What does EAB Look Like?

EAB looks different in each of its four life stages

Adult (beetle)
Emerald ash borer adults are very small, metallic green beetles. They are about the size of a cooked grain of rice: only 3/8 - 1/2 inch long and 1/16 inch wide.

Adult emerald ash borers emerge from beneath the bark of ash trees late May through mid-July. They create a D-shaped exit hole as they chew their way out of the tree. The beetles are most active during warm and sunny days. They never wander far from where they exit a tree (less than one mile) in search of a mate. Once they find a mate, the female will lay 60 - 90 eggs, one at a time, in the crevices of ash tree bark. The beetles will feed lightly on ash tree leaves, but do not cause much harm that way. EAB beetles live a total of three to six weeks.

Egg
Emerald ash borer eggs are very small (1 mm), difficult to find and are rarely seen. Female beetles deposit them in bark crevices and as larvae hatch from the egg, they immediately chew their way into the tree.

Larva (immature EAB)
Emerald ash borer larvae are white and slightly flattened, with a pair of brown pincher-like appendages on the last segment. Their size varies as they feed and grow under the ash tree's bark. Full grown larvae average 1.5 inches in length. They wind back and forth as they feed, creating S-shaped patterns called galleries under the bark. Larvae will feed under the bark for one or two years and can survive in green wood, such as firewood, as long as the bark is attached.

Pupa
In autumn, after one or two years of feeding under the bark, larvae will create a chamber for themselves in the tree's sapwood. They stay in this chamber over winter and pupate in the spring, turning into adults. The beetles emerge from the tree, completing the life cycle. The pupae, like the larvae, cannot be seen unless bark is pulled away from the tree.

EAB Look-Alikes
There are many metallic green insects that are common in Wisconsin and often mistaken for EAB. For more information on these look-alikes please visit the University of Wisconsin - Madison's emerald ash borer webpage. (Please note that the six-spotted tiger beetle may have any number of spots, or none at all.)

Related Documents

MI Extension Bulletin about emerald ash borer look-alikes and native borers.
EABlookalikesE2939MIBulletin.pdf

More emerald ash borer look-alikes.
EABlookalikes2E2944MIBulletin.pdf

Insects in Wisconsin often confused with emerald ash borer
Insects in Wisconsin that can be confused with EAB.pdf

The EAB life cycle, with pictures and descriptions.
EABLifeCycle.pdf

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Related Images

When EAB adults exit the ash tree they leave behind tiny D-shaped holes (about 1/8 inch).

Fourth instar (full-grown) emerald ash borer larva. 1.5 - 2 inches long.

An adult emerald ash borer is a small metallic green insect, only 1/2 inch long and very narrow. These adult beetles are rarely seen because of their small size and because they are only present for 3 - 6 weeks each year.

What does an Ash Tree Look Like?

An ash tree is most easily identified by:

1. It has an **opposite branching pattern** (two branches come off the main stem, one on each side and directly opposite each other)

2. It has **compound leaves** with 5-11 leaflets (depending on the species of ash). Leaflets are moderately toothed and may be stalked or sessile.

3. In winter: first look for the **opposite branching pattern and stout twigs** of ash. Small branches grow off larger **branches opposite one another.** Likewise, **buds and leaf scars are opposite one another on twigs.**

Next, **Ash trees have many small dots (vascular bundles) on their leaf scars,** forming a semi-circle or crescent pattern.

And, white and green ashes have **thick, diamond-patterned bark,** while black ash bark is **thin, ashy-gray, and scaly.**

Ash species attacked by emerald ash borer include green *(Fraxinus pennsylvanica),* white *(F. americana),* black *(F. nigra),* and blue *(F. quadrangulata),* as well as horticultural cultivars of these species. Green and white ash are the most commonly found ash species in the Midwest with blue ash being rare. Note: blue ash twigs are 4-sided. All other Wisconsin ash trees have round stems.

While other woody plants, such as **mountain ash and prickly ash**, have 'ash' in their name, they are not true ash (*Fraxinus* species). Therefore they **are not susceptible** to attack by emerald ash borer.

Ash trees are abundant in Wisconsin, with estimates as high as 765 million trees in forests and over 5 million in urban areas. Ash is a component of three forest types in Wisconsin including 1) Elm / Ash / Cottonwood, 2) Northern Hardwood and 3) Oak / Hickory.

Ash wood is used for making flooring, baseball bats, tool handles, cabinets and much more.

Related Documents

Ash Tree Identification (This document outlines how to recognize an ash tree. By Michigan State University Extension, in PDF format.)
EABMIextension.pdf

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Related Images

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Related Images

Example of the **diamond pattern typical of green and white ash bark**. This photo is of a green ash tree. WDNR Photo by Brian Schwingle

Opposite branching pattern of ash trees. WDNR Photo by Renee Pinski

XHT1215

University of Wisconsin Pest Alert

UW Extension
University of Wisconsin–Extension

Provided to you by:

Is My Ash Tree Worth Treating for Emerald Ash Borer?

PJ Liesch, UW Entomology, Patti Nagai, UW-Extension Racine County and R. Chris Williamson, UW Entomology

This factsheet addresses some of the most frequently asked questions regarding the treatment of ash trees for emerald ash borer (EAB), and the removal and disposal of infested trees.

When should I consider treating my ash tree for EAB? *Based on current research, EAB treatments are suggested only for ash trees located within 15 miles of a confirmed EAB site, or for trees located within a quarantined area. Insecticide treatments are* ***not*** *necessary for ash trees located outside of these areas. Even within the 15-mile radius, not all trees should be treated. Due to the expense of insecticide treatments for EAB, consider the value of a particular ash tree in relation to insecticide treatment costs before making any treatments. Proper use of EAB insecticides can help maintain the health of high value ash trees over time. Lower value ash trees are not ideal candidates for EAB insecticide treatments.*

High value ash trees are candidates for treatment for emerald ash borer.

How do I know if my ash tree has value? *Ash trees can be a valuable part of the landscape. A properly cared for ash tree can increase property value, provide environmental benefits such as runoff and erosion mitigation, and reduce electricity costs by shading a home. Determining tree value can be subjective. Qualities to consider when assessing value include (but are not limited to) a tree's overall health, shape, location with respect to landscape design, and appearance through the seasons, as well as whether or not a tree provides shade. A healthy ash that is properly located in the landscape, has a nice shape and good fall color, and provides shade has value. An ash tree that is not healthy due to disease or insects, has poor shape or structural damage, is otherwise unattractive, or is in a bad location (e.g., near a power line) is of lower value.*

How do I know if there are ash trees in my area that are infested with EAB? *The Wisconsin Department of Agriculture Trade and Consumer Protection (DATCP) keeps track of EAB infestations in the state. Visit the Wisconsin DATCP Emerald Ash Borer Resource Guide website (http://datcpservices.wisconsin.gov/eab/) and follow the "Where has EAB been found?" link to access an up-to-date list and map of EAB infested counties and municipalities. You can also contact your local county UW-Extension office to see if EAB has been found in your area.*

How do I know if my ash tree has EAB? *Symptoms of an EAB infestation can include* ***canopy thinning*** *starting in the upper portion of the tree,* ***epicormic sprouting*** *(i.e., formation of sprouts) along the trunk,* ***bark splitting****, and* ***woodpecker damage****. These symptoms indicate general tree stress, and can be due to EAB. However, they also can be caused by diseases or insects other than EAB. Specific signs of EAB include* ***D-shaped exit holes*** *(~$^{3}/_{16}$ inch wide) in the bark of the tree,* ***S-shaped larval tunnels*** *and/or* ***larvae*** *(cream colored, up to 1½ inches long) beneath the bark, and* ***adults*** *(metallic green, ~$^{3}/_{8}$ inch long). Visit the UW-Madison Emerald Ash Borer in Wisconsin website (http://www.entomology.wisc.edu/emeraldashborer) for additional information on the symptoms and signs of EAB. If you suspect an EAB infestation, call the Wisconsin EAB Hotline at 1-800-462-2803.*

If I decide to treat my ash tree, will I have to treat every year? *In most cases, yes. Most insecticides registered for EAB management require yearly applications to effectively protect a tree. The one exception is TREE-äge (active ingredient = emamectin benzoate), which can protect a tree for at least two years. TREE-äge is a trunk-injected insecticide available only to professional insecticide applicators (e.g., certified arborists). TREE-äge can effectively protect an ash tree if the tree is treated every two years.*

Revised Dec. 18, 2012

University of Wisconsin Pest Alert

UW Extension
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Can I treat an ash myself or do I have to call an arborist? *If your ash is smaller than 47 inches around the trunk at chest height [i.e., 15" diameter at breast height (DBH)], you may be able to treat your ash tree yourself. University of Wisconsin Pest Alert XHT1181 ("Homeowner Guide to Emerald Ash Borer Insecticide Treatments") provides a list of products currently available for homeowner use. If you decide to treat your own trees, be sure to read and follow all label instructions of the insecticide that you select to ensure that you use the product in the safest and most effective manner possible.*

In some situations, hiring a certified arborist to treat your ash tree may be more desirable. Professionals have access to specialized application equipment and additional insecticides not available to homeowners. They are also trained to measure trees accurately, and assess the overall health of trees. The Wisconsin Arborists Association website (http://www.waa-isa.org) has a list of certified arborists in the state.

Note that the University of Wisconsin does not endorse any insecticide products, and does not recommend any professional products over those available directly to homeowners.

Am I allowed to treat an ash tree in my yard between the sidewalk and street? *The answer to this question varies from municipality to municipality. In many cases, municipalities have treatment or removal and replacement plans already in place. Contact your local town, village or city to determine an appropriate strategy for protecting your sidewalk trees.*

How much does it cost to treat an ash tree for EAB? *A single tree that is 32 inches around at chest height (approximately 10" DBH) can be treated with a granular or soil drench homeowner product for about $20-35/year. Arborist treatment costs vary depending on tree size and location, the insecticide selected, and the application method. Other arborist-specific site visit charges may apply as well. Consult at least two arborists in your area to discuss treatment options and costs. To make an accurate comparison among service providers, make sure you know what insecticide will be used, the method of application, and how often treatments will be made. An arborist will not be able to determine the exact cost of treatment for your specific ash tree without a site visit, but an arborist should be able to provide you with a cost estimate for a typical ash tree.*

Do I have to remove my ash tree if it is infested with EAB? *Applying protective insecticide treatments to a healthy ash tree to prevent an EAB infestation is the best strategy for managing EAB. However, if a tree becomes infested and the infestation is detected early, you may be able to treat your ash tree to prevent further damage, and help the tree recover. Research suggests that insecticide treatments are significantly more effective on EAB-infested ash trees with less than 50% canopy thinning. Insecticide treatments are* ***not*** *recommended for trees with greater than 50% canopy thinning; these trees should be removed. Trees that become infested with EAB and are not treated will ultimately die and will need to be removed.*

How much does it cost to remove an ash tree? *Typically, a small (less than 25 feet in height) ash tree may cost a few hundred dollars to be removed by an arborist. Larger trees may cost $1,000 or more to be removed. Individual factors (e.g., the proximity of the tree to structures, power lines, or other hazards) can significantly increase the cost of removal. Tree removal costs also may vary from location to location in Wisconsin. Ultimately, removing recently killed trees while they are structurally sound, rather than allowing them to deteriorate, may be safer and more cost effective.*

How do I dispose of wood from an infested ash tree? *If you choose to remove an infested ash tree, check with your municipality to see if a wood disposal or utilization program is in place. If you have a tree removed by a tree care service, the service may be able to handle the disposal of wood from the infested tree. If you decide to use wood from an ash tree for firewood or other purposes,* ***use it locally****. Transporting infested wood risks spreading EAB elsewhere in the state, and may be in violation of Wisconsin's EAB quarantine laws. Information about Wisconsin's EAB quarantines can be found on the Wisconsin DATCP Emerald Ash Borer Resource Guide website (http://datcpservices.wisconsin.gov/eab/).*

For more information on controlling emerald ash borer: *Visit http://www.entomology.wisc.edu/emeraldashborer, http://datcpservices.wisconsin.gov/eab/index.jsp, or http://www.emeraldashborer.info, see University of Wisconsin Pest Alert XHT1181, or contact your county Extension office. For a video demonstration of treating your ash trees using a systemic drench, visit http://www.entomology.wisc.edu/new-video-protecting-your-tree-emerald-ash-borer.*

Thanks to Donna Henderson, Barb Larson and Vijai Pandian for reviewing this document.

Arbor Day Foundation

Benefits of Trees

Trees can add value to your home, help cool your home and neighborhood, break the cold winds to lower your heating costs, and provide food for wildlife.

The Value of Trees to a Community

The following are some statistics on just how important trees are in a community setting.

The net cooling effect of a young, healthy tree is equivalent to ten room-size air conditioners operating 20 hours a day. - *U.S. Department of Agriculture*

If you plant a tree today on the west side of your home, in 5 years your energy bills should be 3% less. In 15 years the savings will be nearly 12%. - *Dr. E. Greg McPherson, Center for Urban Forest Research*

A mature tree can often have an appraised value of between $1,000 and $10,000. - *Council of Tree and Landscape Appraisers*

In one study, 83% of realtors believe that mature trees have a 'strong or moderate impact' on the salability of homes listed for under $150,000; on homes over $250,000, this perception increases to 98%. - *Arbor National Mortgage & American Forests*

Landscaping, especially with trees, can increase property values as much as 20 percent. - *Management Information Services/ICMA*

One acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. This is enough to meet the annual needs of 18 people. - *U.S. Department of Agriculture*

There are about 60- to 200-million spaces along our city streets where trees could be planted. This translates to the potential to absorb 33 million more tons of CO^2 every year, and saving $4 billion in energy costs. - *National Wildlife Federation*

Trees properly placed around buildings can reduce air conditioning needs by 30 percent and can save 20–50 percent in energy used for heating. - *USDA Forest Service*

Trees can be a stimulus to economic development, attracting new business and tourism. Commercial retail areas are more attractive to shoppers, apartments rent more quickly, tenants stay longer, and space in a wooded setting is more valuable to sell or rent. - *The Arbor Day Foundation*

Healthy, mature trees add an average of 10 percent to a property's value. - *USDA Forest Service*

The planting of trees means improved water quality, resulting in less runoff and erosion. This allows more recharging of the ground water supply. Wooded areas help prevent the transport of sediment and chemicals into streams. - *USDA Forest Service*

In laboratory research, visual exposure to settings with trees has produced significant recovery from stress within five minutes, as indicated by changes in blood pressure and muscle tension. - *Dr. Roger S. Ulrich Texas A&M University*

Nationally, the 60 million street trees have an average value of $525 per tree. - *Management Information Services*

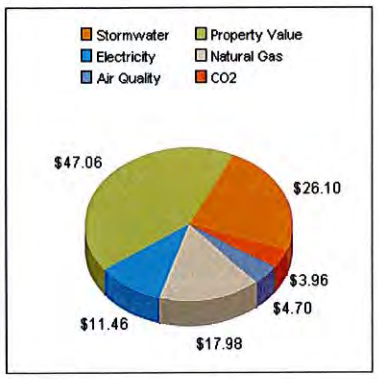
To help locate New York City's heritage trees, the City Department of Parks and Recreation conducted a program called the "Great Tree Search." New Yorkers looked for trees of unusual size and age, those linked with historic landmarks, and trees of unusual species or location. On Arbor Day, they held a big party to celebrate New York City's Great Trees.

After a tornado destroyed more than 800 trees in Cardington, Ohio, citizens organized a tree restoration committee which solicited donations and memorials. Volunteers who learned of the tree planting through local newspaper articles appeared on Arbor Day to wrap trunks, water, mulch, and stake 40 large trees which were planted along major streets.

National Tree Benefit Calculator

Beta

Overal Benefits | Storm Water | Property Value | Energy | Air Quality | CO2 | About the Model



Breakdown of your tree's benefits
Click on one of the tabs above for more detail

This **11 inch White ash** provides overall benefits of: $111 every year.

While some functional benefits of trees are well documented, others are difficult to quantify (e.g., human social and communal health). Trees' specific geography, climate, and interactions with humans and infrastructure is highly variable and makes precise calculations that much more difficult. Given these complexities, the results presented here should be considered initial approximations—a general accounting of the benefits produced by urban street-side plantings.

Benefits of trees do not account for the costs associated with trees' long-term care and maintenance.

If this tree is cared for and grows to 16 inches, it will provide $195 in annual benefits.

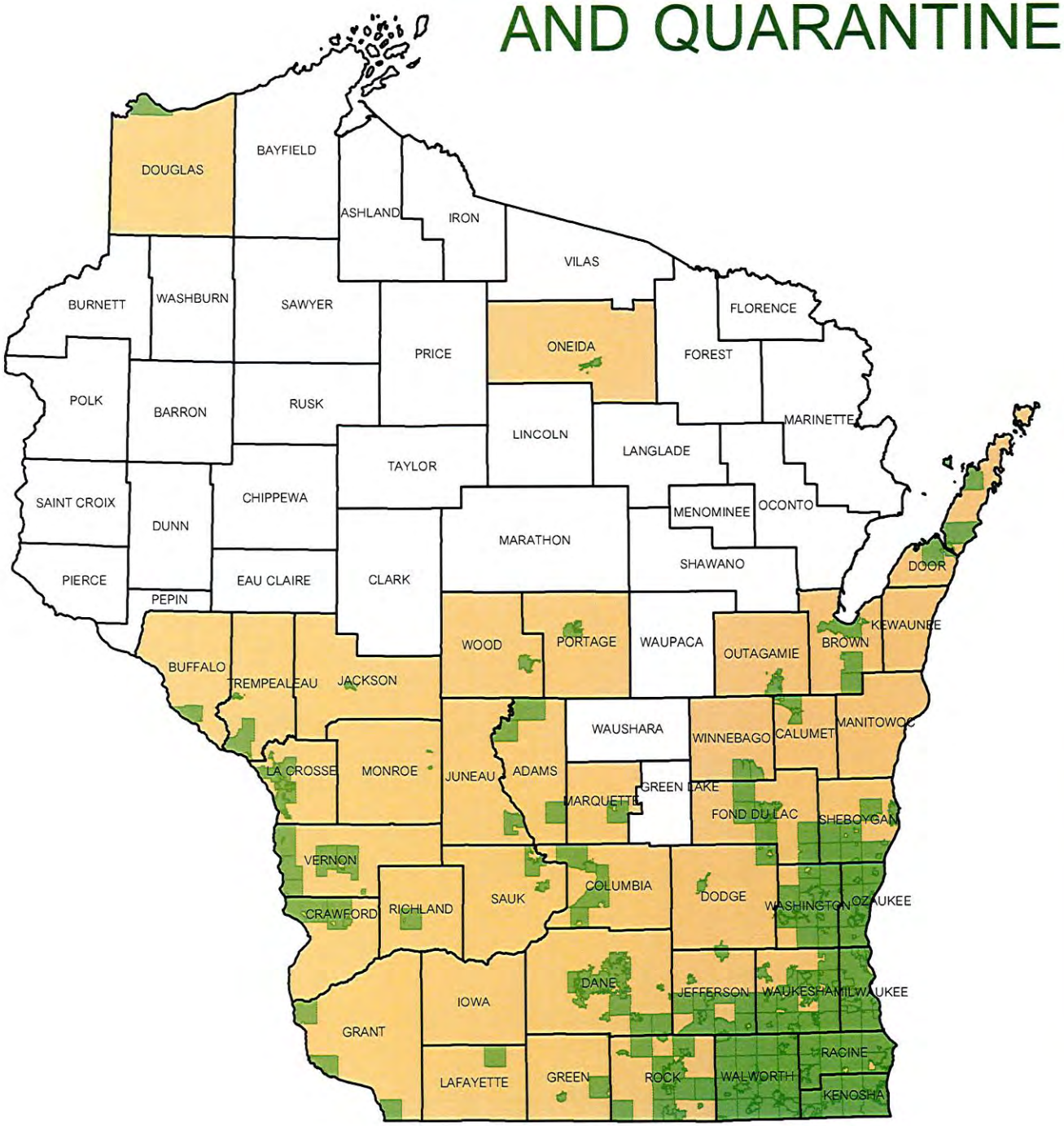
White ash
Fraxinus americana

Casey Trees WASHINGTON DC

The National Tree Benefit Calculator was conceived and developed by Casey Trees and Davey Tree Expert Co.

DAVEY

EMERALD ASH BORER DETECTIONS AND QUARANTINE IN WISCONSIN



Most of Wisconsin is EAB-free, including most of the northern half and the yellow areas in all quarantined counties. EAB has been confirmed only in those cities, villages and townships colored dark green. By following quarantine rules and limiting the transport of ash wood and all firewood, we can slow down EAB's spread to the northern forests and un-infested communities in the south. Visit *www.emeraldashborer.wi.gov* for information on what you can do.

- Non-Quarantined County, No EAB Detections
- Quarantined County
- EAB Confirmed Area in a Quarantined County

Map last updated 7/8/2016

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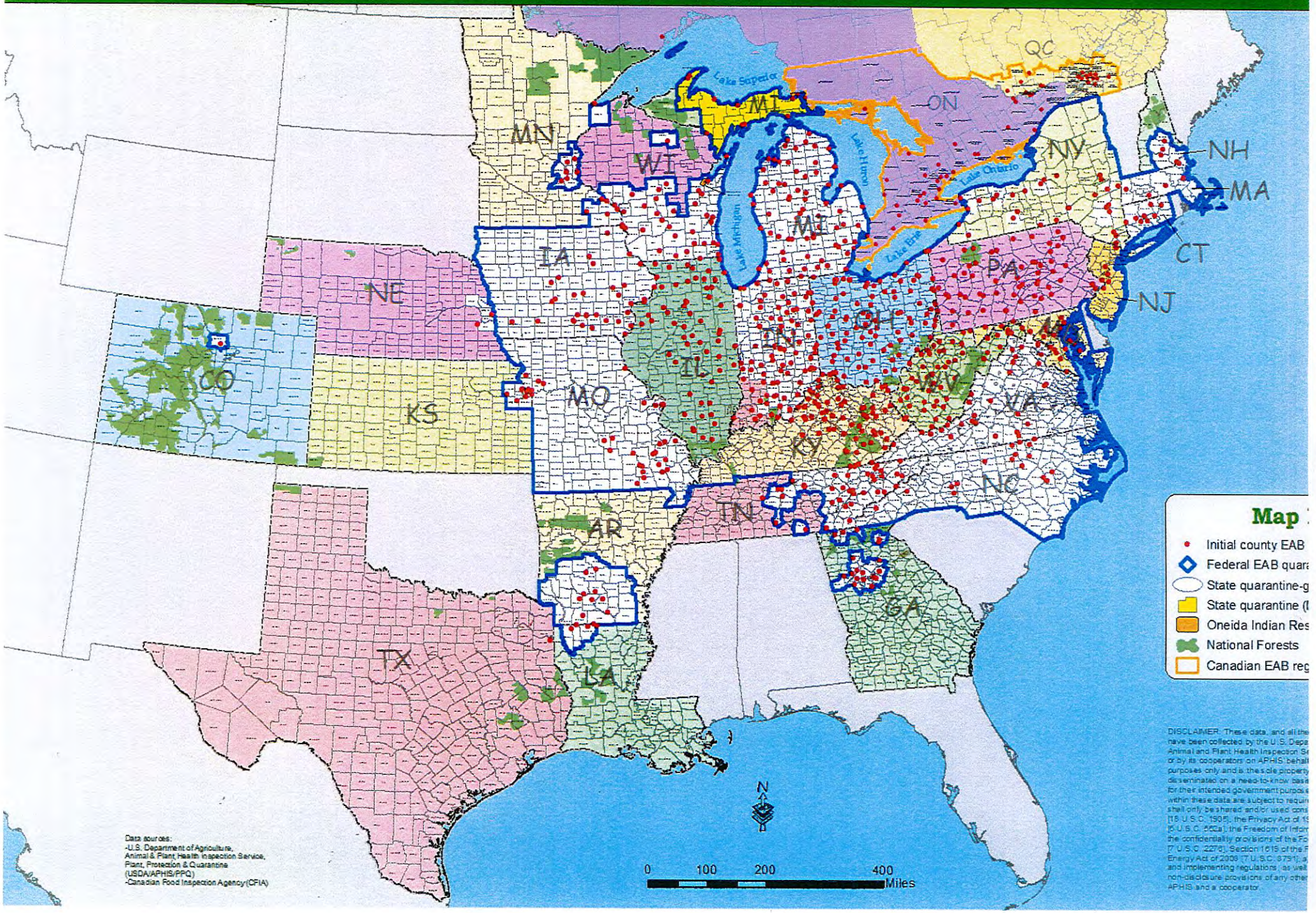
Cooperative Emerald Ash Borer Project

Initial county EAB detections in North America



Emerald Ash Borer

Management Considerations

7/11/2016

*Data and figures determined by and generated from "Emerald Ash Borer PLANning Simulator (EAB-PLANS©) Version MKE" created by the University of Wisconsin Stevens Point, developed from research in Milwaukee, Wisconsin and adapted to fit certain criteria in Wausau, Wisconsin.

Background:

Dr. Richard Hauer and Mr. Andrew VanNatta of the University of Wisconsin-Stevens Point with help from USDA McIntire-Stennis, TREEFund, and the Wisconsin Arborist Association have created a progrm to help decision makers in communities creat a management plan for the spread of emerald ash borer (Coleoptera: Buprestidae).

Emerald Ash Borer PLANning Simulator (EAB-PLANS©) Version MKE creates a detailed analysis of tree growth and mortality, management values, costs, and trees lost naturally under four different management scenarios. These scenarios include: no EAB, treatment, preemptive removal, and preemptive removal with replacement. All scenarios are analyzed over a 20-year time span, and variables can be changed by using values that are specific to the city of Wausau (Table 1).

Variables	
Starting Diameter (Mean Size in Inches)	11.28
Starting Population (Number of Trees)	5200
Removal Cost ($/Diameter Inch)	8
Treatment Cost ($/Diameter Inch)	7.5
Replacement Size (Inches)	1.25
Replacement Cost (Dollars)	60
Installation Cost (Dollars)	50

Table 1. List of variables specific to the City of Wausau using current estimates and data procured by the Wausau/Marathon County Parks, Recreation, and Forestry Department.

Findings:

Figure 1. Estimated number of individual ash that are expected to survive EAB over a 20 year time span for each management plan. ***Control refers to "no control" of emerald ash borer.***

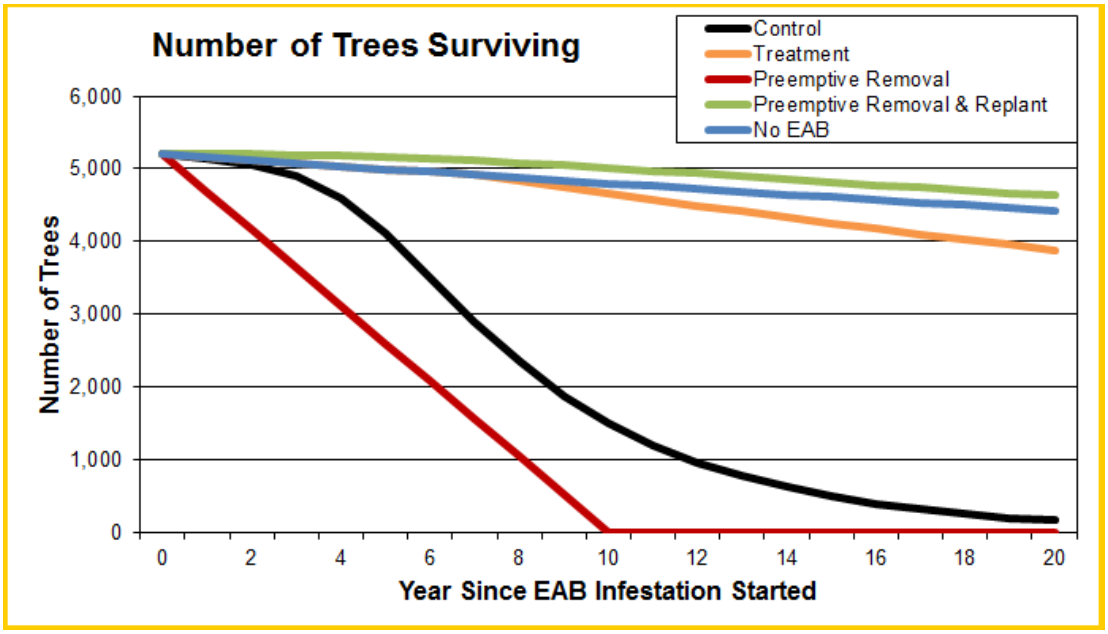


Figure 2. Estimated ratio of net value retained when comparing management options for no control, treatment, preemptive removal without replanting, preemptive removal with replanting, and no EAB over a 20 year period. A value > 1 suggests that alternative is better than the "No Control" (doing nothing).

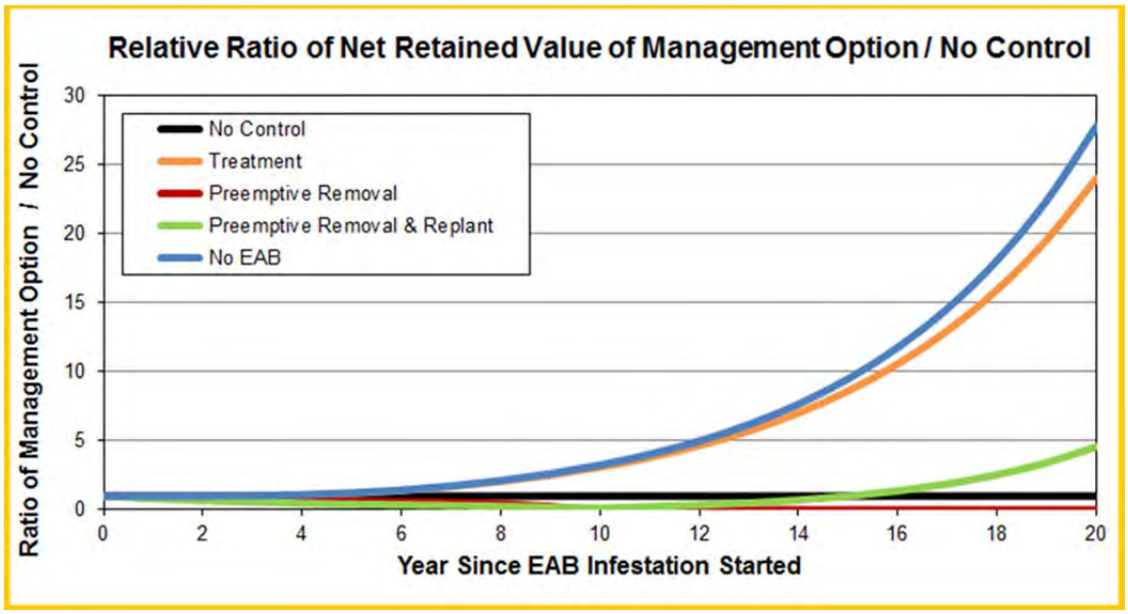


Figure 3: Estimate of value ($) retained after 20 years for each management plan considered. ***Treatment: Estimate is for 100% of ash treated every two years.***

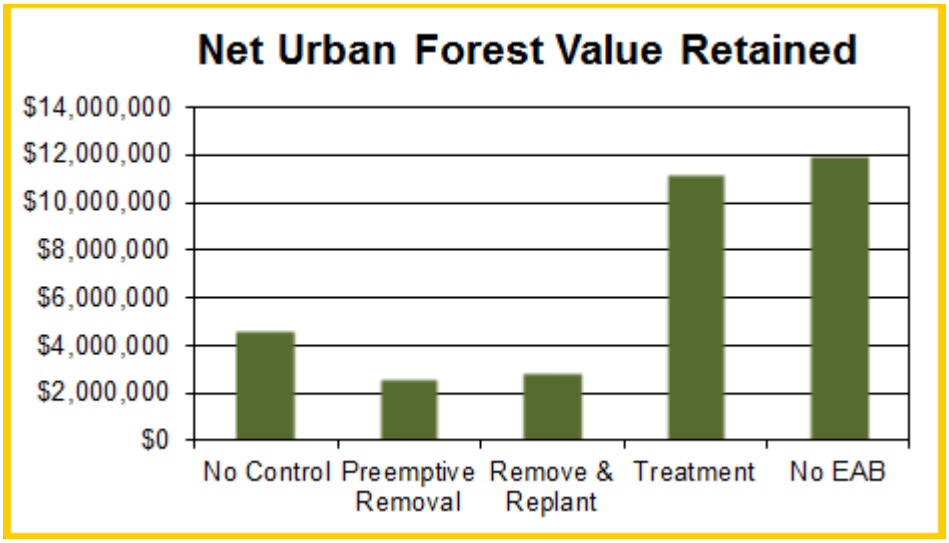
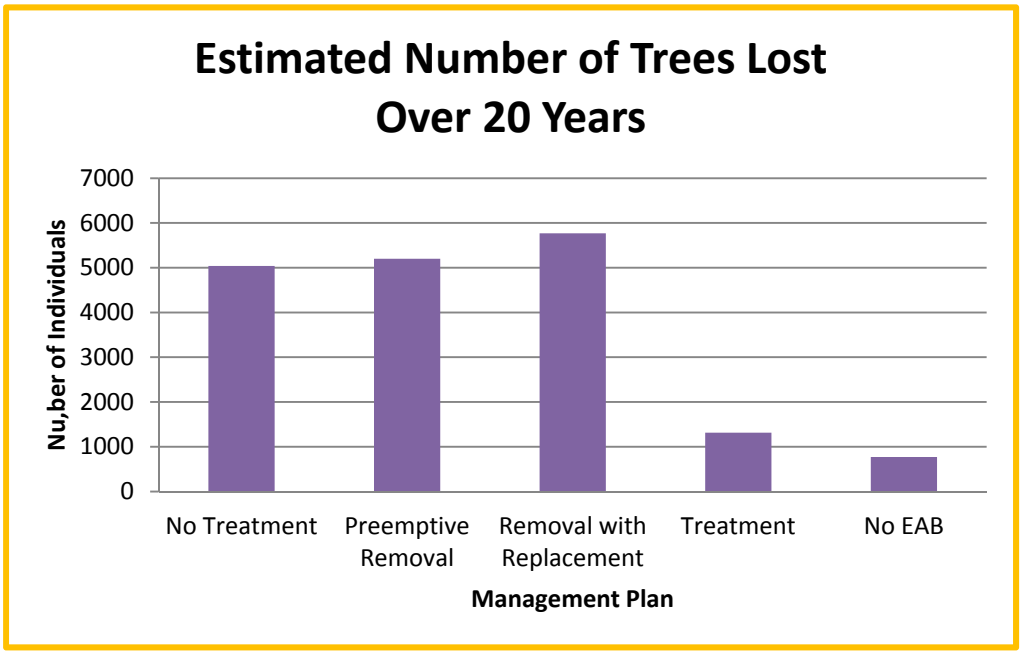


Figure 4. Number of ash and replacement trees that are estimated to be lost from EAB and other factors. ***Treatment: Estimate is for 100% of ash treated every two years.***



Year	100% Treatment	70% Treatment	50% Treatment
0	$228,290	$206,583	$219,870
1	$236,301	$212,795	$226,572
2	$244,169	$218,907	$233,153
3	$251,896	$224,908	$239,612
4	$259,483	$230,799	$245,952
5	$266,934	$236,580	$252,173
6	$274,248	$242,254	$258,276
7	$281,428	$247,821	$264,264
Total	$2,042,748	$1,820,647	$1,939,872
Average Yearly	$291,821	$260,092	$277,125

Table 2. Yearly predicted expenses for treatment options including the treatment of 100% of the ash population, treatment of 70% of the ash population with removal of 30% and treatment of 50% of the ash population with removal of 50%. Expenses take into consideration mortality rates, growth rates, removal costs and replacement costs.

Grants:

Wisconsin DNR:

- "Cities, villages, towns, counties, tribes and 501(c)(3) nonprofit organizations in or conducting their project in Wisconsin may apply for a regular urban forestry grant."
    - $1,000 to $25,000

Options for Homeowners:

- Currently there are no grants or funding options for the management of emerald ash borer on private property in the state of Wisconsin.