

Emerald Ash Borer in Fond du Lac County



Bill McNee
Forest Health Specialist, Plymouth
bill.mcnee@wisconsin.gov
(920) 893-8543



Emerald Ash Borer

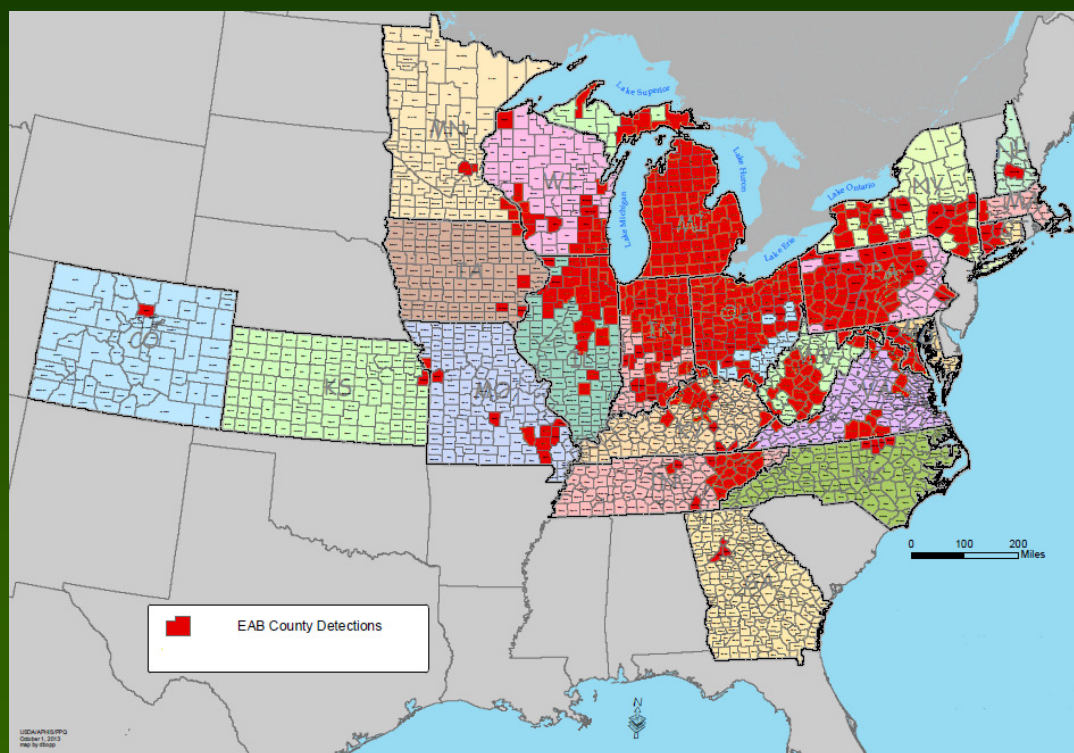
- ❖ Introduced to southeast Michigan inside wood packing materials from China, probably in the late 80s or early 90s
- ❖ Tree ring examination shows that ash trees in Michigan were dying from EAB by 1994
- ❖ Ash was declining throughout the Midwest during the 1990s due to a number of causes
- ❖ EAB was an unknown insect lurking inside the dead and dying trees
- ❖ Many of the trees were cut down and turned into firewood, contributing to long-distance spread



Approximate native range

Emerald Ash Borer

- ❖ First identified in the summer of 2002 near Detroit
- ❖ By this time, EAB had already been moved to several other states and Ontario, Canada
- ❖ First found in Wisconsin in 2008 near Newburg (Ozaukee County), but was present by 2004 based on tree ring analysis
- ❖ Wisconsin likely has many other infestations that have not yet been found – it is not easy to find early-stage EAB infestations



Has now been found in 22 states and 2 provinces

Emerald Ash Borer

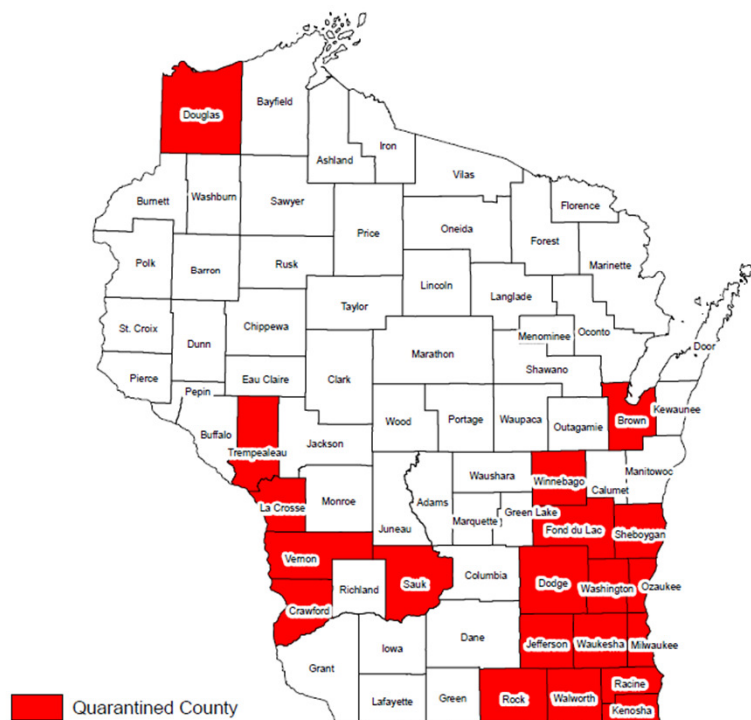
❖ In this part of Wisconsin, EAB has been found in:

- Long Lake and Mauthe Lake campgrounds
- Town of Black Wolf
- Town of Nekimi
- West Bend

❖ The pest is probably present in other communities and may already be in Fond du Lac

❖ Articles that could spread EAB (such as hardwood firewood) cannot leave a quarantine area without special permission from agriculture authorities

**Emerald Ash Borer Quarantined Counties
August 2013**



Why is EAB Such a Big Deal?

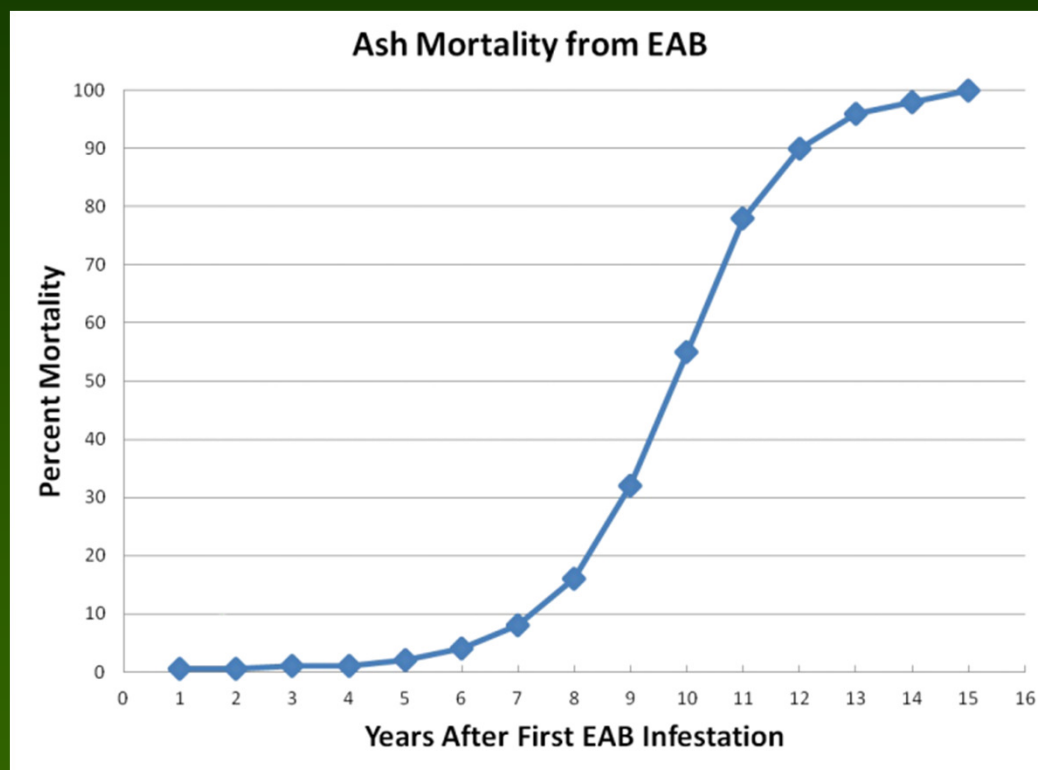
- ❖ Attacks and kills all true ash species (white, green, black, blue in WI) and their ornamental varieties
- ❖ 99.7% fatal to ash trees, according to Michigan data
- ❖ An estimated 834 million ash trees over 1" in diameter in Wisconsin
- ❖ Ash is a common urban tree (20% of street trees and 12% of all urban trees in WI)
- ❖ Spread through firewood, nursery stock, and raw logs
- ❖ Very difficult to find until it has been present for at least 2-3 years



This tree is infested!

Why is EAB Such a Big Deal?

- ❖ At first, EAB mortality in a community is low
- ❖ But then it takes off rapidly and overwhelms a community's budget and ability to remove dead/dying trees
- ❖ Dead ash trees disintegrate very quickly and are a safety hazard
- ❖ Fallen branches damage vehicles and houses, leading to lawsuits and damage claims
- ❖ Altered ecosystems
- ❖ Invasive species expand



State EAB Perspective

- ❖ In the early years, an intention to cut all ash within ½ mile of an infestation to eliminate the insect
- ❖ In other states, this plan ultimately failed everywhere it was tried because they could not find the true edge of the infestation
- ❖ By the time EAB was found here, this plan had largely been abandoned
- ❖ Current management:
 - Regulation of articles that could spread EAB
 - Education to reduce the spread of EAB
 - Surveys to try to find new EAB infestations
 - Management of EAB on state lands
 - Technical advice to landowners and local governments
 - Grant funds available to communities

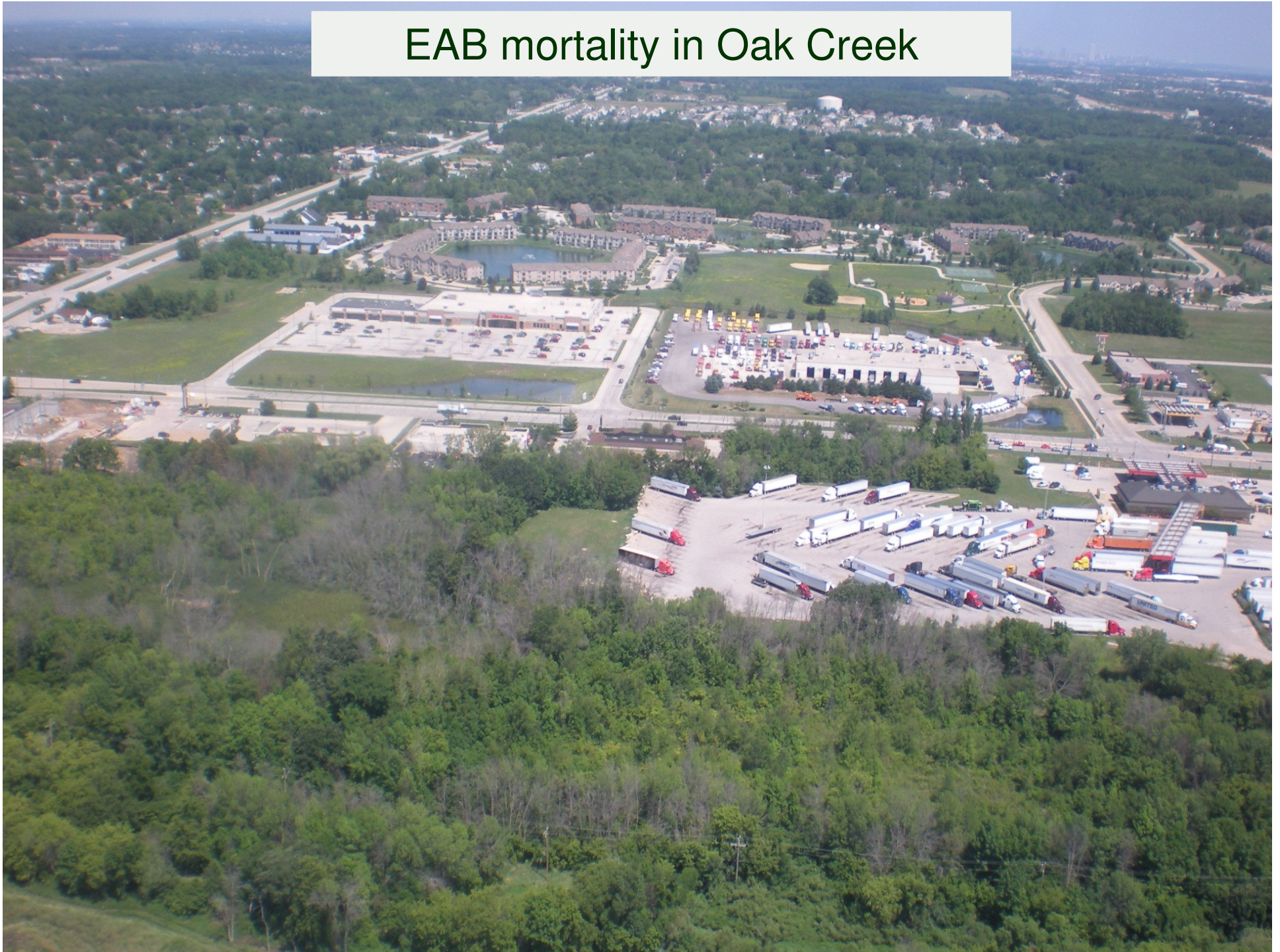


Belvedere Drive, Toledo, Ohio in 2006

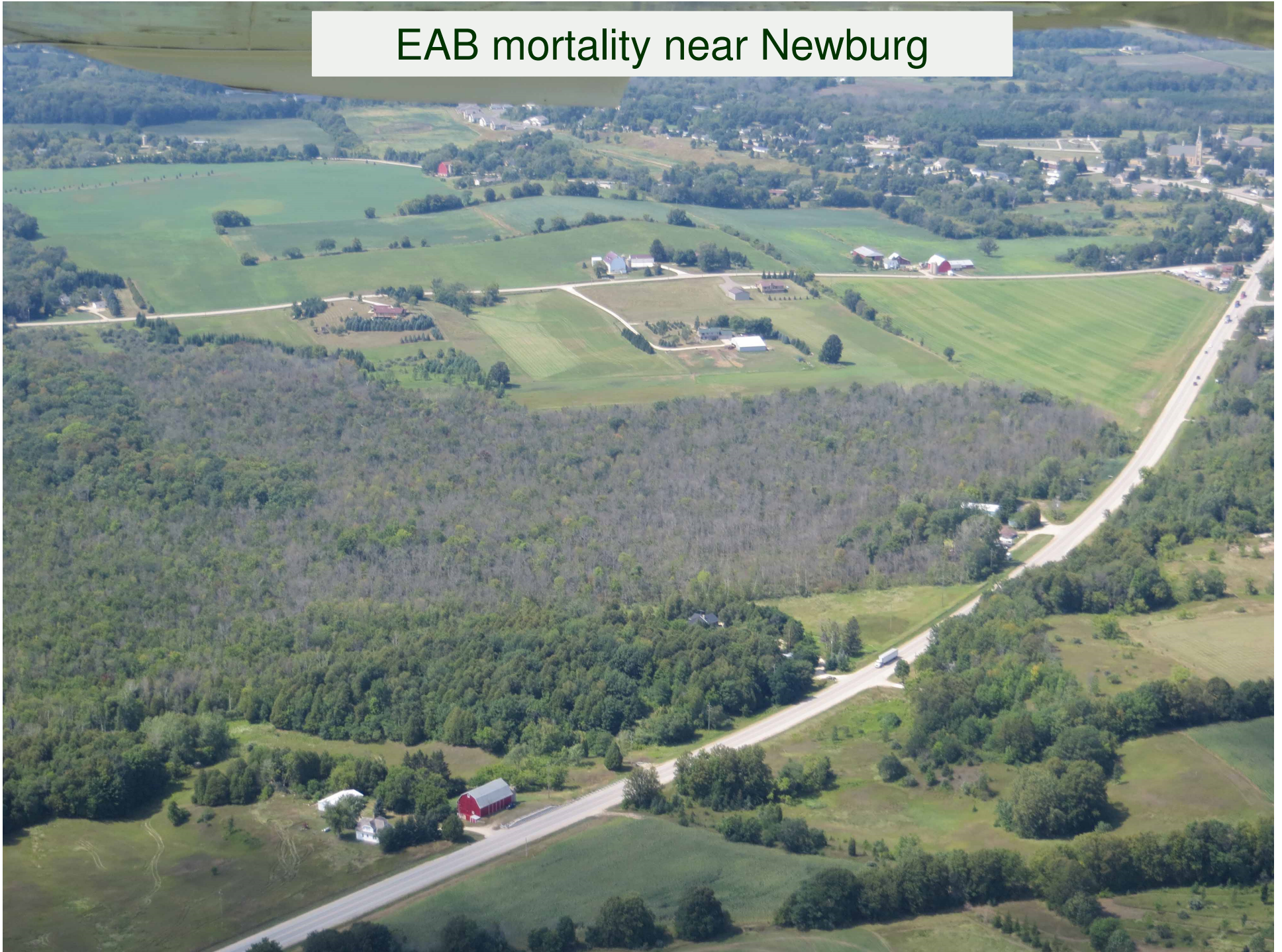


Belvedere Drive, Toledo, Ohio in 2009

EAB mortality in Oak Creek



EAB mortality near Newburg



Life Cycle



Pupate in the wood or bark



Larvae tunnel beneath the bark and take 1-2 years to develop



Adults present from June to August



Eggs



Extensive larval tunneling
cuts off the flow of water and
nutrients up and down the
tree

Galleries are S-shaped and
winding



Canopy Thinning and Dieback

- ❖ Smaller than normal leaves
- ❖ Dead branches
- ❖ Begins in the upper canopy
- ❖ Trees typically do not show any signs of infestation for 2-3 years
- ❖ Trees typically die within 4-6 years of first infestation



Epicormic Sprouts



D-Shaped Exit Holes

- ❖ Exit holes are made by emerging adults
- ❖ Adult beetles are D-shaped, thus the exit hole shape
- ❖ Approximately 1/8" wide



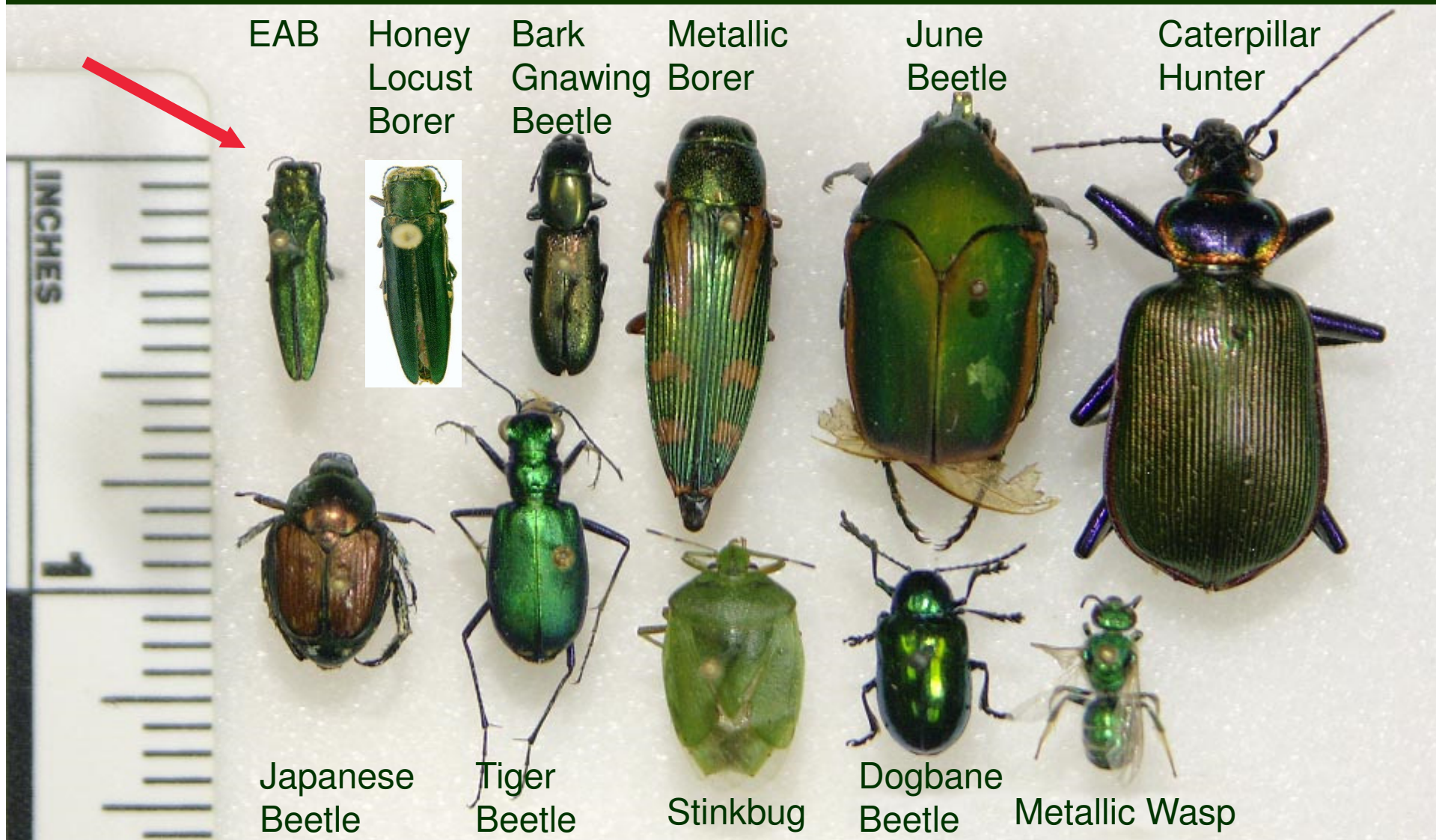
Bark Crack With Larval Gallery Beneath



Heavy Woodpecker Activity



Insects Mistaken for EAB



Other Ash Pests



Flatheaded Appletree Borer
*oval or elliptical exit holes



Ash Bark Beetle
*small round exit holes



Redheaded Ash Borer

Report Suspect Trees and Beetles

If you find ash trees with several symptoms of EAB infestation:

- ❖ Report it to your municipal forester. In Fond du Lac, the city arborist is Brian Weed, 920-322-3594.
- ❖ Call the EAB hotline, 1-800-462-2803, or email: DATCPEmeraldAshBorer@wisconsin.gov
- ❖ If you find beetles or larvae, place them in a jar and take them to the municipal, DNR or Extension office; preserve in rubbing alcohol if possible
- ❖ Sending a digital photo may help us screen out suspects
- ❖ New discoveries are often reported by a homeowner

How to Identify an Ash



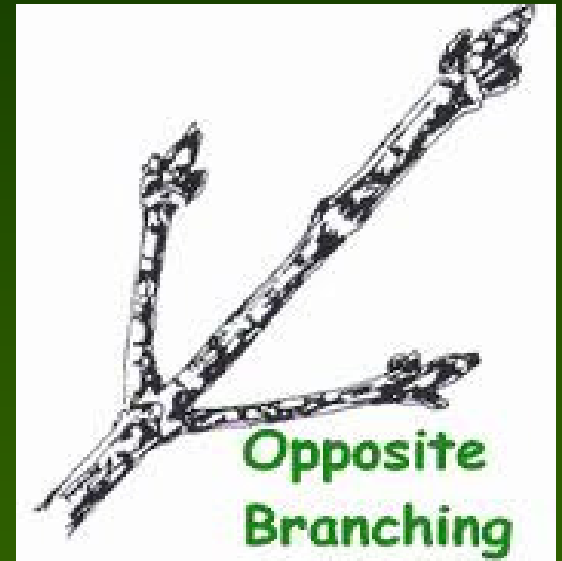
Diamonds of white ash bark,
mature tree



Bark of mature green ash,
horizontal cracks more apparent
and ridges more plate-like



Canoe paddle seeds



Ash Identification Guide

Extension Bulletin E-2942

New, May 2005

Ash Tree Identification

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.

While other woody plants, such as mountainash and pricklyash, have "ash" in their name, they are not true ash, or *Fraxinus* species. Only true ash are susceptible to attack by emerald ash borer.

To properly identify ash trees, use the following criteria:



Branch and Bud Arrangement

Branches and buds are directly across from each other and not staggered. When looking for opposite branching in trees, please consider that buds or limbs may die; hence not every single branch will have an opposite mate.



Leaves

Leaves are compound and composed of 5-11 leaflets. Leaflet margins may be smooth or toothed. The only other oppositely branched tree with compound leaves is boxelder (*Acer negundo*), which almost always has three to five leaflets. White ash (on left) and green ash (on right)



Bark

On mature trees (left), the bark is tight with a distinct pattern of diamond-shaped ridges. On young trees (right), bark is relatively smooth.



Seeds

When present on trees, seeds are dry, oar-shaped samaras. They usually occur in clusters and typically hang on the tree until late fall, early winter.

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Ash Tree Identification

Tree Species Resembling Ash

Boxelder (*Acer negundo*)

Exhibits opposite branching and compound leaves. However, has 3 to 5 leaflets (instead of 5 to 11) and the samaras are always in pairs instead of single like the ash.



Paul Wray, Iowa State University

Neil Cook, Michigan State University

European Mountainash (*Sorbus aucuparia*)

Leaves are compound with alternate (staggered) branching. Tree bears clusters of creamy white flowers in May. Fruits are fleshy, red-orange berries.



Clara Brown, Illinois

Steve Haeussler, University of Zagreb

Shagbark Hickory (*Carya ovata*)

Leaves are compound with 5 to 7 leaflets, but the plant has an alternate branching habit. Fruit are hard-shelled nuts in a green husk.



Paul Wray, Iowa State University

Paul Wray, Iowa State University



Paul Wray, Iowa State University

Paul Wray, Iowa State University

Elm (*Ulmus* species)

Branching is alternate and the leaves are simple with an unequal leaf base.



Black Walnut (*Juglans nigra*)

Leaves are compound with 9 to 15 leaflets, but the plant has an alternate branching habit. Fruit is a large dark brown nut inside a green husk.



Paul Wray, Iowa State University

Paul Wray, Iowa State University

Authors: Kimberly Rebek and Mary Wilson

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New - 5.05 - 6,250 - KMF/LB

Trees with Opposite Branching

Ash

Maple

Japanese Tree Lilac

Catalpa

Buckeyes

Dogwood

Ash Leaves



Green Ash
5-9 leaflets



White Ash
5-9 leaflets



Black Ash
7-13 leaflets

Other Trees With Similar Leaves



Box elder



Black walnut



European
mountain ash



Shagbark hickory

Homeowner Options

- ❖ Remove ash trees prior to infestation or before the trees die
 - Cheaper than removing dead trees
- ❖ Remove ash trees after they die
 - Be aware of falling branches once branches are dead
- ❖ Treat ash trees with insecticide
 - Other species do not need treatment
 - Not every ash tree should be protected
- ❖ You may need a Tree Service, particularly for large trees



Diversify Your Tree Species

- ❖ More tree killers will eventually arrive
- ❖ Diversify with alternatives to ash and maple
- ❖ Examples:

Kentucky coffeetree
Japanese tree lilac
swamp white oak
hybrid elms
ginkgo

baldcypress
Turkish filbert
chinkapin oak
crab apples

- ❖ To learn more about alternatives to ash, visit www.emeraldashborer.wi.gov

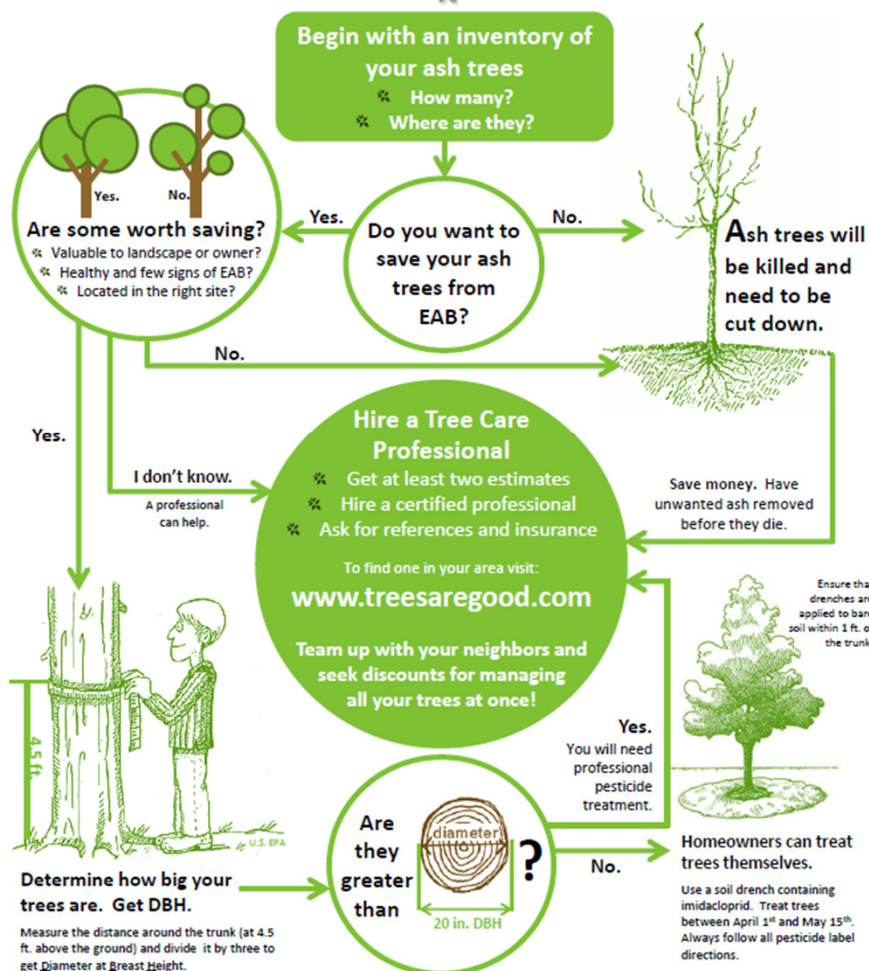


Kentucky coffeetree

EAB Decision Guides



Managing Emerald Ash Borer: Decision Guide



Managing Emerald Ash Borer: Decision Guide



Which trees can be saved?

Trees CAN be saved if they are:

- Healthy and vigorously growing, with more than half their leaves.
- Enhancing the landscape.
- Valuable to the owner.
- Showing only few outward signs of EAB infestation.



These ash trees are healthy, have all of their leaves, and provide shade and beauty to the landscape. They would be good treatment candidates.

Trees should NOT be saved if they are:

- Unhealthy, with more than half of their leaves missing.
- Planted in poor sites or are not important to the landscape.
- Showing many outward signs of EAB infestation, such as woodpecker damage, bark splits, and water sprouts at the tree base.



These ash trees are too unhealthy to be effectively treated. Contact your city forester about local ordinances before performing any tree work!

What are the treatment options?

Homeowners can protect healthy ash trees:

- With a trunk less than 20 in. diameter at Breast Height (see reverse for DBH measurement).
- With over the counter soil drench products containing 1.47% imidacloprid. These products are most effective when applied between April 1st and May 15th.

Professionals can protect ash trees:

- With a trunk greater than 20 in. DBH.
- Later in the year, using specialized equipment to apply pesticides that contain imidacloprid, dinotefuran, or emamectin benzoate.

Want more information on hiring a professional to treat your larger trees?
Visit: www.treesaregood.com

Which new trees should be planted?

The tree species you choose should match the conditions of the site. Remember that some trees can become very large. Contact your city forester, or your local garden center or nursery for advice on choosing a good replacement.

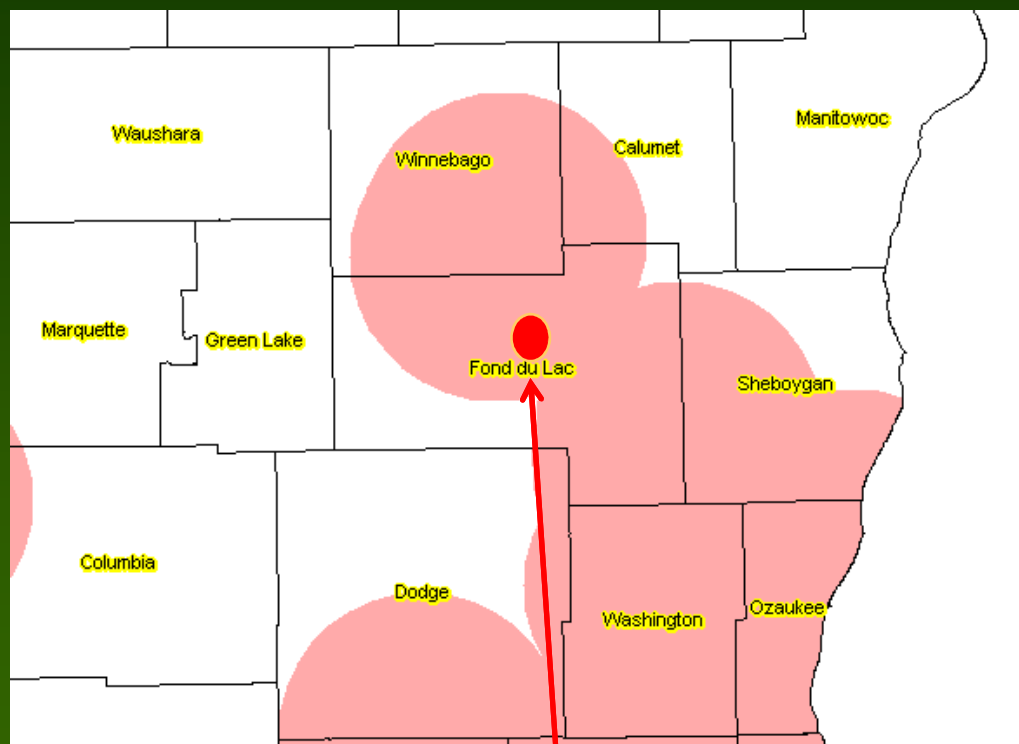
For a list of replacement trees, visit:
www.eabindiana.info



REMEMBER: Choose Diversity!
Replant with several different tree species to increase your neighborhood's resilience to future pest problems.

Consider Insecticide Treatments For High-Value Ash Trees

- ❖ The current recommendation is to consider insecticide treatments if within 15 miles of a known EAB infestation
- ❖ For protection of individual or high-value ash trees. Other species do not need treatment for EAB.
- ❖ For woodlots, consult a forester. Treatments are not cost effective for woodlots or forested areas. Management recommendations are available on the DNR website.

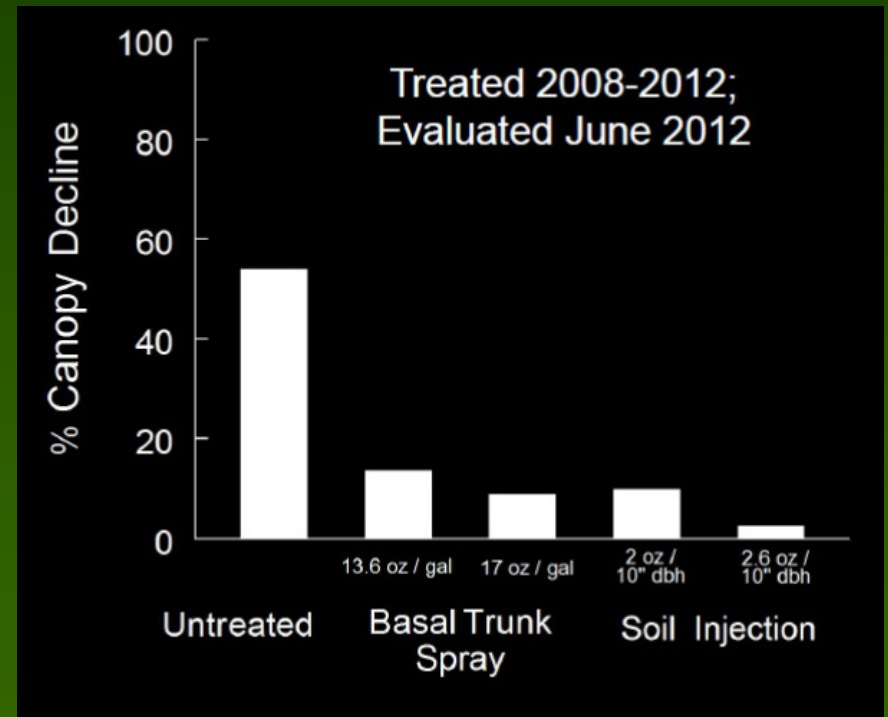


Fond du Lac

Salmon color = 15 mile zone

Insecticide Treatments

- ❖ Different products are appropriate for different situations (homeowner values, EAB levels, tree health, efficacy, cost, soil type, soil moisture, etc.)
- ❖ Insecticide success not assured
 - Most successful on small, healthy trees, low EAB population
 - Most insecticides need soil moisture for water movement up the tree
- ❖ Treatments required every 1-2 years, maybe less frequently at some point in the future
- ❖ Start early to be most effective
 - April for larger trees [$> 6''$ DBH]
 - May for smaller trees [$< 6''$ DBH]



Sample data

(Note: DNR does not endorse any specific insecticides or businesses)

Insecticides for Homeowners

XHT1181



Provided to you by:

Homeowner Guide to Emerald Ash Borer Insecticide Treatments

R. Chris Williamson and PJ Liesch, UW Entomology

Emerald ash borer insecticide treatment considerations. Several insecticide products are available to homeowners for control of emerald ash borer (EAB). However, not all ash trees are worth treating with insecticides. Tree location, value, and health, as well as the cost of treatment are all factors to consider. Based on current research, 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 yearly insecticide treatments, one should consider the value of a particular ash tree in relation to insecticide treatment costs before making any treatments. In addition, consider the health of each tree before treating. Research suggests that insecticide treatments are significantly more effective on EAB-infested ash trees with less than 50% canopy dieback. Insecticide treatments are **not** suggested for trees with greater than 50% canopy dieback. Trees with greater than 50% canopy dieback should be removed and destroyed in accordance with established guidelines.

Emerald ash borer insecticide treatment options. Insecticide products available for use by homeowners are summarized in Table 1. They include:

- ACECAP 97 Systemic Insecticide Tree Implants (acephate)
- Bayer Advanced Tree and Shrub Insect Control (imidacloprid)
- Bayer Advanced Tree and Shrub Protect & Feed (imidacloprid)
- Bayer Advanced Tree and Shrub Protect & Feed II (imidacloprid + clothianidin)
- Bonide Annual Tree and Shrub Insect Control (imidacloprid)
- Ferti-lome Tree and Shrub Systemic Drench (imidacloprid)
- Optrol (imidacloprid)
- Ortho Tree and Shrub Insect Control (dinotefuran)

The Bayer Advanced Products, Bonide Annual Tree and Shrub Insect Control, Ferti-lome Tree and Shrub Systemic Drench, and Optrol are systemic insecticides applied as soil drenches around the base of an ash tree in mid-April to late-May and/or early-September to mid-October. Two of the Bayer Advanced Products (Tree and Shrub Protect and Feed, Tree and Shrub Protect and Feed II) and Ortho Tree and Shrub Insect Control are available in granular formulations. Be aware that many insecticide products available at hardware stores and garden centers look alike. Carefully check all product labels before purchase to make sure that you've selected the correct product/active ingredient. ALWAYS read and follow the respective pesticide label directions! University research indicates that soil applications of imidacloprid provide excellent EAB protection for small ash trees less than about 18 inches in circumference in the first year following treatment. Current research findings also suggest that EAB-infested ash trees greater than about 50 inches in circumference (16 inch DBH) should be treated in the fall and again the following spring. Additionally, larger trees may require two years of treatment before they are effectively protected. Thus, treatment of large tree should begin before the tree becomes infested. Lastly, insecticide treatments must be repeated each year.

Although ACECAP 97 Systemic Insecticide Tree Implants are available to homeowners, they are not suggested for use by homeowners because they require physically drilling into a tree during their application.



Table 1
Emerald ash borer insecticide treatments available to homeowners

Product	Active Ingredient	Timing	Type of application
Bayer Advanced Tree & Shrub Insect Control (D)	Imidacloprid	Mid-April to mid-May and/or early-Sept. to mid-Oct.	Soil Drench (D) or Granular (G)
Bayer Advanced Tree & Shrub Protect & Feed (D or G)			
Bonide Annual Tree & Shrub Insect Control (D)			
Ferti-lome Tree & Shrub Systemic Drench (D)			
Optrol (D)	Imidacloprid + Clothianidin	Mid-April to mid-May and/or early-Sept. to mid-Oct.	Soil Drench (D) or Granular (G)
Bayer Advanced Garden Tree & Shrub Protect & Feed II (D or G)			
Ortho Tree & Shrub Insect Control	Dinotefuran	Mid-May to mid-June	Granular
ACECAP 97 Systemic Insecticide Tree Implants	Acaphate	Mid-May to mid-June	Trunk Implant

Other emerald ash borer treatment options. Homeowners may also contact a certified arborist or certified pesticide applicator to treat their trees. See <http://www.waa-isa.org> for a list of certified arborists in Wisconsin. Professionals have access to some products that are not available to homeowners.

The University of Wisconsin does not endorse commercially available insecticide products over those available directly to homeowners. Products discussed in this fact sheet have been evaluated in a variety of Michigan State University research tests on EAB.

For more information on controlling emerald ash borer: See <http://www.entomology.wisc.edu/emeraldashborer>, <http://www.emeraldashborer.wi.gov>, or <http://www.emeraldashborer.info> or contact your county Extension agent. For a video demonstration of treating your ash trees using a systemic drench, see <http://www.entomology.wisc.edu/new-video-protecting-your-tree-emerald-ash-borer>.

© 2009-2013 by the Board of Regents of the University of Wisconsin System doing business as the Division of Cooperative Extension of the University of Wisconsin-Extension. An EAB-infested ash tree. University of Wisconsin-Extension provides equal opportunities in employment and programming, including Title IX and ADA requirements. This document can be provided in an alternative format by calling Brian Hildebrand at (608) 262-2862 (T11 for Wisconsin Relay).
References to pesticide products in this publication are for your convenience and are not an endorsement or criticism of one product over similar products. You are responsible for using pesticides according to the manufacturer's current label directions. Follow directions exactly to protect the environment and people from pesticide exposure. Failure to do so violates the law.
Thanks to Kristen Kozowski, PhD, Philbert and Robert Tomasz for reviewing this document.
A complete inventory of University of Wisconsin Garden Facts is available at the University of Wisconsin-Extension Horticulture website: <http://hort.uwex.edu>.

Revised
May 12, 2013

University of Wisconsin Pest Alert

University of Wisconsin Pest Alert

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<i>Bayer Advanced Garden Tree & Shrub Protect & Feed II (D or G)</i>	<i>Imidacloprid + Clothianidin</i>	<i>Mid-April to mid-May and/or early-Sept. to mid-Oct</i>	<i>Soil Drench (D) or Granular (G)</i>
<i>Ortho Tree & Shrub Insect Control</i>	<i>Dinotefuran</i>	<i>Mid-May to mid-June</i>	<i>Granular</i>
<i>ACECAP 97 Systemic Insecticide Tree Implants</i>	<i>Acephate</i>	<i>Mid-May to mid-June</i>	<i>Trunk Implant</i>

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Tree Service Insecticide Options

- ❖ They have pesticides that are not available to homeowners (restricted use pesticides)
- ❖ Check qualifications and pesticide licenses of businesses you might hire
- ❖ Many 'Certified Arborists' do treatments – visit the Wisconsin Arborist Association website, www.waa-isa.org. Other businesses may be found online or in the phone book under 'Tree Service.'
- ❖ Application methods and sample products:
 - Bark and Canopy Sprays: Sevin, Safari
 - Soil Injections or Drenches: Xytect, Merit, Bayer Advanced Tree and Shrub Insect Control
 - Trunk Injections: Tree-age, Pointer, ACECAPS, TreeAzin



Treatment Success



Untreated and treated trees, Novi, Michigan, 2010

To Treat or Not to Treat?

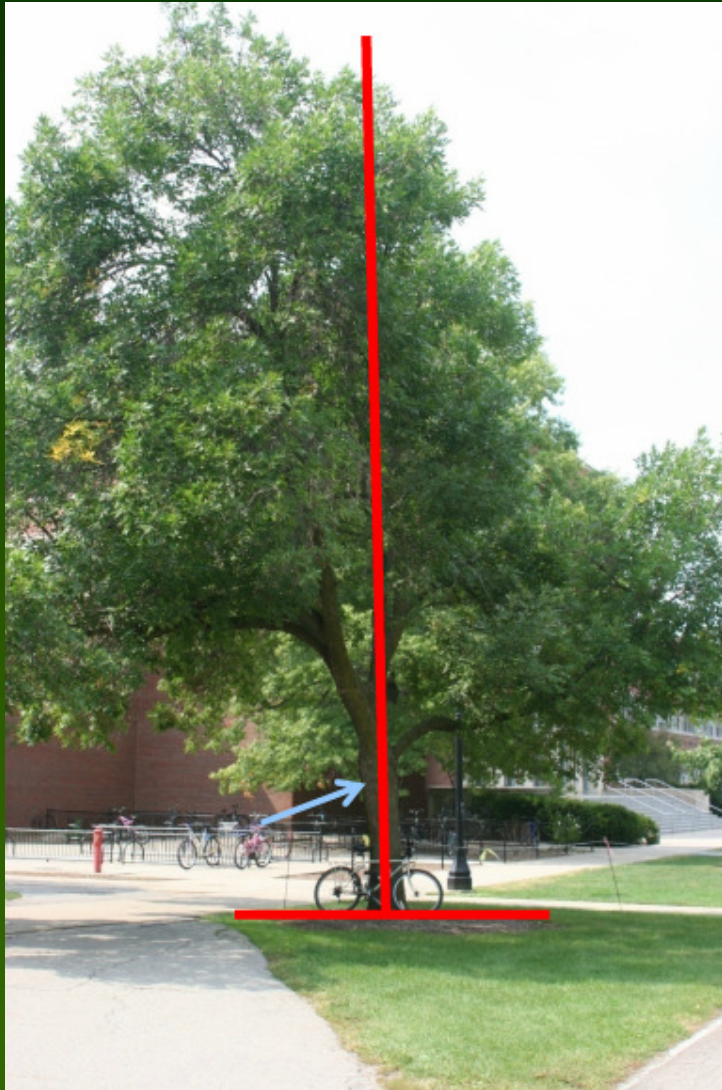


Worth treating



Remove and Replace

Other Trees Not Worth Saving



Unbalanced, will split



Existing maintenance problem

The best way to deal with EAB



visit www.emeraldashborer.wi.gov



Any questions?