



City of Algoma, Wisconsin Emerald Ash Borer Readiness Plan



CITY OF ALGOMA EMERALD ASH BORER READINESS PLAN

ADOPTED: NOVEMBER 1, 2010

Prepared by:

City of Algoma Tree Management Board



With Assistance from:

Bay-Lake Regional Planning Commission

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ACKNOWLEDGMENT

This plan was funded through an Urban Forestry Grant from the Wisconsin Department of Natural Resources (WDNR), and plan facilitation and development was provided by the Bay-Lake Regional Planning Commission under the direction of the members of the City of Algoma Tree Management Board.

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RESOLUTION NO. 637

ADOPTION OF THE CITY OF ALGOMA EAB READINESS PLAN

WHEREAS, the intent of an Emerald Ash Borer (EAB) readiness plan is to help city officials, staff, and the public to be better prepared to address the arrival of the emerald ash borer to Algoma, and

WHEREAS, EAB infestation is both an environmental and economic threat to City of Algoma; and

WHEREAS, City of Algoma is being proactive in the planning and mitigation of the potential disruption to its city trees caused by the pending infestation of EAB; and

WHEREAS, taking a proactive approach to this infestation will enable the City to address tree management needs in an efficient and effective manner; and

WHEREAS, the City of Algoma Tree Management Board has reviewed the *City of Algoma Emerald Ash Borer Readiness Plan* and concurs with the plan content.

NOW, THEREFORE BE IT RESOLVED that the City of Algoma Council hereby adopts the *City of Algoma Emerald Ash Borer Readiness Plan*.

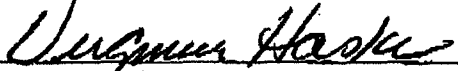
Dated this 1st day of November, 2010.

Resolution introduced and adoption moved by Barlow.

Motion for adoption seconded by IWEP.

Voting Aye: 7 Nay: 0

APPROVED:


Mayor, City of Algoma

ATTEST:



Clerk, City of Algoma

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EXECUTIVE SUMMARY

Emerald ash borer (EAB) is a highly destructive non-native insect that was detected in southeastern Michigan during the summer of 2002. Despite eradication and containment efforts by federal, state, and local government entities, EAB continues to broaden its range in North America both naturally and unknowingly by the movement of infested firewood and nursery stock. As of June 2010, EAB has been found in Wisconsin, Michigan, Minnesota, Ohio, Indiana, Illinois, Maryland, Pennsylvania, Virginia, West Virginia, New York, Iowa, Kentucky, Missouri, and Canada. Since its discovery, EAB has:

- Killed tens of millions of ash trees in southeastern Michigan alone, with tens of millions more lost in Illinois, Indiana, Kentucky, Minnesota, Missouri, New York, Ohio, Ontario, Pennsylvania, Quebec, Virginia, West Virginia, and Wisconsin.
- Caused regulatory agencies and the USDA to enforce quarantines and fines to prevent potentially infested ash trees, logs, or hardwood firewood from moving out of areas where EAB occurs.
- Cost municipalities, property owners, nursery operators, and forest products industries tens of millions of dollars.

(From www.emeraldashborer.info)

Emerald ash borer was found for the first time in Wisconsin in August, 2008 near the community of Newburg, along the northern Ozaukee and Washington County line. In April, 2009, EAB was found in western Wisconsin, in Vernon County, alongside the Mississippi River. In July 2009, adult beetles were caught on survey traps located in Crawford and Brown counties. In August 2009, the Milwaukee County community of Franklin became the site of the latest confirmed presence of EAB when city officials alerted program staff to declining ash trees.

EAB has been identified in the following Wisconsin counties: Vernon, Crawford, Kenosha, Washington, Milwaukee, Ozaukee, and Brown.

As of the date of this plan, EAB has not been identified in the City of Algoma, or any municipality in Kewaunee County. Unfortunately, its arrival is probable and it will impact ash trees and public service capacity in Algoma.

The Algoma Tree Management Board had this plan developed to detail the City's authority to act, identify assets at risk, examine available resources, and make key recommendations that will allow the City to manage EAB proactively and strategically. Although an impending EAB infestation will cause tree loss and burden the City's ability to deliver exceptional public services, Algoma can greatly reduce the risk and the negative impacts associated with EAB by following the guidelines and implementing action items endorsed in this plan.

ASH RESOURCES AT RISK

- The City of Algoma in Kewaunee County, Wisconsin has a recent tree inventory and they have found there to be 46 ash trees (or 3 percent) public ash trees at risk in the city (as of their 2010 tree inventory update).
- The quantity of ash at risk on private lands is unknown.

CITY RESOURCES

- Algoma has a crew of five people in the Public Works Department available to undertake EAB management. This crew is adequate to handle EAB related tree work if distributed over

a multi-year plan. However, crews will need to be trained in EAB detection and management, and additional administrative support may be needed to respond to EAB public inquiries, hazard inspections, training, scheduling, contracting, and media relations that are inherent with EAB management.

- Equipment needed to perform EAB related tree work is adequate; however, there is no city-owned equipment able to chip infested ash to the recommended 1 inch by 1 inch size. Such services would need to be contracted with private businesses.
- Algoma has identified two debris handling locations, which is sufficient for public trees. However, in order to accept a large amount of private ash trees, chipping would need to be done to consolidate debris or an additional site would be needed.
- Additionally, Kewaunee County has completed a countywide EAB readiness plan (2010) and county staff would assist Algoma in the event of confirmed EAB within the City.

PLAN RECOMMENDATIONS

- Provide staff training and public education on EAB identification and proper ash removal and utilization.
- Engage the public to inform them of their options and rights with regard to EAB.
- Maintain a current and complete tree inventory for public trees.
- Continue working to replace ash and diversify the public tree inventory.
- Explore opportunities for additional ash utilization.
- Work with Kewaunee County to increase the number of debris handling sites available to Algoma residents.
- Review and update the *City of Algoma EAB Readiness Plan* after EAB detection in the county or city, every 5 years, or as needed.

This EAB Readiness Plan will further detail recommendations and resource needs to ensure that Algoma can continue to maximize and maintain the long-term economic, environmental, social, and aesthetic benefits of public trees.

INTRODUCTION

In August of 2008, the EAB was confirmed in Wisconsin for the first time when an established infestation was found in Ozaukee and Washington Counties in the southeastern part of the state. The beetle continues its spread. On April 6, 2009, EAB was confirmed in Vernon County, located on the western edge of the state along the Mississippi River. While control and containment efforts may slow the spread of this invasive beetle, it now seems highly likely that Algoma residents and local officials will be dealing with the impacts of the EAB in the near future. Every native ash tree is susceptible to EAB infestation and mortality.

The economic impacts of EAB are certain to be significant for Algoma and private property owners in the City. In response, the Algoma Tree Management Board has developed a plan to guide the City's approach to EAB management. While this plan can provide direction to Algoma residents and local officials, it is not a mandate. It serves as guidance to assist with planning and decision-making.

The plan provides a concise overview of the history of the EAB in North America, including background on Wisconsin's EAB management efforts, and the lessons learned from other states that have experience with the EAB. Because public education and local monitoring are critical elements of proactive management, information on ash tree identification, the signs and symptoms of EAB, and EAB identification are included. The plan outlines Algoma's available resources to address EAB, the actions that can be taken to prepare for the arrival of EAB, guidance on steps to take once a confirmed EAB detection occurs, and it summarizes EAB control and containment options. The plan further outlines objectives, recommendations, and implementation strategies for addressing the EAB. Appendices to the plan provide contact information on contractors that can assist with ash removal, information on Algoma-approved street trees, and a glossary of common terms.

GOALS

The purpose of this plan is to offer Algoma officials and residents the tools needed to meet the challenges posed by the EAB in a constructive and economical manner. It is intended to be a relevant resource for local officials and residents in Algoma. The *City of Algoma Emerald Ash Borer Readiness Plan* was developed with the following guiding goals in mind. The plan will:

- Goal #1: Minimize the negative impacts of EAB within the City of Algoma.**
- Goal #2: Mitigate the potential economic and social costs associated with EAB control efforts and damage.**
- Goal #3: Maximize the use local resources when removing and utilizing public and private ash.**
- Goal #4: Find positive and profitable ways to utilize ash.**
- Goal #5: When feasible, work with the private landowners of affected woodlands in the utilization of EAB infected timber.**

GENERAL EAB INFORMATION

ABOUT EAB ¹

(Information from the Wisconsin Department of Natural Resources)

The emerald ash borer (*Agrilus planipennis*) is an exotic pest, native to Asia, currently threatening the ash (*Fraxinus* spp.) tree resource in the Great Lakes region. The emerald ash borer belongs to a group of insects known as metallic wood-boring beetles (*Buprestidae*). Since its discovery in southeastern Michigan in 2002 it has continued to spread in Michigan and throughout the Midwest. Infestations also exist in Illinois, Ohio, Indiana, Maryland, Pennsylvania, West Virginia, and Ontario, Canada. For a current map of infested areas, go to <http://www.emeraldashborer.info>. Transmission of this pest is accelerated by the transportation of larvae in logs, firewood and nursery stock. The subcortical (beneath the bark) feeding habits of emerald ash borer larvae cause extensive damage to an ash tree's vascular system, depriving the crown of water and nutrients. The emerald ash borer appears to attack both stressed and healthy trees, typically killing its host in 1-3 years. In Michigan, this insect has caused wide-ranging mortality, including white, green, and black ash species. Likewise, Wisconsin's ash resource is threatened by emerald ash borer infestation. Forest inventory and analysis data shows that Wisconsin has approximately 727 million ash trees in its forests.

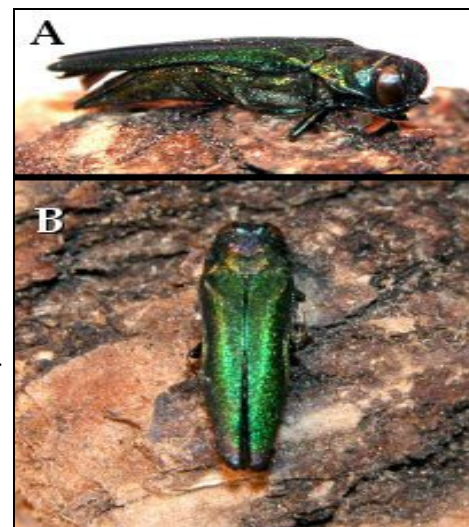


Emerald ash borer

© photo by Renee Pinski, WI DNR

Identification and Biology

The emerald ash borer adults are metallic green in color and belong to a group of insects known as the metallic wood-boring beetles (*Buprestidae*). Adults are 3/8 - 1/2 inch long and 1/16 inch wide. Adult emerald ash borer emerge through the bark of ash trees in the early summer, creating a D-shaped exit hole as they chew their way out of the tree. Based on observations of emerald ash borer populations in Michigan, adult emergence is staggered, beginning in early June and continuing through late July. Emerald ash borer adults live approximately three weeks and have been observed well into August. Adults are most active during the day, favoring warm, sunny weather. Adults are often found feeding on the margin of ash tree foliage. Mating occurs soon after adult emergence, with egg-laying occurring a few days later. Eggs are laid singularly in bark crevices, with females laying 60-90 eggs throughout their lifetime. As eggs hatch, first instar larvae chew into the bark until they reach the cambial region. Emerald ash borer larvae are white in color, slightly flattened and have a conspicuous pair of brown pincher-like appendages (urogomphi) on the last abdominal segment. The size of larvae varies as they pass through each instar, with mature larvae averaging 1¼ inches in length. As larvae feed they wind back and forth, creating characteristic serpentine shaped galleries in the phloem and outer sapwood. As mature larvae complete feeding in the fall they excavate a pre-pupal



Emerald ash borer adult.

A) Side View and B) top view.

© photos by Renee Pinski, WI DNR

chamber in the outer sapwood where they stay to over-winter. Pupation occurs in this same chamber the following spring, thus completing the life cycle.

Emerald Ash Borer Life Cycle

- May to August: Eggs hatch into larvae and tunnel into ash trees
- August to October: Larvae feed under tree bark, creating S-shaped galleries
- October to May: Larvae over winter under tree bark
- May to June: Adults emerge leaving D-shaped exit holes; some adults have been seen into August; adults live about three weeks
- Mid-May to Mid-August: adults mate then lay eggs in ash bark

Host Trees

The emerald ash borer appears to feed exclusively on ash tree species in North America. Thus, the four native species of ash in Wisconsin, white (*Fraxinus americana*), green (*Fraxinus pennsylvanica*), black (*Fraxinus nigra*) and blue (*Fraxinus quadrangulata*) are all susceptible to this pest. Mountain ash (*Sorbus americana*) is not a true ash, and so is not susceptible to EAB. Ash trees are quite abundant in Wisconsin, with estimates as high as 727 million trees total, and are commonly found in both urban and forest settings. Ash is a component of three forest types in Wisconsin including 1) Elm / Ash / Cottonwood, 2) Northern Hardwood and 3) Oak / Hickory. An ash tree is most easily identified by its opposite branching pattern (two branches come off the main stem, one on each side and opposite each other) and compound leaves with 5-11 leaflets. Leaflets are moderately toothed and may be stalked or sessile.



Emerald ash borer larva.

© photo by Linda Williams, WI DNR



Compound Leaf with 7 toothed leaflets.

© photo by Renee Pinski, WI DNR



Opposite branching pattern of ash trees.

© photo by Renee Pinski, WI DNR

Symptoms and Signs

The symptoms associated with emerald ash borer infestations are almost identical to those of other common ash pests and diseases. Therefore, it is important to look for a combination of at least two or more symptoms or signs when trying to determine the presence of EAB in your ash tree. The following symptoms and signs are commonly associated with emerald ash borer infestations.

Symptoms



© photo by Jane Cummings Carlson, WI DNR

Crown dieback:

Dieback of the upper and outer crown. Trees begin to show dead branches throughout the canopy, beginning at the top. Foliage in the top of the tree is thin and discolored.



© photo by Renee Pinski, WI DNR

Sprouting:

Sprouting at the base and/or on the bole of the tree. Trees may sucker excessively both at the base of the tree and on the trunk, often just above where the larvae are feeding.



© photo by Linda Williams, WI DNR

Bark splits:

Vertical splits in the bark are caused due to callus tissue that develops around larval galleries. Larval galleries can often be seen beneath splits.



© photo by Renee Pinski, WI DNR

Woodpecker feeding²:

Woodpeckers feed on larvae located under the bark. Feeding is typically evident higher in the tree where EAB prefers to attack first. Large numbers of larvae under the bark can lead to woodpecker damage that looks like strips of bark have been pulled off of the tree.

Signs



© photo by Renee Pinski, WI DNR

D-shaped emergence holes:

As adults emerge from under the bark they create an emergence hole approximately 1/8 inch in diameter.



© photos by Linda Williams, WI DNR

S-shaped larval galleries:

As larvae feed under the bark they wind back and forth, thus creating galleries that are packed with frass and follow a serpentine pattern.



© photos by Linda Williams, WI DNR

Larvae:

Larvae are cream-colored, dorso-ventrally flattened and have pincher-like appendages (urogomphi) at the end of their abdomen. Mature larvae reach 1 1/4 inches in length and all larvae are found feeding beneath the bark.



© photo by Renee Pinski, WI DNR

Adults:

Adult beetles are metallic green in color and are 3/8 - 1/2 inch in length and 1/16 inch in width.

Other Pests and Diseases

There are a number of pests and diseases that cause symptoms similar to those induced by the emerald ash borer. It is important to note that when determining whether the emerald ash borer is present you will typically find a combination of at least two of the symptoms or signs previously described.

Insect Pests

Other wood-boring and phloem-feeding pests of ash include moth, beetle, and fly larvae. A distinguishing characteristic between these pests and the emerald ash borer is that the exit holes of the former are circular while those of the emerald ash borer are D-shaped. The following pests are the most commonly found developing in ash trees:

Clear winged moths (*Lepidoptera: Sesiidae*)

- Banded Ash Clearwing (*Podosesia aureocincta*)
- Ash borer (trunk borer) (*Podosesia syringae*)

Bark beetle (*Coleoptera: Curculionidae*)

- Eastern ash bark beetle (*Hylesinus aculeatus*)
- Northern Ash Bark Beetle (*Hylesinus criddlei*)
- White-Banded Ash Bark Beetle (*Hylesinus fasciatus*)

Long-horned beetles (*Coleoptera: Cerambycidae*)

- Redheaded ash borer (*Neoclytus acuminatus*)
- Banded Ash Borer (*Neoclytus caprea*)



Circular exit hole damage produced by ash bark beetles.

© photo by Renee Pinski, WI DNR

Diptera: Agromyzidae

- Ash cambium miner (*Phytobia* spp.)

Disease, Decline, and Environmental Stressors

Fungi, phytoplasmas, and environmental stressors can also be found negatively impacting ash tree vigor in Wisconsin. These biotic and abiotic agents typically induce gradual decline and branch dieback, symptoms similar to those caused by the emerald ash borer. Thus, it is important to look for additional symptoms caused by the emerald ash borer such as D-shaped exit holes and S-shaped larval galleries on and under the bark, respectively. The following biotic and abiotic stressors are typical of ash in Wisconsin:

- Verticillium wilt (*Verticillium dahliae*, *V. albo-atrum*)
- Ash yellows (*phytoplasmas*)
- Ash decline (environmental agents)
- Drought (environmental)



Brooming symptom of ash yellows on ash. Note the lack of apical dominance in the brooms that is typical of ash yellows.

© photo by Mark Guthmiller, WI DNR

EAB DETECTION ¹

Detection of low level EAB populations is very difficult. Newly infested trees may appear healthy and have no visible symptoms of attack. In smaller trees (less than 3- 4 inches in diameter), a few exit holes may be visible on the trunk. In larger trees the insect is more apt to be located in the canopy for at least the first few years as insect populations build. By contrast trees in areas containing high density EAB populations, where the insect has been present for several years, are likely to exhibit decline and mortality and visible signs of infestation such as thin crowns, vertical bark splits, D-shaped exit holes, dead and dying branches, woodpecker damage, and epicormic sprouts.

Emerald ash borer visual survey and detection efforts in Wisconsin have been carried out cooperatively since 2004 by Wisconsin DATCP, WDNR, USDA APHIS, USDA Forest Service Research and the University of Wisconsin, and UW Extension. With an estimated 770 million forest ash trees at risk in Wisconsin, the state is committed to early detection and thoughtful management of this pest.

To date, Wisconsin's survey efforts have included visual, detection tree, and purple panel trap surveys. Surveys have been conducted in high risk areas across the state, including state, federal, municipal, and private lands.

Survey

The following three EAB detection methods are commonly used to detect EAB.

- Detection trees (girdling a tree to attract EAB, after one growing season cut and peel)

EAB adults are attracted to ash trees that are girdled to serve as detection trees (often referred to as trap trees). Detection trees work because EAB adults are attracted to trees that are stressed by the girdling process.



A detection tree is an ash tree (preferably declining in health) that the surveyor girdles, or wounds, causing the tree to release beetle-attracting chemicals. The tree is typically girdled at waist height and an 18-inch sticky band is placed above the wound. The sticky band, which is used to catch adult beetles, is checked biweekly June through August. Girdled trees are left to stand for one or two growing seasons before they are felled in fall or winter and their bark is removed (see destructive sampling below for more information). Tree peeling is an essential part of the survey because research has shown that detection trees may be infested with emerald ash borer even if no adult beetles are collected on the sticky band ².

- Destructive sampling (through visual survey data, choose, cut and peel the tree)

Ash trees that are under stress as indicated by signs and symptoms like branch dieback, stunted growth, and epicormic branching, may also be attractive to EAB. These are candidate trees to simply cut down and the bark is carefully peeled to look for EAB life stages and larval galleries, this method is referred to as destructive sampling.

Bark removal allows surveyors to detect emerald ash borer larvae and their S-shaped galleries. The larvae are found in the phloem region, sandwiched between the inner bark and outer sapwood.

- Visual surveys (documenting ash trees that show symptoms of decline and dieback)

Visual detection surveys for emerald ash borer are conducted from the ground. Surveyors determine if trees are infested by visually scanning them for emerald ash borer-like symptoms and signs.

EAB surveys are best focused in the areas where EAB introduction is most likely to occur. These areas include:

- 1) nurseries that sell or broker ash trees;
- 2) high-use recreational sites (firewood introductions);
- 3) hardwood sawmills that use ash;
- 4) commercial firewood dealers;
- 5) new housing and commercial developments where ash may have been recently planted;
- 6) Since ash is a common street tree, a cross section of municipalities should be surveyed as well areas with declining, stressed, and/or dead ash trees.



- Purple Panel Trap

Detection traps are used to identify if EAB has invaded an area. The traps are purple to attract the beetle, almost three feet tall and one foot wide, and covered with a sticky substance. The adult beetle will stick to the trap if it lands on it. Traps are placed in the tree canopy prior to the start of adult EAB emergence and are left hanging through the end of seasonal beetle flight ².

Reporting

Wisconsin has established the following standard formats for reporting and submitting EAB suspects and samples.

Reporting and Submitting EAB Suspects and Samples

To help ensure that suspect samples are resolved as quickly and thoroughly as possible, all samples are to be sent to the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP). Please call or contact DATCP using the following toll-free hotline or e-mail address:

HOTLINE: 1-800-462-2803

E-MAIL: eab@datcp.state.wi.us

All insect samples should be forwarded to DATCP, with a phone call to the hotline in advance to let DATCP staff know that a sample is being delivered. Use the following address:

Becky Gray
WI Dept. of Agriculture, Trade and Consumer Protection
2811 Agriculture Drive
Madison WI 53718-6777

How to Collect and Preserve Insect Specimens

Adults – adult beetle samples should be dead. Do not send live samples. To kill an adult beetle place it in your freezer overnight, or submerge it in rubbing alcohol or hand sanitizer gel. Alcohol is considered a hazardous material and is illegal to ship without proper packaging and certification, so just prior to shipping pour off the alcohol, re-cap the container, place in a crush-proof box, and mail. If you have killed the beetle using other ways please ship the beetle in a crush-proof container. Specimens are difficult to identify if they arrive crushed, broken, or moldy.

Larvae – larvae samples should be dead. Do not send live samples. To kill and preserve a larva (the white worm-like immature stage of this insect) place it in a small leakproof vial filled with rubbing alcohol or hand sanitizer gel. Medicine, vitamin, and film canisters are commonly used for sample submissions. Mail the vial in a small box to ensure that the vial will not be crushed during transport. Alcohol is considered a hazardous material and is illegal to ship without proper packaging and certification, so just prior to shipping pour off the alcohol, re-cap the container, place in a crush-proof box, and mail.

When you send in the samples, include the following information along with the insect:

1. Your name and phone number
2. Date, county, and address where you collected the insect
3. Where did you collect the insect (a tree, the ground, on firewood, etc)
4. Are there ash trees in the area where you collected the insect
5. If you collected it from a tree, list the symptoms that you observed on the tree:
 - sprouts on trunk of tree;
 - D-shaped exit holes in bark;
 - S-shaped winding tunnels under bark;
 - woodpecker activity on tree;
 - dieback in the upper crown of the tree.

CONTROL¹

EAB control includes incorporating methods of preventing the introduction of EAB, managing it when it arrives, and minimizing the impact of the insect through diversification.

Prevention

Since EAB has not yet been found in Algoma, or any where in Kewaunee County, prevention may be the most cost effective control for EAB. The two principle strategies for EAB prevention include education and preemptive removals.

Education

Education is a very cost effective method of EAB prevention. One of the most effective methods of control for EAB is educational outreach, especially education about the movement of wood. The transport of nursery stock, logs, and firewood by humans greatly accelerates the natural spread of EAB. Natural spread rates are relatively slow since adult beetles do not fly great distances. Most female beetles stay within ½ mile of their emergence point; some mated females may fly several miles³. Nevertheless, natural spread would be relatively slow. Most individuals and business will voluntarily alter their practices to reduce the risk of moving EAB once they are made aware of the risks.

Preemptive Removals¹

Because the financial, environmental, and social impacts of EAB can be costly, gradual, prioritized, preemptive removal of some of public ash trees can minimize the impact of EAB. A tree inventory is invaluable for prioritizing preemptive removals because it can identify ash trees in poor condition, with excessive maintenance needs, in conflict with utility lines or other problem trees.

Dealing with EAB after it has arrived to an area can greatly strain local budgets, personnel, and resources. Preemptively removing ash trees before the arrival of EAB can minimize the immediate demand placed on a community, provide flexibility in tree removal budgets, and potentially diminish the movement of EAB across the landscape by making it difficult for dispersing EAB to find host trees.

The scale of preemptive removals can vary from removing all ash trees in a short amount of time (i.e. 10% removal each year for 10 years) to only removing ash trees in poor health. It could also include only removing and replacing young trees (i.e. all ash trees less than 5" caliper or less than 3 years old). Any preemptive removal of ash trees will make EAB more manageable when it arrives⁴.

As an alternative to a preemptive removal program, utility companies may be able to help with ash tree removal and replacement of unhealthy ash trees or those in conflict with electric utility lines. For assistance related to ash in utility right-of-ways in Algoma, contact:

1. Wisconsin Public Service Call Centers, 1-800-450-7260 – Refer to line clearance coordinator to contact Greg Kirchmayer.
2. American Transmission Company, contact Chris Dailey, 262-506-6884, e-mail: cdailey@atcllc.com.
3. Municipal electric utilities may also provide similar EAB support.

City officials and landowners will have to decide if preemptive removal is right for them. Listed below are some of the pros and cons of preemptive removals⁵.

Pros:

- Opportunity to spread removal costs over longer time frame.
- Reduces problem of dealing with many dead and/or hazardous ash trees at one time.
- Opportunity to start the replanting/recovery process right away.
- Greater flexibility in organizing removal and routine work schedules.

- Ability to utilize ash wood for products or use it as a local source of firewood.

Cons:

- Immediate impacts to tree canopy and aesthetics.
- Removing healthy ash may create negative feeling in within the community.
- Does not take into account that research may find an effective control of EAB.

Management ¹

There is no *one-size-fits-all* strategy for managing an infestation of EAB. The best response to an infestation must take into account the unique circumstances surrounding the infestation. Management recommendations will likely involve a number of control options including:

- Mechanical controls, such as removing symptomatic or asymptomatic trees
- Chemical controls, such as using pesticides in specific circumstances
- Biological controls, such as using parasitoids or other natural enemies
- Behavioral controls, such as changing habits regarding the use of firewood
- Silvicultural controls, such as reducing the number of target trees and replanting diverse, non-target trees
- Regulatory controls, such as enacting quarantines and enforcing regulations regarding firewood movement

An infestation in the county will be examined by Wisconsin DATCP and Wisconsin DNR and evaluated to determine the most responsible and reasonable course of action, based on the most scientifically sound information available at the time. In addition to collection of the scientific data, site surveys will be conducted to determine environmental sensitivity, endangered resources, and social impacts. These assessments will be done with guidance from the US Fish and Wildlife Service and DNR Endangered Resources.

Chemical Management of EAB Infested Wood

Chemical treatment cannot eradicate EAB infestations. Research suggests that the best control can be achieved when insecticide treatments are started in the earliest stages of infestation before visible symptoms are present or possibly the year before trees are infested ⁶. Since infestation is difficult to predict, the success rate of chemical treatment is limited.

Chemical treatment can protect individual ash trees from being killed by EAB; however, there is no guarantee of success. In some university trials, insecticide treatments were effective, but in other trials the same treatments failed. Some studies conducted over multiple years revealed that EAB infestations continued to increase despite ongoing treatment programs ⁶. Furthermore, in some studies conducted over multiple years, EAB densities continued to increase in individual trees despite annual treatment. Some arborists have combined treatments to increase the odds of success (e.g., combining a cover spray with a systemic treatment) ⁷. It is important to understand that insecticide treatments must be repeated each year. Consequently, it may be more cost-effective to remove and replace the ash tree with an alternative tree to increase species diversity ⁶.

Although the success of chemical management of EAB infested wood may be limited, insecticides are valuable tools that have shown potential for protecting trees from EAB, including soil-applied systemic insecticides, trunk-injected systemic insecticides, and protective cover sprays applied to the trunk, branches, and (depending on the label) foliage. Some formulations can be purchased and applied by homeowners; others must only be applied by professional applicators.

The bottom line is that research on chemical (insecticide) control of EAB remains in the early stages, and we still do not have enough experience to know under what circumstances insecticides treatments will be effective over the long term ⁶.

Insecticide Options for Controlling EAB ⁷

Insecticides that can effectively control EAB fall into four categories: (1) systemic insecticides that are applied as soil injections or drenches; (2) systemic insecticides applied as trunk injections; (3) systemic insecticides applied as lower trunk sprays; and (4) protective cover sprays that are applied to the trunk, main branches, and (depending on the label) foliage.

Insecticide formulations and application methods that have been evaluated for control of EAB are listed in Table 1. Some are marketed for use by homeowners while others are intended for use only by professional applicators. The “active ingredient” refers to the compound in the product that is actually toxic to the insect. Formulations included in Table 1 have been evaluated in multiple field trials conducted by the authors. Inclusion of a product in Table 1 does not imply that it is endorsed by the authors of the table or of the Algoma EAB Readiness Plan, nor have these products been consistently effective for EAB control ⁷.

Table 1. Insecticide Options

Insecticide Formulation	Active Ingredient	Application Method	Recommended Timing
<i>Professional Use Products</i>			
Merit® (75WP, 75WSP, 2F)	Imidacloprid	Soil injection or drench	Mid-fall and/or mid- to late spring
Xytect™ (2F, 75WSP)	Imidacloprid	Soil injection or drench	Mid-fall and/or mid- to late spring
IMA-jet®	Imidacloprid	Trunk injection	Early May to mid-June
Imicide®	Imidacloprid	Trunk injection	Early May to mid-June
TREE-äge™	Emamectin benzoate	Trunk injection	Early May to mid-June
Inject-A-Cide B®	Bidrin®	Trunk injection	Early May to mid-June
Safari™ (20 SG)	Dinotefuran	Systemic bark spray	Early May to mid-June
Astro®	Permethrin		2 applications at 4-week intervals; first spray should occur when black locust is blooming (early May in southern Ohio to early June in mid-Michigan)
Onyx™	Bifenthrin	Preventive bark and foliage cover sprays	
Tempo®	Cyfluthrin		
Sevin® SL	Carbaryl		
<i>Homeowner Formulation</i>			
Bayer Advanced™ Tree & Shrub Insect Control	Imidacloprid	Soil drench	Mid-fall or mid- to late spring

Note: Insecticide options for professionals and homeowners for controlling EAB that have been tested in multiple university trials. Some products may not be labeled for use in all states. Some of the listed products failed to protect ash trees when they were applied at labeled rates. Inclusion of a product in this table does not imply is endorsed by the authors of the table or of the Algoma EAB Readiness Plan, nor have these products been consistently effective for EAB control ⁷

Source: Herms, McCullough, Smitley, Sadof, Williamson, Nixon; 2009. ⁷

Non-Chemical Management of EAB Infested Wood

A key aspect of reducing the spread of emerald ash borer is properly managing the wood, brush and stump grindings generated by removal of infested trees. This requires an understanding of the processes that will destroy the insect, but also the USDA APHIS, WI-DATCP, WDNR and local regulations that apply to those processes and to the movement, storage, and disposal of infested material. In addition, it is important to consider how to best utilize the wood to minimize environmental impact, offset disposal costs or even create a value-added product.

Processing Options to Eliminate EAB

The following options are available for processing infested ash wood to kill EAB or prevent completion of its life cycle and spread to uninfested trees:

- Chipping – ash wood, brush and stump grindings must be chipped or ground down to a maximum size of no more than 1" in two dimensions (two of the three measurements - length, width and depth - must be 1" or smaller). The typical chipper used in tree care operations will not reliably create chips that meet this specification. Chippers equipped with a 1" screen will assure compliance.
- Debarking – complete removal of all bark plus ½ inch of wood. Note that the removed bark and wood must be chipped down to a maximum size of 1" by 1" in 2 dimensions.
- Heat treatment – the wood temperature must reach 160 degrees F for 75 minutes in the center of the piece. Heat treatment chambers or kilns need to be certified by USDA APHIS.
- Composting – To compost bark and the additional one-half inch wood, temperatures must reach at least 140 degrees F for four days and the compost pile must be turned after four days.
- Fumigation – use labeled fumigants by a process approved by state or federal agencies.
- Burning – wood, brush, or chips may be burned prior to insect emergence
- Aging – ash wood material that is aged for 2 years after tree death will be free of EAB. The wood will have dried to the point EAB can no longer survive in it and any EAB present when the tree died or that infested the wood shortly after cutting will have emerged during the 2 year period. If this processing option is used, it should be understood that EAB will continue to emerge during the 2 year aging period and this wood poses a risk of infestation to living ash in the area where it is being aged. This wood must not be moved out of a quarantined area during the aging period.

Storage until Processing

Adult emerald ash borers can emerge from infested wood from May through September. Infested wood should be processed by April 30 to avoid risk of emergence. If processing before adult emergence is not possible, or if infested wood is found during an emergence period, double-bagging can be used to contain emerging adults.

The double-bagging procedure is feasible for small quantities of infested wood. Loosely double bag in 4mil or thicker plastic bags. Keep bags tightly closed until October 1 to contain emerging adults. This is a temporary storage plan; processing should occur after bagging to destroy emerald ash borers.

Utilization Options

The following is a list of the options in recommended order for utilizing properly treated wood waste:

- Use as **lumber** (with no bark present) to produce value added products.
- Use as **chipped mulch** for landscaping and trail surfaces.
- Use chipped material as a **carbon source** for compost piles.
- Use as **boiler fuel** in a boiler equipped with the appropriate air pollution control equipment. This generally means industrial and utility boilers approved to burn wood. Consult individual boiler owners for required fuel specifications.

- Use as **firewood** for wood burning stoves and outdoor camp fires. Residential outdoor wood fired boilers are not recommended due to their heavy release of fine particulate matter pollution.

*Regulations and Recommendations **before** the Area is under Quarantine*

The regulations and use or disposal options for ash wood material generated outside the quarantine area are the same as those listed above. The major exception is that the material does not need to be treated to eliminate EAB since the insect has not been found outside of the quarantine area. Be aware that any ash wood material brought into the quarantine zone will then be subject to the quarantine except for wood being transported through the quarantined area that is:

- transported through without stops (brief stops for fueling, traffic signals, etc. are allowed) and
- wood is covered securely to prevent access by adult beetles between April 30 and Oct 1 when adult beetles could infest wood.

*Regulations and Recommendations **after** the Area is under Quarantine*

1. Transportation

- Technically, it is legal to move ash wood material anywhere within the quarantine area. However, movement of untreated infested ash wood material should be avoided to prevent possible spread of EAB to uninfested areas in the quarantine zone, but if transport is absolutely necessary, distance traveled should be minimized.
- If the logs, brush, or chips will be transported for another use such as mulch, compost, boiler fuel, or daily cover at a landfill, no DNR Waste Program approvals or licenses are necessary.
- If the wood is to be landfilled or burned without energy recovery, a DNR solid waste transportation license is required.

2. Storage – Debris Handling Sites

- Access to the Algoma debris handling site is regulated under city guidance and control based on ordinance.
- Wood may be stored temporarily either on site or at a dedicated marshaling yard for transfer elsewhere without a DNR Waste Program approval or license, if done in a nuisance free and environmentally sound manner.
- A DNR construction site stormwater permit under NR 216, *Wis. Admin. Code* is necessary if the activity on-site or at a marshaling yard results in a land disturbance of one or more acres, which could happen if the stumps are removed or if an area is cleared to accept the wood.

3. Lumber

- Lumber and the products that are made from it do not have to be treated if they will never leave the quarantine area. Ash logs and lumber will need to be processed in an approved manner, such as complete removal of bark (plus ½ inch of wood), kiln drying by approved standards, or fumigation prior to distribution out of the quarantine area. All processes will need approval by DATCP and/or APHIS.

4. Chipping/Grinding for Mulch

- Wood may be ground up for use as landscaping mulch or trail cover. Grinding to no larger than 1" by 1" is not required inside the quarantine area, but it is recommended to reduce possible emergence of adults or if the material will be transported away from its source.
- No DNR Waste Program approvals or licenses are necessary for grinding or use of this material.

5. Chipping/Grinding for Compost

- Wood may be ground up for use as a supplemental carbon source for composting operations. Grinding to no larger than 1" by 1" is not required inside the quarantine, but it is recommended to reduce emergence of adult EAB that could supplement the local population or start new infestations if the material is transported away from its source.
- Small compost operations (< 50 cubic yards) utilizing yard and vegetable food waste do not require a DNR Waste Program approval and license, but must be operated in a nuisance free and environmentally sound manner.
- Existing licensed municipal yard waste composting sites may also be used.

6. Boiler Fuel

- Wood may be used as industrial fuel in large industrial boilers, if authorized by their DNR Air Management operation permit.
- The boiler would be exempt from DNR Waste Program approvals and licenses but the resulting ash may be subject to testing requirements prior to disposal.
- Household wood fired boilers are not recommended for this material due to heavy release of fine particulate matter pollution and lack of pollution control equipment.

7. Firewood

- Movement of firewood is believed to be the primary means of overland spread of EAB, so utilization of infested wood for firewood should not be considered unless it can be assured that it will be treated to kill the insects and prevent the completion of their life cycle. Firewood treatments include heat drying, fumigation, and debarking (plus removal of ½ inch of wood). These processes must be approved by DATCP if wood will be moved within Wisconsin or APHIS if wood will be moved out-of-state.
- Firewood not for commercial sale (homeowner use) may be legally moved within the quarantine area, but users are advised not to move firewood any distance from the area where the wood originated to reduce further spread of EAB. All untreated firewood should be burned before April 30 to prevent insect emergence.
- Other firewood information can be found at: <http://dnr.wi.gov/invasives/firewood/>

Regulations for Transporting Ash Wood Materials from a Quarantine Area to a Non-quarantine Area

The intent of these regulations is to prevent the spread of EAB, starting with standing infested trees until the wood and any residue are completely processed.

Compliance Agreements:

- All ash wood producers, transporters, and processors must sign a compliance agreement with DATCP or APHIS officials before ash wood materials can be moved out of a quarantine area.

- o Producers – these include anyone that takes down infested trees and moves the material off site, for example, loggers, commercial arborists, or municipal crews. Producers need a compliance agreement to move the infested material away from where the trees were growing or to a certified facility if it is outside the quarantine area.
- o Truckers and Transporters - Truckers and transporters that move ash logs and materials out of a quarantine area must sign a compliance agreement stating that the transporter will deliver regulated (ash) logs and materials only to mills or processors with an approved compliance agreement and will only ship the material between October 1 and March 31.
- o Mills and Processors - The mill or processor must be visited by a DATCP or APHIS official and a compliance agreement must be completed and signed.
- Compliance agreements are not complicated and are simple to obtain. Sample copies of compliance agreements are available at: <http://emeraldashborer.wi.gov/>

The following regulations apply to moving ash wood materials outside a quarantine area:

- Mills and other processors located outside a quarantine area can only receive ash logs and materials from within the quarantine area between October 1 and March 31. (This is after and prior to emergence and flight by adult emerald ash borers.)
- Ash logs and materials must be processed by April 30.
- Residual bark and one-half inch of wood from debarking operations must be utilized or disposed by an approved method by April 30.
 - o Chipping - bark and one-half inch wood must be chipped to less than 1" by 1" dimensions.
 - o Composting - bark and one-half inch wood must be composted so that temperatures reach at least 140 degrees for four days and the compost pile must be turned after four days.
- All ash logs or materials at the processor, whether from inside or outside the quarantine area, are considered regulated unless the mills or other facilities can segregate and mark the ash logs or green lumber. If they can keep the different materials separate, then the other non-quarantine ash logs or lumber can be processed as usual.
- Ash green lumber must be free of bark prior to movement out of the mill unless heat treated according to USDA specifications.

Diversification ¹

The impact of EAB on a community is directly dependent on the number, size, and location of ash. The more ash, the more trees will be infested and the faster the insect will spread. The larger the trees, the greater the cost of removal will be, and the greater the loss of environmental services.

Providing for species and age diversity in a forest are two significant ways to reduce the impact of a destructive pest or disease. Recent pilot studies show that ash comprises around 12% of the all tree species within the boundaries of Wisconsin's communities, but they also show that ash is the second most common street tree in Wisconsin communities (behind Norway maple) and may make up as much as 30% of the street trees in a community.

The City of Algoma is well on its way to reduce the ash content in its tree populations. Only three percent of the trees in Algoma are ash and the city will continue to reduce this amount.

Much work is still needed by the landowners to move towards diversifying private trees. It is recommended that landowners should stop or drastically cut back on planting ash or any dominate species on their property. *Wisconsin's Urban Forestry Best Management Practices for Preventing the Introduction and Spread of Invasive Species* (WDNR, 2009) suggests striving to meet no more than 5% of one species, 10% of one genus, and 20% of one family. Adherence to this rule of thumb in the case of EAB would sill result in the loss of trees, but would hopefully minimize the impact. Optimally, it is wise to aim for the greatest diversity of species that is manageable.

In addition to species composition, the size of trees in the community should be considered. EAB has been shown to attack all ash trees regardless of size. However, the sustainability of the whole forest and the cost of management are impacted by size. If all the trees in the area are the same size/age, they could potentially start to fall apart at the same time, and eventually the community will be faced with the same catastrophic tree loss even without EAB.

For a list of possible tree replacement choices, see Appendix A: Alternatives to Ash Trees.

Frequently Asked EAB Questions

1) What do larval galleries of native borers look like compared to EAB galleries?

Answer: Distinct characteristics of emerald ash borer larvae include: 1) larval feeding galleries typically are shallow and s-shaped or serpentine, 2) galleries weave back and forth across the wood grain, 3) galleries are packed with fine, sawdust-like frass, 4) adult beetles form D-shaped holes upon emergence, approximately early June till early July.

2) How were the initial EAB finds first discovered in Michigan in 2002?

Answer: Emerald ash borer was introduced into North America sometime in the 1990s. It was first reported killing ash (genus *Fraxinus*) trees in the Detroit and Windsor, Ontario areas in 2002. During the summer of 2002, while investigating the increasing decline and death of ash throughout southeastern Michigan, David Roberts of Michigan State University (MSU) Extension, observed an association of adults of an unknown buprestid beetle with ash trees from various parts of southeastern Michigan. In June of 2002, a sample was sent to the Entomology Department at MSU, where Gary Parsons identified them to the genus *Agrilus*. There were no similar species in the MSU insect collection so the beetles were suspected to be exotic. Additional beetles were collected and either beetles or digital images were sent to five beetle experts in the United States. Although all agreed that they were exotic, and probably Asian in origin, a positive identification could not be made. On June 30, a description and digital images of the unknown beetles were sent to Eduard Jendek in Slovakia, an expert on Asian *Agrilus* species. Jendek tentatively identified the beetles as *A. planipennis*. On July 9, once actual specimens reached Slovakia, Jendek positively confirmed that the beetles were *Agrilus planipennis*, commonly known as the emerald ash borer. (Information from the *Newsletter of the Michigan Entomological Society*.)

3) How will people be compensated for trees removed from private property?

Answer: At this time, there are no plans/programs to compensate people for the removal of trees on private property. In areas that have been devastated by EAB, replanting programs are beginning to reforest communities. Some of the most successful programs are the result of partnerships between non-profit groups, commercial businesses, and government

4) What is the best means to inventory large wooded areas under public control?

Answer: The best means would be through a survey mechanism. The WDNR service forester in your county may be a good source of information.

5) What research is currently being conducted? Are there any potential solutions close at hand?

Answer: EAB is a relatively new pest to North America and limited research has been conducted. For a survey of research activities, refer to the multi-state emerald ash borer Web site at: www.emeraldashborer.info/Research.cfm.

6) Is there more information I can get on the web?

Answer: The primary portal for Wisconsin EAB information is: <http://emeraldashborer.wi.gov>.

Other sites include:

Wisconsin DNR Urban Forestry: <http://dnr.wi.gov/org/land/forestry/UF/>

Wisconsin DNR Forest Health: <http://dnr.wi.gov/org/land/Forestry/FH/Ash/>

Multi-state EAB Web site: www.emeraldashborer.info

The Bugwood Network at: <http://forestpests.org/ash/index.html>

Wisconsin Garden Facts at: <http://uwex.edu/ces/wihort/GardenFacts.html>

Urban Forestry Insider at

<http://www.dnr.state.wi.us/org/land/forestry/UF/Resources/InsiderArchive.html>

ASSESSMENT

FOREST RESOURCES¹

The first and most important step in managing community forest resources and preparing for EAB is to conduct a tree inventory. A tree inventory is the process of counting, characterizing, and recording information about the public and sometimes private trees that make up the community forest or the trees within a stand for woodlots. It is a useful tool that documents important information related to the total number of trees, their condition, location, and species composition.

Street tree inventories document and help with management of trees along roads and within the public right-of-way. They are conducted using a variety of on-the-ground sampling methods ranging from a relatively quick windshield survey to the more detailed walking survey using handheld field computers running geographic information systems (GIS). Documentation of street trees is useful for identifying the species, location, and condition of trees the local government is responsible for maintaining. This information can then be used to identify areas of susceptibility (high ash component), low species diversity (species and/or age), and future planting opportunities. Because street trees are located in areas of higher pedestrian traffic, they pose a higher liability risk and should be documented regularly.

Tree Inventories

Algoma’s tree inventory was just updated this year (2010). It was found that there are 46 remaining ash trees at risk in the city or 3% of the 1,573 trees in Algoma. Algoma has been actively working to reduce the ash content of their tree population. In the past nine years since the City’s last inventory, ash trees have been reduced from 71 ash trees in 2001 to 46 ash trees in 2010, which represents a reduction of 54 percent.

SUPPORT RESOURCES

Support resources at the city include staff, equipment, and debris handling locations, to address EAB management.

Staff

Algoma currently has adequate staff in the Public Works department to address EAB management for public trees. However, training on EAB identification, monitoring, removal, and utilization would be beneficial. Table 2 provides a list of staff with contact information and skills available to address EAB.

If EAB was confirmed in Algoma, or any where in Kewaunee County, additional administrative support would be needed to help with responding to public inquiries, hazard inspections, training, scheduling, contracting, and media relations.

Table 2. Staff Resources, Algoma Public Works Department

Name	Phone	Skills			
		ChainSaw	Felling	Chipper	CDL
Dennis Schneider	920-487-2391	X	X	X	X
Mike Romdenne	920-487-2391	X	X	X	X
Guy Fernette	920-487-2391	X	X	X	X
Kevin Stauber	920-487-2391	X	X	X	X
Gary Paape	920-487-2391	X	X	X	X

Equipment

Algoma currently has adequate existing equipment at the Public Works department to address EAB management. However, there is no municipal owned equipment that is able to chip infested ash to the recommended 1 inch by 1 inch size. Such services would need to be provided by contractors. Table 3 provides a list of available municipal equipment to address EAB.

Table 3. Equipment Resources, Algoma Public Works Department

Equipment	Quantity
Loader (Fork)	2
Bucket Truck	2
Chipper	1
Chain Saw	5
Pole Saw	1
5 YD Truck	5
3 YD Truck	1
Chipper Box	1
Pick-up Truck	3
Safety Equipment, Chains, Cables, Signs	--

Debris Handling Locations

Algoma municipal debris handling site is sufficient to accept public ash trees in the city. However, should an additional site be needed during EAB infestation, Algoma Lumber could provide an additional debris handling location.

In order to accept a large amount of private ash trees, Algoma would need to either consolidate debris at the municipal site through chipping, or an additional site would be needed.

Table 4 provides location and size of Algoma's debris handling locations.

Table 4. Debris Handling Locations, Algoma

Name of Site	Location	Site Size (acres)	Notes
Public Works (Street Dept. Site)	1520 Jefferson Street, Algoma	0.5	Yard waste site.
Algoma Lumber	1400 Perry Street, Algoma	5	Will accept in log form only.

Authority

The City of Algoma ordinance provides the City authority over the management of public trees, as well as private trees where there is a threat to public property or public welfare. Chapter 8, Section 8.09(3) of the City of Algoma Municipal Code states the following:

The Tree Management Board of the City shall have jurisdiction over administration of planting, maintenance and removal of any tree, shrub or plant in and upon any public property. The Tree Management Board shall have jurisdiction over any tree, shrub or plant on private property, which may in any way have an adverse effect upon public property or upon public welfare.

ASH WOOD UTILIZATION

Finding ways to utilize the wood generated from ash tree removals can help to lessen the economic impact from EAB while strengthening local wood product industries. Communities affected by EAB and other pests have shown the potential to lower disposal costs by allowing businesses to use removed trees for mulch, production, or fuel. Others have worked directly with local sawmills to produce lumber and other products, many of which can be used for community projects⁴.

UTILIZATION OPTIONS⁸

The following are some potential options for the utilization of ash wood. This listing is not exhaustive and is meant to provide some ideas for utilization that have been incorporated in other areas.

Whichever utilization option is pursued, it is important to keep in mind that if or when Kewaunee County comes under quarantine, no untreated ash wood can leave the quarantine area without a compliance agreement.

Firewood

Wood from trees killed by the EAB can be used for firewood at the location where the trees were removed. However, this firewood should not be transported to other locations.

Landscaping Materials

Ash trees removed because of EAB can easily be milled to become landscape timbers or chipped to create mulch or compost for gardening and home landscaping projects. These materials need to be chipped to the proper size for mulch or properly treated to become timbers.

Lumber

Milling is especially suited to trees killed by the EAB because the insect does not damage the interior portion of the wood when it kills the tree. Ash wood has many redeeming qualities and often makes a good substitute for oak. It can be made into many beautiful and durable products, including furniture, flooring, paneling, and molding. Additionally, many mill operators have portable sawmill to allow removed trees to be converted into lumber on-site.

Art and Furniture

After the proper treatment of wood from trees killed by EAB, a woodworker or chainsaw carver can use it to create a piece of art or furniture.

Sell Logs

With a significant number of ash trees, the logs can be sold to sawmills or other industries within the quarantine area – or outside the quarantine area after it is properly treated and a compliance agreement is obtained.

Provide Materials to Local Woodworkers

Many craftspeople enjoy using removed street and yard trees for their specialty projects. Ensure that proper treatment or quarantine regulations are followed.

Donate Wood

Wood from trees killed by the EAB can be used by local schools or community organizations such as Habitat for Humanity, scouting groups, nature centers, etc. Once treated properly, it could be used as materials for picnic tables, park benches, renovation or construction programs, or other projects.

TREE REMOVAL AND CHIPPING CONTRACTORS

Table 5 provides a listing of tree removal contractors in the area and Table 6 provides a listing of chipping contractors in the area. These lists were created by the Kewaunee County EAB Planning Team and do not serve as an endorsement for any of the listed companies, nor does it serve as an all-inclusive list.

Table 5. Tree Removal Contractors

Company	Contact Name	Location	Phone	Equipment
Burmeister Logging	Aaron Burmeister	Seymour	920-655-7752	processor
Dave's Tree Service, Inc.	Dave Burke	Egg Harbor	920-823-2259	bucket trucks, chipper, saws, trailers
Jerry Jonet Tree Service	Jerry Jonet	Casco	920-837-7497	boom truck, trailers, chipper
Krause Forest Products	Jeff Krause	Algoma	920-487-3495	skidder, processor, forwarder, grinder
Krueger's Tree Service	Mark Krueger	Forestville	920-856-6685 920-493-3574	skidder, chipper, clammer, bucket
Lohrey Logging, Inc.	Mark Lohrey	Casco	920-837-7334	
Staats Services, LLC	Jeff Staats	Luxemburg	920-304-0091	saws, trucks, slashers
Thielke Forest Products	Mike Thielke	Waupaca	715-572-2436	chipper, grinder
Xtreme Logging	Kit Olson	Algoma	920-487-9901	skidder, processor, forwarder

Table 6. Chipping Contractors

Company	Contact Name	Location	Phone
Asplundh		Schofield	715-241-8733
Dave's Tree Service, Inc.	Dave Burke	Egg Harbor	920-823-2259
Jerry Jonet Tree Service	Jerry Jonet	Casco	920-837-7497
Krause Forest Products	Jeff Krause	Algoma	920-487-3495
MJB Inc	Dennis Bergeson	Marinette	715-923-6535
Pomps Services	Frank Pomprowitz	Sobieski	920-826-2039
Thielke Forest Products	Mike Thielke	Waupaca	715-572-2436
Woodside Custom Cutting, Inc	Brian Paplham	Kewaunee	920-388-0846

EDUCATION AND OUTREACH

Public awareness can contribute greatly to slowing the spread of EAB. Education and outreach is important to communicate the effects of EAB on a community's forestlands and increasing public understanding and support for an EAB plan and program. Therefore, education and outreach should begin early in the EAB management process.

Increasing public awareness of a community's EAB plan will enhance the effectiveness of detection survey efforts, help to prevent adverse public reaction to control efforts, and promote compliance with regulations. The following provides a general overview of EAB education and outreach options for elected officials, county and local staff, and the public.

LOCAL OFFICIALS

- Hold education meetings and presentations on EAB with local officials.
 - Ask DATCP and/or WDNR personnel to attend local meetings, give a presentation, and answer questions about EAB.
 - Member of the County's EAB Planning Team, or others knowledgeable about EAB, could present a WDNR PowerPoint presentation about EAB (available here: <http://dnr.wi.gov/forestry/uf/eab/filesTOC.asp>) or could prepare a presentation on local EAB efforts to present to local boards and committees.

CITY STAFF

- Provide training on EAB identification, control, and management to county and local staff.
- Ask DATCP and/or WDNR personnel to give a presentation and answer questions about EAB.

PUBLIC

- Provide public displays, brochures, or flyers in a municipal or county office, library, or other public site. DATCP and WDNR have produced various materials that can be loaned or distributed to interested citizens or copies can be made from outreach materials found at: <http://dnr.wi.gov/forestry/uf/eab/index.asp>; emeraldashborer.info; and <http://www.emeraldashborer.wi.gov/>.
- Provide information at the Algoma's annual Arbor Day celebration training workshop
- Offer EAB educational workshop at the Algoma's annual Arbor Day celebration.
- Record public education training session and air it on local cable access channel.
- News releases, municipal newsletters, and other publications. There are many pre-written articles available from UW-Extension and WDNR.

EAB Management for Homeowners

As opportunities for funding arise, Algoma will explore options for incentive programs and partnerships that may be able to help offset the costs associated with removing and replacing ash trees on private property. For more information regarding concerns about private yard trees, please contact Aerica Opatik at the Kewaunee County UW-Extension office at 920-388-7138 or aerica.opatik@ces.uwex.edu.

IMPLEMENTATION STRATEGY

In order to promote the implementation of the *City of Algoma Emerald Ash Borer Readiness Plan*, the following recommendations and action items were developed based on the goals for the plan, which are listed in the *Introduction* section.

RECOMMENDATIONS TO ADDRESS EAB

- Provide staff training and public education on EAB identification and proper ash removal and utilization.
- Engage the public to inform them of their options and rights with regard to EAB.
- Maintain a current and complete tree inventory for public trees.
- Continue working to replace ash and diversify the public tree inventory.
- Explore opportunities for additional ash utilization.
- Work with Kewaunee County to increase the number of debris handling sites available to Algoma residents.
- Review and update the *City of Algoma EAB Readiness Plan* after EAB detection in the county or city, every 5 years, or as needed.

Action Items

The following items were developed to provide specific, tangible actions to be undertaken in an effort to carry out the plan recommendations. Action items are not listed in any particular prioritized order.

- Provide staff training on EAB identification.
- Provide staff training on proper ash removal and utilization.
- Hold a public educational workshop as part of Algoma's Arbor Day celebration.
- Air recording of the public EAB training on the public access cable channel throughout the year.
- Develop guidance and informational brochures for private landowners.
 - Provide public informational brochures with DATCP contact information at relevant departments.
- Maintain Algoma's city and park tree inventory.

APPENDIX A: CITY OF ALGOMA APPROVED STREET TREE PLANTING LIST

Large Trees

Large trees for use in wide planting areas (7' + width) and where no over head utilities exist.

<u>Scientific Name</u>	<u>Species Name</u>
Acer x freemanii	Autumn Blaze Maple
*** Acer rubrum	Red Maple
Acer saccharum	Sugar Maple
Celtis occidentalis	Common Hackberry
Corylus colurna	Turkish Filbert
* Fraxinus americana	White Ash
* Fraxinus pennsylvanica	Green Ash
Gingko biloba	Gingko
* Gleditsia tricanthos inermis	Honey Locust
Gymnocladus dioicus	Kentucky Coffee Tree
Nyssa sylvatica	Black Gum
Quercus alba	White Oak
Quercus bicolor	Swamp White Oak
Quercus macrocarpa	Bur Oak
Quercus robur	English Oak
Quercus rubra	Red Oak
Tilia americana	American Basswood
* Tilia cordata	Littleleaf Linden
** Ulmus americana	American Elm

* Many cultivars exist for these species. Cultivars are used for variety among species and improved performance through characteristics: i.e. shape, structure, growth habit, insect/disease resistance, absence/persistence of fruit, and color.

** American Elms should be a disease resistant variety.

*** Not conducive to sites with high soil pH.

Small Trees

Small trees for use in restricted planting areas (4-6' width) or areas where overhead utilities exist.

<u>Scientific Name</u>	<u>Species Name</u>
Acer ginnala	Amur Maple
Acer mandshuricum	Manchurian Maple
Acer miyabei	Miyabe Maple
* Amelanchier spp.	Serviceberry
Carpinus caroliniana	Hornbeam, Muscledwood
Cercis canadensis	Red Bud
Crataegus sp. var. thornless	Hawthorn sp.
Fraxinus pennsylvanica	Green Ash
Liquidambar styraciflua	Sweetgum
Magnolia sp.	Magnolia sp.
* Malus sp.	Crab Apple
Ostrya virginiana	Ironwood
Phellodendron amurense	Amur Cork Tree
* Prunus sp.	Cherry/Plum
* Pyrus calleryana	Callery Pear
Syringa reticulata	Japanese Tree Lilac

* Many cultivars exist for these species. Cultivars are used for variety among species and improved performance through characteristics: i.e. shape, structure, growth habit, insect/disease resistance, absence/persistence of fruit, and color.

City of Algoma Trees Not Approved for Street Tree Planting

<u>Scientific Name</u>	<u>Common Name</u>	<u>Reason</u>
Acer negundo	Box Elder	weakwood, female tree attracts Box Elder Bugs
Acer platinodes	Norway Maple	Over represented in street tree population
Acer saccharinum	Silver Maple	weakwood, buttress roots heave pavement
Ailanthus altissima	Tree of Heaven	weakwood, messy, undesirable characteristics
Betula papyifera	White Birch	insect problems, site sensitive, weakwood
Eleagnus angustifolia	Russian Olive	subject to disease and litter problems
Morus spp.	Mulberry spp.	litter of fruits, weakwood
Platanus occidentalis	Sycamore	subject to anthracnose disease
Populus spp.	Poplar/Cottonwood	weakwood, roots block sewers, litter of seeds
Salix spp.	Willow spp.	weakwood, litter of twigs, roots block sewer
Sorbus spp.	Mountain Ash	shortlived, subject to disease
1 Ulmus americana	American Elm	subject to Dutch Elm Disease
Ulmus pumila	Siberian Elm	weakwood, buttress roots heave pavement
*Large Nut and Fruit Bearing Trees		large nuts / fruit create litter and safety problem
2Aesculus spp.	Horsechestnut, Buckeyes	
Carya spp.	Hickory spp.	
Juglans spp.	Black walnut, Butternut	
Coniferous Trees		can create visual screening as a street tree
*Picea spp.	Spruce	
*Pinus spp.	Pine	
*Thuja spp.	Cedar	

1 = Disease resistant American Elms available

2 = Fruitless varieties available

spp. = Abbreviation for species

* = May be suitable in specific park settings

APPENDIX B: DEFINITIONS

dbh – diameter at breast height; represents the diameter in inches of a trunk cross-section measured at 4½' above ground level; a basis for estimating or identifying tree volume, value, management needs and costs, utilization options, etc.

delimit – to establish geographic limits or boundaries; emerald ash borer quarantine areas are determined after *delimiting* or determining the extent of area infested by EAB.

EAB – the emerald ash borer insect; as an adult it measures approximately ½" in length by 1/8" wide, is metallic green in color and somewhat bullet shaped. The larvae can reach a length of a little more than 1" in length, are white to cream colored, have a 10 segmented abdomen with a pair of brown, pincer-like appendages on the last segment.

EAB readiness team – a group of people responsible for all aspects of preparing for emerald ash borer within a particular jurisdiction/municipality; team members have specific roles and tasks.

EAB readiness plan – a document delineating local EAB readiness activities and processes; includes scope & purpose, authority, responsibility, policies & procedures, actions/tasks, available resources, forms & contracts, technical references & support information (such as surveying and reporting protocols), and similar content.

eradication – total elimination of ash trees within a specified geography area where EAB has been verified.

infestation – refers to an area where the ash trees have been positively identified as having a sustained population of EAB.

marshaling yard – a designated location within a quarantine area where infested trees are collected and held for further handling.

preemptive removal - in the case of EAB it refers to removing trees prior to them becoming infested with EAB. At this time (February, 2008) it has not been recommended by either the WI-DATCP or WI-DNR to perform this practice, however it is up to each municipality dependent on their fiscal and personnel resources along with the amount of ash trees within their community and the distance from known EAB infestations. It does seem reasonable that if a community has ash trees that are declining or are in conflict with buildings or utilities, that instead of performing a remedial pruning, removal may be a strong option.

quarantine area – a defined geographic area from which goods may not be transported; *quarantines* will be established by federal or state agencies to restrict ash wood movement out of infested areas to avoid emerald ash borer infestation of new areas; *quarantines* can be applied to an individual property, township, county or entire state.

REFERENCES

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- ⁴ Sheboygan County Emerald Ash Borer Resource Management Plan; 2010.
- ⁵ Emerald Ash Borer Community Preparedness Plan, Michigan Department of Natural Resources and Michigan Department of Agriculture; Michigan Department of Natural Resources and Michigan Department of Agriculture; April 2007.
- ⁶ Emerald Ash Borer: Insecticide Options for Protecting Ash Trees and Their Effectiveness; R. Chris Williamson, Associate Professor; Department of Entomology, University of Wisconsin-Madison; 2007.
- ⁷ Insecticide Options for Protecting Ash Trees from Emerald Ash Borer; Herms, McCullough, Smitley, Sadof, Williamson, Nixon; 2009.
- ⁸ My Ash Tree is Dead... Now What Do I Do?; Extension Bulletin E-2940; Michigan State University Extension; February 2005.