

THE EMERALD ASH BORER LIFE CYCLE – CONDENSED VERSION

Once EAB arrives, its life cycle will dictate, to a large extent, how and when the infested ash are disposed of. For example, cut trees should not be moved during the period May-August because the EAB adults will be emerging from the trees at that time and seeking new host trees. The following is a condensed version of the EAB life cycle:

MONTH	STAGE OR ACTIVITY
May	Adults moult from pupae in bark or outer portion of sapwood of the host tree
May	Adults emerge from tree through distinctive D-shaped holes
June – August	Adults move into the foliage to feed on the edge of leaves; for females, this is essential for their ovaries to mature and be able to lay eggs
July – August	Several weeks after emergence females mate and lay eggs singly or in small clusters in bark crevices and under bark scales
July – August	Newly hatched larvae chew through the bark and into the cambial layer beneath the bark
August – September	The larvae from distinct S-shaped galleries in the inner bark which girdles the tree eventually killing it; larvae go through four instar stages and as they grow the galleries become wider
September – October	Larvae excavate pupal chambers
November – March	Larvae in pre-pupae stage stay in pupal chamber
March – May	Pre-pupae moult into pupae
May	Adults moult from pupae

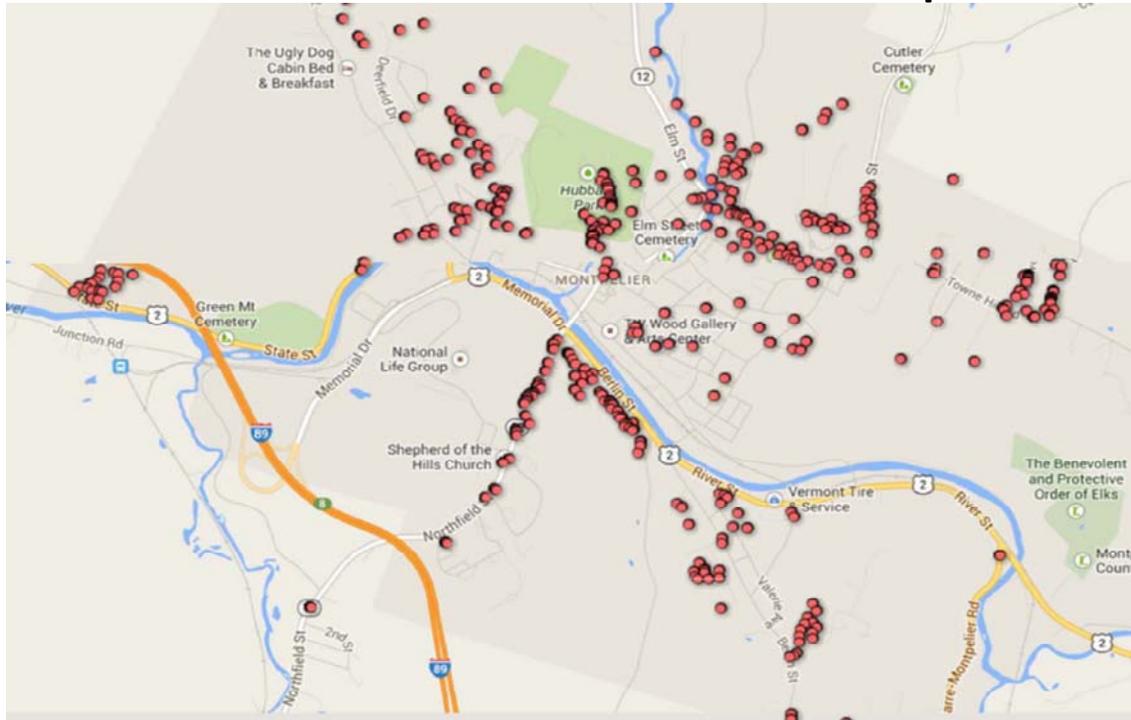
NOTES:

EAB is very difficult to detect. After the adults emerge, they feed on foliage in the upper parts of the tree which are leafing out about the same time. Therefore, it is unlikely that this small insect would be spotted by individuals on the ground below the tree. The State of Vermont Agency of Agriculture, in cooperation with United States Department of Agriculture, has deployed purple sticky traps in ash trees across the state to attempt to capture EAB. None were captured by the surveys conducted in 2011 and 2012. So, EAB has not been detected in Vermont yet but some computer models indicate that it will be in Vermont within five years. See Attachment #3 for an example of the damage to an ash by the EAB larvae.

MONTPELIER ASH TREES – WHAT WE KNOW

In 2008 and 2009 Montpelier street trees were surveyed and the data entered into a tree inventory database. Listed in that inventory are the locations and condition factors for 64 ash trees. However, a re-survey of Montpelier street trees to enumerate ash trees only was conducted in 2013. This

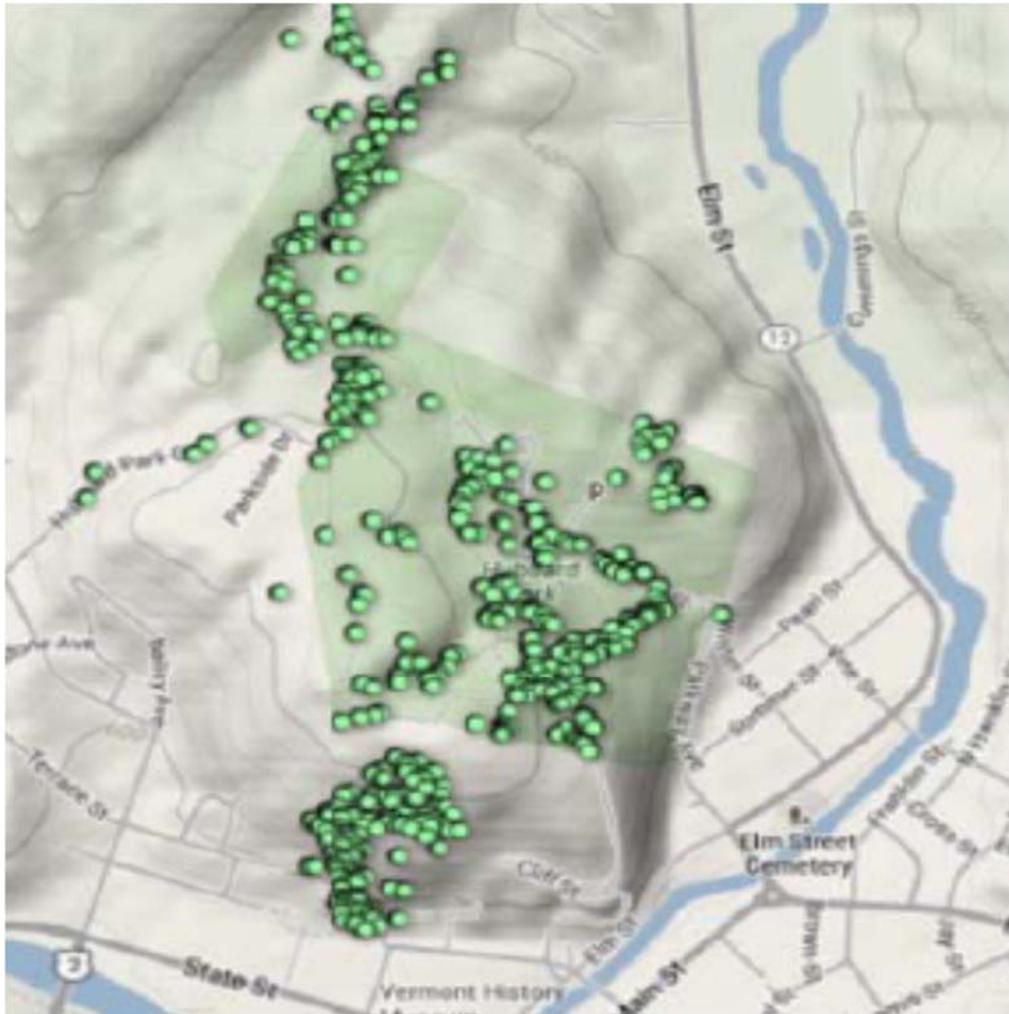
Distribution of Ash Street Trees in Montpelier



survey identified over 500 street ash trees.

There is, of course, a major forest in the center of the city, Hubbard Park. The Park contains a mix of trees including ash. A rough guess of the ratio of ash to all trees is 1:15-20 for most areas of the Park based on personal observation. However, Ash exist along several trails in the Park and these could present a hazard to park users if they were killed by EAB. Initial surveys indicate high densities of ash along certain trails in and near the Park (such as the Statehouse trail).

Distribution of Ash Trees in Hubbard Park and Along the Statehouse Trail



About 600 ash trees have been identified along trails in Hubbard Park and associated trails.

Private Property Ash Trees

When the Emerald Ash Borer arrives, ash trees on private property can also be expected to be infested. According to City Ordinance 13-316 ***"The City shall have the right to cause the removal of any dead or diseased tree on private property within the city, when such tree constitutes a hazard to life and property, or harbor insects or disease which constitutes a potential threat to other trees within the city."*** Depending upon the size, number and location of ash trees on private property, their removal can be expected to cause a financial

hardship for some City residents and an unexpected expense for all. The Tree Board, assisted by volunteers, undertook a study to try to determine the number of ash trees located on private property throughout the City. Because it would be impractical to try to survey every property, a random sampling of about 97 properties throughout the City were surveyed with the results extrapolated to provide an estimate for the City private landholdings as a whole. The survey found that 44 properties with acreages less than 10 had ash trees, this was equivalent to approximately 46% of the parcels. It is estimated that 681(+/- 68) of property owners in Montpelier have ash trees. Using a median number of four (4) ash trees per parcel, the estimated number of ash trees on private property in the City is estimated at 2,724 trees. This number far exceeds the combined number of ash trees on streets in the City and those along Hubbard Park trails. See Survey Information in Attachment #4. It appears that the residents of the City will bear the brunt of the costs associated with ash tree removals when the Emerald Ash Borer arrives.

COMMUNITY OUTREACH EFFORTS

The Tree Board kicked off outreach efforts to educate the residents of Montpelier with the July 3, 2013 parade when EAB information cards were distributed to parade watchers. The Tree Board also met with the Montpelier City Council on October 23rd of 2013 to brief them on the threat that EAB poses not only to City finances but also to residents. A follow-up meeting was held with the City Manager on December 17, 2013 but unfortunately no concrete steps were taken in terms of City planning for EAB. Given the fact that Ash Tree Awareness Week was to be conducted during the month of April, 2014, the Tree Board took advantage of the Welcome Back Legislators event to advertise the Awareness Week and provide EAB information to the legislators. Information regarding invasive pests was given to about 25 individuals during a presentation conducted in collaboration with the VT Agency of Agriculture at the Unitarian Church on February 15, 2014. A member of the Tree Board participated in a webinar entitled "Planning For EAB" during which the steps that the Montpelier Tree Board is taking to counter EAB was presented to about 30 people statewide. The Montpelier Parks Commission was also made aware of the EAB threat during one of their meetings on February 20, 2014 when a member of the Tree Board was asked to provide them with some facts on the subject. The Tree Board also participated in an airing of "Across The Fence" on March 21, 2014 featuring some tagged trees in Hubbard Park and downtown as well as what the Tree Board is doing to prepare for the arrival of EAB. Additional ash tree tagging was conducted during the Ash Tree Awareness Week in April, 2014. On Arbor Day, May 2, 2014 the Tree Board had two ash tree/EAB awareness outings in Hubbard Park with students of the Union Elementary School. As can be seen, a good time was had by all.



ACTION PLAN: ACTIVITIES PRIOR TO ARRIVAL OF EAB IN MONTPELIER AREA

(1) Preparedness Planning Document

Prior planning prevents poor performance. Having a preparedness document provides guidance for dealing with the threat of EAB in a controlled manner with various options and their associated costs identified in advance. Municipal officials and the community can then decide on the right course of action.

Target Date For Completion: Version 2.0 by April, 2015

(2) Complete a Montpelier Inventory of Ash Street Trees and a Limited Inventory of Ash Park Trees

There is no substitute for having an accurate assessment of the vulnerability of Montpelier to the threat of EAB and that means having a good estimate of the number of ash trees within city limits. At a minimum, street trees need to be

located and information gathered on their condition using some of the parameters contained in the existing Montpelier inventory of street trees. At a minimum, ash within 30 feet of the trails in the Park should be inventoried and mapped in a similar fashion. As part of the inventory effort, high value ash, if they exist in the city limits, will be identified.

Status: Completed in 2013

(3) Estimate Ash on Private Property

The overall costs of EAB to the Montpelier community will be a combination of the ash trees killed on public and private land. In order to get the best estimate of total costs involved, it will be necessary to have a good estimate of the ash growing on private property in the City (residential and commercial). One way to do this would be to survey a representative subset of all properties in the City and extrapolate the results.

Status: Completed: October, 2014

(4) Estimate Future Costs Due to EAB

With a good estimate of the ash tree population within City limits, costs associated with EAB can be estimated using online tools such as the Purdue University's EAB Cost Calculator (<http://extension.entm.purdue.edu/treecomputer/index.php>) The calculator requires the number and size of ash trees present in the community (determined in Steps 2 and 3 above) and the costs involved with removing or treating trees based on the sizes of the trees. The calculator provides cost estimates not only for a "do nothing" option whereby all ash trees are allowed to die within 8 years of arrival of EAB (which is probably an estimate on the long side) but also cost estimates based on proactive steps taken by the community in advance of the arrival of EAB such as removal of poor condition or hazard ash trees.

Estimated removal costs (only) based on \$250 per tree.

Montpelier Street Trees: \$137,500

Montpelier Private Property Trees: \$681,000

Status: Partially Completed; Additional Replacement Costs To Be Determined: October, 2015

(5) Educate the Community on the EAB Threat

As the lead advocate for Montpelier's urban forest, the Montpelier Tree Board should take the lead in making the community aware of the threat of EAB to Montpelier ash trees. The Tree Board has already begun this process but there is more work to do along these lines. Several opportunities for educating the community come to mind:

- a. Take advantage of community events and gatherings to distribute flyers which concisely capture the threat and the consequences of an EAB arrival in the Montpelier area;
- b. Engage the various Capital Area Neighborhood (CAN) groups to become more familiar with the ash trees in their neighborhoods and conduct community ash walks to help that process;
- c. Involve the Montpelier school system in the education process by providing a curriculum of trees and tree pest information to be presented to elementary school children (for example, devote twenty minutes of classroom time a week to teach children about trees and tree pests). See an example curriculum for elementary school [Attachment #5]; also involve the high school by involving interested students in the neighborhood ash walks, monitoring and special studies they may devise as part of their science studies;
- d. Use the Montpelier website and The Bridge as education vehicles;
- e. Have a yearly event which flags downtown ash trees with purple ribbons and with information on EAB so that pedestrians become familiar with the threat;
- f. Determine the effectiveness of the education campaign by random surveys of Montpelier residents to determine if they know what EAB is and what trees are at risk. Use the results of these surveys to determine what future education efforts should be conducted.

Status: Ongoing

(6) Engage Municipal Officials and Community In EAB Options Discussions

How well the Montpelier community addresses the threat of EAB will be based on providing up-to-date information on the EAB threat, Montpelier's vulnerability, and the cost of various ways to address the threat. If proactive steps in this preparedness plan are not utilized, and if the community is not made aware of the severity of the threat in advance, Montpelier will be forced to react to the arrival of EAB and the end result is that the costs of doing so will be higher than if proactive measures were taken. There will need to be decisions made regarding

how to finance the ash tree removals on City property, requirements to be imposed on private landowners to deal with dead/dying ash trees, whether or not to utilize pesticides to combat EAB, creating effective measures within Montpelier to slow the infestation, etc. Given the costs to be faced by private landowners, determine whether the City can establish a revolving loan fund to assist private landowners with the costs associated with removal of dead ash trees. Updating Montpelier's Tree Ordinances should also be discussed as the ordinances list ash trees as a preferred planting species. The following individuals and groups need to be involved: City Manager, City Council, Planning Commission, Public Works Department, Tree Board, Tree Warden, Parks Commission, School Board and business owners. The community will also need to be involved in all discussions involving the potential use of pesticides to combat EAB. [See Attachment #6 - Vermont Forest Pest Planning - Frequently Asked Questions]

Status: Ongoing

(7) Develop a Protocol For Examining Downed Ash Trees

Any ash trees cut in the Montpelier City limits should be examined carefully for any signs of EAB. Notification of this protocol should be made to the professional community involved with tree removals. [See Attachment #7]

The Tree Board has contacted nineteen (19) tree professionals in companies that have done business in the past in the Montpelier area. In order to enhance our first detector efforts, we have asked these professionals to contact us when they encounter ash trees for removal which exhibit possible symptoms of EAB infestation.

Target Date For Completion: Initial Contacts: Spring, 2015; Develop Protocol: Summer, 2015

(8) Plan for the Removal and Possible Replacement of Poor Condition Street Ash

Using the information gathered from the inventory in #2 above, the Tree Board and Tree Warden should identify poor condition ash trees for removal and possible replacement by non-ash species. A five-year plan to remove these trees should be established and presented to the City Manager and City Council for their consideration. Removal of poor condition ash represents a reduction in the vulnerability of Montpelier to the EAB threat. As part of the plan, these poor condition ash should be girdled a year or two in advance of cutting. It has been demonstrated that EAB will preferentially seek out stressed trees and such girdled trees can act as an EAB-sink should EAB be in the Montpelier area, thus providing limited protection of the health ash trees nearby. [See Common Problems of ash Trees -Attachment #8]

Prepare 5-Year Plan and Present To City Council by January, 2016

(9) Identify a Proposed Disposal Location for Future Infested Ash

It is important to have a designated location for the handling of infected ash trees (marshalling area). The Montpelier City dump area would appear to be an ideal location (See Attachment #9). An area of the dump should be set aside for this purpose or, alternatively, another City-owned parcel should be identified in advance.

Suggest Location(s) to City Council by January, 2016

(10) Start Engaging Surrounding Towns

When EAB arrives, all the communities in the area will be affected to some degree eventually. It is important to identify key personnel in the surrounding towns who would be points of contact as we prepare for EAB. While we have no control over the preparations other towns will make, we should keep them apprised of our preparations for EAB and work with them to share available resources in the future. The following towns, within 10 miles of downtown Montpelier, should be contacted and kept informed: Barre, Berlin, Calais, Duxbury, East Montpelier, Marshfield, Middlesex, Moretown, Northfield, Orange, Plainfield, Williamstown, Worcester and Waterbury. Use First Detectors in these Towns and one point of contact. In addition, contacting the Central Vermont Regional Planning Commission might be an efficient way to encourage collaboration among affected communities.

Target Period for Initial Contacts: 2015-2016

(11) Determine Potential Uses For Infested Trees and Potential Ash Utilization

EAB affects only the outer one inch of the outer and inner bark of the ash tree so most of the wood is available for utilization. It should be determined in advance whether it would be economically viable to remove the infected outer and inner bark (which would be chipped to destroy EAB) and utilize the bulk of the tree for other purposes.

Target Date For Completion: October, 2015

ACTION PLAN: ACTIVITIES FOLLOWING ARRIVAL OF EAB IN MONTPELIER AREA

The following activities should occur when EAB is verified, by State and Federal officials, to be present within 10 miles of downtown Montpelier:

- (1) **NOTIFICATION:** Notify municipal officials, homeowners, arborists, parks and recreation staff, commissions, DPW staff, teachers and volunteers using various media (webpage, The Bridge, mass mailings, radio stations, local access cable, etc.). Focus of the communication should be a heads-up as EAB potentially here and what we need to do. Ongoing activity keeping Montpelier informed.
- (2) **SURVEILLANCE:** Increase surveillance and monitoring of street ash trees and selected park ash tree areas. Identify infested trees. This effort should be led by the Tree Board and volunteers. [Use EAB Screening Protocol – Attachment #10].
- (3) **REMOVAL RESTRICTIONS:** Allow tree removals only between September 1st – April 30th of the following year (dormant period) – [New Tree Ordinance].
- (4) **QUARANTINED AREA:** Establish quarantined area; ensure all ash trees which are cut down are taken to the marshalling area – [New Tree Ordinance] [See New Hampshire example – Attachment #11].
- (5) **MARSHALLING AREA:** Establish marshalling area and procedures for use [New Ordinance?].
- (6) **HAZARD TREE REMOVAL:** Remove hazard street ash trees as necessary. Coordinate removal activities with utility companies to spread costs when trees threaten utility lines.

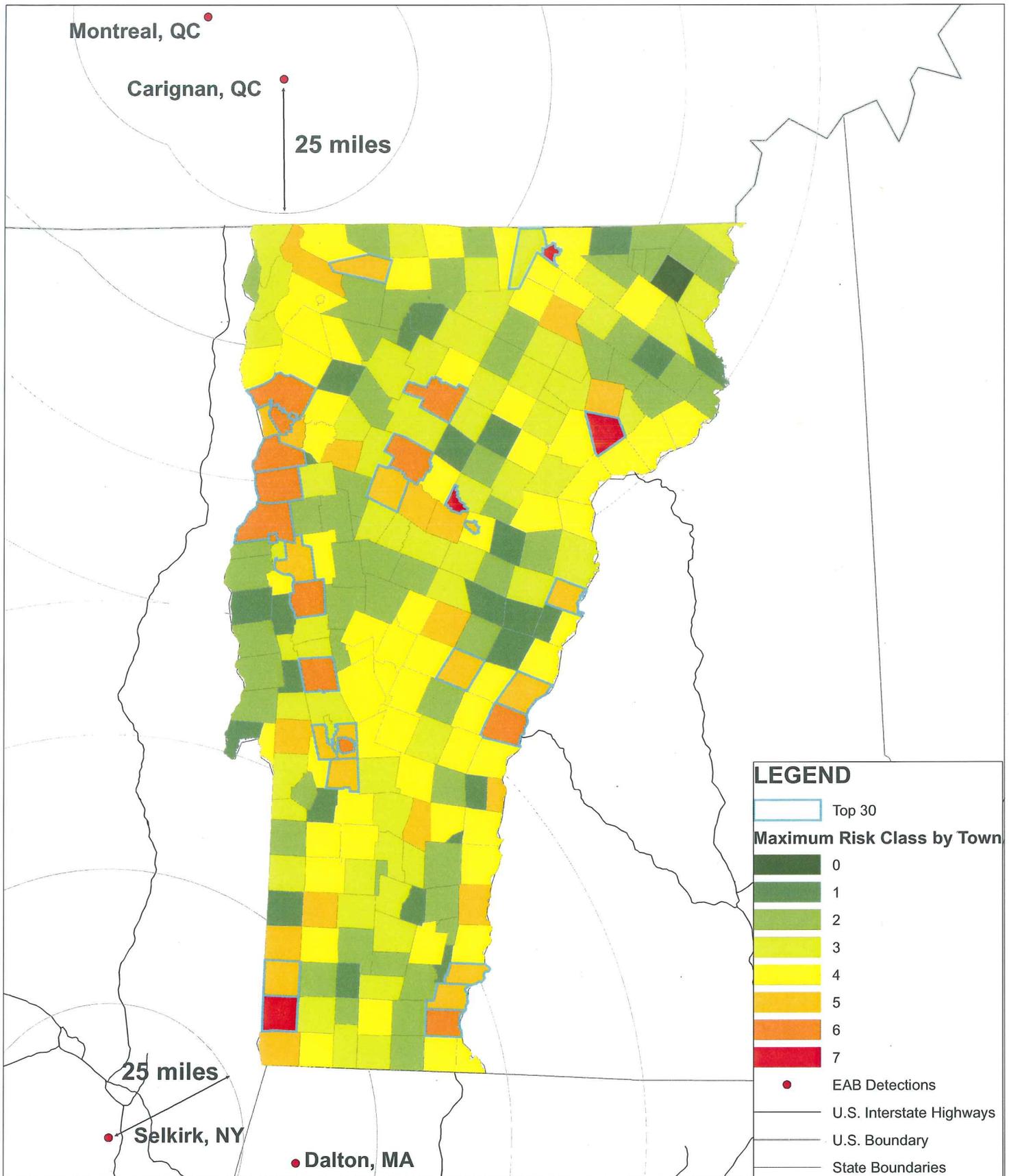
- (7) HAZARD TREES ON PRIVATE PROPERTY: Ensure that landowners remove ash trees which threaten public safety. Establish revolving loan program if possible [City Council/City Manager Directives].

- (8) UTILIZE SLAM: Incorporate aspects of Urban SLAM (Slow Ash Mortality) such as selective girdling of trees to provide beetle "sinks" which can be removed and processed [In coordination with ANR-FPR] as well as ash tree reduction strategies (5% removal and replacement per year) [See Ash Management Guidelines – Attachment #12 [Tree Board, Tree Warden and State and Federal officials].

- (9) COORDINATION: Coordinate as necessary with surrounding towns to share costs and resources.

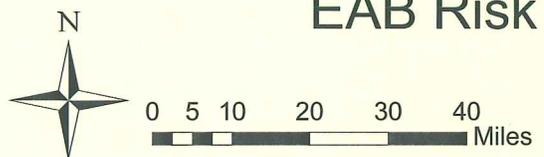
LIST OF ATTACHMENTS

1	EAB Risk Ranking By Vermont Town, University of Vermont Extension, October, 2012
2	Montpelier Ordinance: Chapter 13 – Natural Resources; Article III Trees
3	Emerald Ash Borer Adult and Damage Done By Larvae, New York, June, 2013
4	Tree Board Survey of Ash Trees on Private Property, 2014
5	Possible Elementary School EAB Curriculum, 2013
6	Vermont Forest Pest Planning: Frequently Asked Questions, VTinvasives.org., February 21, 2013
7	Native Ash Borers and Emerald Ash Borer Look-alikes, Penn State University Cooperative Extension, June 2009
8	Common Problems of Ash Trees, University of Iowa Extension.
9	Montpelier City Dump Area: Potential Marshalling Location
10	EAB Screening Protocol Form (VTinvasives.org)
11	State of New Hampshire Emerald Ash Borer Emergency Quarantine, April 8, 2013
12	Vermont Forest Health: Ash Management Guidelines for Forest Managers, Department of Forests, Parks and Recreation, April, 2012



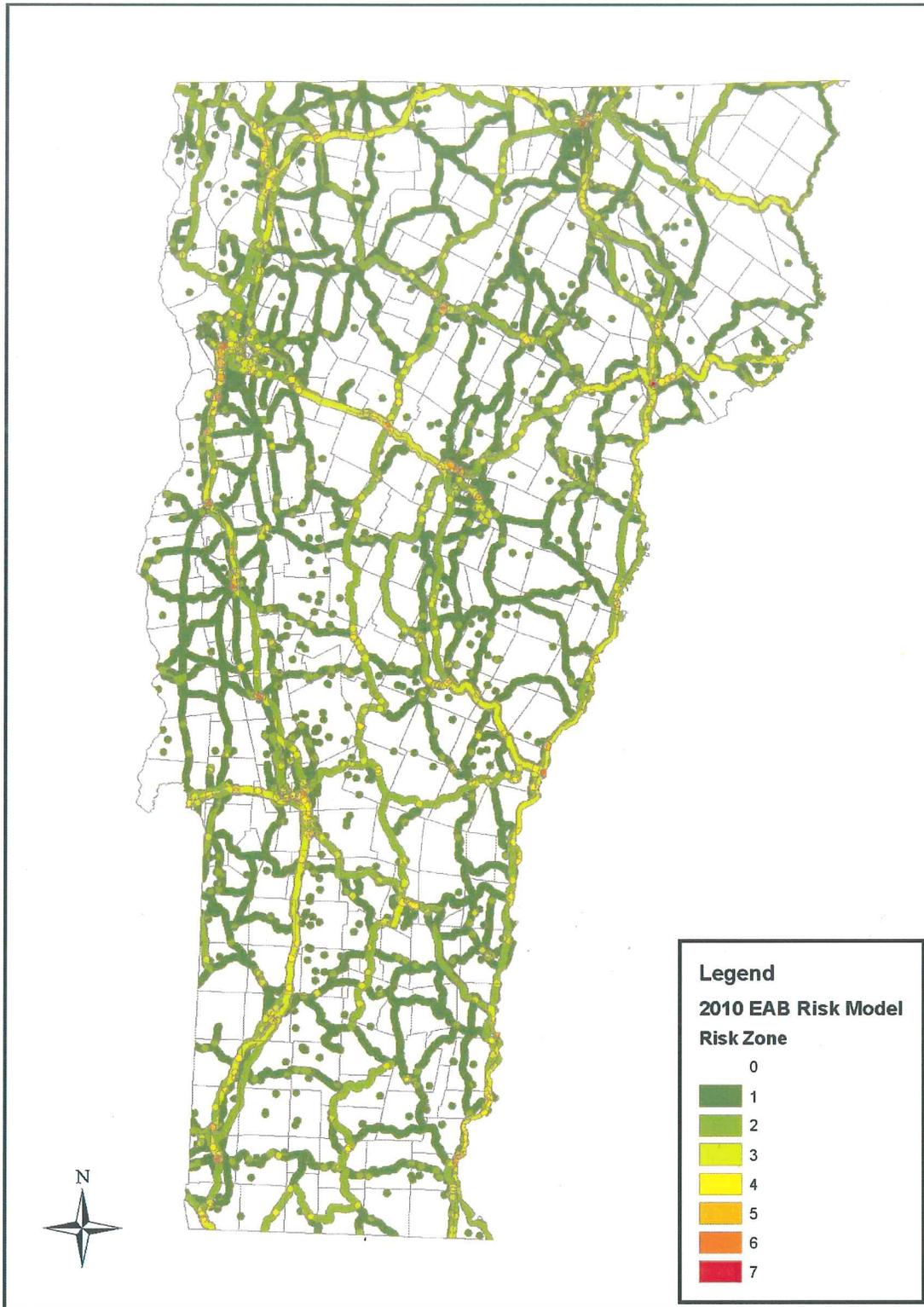
EAB Risk Ranking by Vermont Town

Towns were ranked according to the risk of EAB introduction and the potential impact of EAB to urban and community forests. The risk class refers to the maximum number of introduction pathways (campgrounds, sawmills, logging routes, etc.) within each town. The top 30 ranked towns are highlighted.



Map updated by Caitlin Cusack, Oct. 15, 2012

Figure 1. ForAgProtect EAB Risk Model for Vermont.



Summary of EAB Risk Ranking by Town

October 2012



In order to prioritize where to target outreach for EAB community preparedness planning and the Forest Pest First Detector Program, Vermont's towns were ranked based on their risk to the introduction of the Emerald Ash Borer (EAB) and the potential impact of EAB to the town's urban and community forests. The risk of introduction was determined by the number of introduction pathways and the distance from known infestations. The potential impact was determined by the town's population density; the higher the population the more significant their urban forest and the higher potential for negative impacts from a pest infestation.

Redstart Consulting's ForAgProtect risk model was used as the base model. ForAgProtect is a GIS (geographic information system)-based risk model that takes the spatial locations of potential introduction pathways (e.g. campgrounds, sawmills, etc.) and buffers these locations by the estimated annual natural dispersal distance of EAB adults indicated in reviewed literature (800 meters). Introduction pathways included in the assessment were:

- Nurseries carrying ash
- Sawmills processing ash
- Campgrounds (state, private and national forest)
- Firewood dealers
- Log trucking transportation routes
- Major roads
- Chip plants
- Wood pellet dealers
- Importers
- Airports
- Tourist attractions
- Recreational sites
- Rest areas
- Weigh stations
- Seasonal residences
- Rail lines
- Weight stations

Most of the data in the model were last updated between 2005 and 2009, with the exception of the data on Vermont importers, primary and secondary manufacturers, and nurseries, which were updated in 2010. All of the sawmills and nurseries in Vermont (regardless of whether they sell ash) were included in the analysis. The model also accounts for the volume of traffic on roads and double counts roads that are specifically log trucking routes. In order to account for the higher risk at mills or nurseries that sell ash, those carrying ash were also double counted. Of those mills that process ash all, except for three, also process sugar maple and red maple. Of all the mills or nurseries in the directory only 7 mills process sugar maple or red maple but not ash. Therefore, the risk ranking for the introduction of EAB can also generally be applied to the Asian Longhorned Beetle (ALB).

The model then calculates the number of introduction pathways, or risk factors, that overlap in a given area. The results are shown in Figure 1. The maximum number of overlapping risk factors in Vermont is 7. Only four towns in Vermont contain an area with a risk factor of 7—St. Johnsbury, Montpelier, Newport and Bennington. Fourteen towns contain areas with a risk factor of 6; 28 with a risk factor of 5; 63 with a risk factor of 4; 62 with a risk factor of 3; and the remaining towns have a risk factor of 1 or 2.

Using GIS and Excel, the % area of each town covered in each risk class was calculated. In order to incorporate the potential impact of EAB to urban and community forests, these results were normalized by 2008 population estimates. The results, shown in Table 1, were sorted from largest to smallest by % area of each town in risk class 7 normalized by population, then risk class 6, then risk class 5, and so forth. The top 30 high risk/high impact towns are highlighted in Figure 2. The distance from EAB detections is not incorporated into Redstart's model so the results were reordered to prioritize towns that are within 50 miles of EAB detections (Selkirk, NY and Montréal and Carignan, Quebec) and also ranked within the top 30 high risk/high impact towns. Redstart did not include distance from known infestation in the model because of the restrictions on the interstate movement of firewood. Now that the pests are considerably closer, this is important to include. Only three towns, Bennington, Shaftsbury and Sheldon, rose to the top of the list when the distance from EAB detections was incorporated. The final ranking, shown in Table 1, combines the top 30 high risk/high impact ranking with those towns located within 50 miles of known EAB detections.

Other EAB risk mapping projects, such as that conducted by the Forest Service Forest Health Enterprise Team, place considerable weight on the location of the current ash resource, which is also important to consider. Percentage of ash in urban and community forests was not included in Vermont's analysis due to the lack of forest inventory data at the local community level. The potential impact of EAB to a town's urban and community forests was accounted for using estimates of population density instead of urban tree cover.

Another important consideration in prioritizing towns for community preparedness planning is capacity—the potential for a community to be able to develop and implement a plan. A town's capacity can be determined by the degree to which they meet the four sustainability criteria for urban and community forestry programs—paid town forestry staff, tree ordinances, management plan, and advocacy group. Table 1 shows what criteria each town has met. A town, such as Hartford or Brandon, is considered to be “managing” if they have met all four criteria. If a town has met at least one of the four criteria they are considered to be “developing”.

Table 1. Final Results for EAB Risk Ranking

Town ranking of % area of town in each risk class normalized by population (1000 people in 2008) in declining order of risk class.	Towns within 50 miles of known infestations	Town ranking of % area of town in each risk class normalized by population (1000 people in 2008) in declining order of risk class with towns within 50 miles of known infestations prioritized.	Final Ranking	County	First Detector Trained Already	UCF Type	UCF Sustainability Criteria			
							Mgmt Plan	Staff	Ordinance	Advisory Group
NEWPORT CITY	POWNA	BENNINGTON	BENNINGTON	BENNINGTON	YES	Developing	X		X	X
ST. JOHNSBURY	SWANTON	SHAFTSBURY	SHAFTSBURY	BENNINGTON	YES	Developing		X		
MONTPELIER	ARLINGTON	SHELDON	SHELDON	FRANKLIN	YES	NA				
BENNINGTON	ST. ALBANS CITY	NEWPORT CITY	NEWPORT CITY	ORLEANS	YES	Developing		X		X
VERGENNES	STAMFORD	ST. JOHNSBURY	ST. JOHNSBURY	CALEDONIA	YES	Managing	X	X	X	X
WINOOSKI	ST. ALBANS TOWN	MONTPELIER	MONTPELIER	WASHINGTON	YES	Managing	X	X	X	X
RUTLAND CITY	ENOSBURG	VERGENNES	VERGENNES	ADDISON	FALL '12	Developing	X			
BRANDON	GEORGIA	WINOOSKI	WINOOSKI	CHITTENDEN	YES	Developing	X	X		X
FERRISBURGH	RICHFORD	RUTLAND CITY	RUTLAND CITY	RUTLAND	FALL '12	Managing	X	X	X	X
WATERBURY	FAIRFAX	BRANDON	BRANDON	RUTLAND	FALL '12	Managing	X	X	X	X
HARTFORD	HIGHGATE	FERRISBURGH	FERRISBURGH	ADDISON	FALL '12	NA				
SHELBURNE	GLASTENBURY	WATERBURY	WATERBURY	WASHINGTON	YES	Managing	X	X	X	X
BRATTLEBORO	JAY	HARTFORD	HARTFORD	WINDSOR	FALL '12	Managing	X	X	X	X
MIDDLEBURY	READSBORO	SHELBURNE	SHELBURNE	CHITTENDEN	YES	Developing			X	X
BURLINGTON	NORTH HERO	BRATTLEBORO	BRATTLEBORO	WINDHAM	YES	Managing	X	X	X	X
CHARLOTTE	ALBURGH	MIDDLEBURY	MIDDLEBURY	ADDISON	YES	Developing	X		X	X
MORRISTOWN	WOODFORD	BURLINGTON	BURLINGTON	CHITTENDEN	YES	Managing	X	X	X	X
COLCHESTER	GRAND ISLE	CHARLOTTE	CHARLOTTE	CHITTENDEN	YES	Managing	X	X	X	X
BARRE CITY	FRANKLIN	MORRISTOWN	MORRISTOWN	LAMOILLE		Developing	X			X
CLARENDON	FAIRFIELD	COLCHESTER	COLCHESTER	CHITTENDEN	YES	Developing	X	X		
NEW HAVEN	FLETCHER	BARRE CITY	BARRE CITY	WASHINGTON		Developing	X		X	X
SHAFTSBURY	BAKERSFIELD	CLARENDON	CLARENDON	RUTLAND	FALL '12					
NORWICH	MONTGOMERY	NEW HAVEN	NEW HAVEN	ADDISON		NA				
SHELDON	LINCOLN	NORWICH	NORWICH	WINDSOR	FALL '12	Developing				X
BRADFORD	ISLE LA MOTTE	BRADFORD	BRADFORD	ORANGE		Developing	X	X		X
ROYALTON	SEARSBURG	ROYALTON	ROYALTON	WINDSOR		Developing	X			
WEST RUTLAND		WEST RUTLAND	WEST RUTLAND	RUTLAND		Developing	X	X		
DUMMERSTON		DUMMERSTON	DUMMERSTON	WINDHAM		Developing				X
DUXBURY		DUXBURY	DUXBURY	WASHINGTON						
PUTNEY		PUTNEY	PUTNEY	WINDHAM		Developing	X			X
			POWNA	BENNINGTON		Developing				X
			SWANTON	FRANKLIN		Developing		X		X
			ARLINGTON	BENNINGTON	YES	Developing			X	X
			ST. ALBANS CITY	FRANKLIN	YES	Managing	X	X	X	X
			STAMFORD	BENNINGTON		NA				
			ST. ALBANS TOWN	FRANKLIN		Managing	X	X	X	X
			ENOSBURG	FRANKLIN	YES	Managing	X	X	X	X
			GEORGIA	FRANKLIN						
			RICHFORD	FRANKLIN	YES					

Town ranking of % area of town in each risk class normalized by population (1000 people in 2008) in declining order of risk class.	Towns within 50 miles of known infestations	Town ranking of % area of town in each risk class normalized by population (1000 people in 2008) in declining order of risk class with towns within 50 miles of known infestations prioritized.	Final Ranking	County	First Detector Trained Already	UCF Type	Mgmt Plan	Staff	Ordinance	Advisory Group
			FAIRFAX	FRANKLIN	YES					
			HIGHGATE	FRANKLIN	YES					
			GLASTENBURY	BENNINGTON	YES	NA				
			JAY	ORLEANS		NA				
			READSBORO	BENNINGTON		Developing				X
			NORTH HERO	GRAND ISLE	YES	Developing		X	X	
			ALBURGH	GRAND ISLE						
			WOODFORD	BENNINGTON		NA				
			GRAND ISLE	GRAND ISLE	YES	Developing			X	
			FRANKLIN	FRANKLIN	YES	NA				
			FAIRFIELD	FRANKLIN	YES					
			FLETCHER	FRANKLIN	YES	NA				
			BAKERSFIELD	FRANKLIN		Developing	X			
			MONTGOMERY	FRANKLIN	YES	Developing		X		X
			ISLE LA MOTTE	GRAND ISLE						
			SEARSBURG	BENNINGTON		NA				

CHAPTER 13

NATURAL RESOURCES

ARTICLE III. TREES

Sec. 13-300. Definitions.

Street trees: "Street trees" are herein defined as trees, shrubs, bushes, and all other woody vegetation on either side of all streets, avenues, bike paths and located within the bounds of a municipality-owned highway right-of-way in the city.

Park trees: "Park trees" are herein defined as tree, shrubs, bushes and all other woody vegetation in any public parks and all areas owned by the City to which the public has free access to as a park.

Sec. 13-301. Creation and Establishment of a City Tree Board.

There is hereby created and established the City Tree Board which shall consist of nine members, citizens and residents of this city, whom shall be appointed by the City Council. The City Tree Board shall function under this ordinance and 24 V.S.A., Chapter 67, or successor provision to protect the public health and welfare by improving and preserving the beauty of the city as it relates to street trees and park trees.

Sec. 13-302. Term of Office.

Each member will be appointed for a period of three years. In the event that a vacancy shall occur during the term of any member, his or her successor shall be appointed for the unexpired portion of their term. Any member may be removed from the board for cause. Cause shall include but not be limited to excessive absences from scheduled board meetings and clearly identified conflicts of interest. To remove a member from the board shall require a majority vote of the remaining members and the concurrence of the City Council.

Sec. 13-303. Compensation.

Members of the Board shall serve without compensation.

Sec. 13-304. Duties and Responsibilities.

It shall be the responsibility of the Board to study, investigate, council, and develop and/or update annually, and administer a written plan for the care, preservation, pruning, planting, removal, or disposition of trees and shrubs in parks, along streets and in other public areas. Such plan for the City of Montpelier, State of Vermont. The Board, when requested by the City Council, shall consider, investigate, make finding, report and recommend upon any special matter of question coming within the scope of its work.

Sec. 13-305. Operation.

The Board shall choose its own chairperson on an annual basis during a regularly scheduled meeting in the month of October. A member will also be chosen as secretary and will keep the minutes of each meeting. The City Tree Warden will attend all meeting and will serve in the capacity of advisor to the board. It will be the Tree Warden's additional responsibility to act as the interface between the Board of other regulatory bodies within the city. Meetings will be held once a month, on the first Wednesday of each month at 7:30 P.M. If less than a majority of the members are in attendance, there is no quorum and a meeting cannot be held.

Sec 13-306. Street Tree Species to be Planted.

The following list constitute the official Street Tree species for the City of Montpelier, State of Vermont. No species other than those included in this list may be planted as Street Trees without written permission of the City Tree Board and the concurrence of the City Tree Warden.

<u>Small Trees</u>	<u>Medium Trees</u>	<u>Large Trees</u>
Flowering Crabapple	Green Ash	Sugar Maple
Hawthorn	Honeylocust	Norway Maple
Bradford Pear	Linden (Basswood)	Black Oak
Lilac	Red Oak	
	Pin Oak	

Sec. 13-307. Spacing.

Spacing of Street Trees will be in accordance with the three species size classes listed in Section 13-306 of this ordinance and no trees may be planted closer together than the following: Mall Trees, 30 feet; Medium Trees, 40 feet; Large Trees, 50 feet; except in special plantings designed or approved by the City Tree Warden.

Sec. 13-308. Distance from Curb and Sidewalk.

The Distance Trees may be planted from curbs, edges of roads and sidewalks and will be in accordance with the three species size classes listed in Sec. 13-306 and no tree may be planted closer to any curb, edge of road or sidewalk than the following: In Central Business District I and II: Small Trees, 2 feet; Medium Trees, 3 feet; Large Trees, 4 feet. In General Business District and Residential: Small Trees, 6 feet; Medium Trees, 7 feet; Large Trees, 8 feet. Exceptions may be granted by the Board based on the recommendations of the City Tree Warden on a case-by-case basis and consultation with the Department of Public Works.

Sec. 13-309. Distance from Street Corners and Fire Hydrants.

No Street Tree shall be planted closer than 35 feet of any street corner, measured from the point of nearest intersecting curbs or edges of roads. No Street Tree shall be planted closer than 10 feet of any fire hydrant. Exceptions may be granted only by approval of the Board upon recommendation of the City Tree Warden and consultation with the Department of Public Works.

Sec. 13-310. Utilities.

No Street Trees other than those species listed as Small Trees in Sec 13-306 of this ordinance may be planted under or within 10 lateral feet of any overhead utility wire, or within 5 lateral feet of any underground water line, sewer line, transmission line or other utility.

Sec. 13-311. Construction in Vicinity of City Trees.

Any Construction within 10 lateral feet of city trees requires consultation with the City Tree Warden who will provide non-binding specific written recommendations.

Sec. 13-312. Public Tree Care.

The City shall have the right to plant, prune, maintain and remove trees, plants and shrubs within the lines of all streets, alleys, avenues, lanes, squares and public grounds, as may be necessary to insure public safety or to preserve or enhance the symmetry and beauty of such public grounds.

The City Tree Warden may remove or cause to be removed any tree or part thereof which is in an unsafe condition or which by reason of its nature presents a hazard to the general public, is injurious to sewers, electric power lines, water lines or other public improvements, or is affected with any injurious fungus, insect or other pests. This section does not prohibit the planting of Street Trees by adjacent property owners providing that the selection and location of said trees is in accordance with Sections 13-306 through 13-310 of this ordinance.

Sec. 13-313. Tree Topping.

It shall be unlawful, as a normal practice, for any person, firm or city department to top any Street Tree, or other tree on public property. Topping is defined as the severe cutting back of limbs to stubs larger than three inches in diameter within the tree's crown to such a degree so as to remove the normal canopy and disfigure the tree. Trees severely damaged by storms or other causes, or certain trees under utility wires or other obstruction where other pruning practices are impractical may be exempted from this ordinance at the determination of the City Tree Board upon recommendations by the Tree Warden.

Sec. 13-314. Substances Harmful to Tree Life.

It shall be unlawful for any person owning, using or having control of substances harmful to tree life to allow such substance or substances to come in contact with the soil surrounding the roots of any tree in any public thoroughfare, or of any tree or plant in any city park or parking strip in the City of Montpelier in such manner as may injure or destroy the tree or plants.

Sec. 13-315. Pruning, Corner Clearance.

Every owner of any tree overhanging any street or right-of-way within the city shall prune the branches so that such branches shall not obstruct the light from any street lamp or obstruct the view of any street intersection and so that there shall be a clear space of eight feet (8') above the surface of the street or sidewalk. Said owners shall remove all dead diseased or dangerous trees, or broken or decayed limbs

which constitute a menace to the safety of the public. The City shall have the right to prune any tree or shrub on private property when it interferes with the proper spread of light along the street from a street light or interferes with visibility of any traffic control device or sign, or to maintain a clear space of 8' above the surface.

Sec. 13-316. Dead or Diseased Tree Removal on Private Property.

The City shall have the right to cause the removal of any dead or diseased tree on private property within the city, when such tree constitutes a hazard to life and property, or harbor insects or disease which constitutes a potential threat to other trees within the city. The City Tree Board will notify in writing the owners of such trees. Removal shall be done by said owners at their own expense within sixty days after the date of service of notice. In the event of failure of owners to comply with such provisions, the City shall have the authority to remove such trees and charge the cost of removal on the owners property tax notice.

Sec. 13-317. Removal of Stumps.

The removal of any stumps of Street or Park Trees shall not be mandatory unless it is deemed necessary by the City Tree Board to allow for a replanting or other reason. The City Tree Board must find that the removal of the stump is necessary for other than just aesthetic reasons. Any landowner with property adjacent to any stump may petition the City Tree Board to allow removal of said stump at the landowners' expense for purposes of aesthetics.

Sec. 13-318. Interference with City Tree Board.

It shall be unlawful for any person to prevent, delay, or interfere with the City Tree Board, the City Tree Warden or any agents of the Board, while engaging in and about the planting, cultivating, mulching, pruning, spraying, or removing of any Street Trees, Park Trees or trees on private grounds, as authorized in this ordinance.

Sec. 13-319. Arborist License and Bond.

It shall be unlawful for any person or firm to engage in the business or occupation of pruning, treating, or removing street or park trees within the City without first applying for and procuring a license. The license fee shall be \$25 annually, in advance; provided however, that no license shall be required of any public service company or city employee doing such work in the pursuit of their public service endeavors. Before securing a contract with the City, a contractor must have possession of liability insurance in the minimum amounts of \$1,000,000 aggregate, general liability per occurrence indemnifying the City or any person injured or damaged resulting from the pursuit of such endeavors as herein described. All tree work performed in the public right-of-way must conform with the National Arbor Society NC 300 Standards.

Sec. 13-320. Review by City Council.

The City Council shall have the right to review the conduct, acts and decisions of the City Tree Board. Any person may appeal from any ruling or order of the City Tree Board to the City Council who may hear the matter and make a final decision.

Sec. 13-321. Review by City Council.

Any person violating any provision of this ordinance shall be, upon conviction or plea of guilty, subject to a fine not to exceed \$500 plus the cost of tree removal.

Sec. 13-322. Tree Warden's Jurisdiction, Public Shade Trees.

The Tree Warden shall have complete power and authority over any and all trees, shrubs, or plants planted and growing or hereafter to be planted and grown in the public right-of-way, or any public highway property of the City of Montpelier not under the jurisdiction of the Park Commission or the Cemetery Commission. Trees so located shall be deemed public shade trees.

The Tree Warden shall have all powers granted to Tree Wardens under 24 V.S.A., Chapter 67, or successor provision. He or she may refer violations of this ordinance or that chapter to the City Attorney or State's Attorney for prosecution.

The Tree Warden will advise the City Tree Board and any other regulatory boards of the City in matters of tree health, care and maintenance as needed. All actions taken by the Tree Warden will be reported to the Tree Board and maintained in an historical file.

Sec's. 13-323 to 13-399. Reserved

Enacted October 25, 1972.

Amendment enacted August 11, 1993 [Entire ordinance rewritten]. Date of Publication: 8/23/93.
Effective Date: 8/29/93.

Amendment enacted February 26, 1997 [Sec. 13-301, membership increased]. Date of Publication:
3/06/97. Effective Date: 3/12/97.

**ASH TREE GIRDLED BY
EMERALD ASH BORER**



Purpose of Survey

After determining the number of ash street trees in the city and having determined the number of ash trees along trails in Hubbard Park, the Tree Board determined that it was also necessary to determine the liability that Montpelier residents will have when and if the EAB arrives in Vermont and infests trees in our City. Making this determination was one of the key components of the Emerald Ash Borer Preparedness Plan and also a mechanism to increase resident awareness of the EAB threat.

Survey Design

In order to get an estimate of the number of ash trees on private property in the City, approximately 100 properties were chosen at random and survey those properties for ash trees. Based on a statistical design, the resulting estimate of affected properties would be approximately within +/- 10%.

The Montpelier City properties as listed in the Preliminary Property Valuation Report - 2010 Reappraisal were enumerated and a random number generator was used to select 100 properties from the listing. A mailing was made to the owners of these properties prior to conducting the survey (see Tree Board Notification postcard). When possible, the landowner was contacted and the purpose of the survey was explained. In some cases the landowner could not be contacted and the survey was conducted from adjacent properties or roads.

Conducting the Ash Survey

During the period June – October, 97 properties were surveyed by members and volunteers of the Montpelier Tree Board. Three properties, all commercial properties, were not surveyed for reasons including excessive acreage (> 40 acres) or inaccessibility or uncertain property boundary delineation.

Of the 97 properties surveyed, 47 properties were found to have ash trees. Of the 47 properties, two were greater than 10 acres in size and had 157 ash and 143 ash trees respectively. These properties were considered atypical of the group and removed from further analysis. One property had ash trees which all measured less than 3 inches DBH; that landowner would probably not need the services of a professional for tree removal. Therefore, that property was also removed from further analysis, as were any ash trees in the 1-3" DBH range listed for other properties. So, the result was that ninety-five (95) properties with acreages less than 10 acres were surveyed and trees with DBH > 3" were enumerated. For the most part tree diameters were estimated.

Property Acreage Size Distribution in Montpelier.

Eighty-one (81) properties were listed in the Preliminary Property Valuation Report - 2010 Reappraisal with acreages equal to or greater than 10 acres in size. 1481 properties were listed with acreages less than 10 acres in size. Because the survey found that 44 properties with acreages less than 10 had ash trees, this was equivalent to approximately 46% of the parcels.

Estimating the Number of Ash Trees on Private Property

Extrapolating to the 1481 properties, it is estimated that 681 (+/- 68) property owners in Montpelier have ash trees. To determine how many ash trees may be on these properties, the mean, median and mode of the number of ash trees per parcel was calculated. The mean number of ash trees was determined to be seven (7) per parcel. However, this average is unduly influenced by a minority of parcels that had an unusually high concentration of trees. The mode, the most common number of ash trees found per parcel was one (1) per parcel, found on 14 parcels. Use of the mode to calculate the overall number of ash trees on private property would, in all likelihood, yield a low estimate because approximately 68 percent of all ash-containing parcels had more than one ash tree present. Therefore, the median of four (4) ash trees was used for the estimate; the resulting number of ash trees on private property in the City is estimated at 2,724 trees.

Tree Size Estimates and Removal Costs

As the tree size distribution on the plot below indicates, about 77 % of all trees surveyed were in the size range 7" to 18" DBH. Because even an ash with a DBH of 7" can be over 40 feet high, these trees would need to be removed by a professional service.

Assuming a **low removal cost estimate of \$250 per tree**, the average cost per parcel would be \$1000.00. The collective costs for Montpelier residents for the estimated number of trees on private property can be estimated as follows:

$$2,724 \text{ trees @ } \$250.00/\text{tree} = \$681,000.00$$

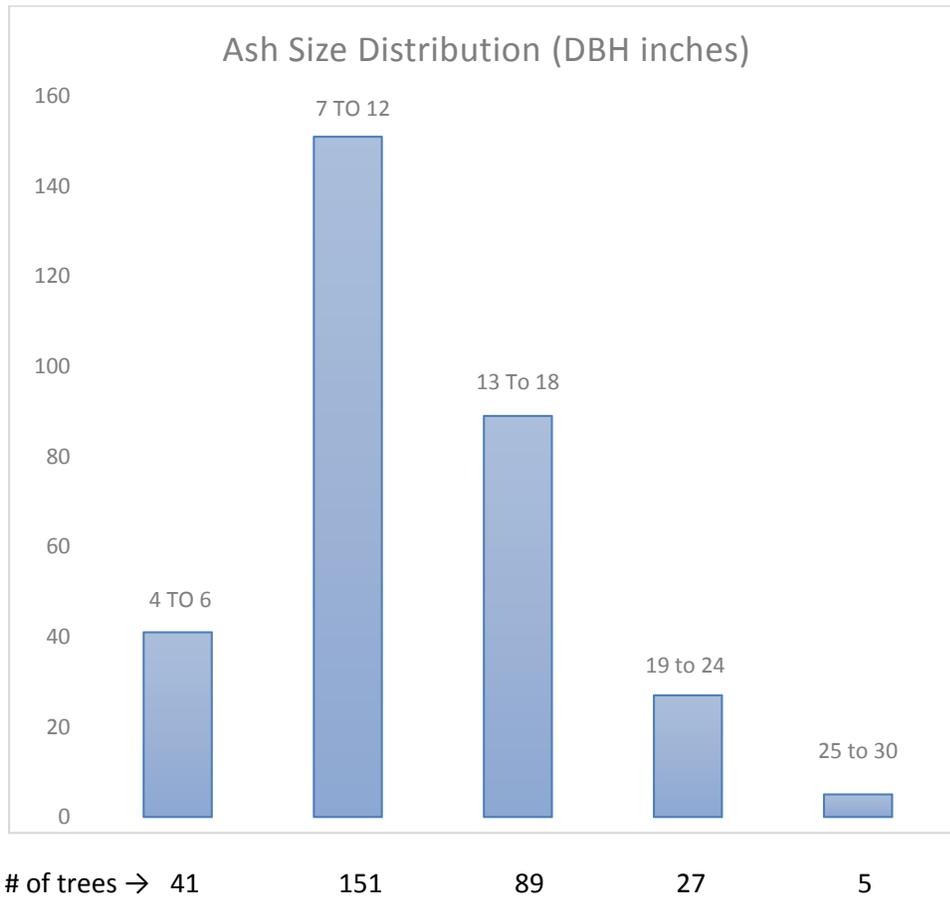
The high estimated cost is \$749,000.00 and the low estimated cost is \$613,000.00 (based on 749 affected parcels and 613 affected parcels, +/- 10% of 681) .

These cost estimates far exceed the estimated municipal cost for removing all of the City's street trees when using the same removal cost per tree:

$$550 \text{ street trees} * \$250.00 = \$137,500.00$$

Size Distribution of Ash Trees Surveyed

The plot below shows the distribution of the ash trees enumerated during the survey:



ELEMENTARY SCHOOL CURRICULUM

- (1) What is a tree? How does it live? Why do we need them anyway? Assignment 1
- (2) Maple tree leaves; ash tree leaves; how do we identify them? Assignment 2
- (3) Meet the beetles! Where are they from? How did they get here? Where they are now? Are they coming to stay? Assignment 3
- (4) What happens when pests from other countries are spread to new areas? Food feast!! Examples from North America, Australia, New Zealand, etc.
- (5) EAB beetles vs. Ash trees.....Trees lose. How they attack.
- (6) How the tree reacts to the invader. Trees can't talk you know.
- (7) What some woodpeckers are saying....
- (8) The hazard of a dead tree; what happens when a tree falls in your town?
- (9) What can we do? Spread the word , keep looking and listening.

VERMONT FOREST PEST PLANNING

Frequently Asked Questions

What is EAB and why is it a problem for my trees?

- Emerald ash borer is a destructive tree pest that attacks and kills ash trees. Since its accidental introduction into North America in 2002, EAB has killed millions of ash trees in more than 15 states.
- The metallic-green adult beetles are a half inch long, and are active from May to September. EAB larvae kill ash trees by feeding on tree just under the bark.

What are the signs of an EAB infestation?

Potential signs of EAB damage include woodpecker damage, especially at the top of the tree, bark cracks or splits, s-shaped galleries under the bark, and die-back of leaves in the upper one-third of the tree branches.

If a citizen thinks they have an invasive tree pest how do they report it?

- Direct them to the website <http://www.vtinvasives.org/tree-pests/report-it> or have them call their district Department of Forests, Parks and Recreation Office.

Why should we focus on EAB?

- EAB is more destructive, widespread, difficult to manage, and spreads faster than other known exotic pests.
- The closest detections of EAB are just over the border in Dalton, MA, Albany, NY and just outside of Montreal, Quebec. Chances are good that EAB will arrive in your town in the near future.
- Unless treated with insecticides, EAB will kill most infested trees within 2 to 5 years.
- Once EAB is detected in an area, more detections follow quickly and loss of ash trees increases rapidly over a few short years.

Why do we need to prepare if the ash trees are going to die anyways?

- Scientists are making great strides in developing EAB management tools, such as the introduction of natural enemies and host species resistance, and better survey methods for early detection.
- At this point, eradication of EAB has proven to be impossible and is no longer considered an appropriate response to an EAB infestation so our goal is to slow down the spread of the insect to allow more time for communities to prepare and to develop management tools.

Should we plan for other invasives, such as ALB and HWA, and how?

- While management actions, cost estimates and disposal and utilization options will be focused on dealing with EAB, your forest pest preparedness plan will help you plan for other pests by helping your community:
 1. Develop a plan for increasing tree species diversity and selecting site-appropriate species
 2. Improve public awareness and engage community leaders and residents in the natural resource decisions and motivate them to get involved.
 3. Strengthen or enact local policies and partnerships to support long-term tree management.
- HWA is already in Vermont. While it is not expected to kill trees as quickly as EAB, HWA is affecting trees and its impact on both trees and municipalities will grow. Impacts are environmental, economic and aesthetic. Dead and dying trees can threaten public safety, increase town expenses and decrease property values. Planning prepares towns to take prompt and specific action to avoid or mitigate the problems associated with each particular pest.
- Since we don't know IF, or when, ALB or another destructive pest will arrive in Vermont, it would make sense to wait until a threat is on the horizon and then adjust the pest-specific elements of your plan to meet the new threat.

Will trees be cut?

- In most cases, the municipality or private landowner are responsible for tree removals on their respective properties.
- Some states have worked with landowners to remove trees, as necessary, to delineate EAB infestations or as part of experimental efforts to reduce insect numbers. We may consider this option when EAB spreads to Vermont.
- For ALB infestations, the federal government is currently mandating tree removals, which are conducted at government expense.

Is there state or federal funding available to help?

- Unfortunately, no, federal or state funding for removal of privately-owned or municipal trees beyond what is required to abate an EAB infestation is currently unavailable, however that could change once an infestation occurs.
- Ideas for alternative funding options are available at <http://www.vtinvasives.org/tree-pests/community-preparedness/toolbox>.

What technical services and assistance is available from the state or federal government?

State assistance is available to all towns for community preparation planning, outreach and education, pest surveys, pest identification and coordination of pest management activities. Contact your district Department of Forests, Parks and Recreation Office and visit www.vtinvasives.org:

Windsor & Windham Counties: Springfield Office - 802.885.8845

Bennington & Rutland Counties: Rutland Office - 802.786.3851

Addison, Chittenden & Grand Isle Counties: Essex Junction Office - 802.879.6565

Lamoille, Orange & Washington Counties: Barre Office - 802.476.0170

Caledonia, Orleans & Essex Counties: St. Johnsbury Office - 802.751.0110

How long before EAB goes away? How soon can we replant ash?

- A small population of EAB will probably persist for many years after the initial infestation. It is not recommended to plant ash until natural enemies of EAB have become well established. This could be decades.
- The best option is to select the right tree for each site and be careful not to overplant any one tree species. More info. on tree species options at <http://www.vtinvasives.org/tree-pests/community-preparedness/toolbox>.

Will EAB kill all species of ash and of all sizes?

- Although EAB has a preference for some species of ash over others, all ash species native to North America are a suitable host. In Vermont, white, green and black ash are all susceptible. Mountain ash, which is not a true ash, is not susceptible.
- Generally, all branches and stems one inch in diameter and larger are susceptible.

If there's a quarantine how do we inform all of our citizens?

- Use all of the resources available to you (website, town newsletter, e-newsletter or email distribution list, posters, flyers, information sent home with students, newspaper article, public meetings, etc.)
- FPR, AAFM and UVM Extension will assist with public meetings and provide you with the information you need for print advertisements.
- For up-to-date info. on forest pest quarantines visit <http://www.vtfpr.org/protection/quarantinefrontpage.cfm>

What are steps we can take proactively?

- Develop a Forest Pest Preparedness Plan. Many parts of a thorough plan are proactive, such as forming a local forest pest team, updating your tree inventory, budgeting, outreach to the public, and much more. NOW is the time to plan, before EAB arrives.

Are we encouraging preemptive removal of ash trees and when?

- Municipalities with a large number of ash trees should reduce the ash component over time using a prioritized process that starts with structurally unsound ash trees in poor health.
- There are tools available, such as insecticides, that can either preserve trees to extend their lifespan until they need to be removed or preserve them for over a long time with continued application.
- For woodland trees, refer to the ash management guidelines on FPR's website-- <http://www.vtfpr.org/protection/documents/AshManagementGuidanceforForestManagers.pdf>

What as a town are we legally, ethically and financially responsible for?

- Public safety—dead and dying ash trees can threaten people and property.
- Local sentiment—need to respond to public values, such as significant and historic trees, at the community and individual homeowner levels.
- Preserve public resources— These trees remove 750 metric tons of air pollution/year at a value of \$6.6 million/year; store 1.1 million metric tons of carbon at a value of \$25.1 million; draw in \$330 million in tourism revenue during foliage season alone and provide sap to produce maple syrup, which contributes \$30 million of revenue annually.

What is the utility companies roles?

- The utility companies are responsible for removing trees within their ROW (usually 30 to 50 feet) that endanger their lines.
- Companies can also remove “danger trees” that lie outside the ROW but are a threat to the powerline.

We have a lot of ash in our town ROW/on private property that affects the town ROW. What do we do about it?

- The town will need to decide, as a minimum, what needs to be done to ensure public safety.
- A minimum but reasonable approach would be to remove any EAB-killed ash along town roads that threaten public safety and leave those that are not a threat. Preemptive removal of large structurally unsound or unhealthy ash will benefit the budget by spreading out the removals. Cutting live trees is also much safer for the tree crews.
- On private land, removal of trees that threaten public safety is the responsibility of the landowner unless your town has an ordinance to the contrary. Some towns have offered to split the removal cost with the landowner to ensure that high-risk trees are removed promptly.

If the county is quarantined, how will I be able to legally dispose of my tree?

- Proper disposal methods depend on the pest. For HWA visit: http://www.vtfpr.org/protection/documents/VTFPR_HWAinVT_RecommendationsforLandownerResponse.pdf.
- You can hire an arborist to remove and dispose of the tree for you. Go to the Disposal & Utilization tab of the Vermont Forest Pest Preparedness: Community Resource Toolkit (<http://www.vtinvasives.org/tree-pests/community-preparedness/toolbox>) for more information on hiring an arborist.
- The wood and debris can be transported within the quarantined area where it originates. However, removing it from the quarantined area is prohibited without a compliance agreement. For up-to-date info. on forest pest quarantines visit <http://www.vtfpr.org/protection/quarantinefrontpage.cfm>

Can I treat my ash or hemlock trees and how long will I have to treat it for?

- Because landscape trees provide lots of benefits that are hard to attach a dollar value to, pesticide treatments can be well worth the investment for treasured trees.
- No treatments are recommended until the insect is present in the area but you can start planning and budgeting for it now. HWA treatment options are found at: http://www.vtfpr.org/protection/documents/VTFPR_HWAinVT_RecommendationsforLandownerResponse.pdf.
- There are several products currently available and effective against the emerald ash borer for both homeowners and commercial applicators.
 - The most commonly used application method is trunk injection.
 - Depending on the insecticide, trunk injections may be effective for 1 to 3 years.
 - Material costs alone (not factoring in equipment and labor) range from \$2.50/inch of DBH to \$15/inch of DBH for 1 to 2-3 years of control respectively depending on the pesticide.
- More information is found in the Management tab of the Vermont Forest Pest Preparedness: Community Resource Toolkit (<http://www.vtinvasives.org/tree-pests/community-preparedness/toolbox>)

Native Borers and Emerald Ash Borer Look-alikes

Native Ash Borers

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Native ash borers are North American insects that tunnel under the bark of ash trees, sometimes causing enough damage to seriously weaken trees.

These two borers attack healthy ash trees:

Banded ash clearwing, *Podosesia aureocincta*; adult (Fig. A), larva (Fig. B).

Ash/lilac borer, *Podosesia syringae*; adult (Fig. C).

- Wasp-mimicking moths that feed on xylem of ash trees.
- Larvae are round with small legs and expel frass from tree (Fig. D).
- Round exit hole (1/4 inch); pupal case exposed in exit hole upon emergence (Fig. E).

These three borers attack stressed or dying ash trees:

Redheaded ash borer, *Neoclytus acuminatus*; adult (Fig. F), larva (Fig. G).

Banded ash borer, *Neoclytus caprea*; adult (Fig. H).

- Longhorned beetles (roundheaded borers) that attack stressed ash trees, but also colonize elm, hickory, oak, linden and others.
- Larvae tunnel deep into xylem (Fig. I) and adults emerge from round-oval exit holes measuring 1/4 inch (Fig. J).



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J J. Solomon, USDA Forest Service www.forestryimages.com



Emerald Ash Borer

Native Borers (continued)

Eastern ash bark beetle, *Hylesinus aculeatus*; adult (Fig. K).

- Cylindrical bark beetle that forms galleries beneath the bark of ash trees (Fig. L).
- Infested trees peppered with tiny, round exit holes measuring approximately 1/16 inch (Fig. M).



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Emerald Ash Borer Look-alikes

The following insects are common in Pennsylvania and could possibly be confused with the emerald ash borer.



Michigan State University



University of Arkansas

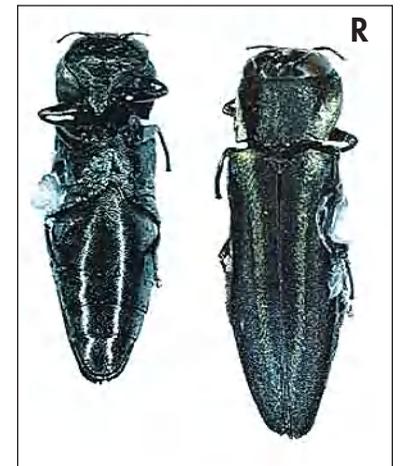


Michigan State University

- **Sixspotted tiger beetle, *Cicindela sexguttata***; adult measures 1/2 inch long (Fig. N).
- **Caterpillar hunter, *Calosoma scrutator***; adult measures 1 inch long (Fig. O).
- **Japanese beetle, *Popillia japonica***; adult measures slightly less than 1/2 inch long (Fig. P).
- **Bronze birch borer, *Agrilus anxius***; adult measures approximately 1/2 inch long (Fig. Q).
- **Twolined chestnut borer, *Agrilus bilineatus***; adult measures approximately 1/2 inch long (Fig. R).
- Several other uncommon metallic wood-boring beetles.



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PENNSTATE



College of Agricultural Sciences
Cooperative Extension

Edited by: Gregory A. Hoover, Pennsylvania State University, Department of Entomology

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Common Problems of Ash Trees

Ash trees (*Fraxinus* spp.) are no longer recommended for planting in the Midwest because of the threat of the emerald ash borer (EAB), a highly-destructive wood-boring insect pest. However, ash trees remain important as up to 6 percent of woodland trees and up to 70 percent of urban trees are ash species.

Other ash problems are often mistaken for emerald ash borer infestation, so ash trees may be needlessly removed or treated with pesticides as a result. This diagnostic guide is intended to help you distinguish emerald ash borer injury from other common problems of ash.

Ash Tree IDENTIFICATION



1. Leaves are compound and composed of 5 to 11 leaflets.



2. Seeds on female trees are paddle shaped.



3. Branches and buds are in pairs directly across from each other (opposite branching).



4. Mature bark has diamond-shaped ridges.

SYMPTOMS AND SIGNS of Emerald Ash Borer



5. **Branches** in canopy decline and die.



6. **Suckers** grow on trunk and branches below EAB activity.



7. **EAB adult beetle.**



8. **D-shaped 1/8 inch exit holes** are made through bark by EAB adults.



9. **Winding tunnels** under the bark are caused by EAB larvae.



10. **Fully-grown EAB larva** in gallery under bark as it would appear in the fall.

Ash trees have other problems in addition to EAB including decline, other insects, and diseases.

Decline

- A gradual, generally irreversible decline in tree health. Symptoms include reduced growth, branch dieback, and a thinning canopy.
- Environmental stress and poor site conditions may contribute to decline.
- To prevent decline avoid injuring the trunk, soil compaction, and disturbance near the tree.
- If a tree is in decline, have it evaluated periodically by a trained arborist to make certain it is not a hazard.



PROBLEMS that can be confused with Emerald Ash Borer



11. **Weed trimmer** damage to trunk.



12. **Damage** by vehicle and poor site conditions.



13. **Planting too deeply** can lead to decline. The trunk should flare out like a bell where it meets the ground.



14. **Limited rooting area** and site disturbances such as construction activity can lead to decline.

BORERS

In addition to EAB, there are native insects that feed beneath the bark of ash. These borers tend to attack only stressed ash trees, unlike EAB that also will attack healthy trees. Symptoms and signs include tree decline, exit holes, and insects under the bark.

Prevention: Keep the tree healthy by providing water during dry periods, removing dead or storm-injured branches, and by reducing or preventing stress.

Control: Insecticides do not provide good control of wood-boring insects. Have the tree evaluated by an arborist to determine if it is a hazard tree.



15. Ash/lilac borer larvae create deep tunnels low in the trunks and limbs of ash, lilac, and privet. This insect causes a gradual decline of the tree over several years.



16. Ash bark beetles are small insects that create winding tunnels beneath ash tree bark and buckshot-size exit holes in the bark.



17. Flatheaded appletree borers are white, legless larvae that feed under the bark, hollowing out the inner bark in a small area. Adults leave a D-shaped exit hole that is larger in size than the EAB. Flatheaded appletree borers can kill newly transplanted, young trees.



18. Roundheaded borer larvae tunnel deeply into the wood with no apparent pattern. Adults make large round exit holes. Two common roundheaded borers feeding on ash are the redheaded ash borer and banded ash borer.

SAP FEEDERS and GALL MAKERS

Several insects and mites attack ash trees and cause stress, discoloration or deformation. These pests harm only the appearance of trees and do not warrant control measures.



19. Leafcurl ash aphids feed on leaflets as they expand in the spring. The insect's body is covered in white, waxy strands. Feeding causes leaflets to twist and curl. In addition, aphids secrete clear, sticky honeydew, which can speckle anything under the tree. Natural enemies usually control the aphids.



20. Oystershell scales live under a protective waxy cover on the bark of trees and feed on plant sap, producing a sparse canopy, reduced tree growth, and branch dieback. Treatments should be timed with egg hatch in the spring. Treat the infested plant with horticultural oil or insecticidal soap; repeat in 7 days.



21. Ash plant bug adults and nymphs feed on ash leaflets in early May as they unfold, producing speckled areas on the leaflets. Later they appear as brown areas. Severe infestations may cause premature leaf drop, but new leaves are formed by mid-summer.



22. Ash flower gall mites feed on the developing flowers of male ash trees in early spring causing flower buds to form unattractive galls. These galls start out green, then turn brown to black and persist over the winter. These galls are considered harmless because they do not affect the growth or survival of the tree.



23. Ash anthracnose produces irregular brown spots on twisted leaflets.



24. Leaves fall from anthracnose-infected trees in the spring. Trees generally produce another set of leaves in 4 to 6 weeks. No treatments are recommended.



25. Verticillium wilt can be fatal to ash trees. Leaves on affected branches wilt and die, usually in July and August. Branches of infected trees die or decline over several years.



26. Verticillium wilt-infested branches show streaks of green to brown discoloration under the bark. There are no effective treatments. Replace with a tree that is not susceptible to this disease.



27. Ash rust produces slightly raised, bright orange areas on leaves, petioles, and green twigs. No treatments are recommended.



28. Close-up of ash rust sporulating.

Use this chart to compare common symptoms of Emerald Ash Borer infestation with other problems of ash trees.

SYMPTOM COMPARISON CHART

for Emerald Ash Borer infestation and other problems of ash trees

PROBLEMS	SYMPTOMS					
	Branch dieback	Thinning canopy	Epicormic sprouts	D-shaped exit holes	S-shaped larval galleries	Woodpecker damage
Emerald ash borer	×	×	×	×	×	×
Planted too deeply	×	×				
Trunk injury	×	×	×			
Poor site conditions	×	×	×			
Ash anthracnose		×				
Ash rust						
Verticillium wilt	×	×	×			
Ash decline	×	×				
Ash plant bug	×	×				
Ash sawfly		×				
Leafcurl ash aphid		×				
Ash flower gall mite		×				
Oystershell scale	×	×	×			
Ash/lilac borers	×	×				×
Eastern ash bark beetle	×	×				×
Flatheaded borers	×	×		×		×
Roundheaded borers	×	×	×			×



Check the ISU Extension store for other publications and sources of information. www.extension.iastate.edu/store

IC 0415	Scale Insects on Ornamental Plants	PM 2084	Emerald Ash Borer Management Options
IC 0417	Insect Galls on Trees and Shrubs	SUL 2	Understanding Decline in Trees
PM 1280	Anthracnose of Shade Trees	SUL 16	Verticillium Wilt of Woody Plants

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... and justice for all

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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Gerald A. Miller, interim director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.



Google earth

feet
meters



EAB SCREENING PROTOCOL

1. Enter location and contact information in the screening log.
2. Set up a time to examine the tree.

3. USE EAB KEY

1A.	Tree may be infested; do not have an insect	> >>>>	2
1B.	Have an insect that may be an EAB	>>>>>	4
2A.	Tree is an ash	>>>>>	3
2B.	Tree is not an ash	>>>>>	Not EAB
3A.	Tree has signs and symptoms of EAB	>>>>>	Outcome #3
3B.	Ash tree does not have signs and symptoms of EAB	>>>>>	Not EAB
4A.	It is May – August and adults may be present	>>>>>	5
4B.	It is not May – August so adults won't be present	>>>>>	Not EAB
5A.	The insect is an EAB look-alike	>>>>>	Not EAB Send for ID
5B.	The insect is not an EAB look-alike	>>>>>	Could be EAB Outcome 3

OUTCOME 1 You ID the pest and rule out EAB. Report results to Owner and UVM

Complete screening log

OUTCOME 2 You have a pest; you rule out EAB, but you can't ID

Contact UVM and submit sample with required paperwork

Complete screening log

OUTCOME 3 You cannot rule out EAB

Contact UVM

Submit sample to Essex Lab

IF NO SAMPLE:

Ask owner for samples or photos

If samples/photos not available ---- site visit

Request assistance from ANR FPR

IF SAMPLE OBTAINED

Complete Online Target Pest Alert Form

Maintain confidentiality

Complete screening log

STATE OF NEW HAMPSHIRE

DEPARTMENT OF AGRICULTURE, MARKETS & FOOD

DEPARTMENT OF RESOURCES & ECONOMIC DEVELOPMENT

EMERALD ASH BORER EMERGENCY QUARANTINE

April 8, 2013

- Section I. Definitions
- Section II. Statement of Concerns
- Section III. Statutory Authority
- Section IV. Specific Purpose and Factual Basis
- Section V. Emerald Ash Borer Quarantine
- Section VI. Violations

Section I: Definitions

1. “Ash” means any woody plant material in the genus *Fraxinus*. This includes but is not limited to *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), and *Fraxinus nigra* (black ash).
2. “Ash nursery stock” means all trees of any size in the genus *Fraxinus*, their roots, cuttings, grafts, and plant parts thereof including any collected plants, for and capable of propagation.
3. “Bark” means the tough outer tissue of woody stems and roots of trees, shrubs and vines outside the vascular cambium.
4. “Cambium” means a layer of delicate meristematic tissue between the inner bark or phloem and the wood or xylem, which produces new phloem on the outside and new xylem on the inside in stems, roots, etc., originating all secondary growth in plants and forming the annual rings of wood.
5. “Chips” means the end product of a milling process that reduces wood (logs, stems, branches) to a wafer or chip-like.
6. “Compliance agreement” means an agreement between the New Hampshire Department of Agriculture, Markets and Food (NHDAMF), and the regulated industry for movement of regulated *Fraxinus* material within New Hampshire.
7. “Emerald ash borer” means *Agrilus planipennis* (Fairemaire), a destructive beetle of regulatory significance initially introduced into the United States from Southeast Asia.
8. “Emerald ash borer host material” means any ash materials including but not limited to trees, parts of trees, wood products, and wood processing waste like bark and chips capable of harboring any life stage of emerald ash borer.
9. “Firewood” means all wood, split or unsplit, less than 4 feet in length that is not labeled as certified heat-treated by a USDA or State regulatory agency.
10. “Injurious insect or disease” means an insect or pathogen species whose introduction causes or is likely to cause economic or environmental harm or harm to human health.
11. “Nursery” means any location where nursery stock is grown, propagated, stored, or sold; or any location from which nursery stock is distributed direct to a customer. This includes landscape companies that temporarily store plant material for business related projects.
12. “Person” means any individual, governmental entity, firm, partnership, corporation, company, society, association, or any organized group of persons whether incorporated or not, and every officer, agent, or employee thereof.

13. “Potentially infested ash material” means any ash trees, wood, or derivative products thereof which have the potential to be infested by emerald ash borer regardless of whether or not they display external signs of infestation.
14. “Quarantine” means a legal instrument duly imposed or enacted by a government agency as a means for mitigating pest risk.
15. “Quarantine areas” means the region(s) under regulation by the quarantine. Persons, nurseries, and the wood-products industries within the quarantine area are prohibited movement of regulated items except as allowed by this quarantine.
16. “Regulated articles” means any woody plant material in the genus *Fraxinus*
17. “Wood-products industry” means sawmills, facilities, or persons that process logs to be cut into lumber; ground into pulp; chip or sell bark mulch and/or wood chips with bark such as, but not limited to nurseries, garden centers, landscapers; arborists generating slash; power plants burning wood chips; or other industries as identified by APHIS, NHDAMF, or NHDRED.

Section II: Statement of Concerns

WHEREAS RSA 433:34 empowers the Department of Agriculture, Markets & Food to establish a quarantine to prevent dissemination of plant pests within the state upon detection of an injurious insect or disease which poses a threat to natural, residential or commercial resources; and

WHEREAS RSA 227-K empowers the Department of Resources and Economic Development Division of Forests and Lands to take measures to monitor the status of changes in the health of New Hampshire's forests and reduce the incidence and severity of forest insect and disease infestations; and

WHEREAS Emerald ash borer is a federally-regulated pest; and

WHEREAS Emerald ash borer has been detected in Concord in Merrimack County; and

WHEREAS this insect kills ash (*Fraxinus*) trees within 3-5 years of infestation; and

WHEREAS Emerald ash borer is spread rapidly into new areas with the trade of ash nursery stock and ash wood materials; and

WHEREAS Ash is an important part of New Hampshire's northern hardwood forests, with an estimated 25 million mature trees in the state; and

WHEREAS Ash is important to the forest economy of New Hampshire, with an estimated 500 million board feet in logs in the state; and

WHEREAS Ash nursery stock has been widely planted throughout the state of New Hampshire and is an important part of the state's urban forests;

WHEREAS Treatment, removal, and replacement of dead and dying ash trees will be expensive costs for the state, municipalities, and landowners of New Hampshire;

THEREFORE, The State of New Hampshire is hereby establishing this emergency emerald ash borer quarantine against movement of all regulated *Fraxinus* materials and emerald ash borer life stages outside of the quarantine area of Merrimack County.

Section III: Statutory Authority

The Statutory Authority for this quarantine order is RSA 433:34 and RSA 227-K:2 III.

Section IV: Specific Purpose and Factual Basis

The specific purpose of these regulations is to protect New Hampshire's natural and landscape ash forest resources by preventing the unregulated movement of emerald ash borer infested or potentially infested ash materials from Merrimack County throughout the remainder of the state.

The Department of Agriculture, Markets & Food (hereto referred to as NHDAMF) and the Department of Resources and Economic Development (hereto referred to as NHDRED) have determined that this quarantine is necessary based on the following:

The emerald ash borer is an introduced insect originating from Asia and a serious pest of North American ash trees. The immature stage of this beetle feeds within the cambium layer of ash trees, disrupting nutrient flow and killing the tree within 3-5 years of infestation if left untreated. As emerald ash borer spends most of its life cycle hidden under the bark of trees, detection is problematic prior to tree death. Regulation of emerald ash borer host material following detection can slow the spread of this injurious insect and enhance potential management programs.

Section V: Emerald Ash Borer Quarantine

1. No person shall harvest, cut, move, carry, transport or ship (or authorize or allow any other person to do the same) Regulated Articles and Commodities outside of the quarantine area, unless specifically authorized in writing via compliance agreement issued by NHDAMF.
2. Quarantined areas – all public and private lands within Merrimack County, New Hampshire.
3. Quarantine period – this quarantine is in effect until modified or rescinded by the NHDAMF and NHDRED.
4. Regulated Articles and Commodities Covered:
 - A. All life stages of the emerald ash borer; and
 - B. Hardwood firewood; and
 - C. *Fraxinus* (ash) nursery stock; and
 - D. *Fraxinus* (ash) green lumber; and
 - E. *Fraxinus* (ash) logs; and
 - F. Any other *Fraxinus* (ash) material, living, dead, cut, or fallen, including chips, stumps, branches, roots and debris; and
 - G. Woodchips consisting in any part of *Fraxinus* (ash) chips;
 - H. Any article, product, or means of conveyance not listed above if an authorized state inspector determines that it presents a risk of spreading emerald ash borer.

5. Conditions of Movement of Regulated Articles and Commodities

A. All regulated articles and commodities having originated or previously been held within a quarantined area within New Hampshire shall not be transported or moved into non-quarantined areas except as specifically allowed by a compliance agreement between the NHDAMF and the wood-products industry attesting that the regulated products or materials have been processed or handled in a manner to render them low-risk for transportation of emerald ash borer. Compliance agreements shall:

- 1) Be issued upon certification by an inspector authorized by NHDAMF; and
- 2) Be renewed annually; and
- 3) Require record-keeping by the wood-products industry; and
- 4) Be requested by contacting NHDAMF in writing, by telephone (603-271-2561) or by email (piera.siegert@agr.nh.gov); and
- 5) Shall meet the below conditions:

- a) Nursery stock: there are no exceptions;
- b) Wood-products industries within the quarantine area shall:
 1. Remove bark and additional ½ inch of wood; or
 2. Kiln sterilization treatment (for wood up to 3 inches in width) as per the T404-b-4 treatment schedule; or
 3. Fumigation treatment as per T404-b-1; or
 4. Heat treatment to 60° C for 60 minutes as per T314-a; or
 5. Chipping materials to a size of less than 1 inch in two dimensions; or composting of materials as per an APHIS-approved composting procedure; or
 6. Safeguarding material from infestation and movement only during the EAB non-flight period of October 1 – May 1; or
 7. Heat treat ash lumber in wood packing material to ISPM-15 standards by an ALSC WPM approved facility that meets IPPC Guidelines as per T404-e-2; or
 8. Only move regulated materials which require further processing to a receiving facility outside of the quarantine area. The receiving facility shall also have a compliance agreement attesting the following:
 - i. Physical separation of all regulated materials from other ash wood materials until processed; and
 - ii. Waste disposed by shredding or chipping to

less than an inch in two dimensions and/or burned on site; and

- iii. Processing or disposal of material during the EAB non-flight period of October 1 – May 1. Any unprocessed material remaining after the EAB non-flight period (October 1 – May 1) shall be considered a violation of this quarantine and will result in the penalty provisions of this quarantine; and
- iv. These receiving facility compliance agreements shall be available by contacting the NHDAMF as above in Section 5A.

B. All regulated articles and commodities originating outside of the quarantine area may move through the quarantine area without additional certification for this pest under the following conditions:

- 1) Passage through the regulated area is made during the EAB non-flight period of October 1 through May 1 and passage is made without stopping except to refuel or for traffic conditions; or during the EAB flight period of May 2 through September 30 if the articles are shipped in an enclosed vehicle or are completely enclosed by a covering adequate to prevent access by the emerald ash borer; and
- 2) The point of origin of the regulated article must be indicated on the bill of lading or shipping documents.

C. Regulated articles originating outside of the quarantined area, which are then moved into the quarantined area shall be considered to have originated from a regulated area. These regulated articles may only be moved as conditioned in Section 5A above.

Section VI: Violations

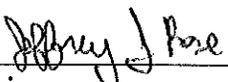
1. Any person or employee or agent of that person, who violates any provision of this quarantine, shall be guilty of a violation. For any subsequent offense, a person shall be guilty of a misdemeanor if a natural person, or guilty of a felony if any other person. (RSA 433:32) (RSA 227-K:17)
2. Any regulated articles not in compliance with the quarantine are subject to destruction or risk mitigation at the cost of the nursery, wood-products industry, or person in violation of the quarantine.
3. Any person who violates any provision of this quarantine is subject to the penalty provisions of RSA 433:32 and RSA 227-K:17.
4. Nurseries or landscapers in violation of this quarantine are subject to suspension of their license (RSA 433:35). Reinstatement of a license shall be at the discretion of NHDAMF.
6. Nurseries or landscapers in violation of this quarantine shall provide DAMF with all Records of Sale for all ash, *Fraxinus*, sold.

This quarantine against the emerald ash borer will become effective upon its adoption.

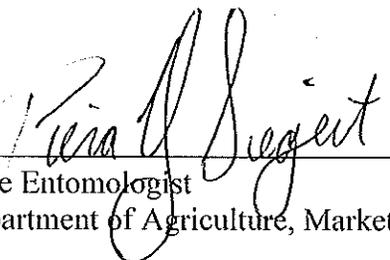


Commissioner
Department of Agriculture, Markets & Food

4/8/2013
Date


Commissioner
Department of Resources and Economic Development

4/8/2013
Date


State Entomologist
Department of Agriculture, Markets & Food

4/8/2013
Date


State Forester
Department of Resources and Economic Development

4/8/2013
Date



Vermont Forest Health

Ash Management Guidance for Forest Managers



Department of Forests, Parks, & Recreation
April, 2012

vtforest.com

Executive Summary

Emerald Ash Borer (EAB), a non-native wood-boring beetle, attacks all native ash (*Fraxinus*) species. There are currently no practical control options for EAB in forestland. Research is being conducted to develop new management tools and understand why some trees have survived EAB. Experimental Slow-Ash-Mortality (SLAM) techniques and parasitoid wasps released for bio-control show promise in reducing EAB populations. EAB will not be eliminated through widespread ash tree removal. This has been unsuccessful in other states.

A federal quarantine now restricts the movement of nursery stock, green lumber, chips, and other woody material of the genus *Fraxinus*, as well as any non-coniferous firewood from EAB regulated areas. Ash logs have been allowed to move within quarantined areas. Shipping logs from within a quarantined area to a mill outside the area is possible, but requires compliance with quarantine restrictions. Moving firewood is the primary human-caused activity that increases the rate of spread of the insect.

Symptoms of EAB include woodpecker activity, dead branches near the top of a tree, D-shaped exit holes, bark splits exposing S-shaped tunnels, and epicormic shoots growing from the lower portion of trunk.

Management Goals

Plan ahead *now* for when EAB is detected in Vermont. Focus on mitigating the effects of ash loss on ecosystem health, forest productivity and economics by maintaining forests diverse in structure and species composition. Forest landowners should consider incorporating the following long-term management options:

- 1) **Maintain ash as a component of the forest;**
- 2) **Promote a diversity of native species; and**
- 3) **Conserve the economic value of ash; don't panic.**

Given the information we currently have regarding EAB, here are some suggested strategies for dealing with the insect and ash trees in Vermont:

- Don't panic. EAB has not been detected here yet and may not spread rapidly when it is.
- Know where ash trees exist on properties you manage. Evaluate the condition of ash regularly.
- Do not preemptively liquidate and eliminate ash from the forest mix. Where appropriate, continue to manage and regenerate ash.
- Focus growth on a variety of species. Where ash exceeds 20% of basal area, reduce the ash component. Residual stand-wide basal area targets should be consistent with appropriate silvicultural guides. Retain other species in greater numbers to maintain adequate stocking if removing substantial amounts of ash.
- Spread the "Don't move firewood!" message to slow the human-caused spread of EAB.
- Know where EAB populations exist. Detection maps are regularly updated at www.emeraldashborer.info/files/MultiState_EABpos.pdf. If you think you may have seen signs of EAB, report it. Call the EAB hotline at 1-866-322-4512.
- Management practices that eliminate ash could be a greater threat to ash than EAB itself. Survival of these species ultimately depends on retaining genes that help ash tolerate EAB, and seedlings or a fresh seedbank to populate a new generation.

The Department of Forests, Parks and Recreation has a policy statement regarding EAB and ash management on properties that are enrolled in Vermont's Use Value Appraisal Program (UVA). This is available at www.vtfor.org/resource/for_forres_useapp.cfm.

In advance of a known emerald ash borer (EAB) infestation in Vermont, but with this insect on the horizon, there are challenging decisions to make in both public and private forest management. There's a lot of uncertainty, but we do know quite a bit about ash and we are rapidly learning more about EAB. The guidance for management presented here is based on what is currently known, in the context of forest ecosystem health as well as the marketability of ash sawtimber. It will need revision when there's new information, developing technology, or as the EAB infestation expands.

Identification and Current Status of Emerald Ash Borer

Emerald ash borer is a non-native, wood-boring beetle that can attack all native ash (*Fraxinus*) species. This insect was first found in North America, in 2002, in southeastern Michigan and adjacent Ontario. It likely arrived in the early 1990s on solid-wood packing material from Asia. It has spread quickly, largely due to human movement of firewood. To date, fifteen states and two Canadian provinces have confirmed EAB infestations, although there are still many uninfested ash trees, of all sizes, in Michigan and other affected states.

EAB adults are 1/2-inch long and metallic green. They emerge through small (1/8 inch) D-shaped holes starting in late May and may be flying until early September. Moving wood products during this time of year presents the greatest risk for spreading the insect to previously uninfested trees and/or sites. The larvae may be found year round. They bore through tree bark, and feed in the cambium, creating long serpentine galleries which get wider as the insects grow. This feeding pattern interrupts the tree's vascular system, eventually girdling and killing it. Adult beetles are more common in sunlit portions of the crown, so initial damage often occurs in upper branches, making early detection more difficult.

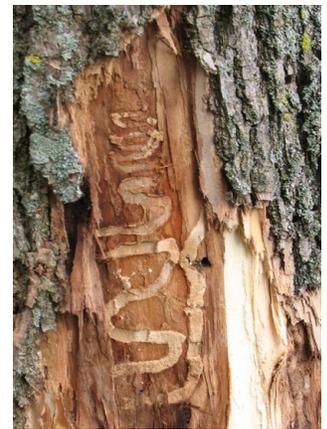
EAB can kill stressed and healthy ash trees greater than 1 inch in diameter. In established infestation areas, most die within two to three years of becoming infested. Up to 1% of ash may survive on sites with heavy mortality. Some of these "lingering ash" show evidence of bark healing, suggesting possible host resistance.



Emerald ash borer will not be eliminated through ash tree removal. Eradication was tried unsuccessfully in Michigan, southern Ontario, & Maryland.



Emerald ash borer adults are 1/2" long and may be flying from late May until early September.



EAB larvae feed in the cambium, creating serpentine galleries.

Individual landscape trees can be protected with systemic insecticides, but there are currently no practical control options for EAB in forestland. In the future, however, additional options may become available. Research is being conducted to develop new management tools, establish biocontrols, and understand why some trees have survived EAB.

Experimental Slow-Ash-Mortality (SLAM) techniques, which include removing infested trees before the beetles emerge, show promise in reducing the rate of EAB spread to new locations. In addition to native parasites and predators that have been found feeding on EAB, parasitoid wasps from Asia have been released in 12 of the 15 infested states as part of an operational biological control program. In study sites, parasitism has slowed the rate of EAB population growth.

Emerald ash borer will not be eliminated through widespread ash tree removal. This has been tried time and again, including attempts in Michigan, southern Ontario, and Maryland. Because these efforts have been unsuccessful, the State of Vermont is not likely to attempt to eradicate the insect.

EAB has not been detected in Vermont.

To slow the spread of EAB, a federal quarantine restricts the movement of materials which might harbor the insect. Such materials are “nursery stock, green lumber, chips, and other woody material of the genus *Fraxinus*, plus any non-coniferous firewood and the insect itself, in any of its life stages”. Ash logs have been allowed to move freely within quarantined areas. Shipping logs from within a quarantined area to a mill outside the area requires compliance with quarantine restrictions. More information is available at 802-879-5687 or: www.aphis.usda.gov/publications/plant_health/content/printable_version/emerald_ash_borer_faqs.pdf.

Thus far, strategies to address EAB in Vermont have focused on detection, such as using purple panel trap surveys, on regulatory activities, and on public awareness campaigns to assist with detection and prevent human-assisted movement of the insect. Outreach efforts have emphasized the “[Don’t Move Firewood](#)” message, as firewood transport is a primary method of human-aided EAB spread.



Firewood transport is a primary method of human-aided EAB spread.

Importance of Ash and Impacts of Emerald Ash Borer



EAB is expected to become established in Vermont and kill ash trees, resulting in detrimental impacts on forest ecosystems and community treescapes as well as economic losses. According to recent FIA data, there are approximately 150 million ash trees throughout Vermont. Over 100 million ash trees in Vermont are sawlog size (>11 inches dbh). Currently, ash represents approximately 6% of the standing sawtimber volume in Vermont.

Ash trees are important ecologically. In Vermont, white ash is an important component of many upland forested natural communities, especially those that have calcareous or enriched soils. In ground water seepage swamp communities, black ash can be a dominant species, and is an indicator of mineral enrichment. Green ash is flood tolerant. It is closely associated with floodplain and clayplain forests of the Champlain Valley. Trees in these areas help stabilize the water table and maintain flood resiliency.

Green ash occurs in floodplain forests, where trees help stabilize the water table and maintain flood resiliency.

Ash provides for many wildlife needs, including:

- Browse for deer.
- Roosting sites for bats under the loose bark of dead and dying ash trees.
- Cavities for nesting, roosting, feeding or perching, which regularly develop when tops are broken.
- Seeds that are a preferred food for a variety of birds, including grosbeaks, blackbirds, cardinals, purple finch and waterfowl.

EAB threatens other values. Ash, especially green ash, has been widely used for tree planting due to its ability to tolerate urban conditions. In areas of the country where ash mortality has been widespread, consequences include decreased property values, wood supply disruptions, changes in hydrology, and impacts on the use of ash for traditional crafts.

There are other causes of ash health decline in Vermont. Ash is particularly susceptible to fluctuating water availability because it is ring porous. Fewer vessels move water in ring porous trees, and they are therefore more prone to cavitation. Ash decline is common on droughty sites, as well as wet or shallow soils where root depth is limited. Ash yellows, caused by a microscopic phytoplasma, is known to occur in southern and western Vermont. Trees vary widely in ash yellows tolerance. Abnormal clusters of twigs called “witches’ brooms” are diagnostic for this disease, although not always present on infected trees.

Symptoms of EAB and Detection

It is difficult to determine whether an ash tree is infested with EAB because recently attacked trees may look healthy.

Woodpecker activity, especially on a live tree, is often the first sign that a tree might be infested with EAB. Look for patches of smooth outer bark where it has been flaked off, irregular holes, and bird toenail scars. Other symptoms of EAB include dead branches near the top of a tree, D-shaped exit holes, bark splits exposing S-shaped tunnels, and epicormic shoots growing from the lower trunk. Unlike the bushy witches' brooms caused by ash yellows, epicormic shoots retain the strong apical dominance typical of ash.



Woodpecker activity on a live tree is often the first sign of infestation. Look for patches of smooth outer bark (right), irregular holes and bird toenail scars (left).

Management Goals

When EAB is initially found in Vermont, most ash in the state will be years away from being infested. However, now is the time to plan ahead, evaluate potential impacts, and develop strategies which capitalize on the remarkable resiliency of Vermont's forests. With this in mind, forest management should focus on mitigating potential effects of emerald ash borer on ecosystem health and stand productivity, using strategies that do not eliminate ash, but rather create a more diverse forest in both structure and species composition.

The goals of all silvicultural treatments typically include maintaining site quality, protecting water resources, and attending to forest health and productivity. Most times, improving access infrastructure and increasing the ratio of acceptable growing stock basal area to total basal area are also goals. Treating an area to reduce exposure to loss by removing ash trees is not a reason to ignore the many other benefits of careful stewardship.



Forest management should focus on strategies that create a more diverse forest in both structure and species composition.

In light of the fact that Vermont has no known EAB infestations, the following long-term management options are recommended:

1) maintain ash as a component of the forest, 2) promote a diversity of native species, and 3) conserve the economic value of ash; don't panic. The Vermont Forest Health leaflet, "Emerald Ash Borer: Information for Vermont Landowners" may help consulting foresters provide answers to clients in management planning. (www.vtfpr.org/protection/documents/EABLandownerFAQs_111011.pdf)

The recommendations in this document were developed with timber management in mind. Where timber is not an objective, such as on sites with limited access or sensitive natural communities like seepage swamps or floodplain forests, some actions may still be warranted. Control of non-native invasive plants in particular may offer significant benefits to sensitive or unique areas. For more information about appropriate management of these sites, contact your [County Forester](#).

Goal #1 – Maintain ash as a component of the forest.

Management practices that eliminate ash could be a greater threat to ash than EAB itself. Survival of these species ultimately depends on retaining genes that help ash tolerate EAB, and seedlings or a fresh seedbank to populate new generations.

Though there is substantial mortality in states that have been infested with EAB, some ash trees have survived. It's possible that the next generation will fare better. By the time regenerating trees have grown to 1 inch or more in diameter – large enough to be infested – introduced natural enemies should be more widely established. Early data on the impact of introduced wasp parasites indicate that these biocontrols help to reduce EAB populations, and could allow the survival of more EAB-tolerant ash.



Management practices that eliminate ash could be a greater threat to ash than EAB itself.



Though there is substantial mortality in states that have been infested with EAB, some ash trees have survived.

Choose healthy ash on good sites for retention.

- Focus retention on sites with deeper soils not prone to drought.
- Uninfested, rapidly growing trees will increase in volume and/or grade.
- Vigorous ash trees survive longer than others, once infested with EAB.

Where site conditions and landowner objectives allow, encourage ash to regenerate.

- Ash seed is viable in the soil for 2-4 years. Good seed years are about three years apart.
- Keep some overstory ash trees to continue replenishing the seed bank.
- Plan for canopy opening sizes and associated light regimes that could favor survival of white ash regeneration.

Retain ash to provide wildlife benefits.

- Consider ash as a seed source, and unhealthy ash trees as potential future snags. Dead trees may be used for nesting, feeding and/or as a perch site.
- Where practical, and with due consideration of safety, retain ash already functioning as cavity trees.

Goal #2 – Promote a diversity of native species.

Many woodlands can benefit from a well-planned harvest in which native tree species diversity is maintained or enhanced. This will promote development of a forest that will remain ecologically and economically productive when ash mortality occurs.

Promote native tree species diversity in all diameter classes.

- Base decisions on accurate, up-to-date stand inventories.
- Where ash exceeds 20% of basal area, reduce the ash component to increase growing space for a variety of species. Ash distribution is irregular in many stands. The target percentage of residual ash can be higher in enriched pockets.

- Remove low-vigor trees to improve overall stand productivity. Select trees with ash yellows witches' brooms for removal.
- Residual stand basal area targets should be consistent with appropriate silvicultural guides. Retain other species in greater numbers if necessary to maintain adequate stocking.
- Multiple harvest cycles may be required to reduce the ash component to desired levels in stands or portions of stands with high concentrations of ash.

Encourage regeneration of a variety of native species.

- Release advanced regeneration of desirable native species under pockets of mature or low-vigor ash.
- Mid-sized canopy gaps, especially those between 120 feet in diameter (1/4 acre) and 200 feet in diameter (1 acre), may favor ash regeneration as well as other intermediate species.

Control non-native invasive plants. Plants in the understory will respond to additional sunlight reaching the forest floor as ash trees in the overstory die. Focus on establishing desirable species prior to the arrival of EAB. Monitor for invasive plants, like honeysuckle, barberry, and buckthorn, which prefer the rich sites favored by ash. They produce prolific seed, and can persist in the understory for many years, excluding more desirable native species.

- Survey for invasive plants and incorporate invasive plant management into forest management plans.
- Remove new populations before they spread. Treatment is cheaper and more effective when populations are still small and isolated.
- Where practical, pre-treat invasive plant infestations before conducting timber harvest activities and after when necessary.
- For more information on how to survey for and treat invasive plants visit www.vtinvases.org/plants/prevention-and-management .



Select trees with ash yellows for removal. Unlike epicormic shoots (right), which retain the strong apical dominance typical of ash, ash yellows witches' brooms (left) are bushy.

Goal #3 – Conserve the economic value of ash; don't panic.

The threat of EAB makes it riskier to retain larger diameter ash trees intended for timber harvest. However, there may be the potential for increased growth and value gain before EAB arrives. Small sawtimber trees with good form and vigor have the greatest potential to increase in grade and value. This is especially true for stands far from an EAB infestation, and if efforts to slow the spread of EAB are successful. In addition, panic cutting has proven to upset local and regional ash product markets and local economies. This is due to depressed stumpage prices related to excessive supply.

Review diameter objectives at which trees will be considered "economically mature".

- Base diameter objectives on the silvicultural system being used, site quality, stand condition, management objectives, and markets. These diameter objectives should be broad goals to which trees can be grown, not necessarily diameter limits.
- In order to achieve the highest economic value for ash logs, tree dbh must often be 16-20 inches or larger. For many Vermont mills, the minimum scaling diameter for the top ash sawlog grade is 14-16 inches on the small end. Markets and specifications change over time so it is important to stay in touch with local mills and their current specifications.

- Reconsider 18- or 20-inch diameter objectives where quick response – easy access, available loggers etc. – to changing ash condition will not be feasible. Given concerns about EAB and other factors affecting ash health, reducing ash diameter objectives to 16 inches may be reasonable.
- Resist setting unnecessarily low targets. Support the capacity of local sawmills to purchase high-quality logs over the long-term.



Ash logs can be sold once EAB appears.

- Preemptive salvage has sometimes flooded ash markets, depressing sawlog prices. When such “panic cutting” subsided, supply dropped and prices for ash timber rose. New York State reports that ash sawtimber markets have generally remained robust despite their EAB infestation.
- In states with EAB, regulating agencies have worked with industry to facilitate wood product movement from quarantine zones. For example, compliance agreements have allowed sawmills to freely accept ash logs during the winter, provided they are debarked and sawn before EAB emergence.
- EAB attack does little to degrade ash wood in living trees. Standing trees should still have value as sawlogs for a year or more following infestation and during the early stages of EAB-related decline.



Credit: Ames True Temper

Ash logs can be sold once EAB appears. Compliance agreements have allowed sawmills to accept ash logs in the winter.

Know when EAB is close.

- Some ash in Vermont are 30 miles from known EAB infestations, but most are a lot farther away. In Michigan, if EAB is over 5 miles away, impacts on tree growth and survival aren’t expected for about 10 years. In New York, ash over 10 miles from EAB is considered in the lowest risk area, with at least 5-10 years before EAB will arrive without human assistance.
- Detection maps are regularly updated at www.emeraldashborer.info/files/MultiState_EABpos.pdf.
- Install trap trees to monitor properties for EAB. Trees are girdled in the spring, cut in late fall, and peeled to look for signs of the insect. Stay “in the loop” by becoming a Forest Pest First Detector. See more details at www.vtinvasives.org/group/eab-girdled-trap-trees.



If you think you might have EAB, report it. Collect and/or photograph any suspect insects. Collected specimens can be stored in the freezer. If you can't reach someone at the contact numbers below, call the EAB hotline at 1-866-322-4512. Don't spread potentially infested materials. Visit www.vtinvasives.org/tree-pests/report-it for more information.

Monitor properties for EAB by installing girdled trap trees in the spring, and peeling them to look for the insect in late fall.

Websites for More Information

USDA APHIS Emerald Ash Borer Information Page

http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/index.shtml

USDA APHIS EAB Quarantine Map Link

http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/downloads/multistateeab.pdf

Emerald Ash Borer Information (a collaborative website providing information related to EAB)

<http://www.emeraldashborer.info/index.cfm>

Vermont Invasives: This website provides a landing page for Vermonters interested in learning more about invasive insects, plants and pathogens. In addition, the website is designed to guide visitors to the appropriate place to learn more and become involved in various monitoring, management and outreach efforts. <http://www.vtinvasives.org/>

Vermont Dept of Forests, Parks, and Recreation, Non-Native Forest Pests

<http://www.vtfpr.org/protection/forestpestsfrontpage.cfm>

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THANKS TO ALL OUR PARTNERS AND THOSE WHO HELPED CREATE THIS DOCUMENT!



For more information, contact the Forest Biology Laboratory at 802-879-5687 or:

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Forest health programs in the Vermont Department of Forests, Parks, and Recreation are supported, in part, by the US Forest Service, State and Private Forestry, and conducted in partnership with the Vermont Agency of Agriculture, Food, and Markets, USDA-APHIS, the University of Vermont, cooperating landowners, resource managers, and citizen volunteers.