

# Village of Belleville Emerald Ash Borer Readiness Plan



Source: David Cappaert, Michigan State University, Bugwood.org

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**EAB HOTLINE 1-800-462-2803**

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## INTRODUCTION

While nobody can predict when the emerald ash borer will arrive in Belleville, it is assumed that the insect *will* arrive in Belleville in the near future. Currently, the insect has been confirmed in multiple locations in Wisconsin. Since EAB's first detection seven years ago, it has spread to 12 additional states and Canada. By all appearances it is unstoppable and is spreading quickly. The Village of Belleville should take proactive measures before an infestation occurs to spread costs over time and maintain public safety.

### Purpose of Readiness Plan

The purpose of this Emerald Ash Borer (EAB) readiness plan is to identify the essential personnel, resources, procedures and fiscal resources to combat the Emerald Ash Borer in Belleville, Wisconsin. Advance planning is the key to minimizing and mitigating the effects of EAB.

### General Discussion of Emerald Ash Borer

#### *History of the Emerald Ash Borer*

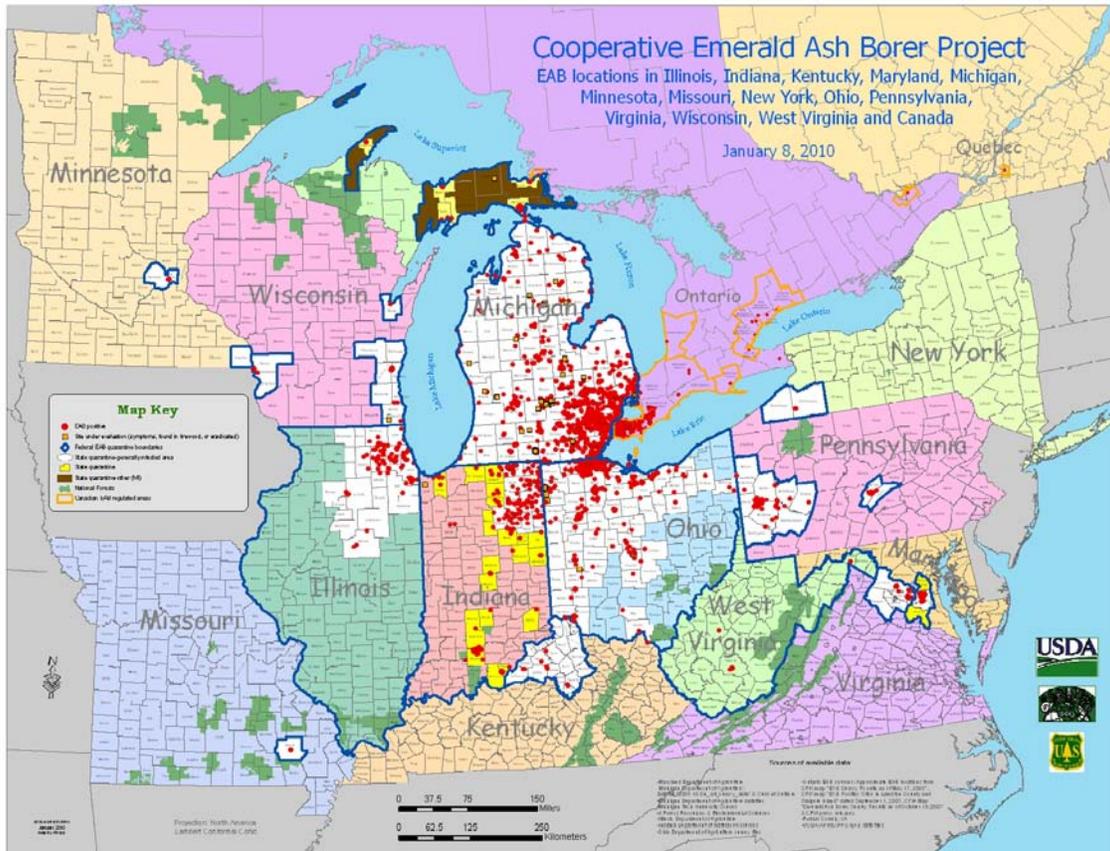
The Emerald Ash Borer (*Agrilus planipennis*) is an exotic pest native to Asia that was identified in southeastern Michigan near Detroit in the summer of 2002. The adult beetles munch on ash foliage but cause little damage. The real damage is caused by the EAB larvae that feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients. It is suspected that the insect was initially introduced to the United States via solid wood packing material carried in cargo ships or airplanes originating in its native Asia.

The natural range of the emerald ash borer is eastern Russia, northern China, Japan, and Korea. Before June of 2002, it had never been found in North America. In its native environment EAB feeds on a variety of plant species but in the United States it feeds exclusively on the ash tree (*Fraxinus*). In its native range it is considered a minor pest and is controlled through natural measures. In the United States, it is known to attack green ash (*Fraxinus pennsylvanica*), white ash (*Fraxinus americana*), black ash (*Fraxinus nigra*) and blue ash (*Fraxinus quadrangulata*). It attacks both healthy and declining ash trees and has been known to attack and colonize branches as small as one inch in diameter.

Since its identification in Michigan, EAB has been found in Missouri, Illinois, Indiana, Ohio, Pennsylvania, West Virginia, Maryland, Virginia, Minnesota, Kentucky, New York and Wisconsin.

Since its identification in Michigan in 2002, the emerald ash borer has:

- Killed more than 40 million ash trees in southeastern Michigan alone, with tens of millions more lost in Ohio, Illinois, Indiana, Pennsylvania, West Virginia, Missouri, Wisconsin and Virginia.
- 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. (Source: [www.emeraldashborer.info](http://www.emeraldashborer.info))



Current infestation map January 8, 2009

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 the small town of Victory 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 Village officials alerted program staff to declining ash trees. Currently, eleven counties are under quarantine in Wisconsin.

The borer is widespread throughout Northern Illinois and has been confirmed in counties that border Wisconsin including Lake and McHenry Counties. The distance from the ash borer in McHenry County, Illinois to Belleville is approximately 90 miles. From Belleville to the nearest Wisconsin find in Franklin is approximately 100 miles.

### ***Description and Lifecycle of EAB***

The Emerald Ash Borer adults are dark metallic green in color and belong to a group of wood boring beetles known as Buprestidae. Adults are approximately 1/2" long and 1/8" wide with very short antennae. The larvae are white in color with flattened segmented bodies and may grow to a length of one inch.

Adults emerge through the bark of ash trees in early summer, creating a D-shaped exit hole in the process. Adult emergence is thought to be staggered, beginning in May and peaking in late June. Adults live approximately 3 weeks and have been observed into August. Adults are most active during the daytime under warm, sunny conditions and have been seen feeding on the ash tree leaves. Mating occurs soon after emergence and females will begin to lay eggs about 2 weeks after emergence. A single female will lay between 60 and 90 eggs in her lifetime.

Eggs hatch in 1-2 weeks, and the tiny larvae bore through the bark and into the cambium - the area between the bark and wood where nutrient levels are high. As the larvae feed they wind back and forth, creating characteristic S-shaped or serpentine galleries in phloem and outer sapwood. The larvae feed under the bark for several weeks, usually from late July or early August through October. As mature larvae complete feeding they create a pre-pupal chamber in the outer bark or in the outer inch of wood and overwinter in this small chamber. Pupation occurs in spring and the new generation of adults will emerge in May or early June, to begin the cycle again on uninfested trees.

Unaided, the beetle is thought to move slowly through the landscape, approximately one mile annually, though the rate of spread varies by insect and host tree abundance. However, humans greatly accelerate the spread of the insect by moving infested nursery stock, firewood and logs to un-infested areas. Emerald ash borer movement into parts of Michigan outside of the Detroit area, Ohio, and Indiana has been the direct result of moving these ash products.

### ***Ash Tree Identification***

In North America, the emerald ash borer feeds exclusively on ash trees. The most commonly found ash tree species within Belleville is the green ash (*Fraxinus pennsylvanica*) and white ash (*Fraxinus americana*). There are many wood boring insects, but EAB will only attack ash trees. An ash tree is most easily identified by its opposite branching pattern (the leaves will grow opposite of one another at the same spot on the branch/twig) and compound leaves with 5-11 leaflets each. The leaflets will have minor serration (teeth) along their margins. The following photographs are representative of white ash bark and green ash leaves.



Source: Paul Wray, Iowa State University, Bugwood.org



Source: Paul Wray, Iowa State University, Bugwood.org

### ***Signs and Symptoms***

The symptoms associated with EAB infestations are very similar to those of other common ash pests or diseases, including other wood boring insects that attack ash trees. It is important to look for a combination of at least 2 or more symptoms before concluding that the borer may be present. EAB is extremely difficult to detect at low populations and by the time severe symptoms are evident the trees are generally heavily infested. Tree death is not instantaneous; it generally takes 2 to 3 years for a tree to die.

Local governments and residents are not expected to be able to diagnose EAB. They should call the Department of Agriculture and Consumer Trade Protection (DATCP) hotline number which is 1-800-462-2803. This number can also be found on the cover of this plan and at the bottom of each page.



Crown dieback: Trees begin to show dead branches throughout the canopy beginning at the top. Foliage at top of tree is thin and sickly. This photo represents severe, late-stage infestation most likely 2 years after infestation.

Source: Daniel Herms, The Ohio State University, Bugwood.org



Epicormic sprouting: Sprouting at the base or along the trunk of the tree. This is often referred to as suckering. This photo represents severe, late-stage infestation most likely 2 years after infestation.

Source: Michigan Department of Agriculture, Bugwood.org

D-shaped exit holes: As adults emerge from within the tree they create an exit hole approximately 1/8" in diameter that looks distinctly like a capital 'D.'

Increased woodpecker damage: Some older infestations have increased woodpecker activity as the birds try to feed on the EAB larvae. This usually occurs in the upper portions of the tree and may be accompanied by branch dieback.



Serpentine larval galleries: The larvae feed just underneath the bark of the ash tree. As the insect larvae feed they wind back and forth creating serpentine or s-shaped larval galleries.

Photo of serpentine larval galleries. Source: Toby Petrice, USDA Forest Service, Bugwood.org

Bark splitting: Vertical splits in the bark appear and are caused by callus tissue that forms around larval galleries. Larval galleries can often be seen beneath the splits.

Presence of larvae or adults: The actual presence of the adult insect or of EAB larvae is confirmation of an infestation. Again, there are similar looking wood boring insects and DATCP will need to confirm an infestation.

### Tree Inventory Findings

In December of 2009, Bluestem Forestry Consulting Inc. conducted a street and park tree inventory in Belleville. Areas that received an individual tree inventory included: street rights-of-way and Village parks. Ash population information such as distribution, health and density were determined from this data. The following data pertinent to this report was collected on each individually inventoried tree:

- GPS Coordinates: A Trimble GeoXT GPS was used to locate all trees. These coordinates were then used to map the ash tree locations (see Attachment 1)
- Species of Ash: While research indicates that EAB attacks all species of ash, it prefers green ash, followed by black and then white ash.
- DBH: Diameter at breast height was collected. This data was used to estimate the work time and equipment necessary for tree removals.
- General Health: The general health of the tree will be useful for tree monitoring. Poor, very poor or dead condition trees can be located and removed in anticipation of EAB.
- Street or Park Name: The park name was identified for each tree located within a park. Street name and block number was identified for each ash located within the street ROW.
- Utility: Presence of overhead utilities will be noted. If it becomes necessary to remove ash trees, the presence of overhead utilities will dictate which entity (Village, utility) will need to perform the removal.

A total of 1140 Village-owned trees were individually inventoried in Belleville. Of these, 259 trees were identified as ash. This equates to an ash tree population of 22.7% for the Village of Belleville. Species diversity guidelines recommend not more than 5% of any one species and not more than 20% of any one family. For example, a green ash is an individual species and these can be found within the ash family. The ash population in Belleville is pushing the recommended family limits. A map detailing ash tree locations can be found as attachment one. Additionally a database listing each individual tree and its attributes has been provided to the Village.

Of the total 259 ash trees, 211 are green ash and 48 are white ash. A total of 52 ash trees were identified as in poor, very poor condition or are dead. This equates to 20.0% of the ash population. The average condition of the ash tree population is fair. One hundred thirteen ash trees are located in the parks (43.6%) and 146 are located on street rights-of-way (56.4%). Thirty-six ash trees have overhead power lines present. The average diameter is 16.3". The largest ash is a 44" green ash on South Harrison Street and the smallest is a 2" white ash in Sugar River Park. It is advantageous at this point that Belleville has a mid-sized population rather than high numbers of large trees, simply because it is easier to remove or treat smaller diameter trees.

# PRE-EMERALD ASH BORER ACTIVITIES

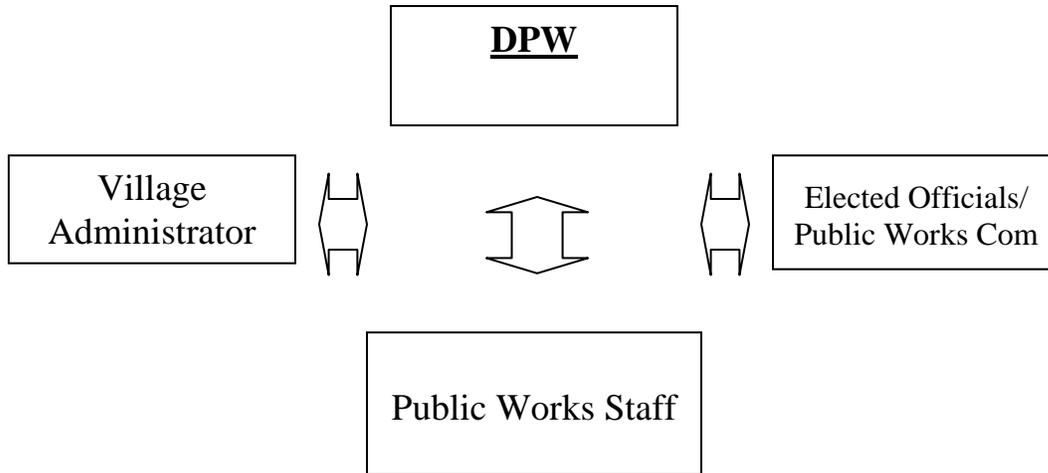
## Establish Chain of Command

A successful action plan always has a designee who is charged with directing the response. This individual will essentially function as a 'point' for the entire Village. They will coordinate all EAB related activities. This EAB project leader will have many responsibilities and duties. Some of these duties will include:

- Prioritizing and budgeting for tree removals, treatments and replanting
- Designating crew leadership and crew work duties
- Updating Village administration and advisory board members
- Public and media outreach
- Education of public
- Enforcement of ordinances
- Coordination with state and local officials
- Set up of marshalling yard
- Coordinate staff training
- Purchase equipment as needed
- Produce templates and investigate contracting/mutual aid agreements with other communities and local utilities
- Investigate wood utilization options

Belleville seems naturally aligned for the Director of Public Works (DPW) to assume this role. The DPW completes most of these actions currently and is well versed with existing budgets, equipment and staffing constraints. He also works closely with Village officials and this relationship will continue when EAB is confirmed within Belleville. The Public Works Committee serves in an advisory capacity to the DPW and will specifically assist with public education and replanting fund raising. The DPW will also be the official Belleville contact when dealing with DATCP, DNR and other state officials.

For EAB related activities within Belleville, the following flowchart will apply:



## Conduct Detection Surveys

With the tree inventory, Belleville has completed the first step of the survey process. Next, EAB/ash tree inspection should be conducted to note potential indicators of EAB activity within the Village. There are several survey methods that can be utilized, but one method in particular seem well suited to Belleville.

**Visual Survey** techniques include looking for outwardly visible signs/symptoms of EAB on ash trees by foot. This was completed by Bluestem Forestry Consulting Inc. during the inventory and no signs/symptoms of EAB were detected. Visual survey can be conducted systematically over a given area or by individually selecting trees thru the inventory. Taking into consideration Belleville's ash stocking level, number of employees and duties, it seems logical to survey half of the ash tree population annually. The main disadvantage of this survey method is that by the time visual symptoms of EAB are present, it usually means the infestation has been in the area for several years. However, it is the easiest and most economical means of survey and can be completed by Village staff. This survey method should begin in late summer 2010 and continue annually thereafter. The tree inventory database can be used for recordkeeping.



If crew members find r more symptoms of EAB on a tree they should call DATCP at 1-800-462-2803 and DATCP will assist with the inspection.

Larvae in small diameter branch. Photo courtesy of Ping Tree Service/IN DNR

## Decide to Remove or Chemically Treat Trees

The first essential question that arises when a community is making decisions regarding EAB is whether to maintain an ash component within their urban forest. Simply put, the options that exist are:

- ✓ *Remove all ash from the public urban forest*
- ✓ *Save all ash thru the use of chemical treatments*
- ✓ *Treat a portion of trees deemed significant and remove the remaining ash trees*

There are pros and cons to each choice:

### **Removing all ash from the public forest (and replanting):**

- |   |  |
|---|--|
| Pro: Costs are definitive and finite          | Con: High initial cost                           |
| Pro: No long term costs                       | Con: A unique species is lost to the forest      |
| Pro: Wise replanting selections can be chosen | Con: Mature trees are replaced with little trees |

### **Save all ash thru the use of chemical treatments:**

- |  |   |
|--|---|
| Pro: Ash remains a component of forest           | Con: Long term treatment costs are incurred |
| Pro: Public is generally supportive              | Con: Additional staff needed for monitoring |
| Pro: Large trees continue contributing to forest | Con: The use of chemicals will be ongoing   |

### **Remove a portion of trees and treat a portion of trees:**

- |  |  |
|--|--|
| Pro: Ash remains a component of forest     | Con: Trees will always need treatment        |
| Pro: Reduces high initial removal costs    | Con: Long term treatment costs are incurred  |
| Pro: Only trees in good condition retained | Con: Public disapproval of decision criteria |

## Identify Significant Ash Trees Suitable for Chemical Treatment

It is unrealistic to expect a community to chemically treat large numbers of ash trees for an indefinite number of years. A very rough estimate of cost of treatment using Tree-äge™ (Emamectin benzoate) via Arborjet is \$10/inch of tree diameter on an every-other year basis. To treat all of Belleville's ash trees (excluding those in poor or very poor condition) would roughly cost \$42,000. In the long-term, it is more economical to simply remove and replant ash. It is a one-time upfront fee that is dealt with and over quickly.

However, if the Village would like to maintain an ash component in its population, there are methods to target trees suitable for chemical treatment. Typically, larger trees in fair, good or excellent condition are more valuable, both from an economic and environmental standpoint. The following chart illustrates some choices the Village can consider:

**Projected budget to chemically treat ash trees:**

	# of trees to be treated*	cost	treatment type**	year/timeline
trees 16" dbh & over	79	\$17,880	Tree-äge™ (Emamectin benzoate) via Arborjet	when EAB is confirmed in Green Lake Co.
trees 18" dbh & over	32	\$8,960		

\*does not include trees in poor, very poor or dead condition

\*\*estimate obtained from First Choice Tree Care

**Reduce Ash Tree Volume**

Once infested with EAB, ash trees typically decline and die over a period of 2-3 years depending upon insect volume. The burden of dealing with volumes of dead and dying trees within a short period of time can place an enormous strain on community budgets, personnel and resources. The Village of Belleville can take small steps now to prepare for and manage for the arrival of this pest.

Belleville should take the pro-active approach of removing non-infested ash as a way to minimize the impacts when EAB arrives. The relative advantages and disadvantages of preemptive vs. reactive removals include:

**Preemptive Removal: Removing ash trees that are not infested with EAB.**

<i>Pros:</i>	<i>Cons:</i>
<ul style="list-style-type: none"> <li>*Opportunity to spread removal costs over a longer time frame</li> <li>*Reduces problem of dealing with many dead and/or hazardous trees at one time.</li> <li>*Opportunity to start replanting process immediately</li> <li>*Greater flexibility in organizing work schedules</li> <li>*Ability to utilize ash wood for products or use it as a local source of firewood</li> </ul>	<ul style="list-style-type: none"> <li>*Immediate impacts to tree canopy and aesthetics</li> <li>*Removing healthy ash may create negative feelings within the community</li> <li>*Does not factor in research that may find an effective control for ash</li> </ul>

**Reactive Removal: Removing ash trees which are either infested with EAB or dead**

<i>Pros:</i>	<i>Cons:</i>
*Delayed impacts to tree canopy and aesthetics	*Budget and staff impacts will be more severe once EAB arrives in Belleville
*Less negative public perceptions	*Replanting funds may not be available due to extreme removal costs
*Delayed budgetary impacts until EAB arrives	*Inability to keep up with removals increases risk from standing dead trees
*Further EAB research may offer effective control, minimizing needs for removal	*Bigger waste stream to manage

***Remove trees in poor or very poor condition or dead trees.*** The most logical method to reduce ash volume initially is to remove ash trees identified through the inventory as in poor or very poor condition or dead. A tree identified as in very poor or poor condition is most likely considered a high risk tree regardless of EAB and therefore has an associated liability. Any tree, dead or alive, which has the potential to entirely or partially fail and impact a target, can be considered a hazard. A target can be a vehicle, building or a place where people gather (Source: Urban Tree Risk Management Guide, USDA Forest Service: [www.na.fs.fed.us/spfo/pubs/uf/utrm](http://www.na.fs.fed.us/spfo/pubs/uf/utrm)). Dead or dying ash trees, whether weakened/killed by EAB or not, pose a risk to public safety and therefore a potential liability for communities if left standing. There are 51 ash trees in poor or very poor condition. There is one dead ash tree.

***Remove and replace small diameter ash trees.*** After removal of poor/dead/very poor trees, communities faced with EAB infestation within 1-2 years have begun removing and replanting small diameter (1-6") ash trees prior to infestation. Replanting in these locations is occurring simultaneously with the removals so that the impact of the removal on residents is lessened. The removal of small diameter ash trees is relatively easy and less expensive than large trees and it is a good opportunity to spread the expense of replanting over a longer time period. EAB infestation has been confirmed in multiple locations throughout Wisconsin. The nearest finds are approximately 90-100 miles from Belleville. Due to the size of the current infestations and the general philosophy that there are more infestations throughout the state that have not been found yet, it seems reasonable to begin this activity immediately following removal of poor/very poor/dead trees. There are 20 trees from 1-6" in diameter in Belleville.

The following activities are recommended for the Village of Belleville:

1. Belleville will stop all planting of ash trees on public property immediately. It will also discourage planting ash on private property through education.
2. Belleville will remove and replace ash trees in its parks and street rights-of-ways that are in poor/very poor/dead condition. The removals will begin in 2010. If any tree declines to the point that it falls into the poor or very poor category, it will also be removed. All adjacent residents will be notified of any planned action. The database provided to the Village of Belleville houses this list.
3. Belleville will remove ash trees that are 1-6" in diameter and replant when appropriate.
4. Belleville will consider chemical treatment of the large diameter, significant ash trees.
5. Ash trees in fair condition will be evaluated in 2010 to gauge their health and vigor. If any ash tree in fair condition falls below the rating of fair, it will also be removed. Rating definitions can be found in the 'Village of Belleville Urban Forestry Plan and Inventory Findings.'
6. Ash removal requests from adjacent residents will be honored. This includes residents who request removal of ash trees, as well as those that request ash trees be retained (in expectation that chemical treatments will be applied by the resident).
7. Protective pesticide treatments may be effective and may be applied to right-of-way ash trees at resident discretion.

An annual review should be completed as new information about the borer is learned. These recommendations are subject to change as research-based guidelines are developed. The DPW is the individual ultimately responsible for implementation and he should prepare an annual report to the Village Council regarding EAB activities.

An estimate has been prepared that outlines the costs of items #2 - #3 above. Based on current equipment, all tree removals over 6" dbh (diameter at breast height – 4.5' above ground) will be contracted. Tree planting and removals under 6" dbh can be completed in-house. Each tree will

need to be individually evaluated by the DPW to determine if the tree can be safely removed in-house or if the removal should be contracted.

**Projected budget to remove 51 ash in poor, very poor or dead condition:**

	# of removals	Man hr/cost*	# trees to be replaced	man hr/cost for planting**	cost to purchase replacement trees***	TOTAL HOURS/ CONTRACT COST
time/cost	51	\$17,850	51	112 / \$3,214	\$8,925	112 / \$26,775

**TOTAL COST OF LABOR AND CONTRACT: \$29,989**

\*based on contract estimate cost of \$350/tree. Estimate obtained from local contractor. Includes stump grinding.

\*\*based on estimate of 7 tree plantings per day per 2 person crew @\$28.70/hour (including benefits).

\*\*\*based on 1.75" caliper b&b tree @ \$175/ea.

**Projected budget to remove and replant 20 ash 1-6" dbh:**

	# of removals	Man hr/cost*	# trees to be replaced	man hr/cost for planting**	cost to purchase replacement trees***	TOTAL HOURS/ CONTRACT COST
time/cost	20	80 / \$2,296	20	n/a	\$3,500	80 / \$3,500

**TOTAL COST OF LABOR AND CONTRACT: \$5,796**

\*based on estimate of 4 tree plantings per day per 2 person crew @\$28.70/hour (includes benefits).

\*\*removals and replanting will occur simultaneously.

\*\*\*based on 1.75" caliper b&b tree @ \$175/ea.

If Belleville chooses NOT to chemically treat and preserve any ash, 188 additional ash trees will remain when all of these tasks are implemented. The cost to remove and replant the remaining trees is estimated to be:

**Projected budget to remove remaining 188 ash (assuming no chemical treatment):**

	# of removals	Man hr/cost*	# trees to be replaced	man hr/cost for planting**	cost to purchase replacement trees***	TOTAL HOURS/ CONTRACT COST
In-house cost/time	188	\$65,800	188	432 / \$12,398	\$32,900	432 / \$98,700

**TOTAL COST OF LABOR AND CONTRACT: \$111,098**

\*based on contract estimate cost of \$350/tree. Estimate obtained from local contractor. Includes stump grinding.

\*\*based on estimate of 7 tree plantings per day per 2 person crew @\$28.70/hour (including benefits).

\*\*\*based on 1.75" caliper b&b tree @ \$175/ea.

The TOTAL cost to remove and replant all trees is:  
Contract labor to remove/grind stumps = \$83,650  
In-house man hours = 624 (78 work days)  
Cost of man hours = \$17,908 (including benefits, excluding equipment costs)  
Cost of replacement trees = \$45,325

## **TOTAL COST = \$146,883**

\*Cost of recurring treatment = \$8,960 - \$17,880 (biennially)\*

This figure includes stump grinding, replanting and man-hours. It excludes chemical treatment. Removals under power lines will need to be topped to below the lines by Alliant Energy. The removals completed by the utility company have been left in the tables above, because the Village will still be responsible for removal below the power lines and stump grinding.

The above table assumes that the each tree removed will be replanted. This may not always be appropriate. The Village forester will need to evaluate each site for replanting suitability.

Belleville is capable of completing the following tasks in-house:

Removals 6" dbh and under.

Stump removal up to 6" diameter. Stumps in natural areas will not be ground.

Tree planting.

### **Equipment Needs**

Belleville's existing equipment includes:

2 chainsaws

Pole saw

2007 Vermeer Brush Chipper Model #BC1000XL

Trucks

Safety equipment

Belleville has a population of 2,200 persons and it is unreasonable to purchase large forestry equipment such as an aerial lift truck (estimated cost of \$160,000) or a stump grinder (estimated cost of \$35,000). It is reasonable for the Village to continue completing small removals in-house and contracting large removals to a qualified tree removal firm. They will continue to need the forestry equipment listed above and this equipment should be maintained and updated as needed.

### **Staffing and Staff Training**

It will take 324 hours to complete all of the work necessary to remove and replant 259 ash trees. This equates to 78 days of work (not including sick or vacation leave) for one person. The Village public works department is comprised of the DPW and four additional employees. However, they currently spend a small portion of their time on forestry related work.

When EAB arrives in earnest and trees are dying, tree work will become a priority. It is unsafe and irresponsible for municipalities to leave dead standing trees in public areas. The amount of time spent on forestry duties will increase significantly and it would be beneficial for on public works crew member to attain ISA (International Society of Arboriculture) certification. This certification is an industry standard and requires a solid framework of forestry knowledge and continuing education is required to maintain status as a certified arborist.

The Village crew is set up for minor forestry work. Considering the increase of forestry work the Village will be completing, it is critical that the crew continue to receive training on removal techniques and proper use of equipment. It is recommended that Belleville contact several nearby communities and coordinate crew training with an accredited, experienced tree health care firm such as ArborMaster Training, Inc. of New England or FISTA (Forest Industry Safety and Training Alliance, Inc) of Rhinelander, WI. This could potentially receive funding thru a grant from the WI DNR.

### **Community Education**

It would be educationally beneficial to distribute the findings of this report to residents. This is most likely to be effective through a direct mailing and through posting on the Village website. Information to be discussed includes:

- Numbers of actual ash trees found in Belleville's inventory
- Ash identification tips
- Assistance to landowners in locating ash trees on their properties
- Disposal site location
- Removal of unhealthy and other ash trees in anticipation of the EAB's arrival
- Chemical treatment options and the Village treatment plan
- The Village focus of boulevard and park trees (not in private yards)
- Replanting efforts
- Reporting to the EAB hotline number
- Beware of hucksters selling tree treatment
- FAQs

This is a great precursor to the arrival of EAB. It would also be beneficial to develop a FAQ sheet for callers and interested individuals. Additionally, preparing a press release for print and live media would be advisable.

### **Chemical Treatment of Trees**

As discussed above, some high value Village owned ash trees are good candidates for preservation through chemical treatment. Treatment might not be an option for every public street tree, but it may be a good option for individual homeowners who wish to save their boulevard or yard trees. It is recommended that individuals be allowed to treat the public trees on their boulevards until or unless they pose a public nuisance. It is also recommended that when the initial EAB find occurs in Belleville, all Village owned ash trees of substantial size (e.g. 16" diameter

and over) that are rated as fair, good or excellent are evaluated to see if chemical treatment is viable.

An estimated cost for treatment of large diameter trees was obtained and the best industry recommendations at this time are for treatment of trees using Tree-äge™ (Emamectin benzoate) via the Arborjet delivery system. This treatment option has proven to be very effective, reasonably priced and necessary only every other year. However, different treatment options are being developed and approved at very fast rates. Because of the speed of ongoing research and development, it is best to utilize a source of information that is updated quickly. The best statewide site for pesticide use and treatment can be found at the University of Wisconsin Cooperative Extension Entomology website at:

[www.entomology.wisc.edu/emeraldashborer/](http://www.entomology.wisc.edu/emeraldashborer/)

### **Sources of Information**

Additional sources of EAB information include:

[www.emeraldashborer.wi.gov/](http://www.emeraldashborer.wi.gov/) - EAB portal for the state of Wisconsin

[www.emeraldashborer.info/](http://www.emeraldashborer.info/) - EAB web page administered by Michigan State University

[www.dnr.state.wi.us/org/land/Forestry/Ash/index.htm](http://www.dnr.state.wi.us/org/land/Forestry/Ash/index.htm) - WI-DNR EAB web site

[www.entomology.wisc.edu/emeraldashborer/](http://www.entomology.wisc.edu/emeraldashborer/) - UW-Extension, Dept of Entomology EAB website

[www.datcp.state.wi.us/arm/environment/insects/emerald-ash-borer/index.isp](http://www.datcp.state.wi.us/arm/environment/insects/emerald-ash-borer/index.isp) - WI DATCP EAB website

<http://dnr.wi.gov/forestry/uf/eab/> - EAB toolkit developed by the WI DNR

<http://dnr.wi.gov/forestry/fh/pdf/WIEABResponsePlan.pdf> - State of Wisconsin EAB response plan

[www.entomology.wisc.edu/emeraldashborer/](http://www.entomology.wisc.edu/emeraldashborer/) - University of Wisconsin Cooperative Extension Entomology website describing pesticide treatments for EAB

For ease of use, this listing can also be found as Attachment 3.



## PRE-EAB ACTION CHECKLIST

Activities to be completed prior to arrival of EAB

1. \_\_\_\_\_ Establish chain-of-command with DPW at top
2. \_\_\_\_\_ Begin visual survey for EAB.
3. \_\_\_\_\_ Remove ash in poor or very poor or dead condition and replant
4. \_\_\_\_\_ Remove ash 1-6" in diameter and replant
5. \_\_\_\_\_ Coordinate tree removal training with neighboring communities
6. \_\_\_\_\_ Prepare and distribute EAB education items
7. \_\_\_\_\_ Prepare press releases and FAQ sheets
8. \_\_\_\_\_ Review ordinances for effectiveness
9. \_\_\_\_\_ Investigate wood utilization options (see page 20 for additional information)
10. \_\_\_\_\_ Contact regional DNR urban forester for updates and new information

## EAB CONFIRMED INFESTATION ACTIVITIES

### Removal of Public Ash Trees



Source: Steven Katovich, USDA Forest Service, Bugwood.org



Source: Pennsylvania Dept. of Conservation and Natural Resources – Forestry Archive, Bugwood.org

Once EAB has been confirmed in Belleville, the remaining ash tree removals will begin. Activities will be proceeding very rapidly. Depending upon circumstances, Belleville may need to coordinate activities with DATCP to allow for delimitation and aging before any wholesale removal begins. Quarantine will most likely be imposed also which will limit the travel of wood into and out of Belleville and/or Green and Dane Counties.

The object of the EAB removal operation will be to remove dying and diseased ash as quickly as possible in the most economical fashion before they become severe hazards. One of the primary lessons learned by other communities that have faced and EAB infestation is that the trees need to be removed while they are green and not brittle. Removing dead, brittle trees increases the expense and time of removals due to the associated clean up costs and it is harder on equipment. Assuming a fairly heavy infestation, research has shown that from the time of infestation with EAB it takes an average tree 2-3 years to completely die. So, Belleville will be removing its remaining 188 trees over a two year span.

### Private Ash Trees

The majority of a community's trees are typically located on private property. In most cases, the responsibility for tree removal on private property will be that of the property owner. In situations where a hazardous condition exists on a private tree with the potential to impact a public right-of-way, Belleville should promptly address the issue. Inspection will need to be completed on private

property as safety issues arise. Belleville should evaluate its tree ordinances now so they encompass EAB. While the Village will not be removing trees on private property, the Village marshalling yard will most likely be accepting wood from private trees. In regards to ash disposal, Belleville needs to be aware that they will be dealing with their own trees, but will likely be disposing of at least that many private or utility trees also.

### Marshalling Yard Location



Source: David Cappaert, Michigan State University, Bugwood.org

A marshalling yard is a disposal site whose purpose is to help prevent ash wood which could house the EAB from being transported out of a quarantined area. They can be used as staging sites for wood processing, such as chipping, debarking and sawing. The yard will also serve as a temporary or emergency storage site as trees are removed.

Marshalling yards allow municipalities, tree service companies, utilities and private individuals to drop off ash material for disposal and processing to slow artificial spread of EAB. A marshalling site needs to be several acres in size and big enough to accommodate large volumes of wood debris. It should also be fenced to prevent other dumping and to protect the public from accessing potential dangerous equipment.

The best identified site for a marshalling yard that meets all of the criteria listed above is Village site at the end of Pearl Street. It is currently used as a waste area and has room for expansion if need be. It is fenced and is somewhat removed from residential areas.

### Wood Utilization

The Village of Belleville will be looking at a large amount of ash debris including boles, branches and grindings. Something will need to be done with this debris. Utilization and marketing of the ash debris has proven to be difficult and complicated. Belleville currently makes their wood waste products (chips, boles suitable for firewood) available to the public. It may be possible to continue

this practice, but likely, homeowners will have plenty of access to firewood and other materials through removal of their privately owned trees.

Belleville will need to spend a significant amount of time researching uses for the wood debris prior to EAB. Some choices for utilization include:

**Firewood:** The wood can be made available to individuals within the quarantined area for firewood purposes. This option does present some disadvantages. Among those are: staff must be available to monitor public access to the site and assure safety, the supply of wood will greatly outstrip demand and will only account for a portion of the debris and the level of assistance to the public that the Village could provide could quickly get out of hand. Decisions to be made prior to release of firewood include: hours of operation, length of logs to be provided for firewood (12", entire bole), assistance loading wood and how to protect the public from harm.

**Mulching:** Landscape quality mulch can be generated to be used for mulching new plantings, flower beds and playground. The mulch could possibly be sold to residents for a small fee which would help offset the cost of the chipping. The best way to create this mulch is to periodically rent a tub or horizontal grinder that can accommodate entire trees. Crew training will need to be provided on the grinder use and several operators will need to be present during the process. It may be possible to coordinate this work with neighboring communities to share the rental cost of the grinder or to potentially purchase a grinder for cooperative use.

**Portable Sawmilling:** A portable sawmill operator may be interested in milling the wood. The Village of Monroe, MI created a partnership with a portable sawmill operator that benefits both the operator and the Village. The sawmill operator mills the wood once per week to custom sizes specified by the Village and for the operators own use. Monroe uses the wood to make tables, benches and other items needed by the Village. No money changes hands and the only paperwork required is a liability waiver for the sawmill operator.

**Traditional Sawmilling:** Traditional sawmilling is also an option. These operations mill wood for different purposes and utilize a variety of woods. Each sawmill differs with their wood requirements and it is advisable to contact these or other mills as soon as possible prior to EAB.

**Paper Milling:** Paper mills typically accept a small portion of mixed hardwoods for their operations (which includes ash). Each mills paper product has fiber length specifications that dictate the amount of hardwood component that is acceptable. The Village would need to contact the mills to determine proper log length (typically 8 foot length or 100 inch length) and straightness requirements. Paper companies may also accept ash chips depending upon their operations. In both instances the Village will most likely be required to deliver the wood to the paper mill.

While there will be a quarantine in place, DATCP has a process to certify transportation of firewood, mulch and logs outside the quarantined area. This information can be found at [www.emeraldashborer.wi.gov](http://www.emeraldashborer.wi.gov)

The Wisconsin Primary Wood Using Directory is a listing of companies who use or process wood products in Wisconsin. It includes sawmills, veneer plants, particle board plants, log cabin

manufacturers, pulp mills and chip plants. This directory can be found at [www.woodindustry.forest.wisc.edu/apps/search.asp](http://www.woodindustry.forest.wisc.edu/apps/search.asp)

## Replanting Strategies

The Village of Belleville will lose 259 ash trees due to EAB. While it is not always appropriate or feasible to replant all trees that are removed, replanting a portion of these trees will be an important component in Belleville's urban forest.

Replanting is one of the most often delayed or eliminated forestry operations. It takes quite a sum of money and staff-hours to replant large numbers of trees. However, the ultimate cost savings that trees generate is enormous. Some proven benefits of trees include:

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

"Landscaping can reduce air conditioning costs by up to 50 percent, by shading the windows and walls of a home." — *American Public Power Association*

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

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

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

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

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

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

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

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

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

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

There are three keys to proper tree planting:

1. **Diversity.** The urban forest should be comprised of a variety of tree species that have a varied growth habits and longevities. Generally, tree planting recommendations are not more than 5% of any one species, not more than 10% of any one genus and not more than 20% of any one family. For example, it is appropriate to plant 5% white oak, but not more than 20% of the oak family. This is the single best method to lessen the impact of disease or insect infestations.

2. **Right Tree, Right Place.** One of the most important aspects of tree planting is selecting the proper tree species for the planting location. If there are overhead utilities, make certain the species you are selecting is appropriately sized to avoid interfering with power lines. If a boulevard is only 5 feet in width, do not plant an oak which may reach 3 feet in diameter and cause sidewalk and curb heaving. Choose an appropriately sized tree for the planting site. If it is a medium sized boulevard (5-6) feet choose a medium sized tree such as Turkish filbert. Large boulevards can accommodate large trees such as oak, maple and linden. Other factors to consider include light requirements, mature height and root growth habits. Selecting and planting the right tree for the right location will ensure its survival and success for years to come (see Attachment 2).

3. **Proper Planting and Mulching.** Many trees do not survive due to improper planting techniques such as planting too deeply, digging the hole too small and not backfilling correctly. Incorrect mulching, most often seen as volcano mulching (piling the mulch too high around the tree), can cause many growth problems from inadequate water uptake to trunk rot. Be sure to follow established WI DNR planting guidelines (found at <http://dnr.wi.gov/forestry/UF/index.htm>). The goal is 100% survival of newly planted trees and planting correctly is the path to get there.

A comprehensive list of tree species (by size) recommended for Belleville can be found as Attachment 2.



## CONFIRMED INFESTATION CHECKLIST

Activities to be completed upon confirmation of EAB in Belleville.

1. \_\_\_\_\_ Remove infested ash that will not be chemically treated.
2. \_\_\_\_\_ Evaluate and begin systematic treatment or removal of infested ash
3. \_\_\_\_\_ Mobilize plans and agreements for wood utilization
4. \_\_\_\_\_ Monitor marshalling yard use
5. \_\_\_\_\_ Monitor private ash trees for public nuisance
6. \_\_\_\_\_ Prepare for a diverse replanting
7. \_\_\_\_\_ Continue ongoing public information/education campaign
9. \_\_\_\_\_ Contact regional DNR urban forester for updates and new information

## SUMMARY

This plan has one goal: preparation. Experience has shown that communities who develop a readiness plan and begin the preparation phase will have a much easier time managing their infestation. This plan gives Belleville a head start on EAB activities. Belleville is now armed with the knowledge of:

- The location of their publicly owned ash trees
- An estimate of the time and money required to manage EAB
- Equipment and staffing needs
- Public education strategies
- Resources available for information and assistance

Belleville has 259 publicly owned ash trees and the Village can expect there to be many times this number in private ash trees. Belleville will need to appropriately address both the private and public ash trees and assist residents with planning, debris disposal and replanting advice to provide a safe and healthy community forest. Planning ahead saves money and time. And while this process will not be easy, inexpensive or fast, with planning and attention to detail, it can be done well.

# Attachment 1: Map detailing locations of public ash trees



# Attachment 2: Recommended species for planting

Belleville will be replanting large numbers of trees in a short time frame. It is important to diversify the forest as much as possible to help mitigate the effects of disease and insects. The general population guidelines are to plant not more than 20% of any one genus and not more than 5% of any one species. One illustration is to plant not more than 20% oak and not more than 5% of bur oak. This will help assure that if there is a population crash, large portions of the populations will not be lost.

The type of planting is best determined by the available site. General guidelines are as follows:

**Under power lines:** small growing trees (not to exceed 20' in height upon maturity)

**Boulevard size from 4-6' in width:** medium growing trees (measuring 30-40' in height upon maturity)

**Boulevard size 6' or greater in width:** large growing trees (measuring 40' or greater in height upon maturity)

It is recommended that no boulevard under 4' in width be planted due to the restricted growing conditions.

Belleville has a USDA hardiness zone rating of 4.

**\*\*Maples are over-represented and should be planted very sparingly\*\***

The following are some species recommended for planting in the Village of Belleville (partially compiled from: Alternative to Ash Trees: Commercially Available Species and Cultivars by Dr. Laura G. Jull, Department of Horticulture, University of Wisconsin-Madison).

### **Large to medium-sized Trees**

***Acer* × *freemanii*:** Freeman maple, Zone 3b-4 (depends on cultivar), native hybrid of red and silver maple, oval to rounded form, ascending branches, 40-60' tall, 35-40' wide, moderate to fast growth rate, yellow, orange to red fall color, smooth, light gray bark when young, red samaras in spring, not fall, adaptable to most soils and pH, some cultivars can get chlorotic at very high pH, tolerant to wet soils, drought and urban conditions, moderate salt tolerance, can get verticillium wilt and leaf hoppers, some cultivars prone to included bark formation and narrow branch crotch angles, dioecious (separate male and female flowers produced on separate plants)

**'Armstrong**': narrow, fastigiate form, 45' tall, 15' wide, yellow fall color, female, produces seeds

**'Celzam** (**Celebration**<sup>®</sup>): upright to oval form, 45' tall, 25-30' wide, better branch angles and straight central leader, yellow fall color, fast grower, male, seedless, drought tolerant

**'DTR 102** (**Autumn Fantasy**<sup>®</sup>): broadly oval form, upright branches, 50' tall, 40' wide, bright to dark red fall color, female, produces seeds

**'Indian Summer**' or **'Morgan**': broadly oval to rounded form, 45' tall, 40' wide, early, bright rosy-red fall color, vigorous, female, produces seeds, very sensitive to flooded soils

- 'Jeffersred' (Autumn Blaze<sup>®</sup>): broadly oval form with upright branches, 50' tall, 40' wide, bright orange-red to red fall color that is longer lasting, male, seedless, drought tolerant, tends to develop narrow crotch angles, included bark, and multiple leaders
- 'Marmo': upright, oval form, 55' tall, 45' wide, early, fair, mottled blend of deep red and green fall color starts at leaf tips and gradually works its way down leaf, good branching with straight central leader, male, seedless, slower grower
- 'Scarsen' (Scarlet Sentinel<sup>®</sup>): upright form becoming oval, 40' tall, 20' wide, yellow-orange to orange-red fall color, fast grower, male, seedless
- 'Sienna' (Sienna Glen<sup>®</sup>): pyramidal form, 50' tall, 35' wide, rusty orange to burgundy fall color, male, seedless, wider branch angles, from northern seed source, less susceptible to frost crack, hardy to zone 3

***Acer rubrum***: red maple (in acidic soils (pH below 7) only or else very chlorotic), hardy to zone 3b-5b (depends on cultivar), native to eastern and central U.S., Canada, and Wisconsin, oval to rounded to irregular form, 40-60' tall, 25-35' wide, moderate to fast grower, yellow, orange to bright red fall color, smooth, light gray bark when young, reddish flowers in early spring, red samaras in spring, not fall, dioecious (separate male and female flowers produced on separate plants), adaptable to most soils, requires acid pH or else develops serious chlorosis due to lack of manganese, not iron, easy to transplant, tolerant to wet soils (some cultivars), sensitive to salt and air pollution, susceptible to verticillium wilt, leaf hoppers, frost crack, girdling roots, prone to included bark formation and narrow, branch crotch angles, shallow roots

- Autumn Flame<sup>®</sup>: dense, rounded with spreading branches, 40' tall, 35' wide, early, bright red fall color, male, seedless, slower grower
- Autumn Radiance<sup>®</sup>: rounded, open, symmetrical form, 60' tall, 40' wide, early red-orange fall color
- 'Autumn Spire': narrow to oval form, 40-50' tall, 30' wide, bright red fall color, male, seedless, from a northern seed source, newer cultivar, Zone 3
- 'Bailcraig' (Scarlet Jewell<sup>™</sup>): upright form, 60' tall, 30' wide, early, deep crimson-red fall color, from a northern seed source, Zone 3, new cultivar
- 'Bowhall': upright, very narrow form, 40-50' tall, 15' wide, yellowish-orange to reddish fall color, female, produces seed, prone to included bark formation
- 'Brandywine': oval form 40' tall, 30' wide, deep red fall color for a longer period, male, seedless, newer cultivar
- Fairview Flame<sup>™</sup>: good branching, 45' tall, fast growing, later, orange-red fall color
- 'Frank Jr.' (Redpointe<sup>™</sup>): broadly pyramidal form, 45' tall, 30' wide, bright red fall color, faster growing, straight central leader, better branch crotch angles, new cultivar
- 'Franksred' (Red Sunset<sup>®</sup>): upright, dense, oval form, symmetrical form, bright red to orange fall color, fast grower, 45-50' tall, 35' wide, female, produces seeds, dark green, glossy leaves, older cultivar
- Karpick<sup>®</sup>: narrow, oval, dense form, 40' tall, 20' wide, yellow to orange fall color, male, seedless, prone to included bark formation
- 'Magnificent Magenta' (Burgundy Belle<sup>®</sup>): oval to rounded form, 45' tall, 40' wide, bright red fall color that changes to burgundy, symmetrical form, heat tolerant, prone to leafhoppers and witches' broom
- 'New World': upright, narrow-oval form, 40' tall, 20' wide, orange-yellow to orange-red fall color, male, seedless
- 'Northwood': symmetrical, broadly oval to rounded form, ascending branches, 40' tall, 35' wide, early orange to reddish fall color, male, seedless, from a northern seed source, Zone 3
- 'Olson' (Northfire<sup>®</sup>): oval form, 50' tall, 35' wide, early, bright red fall color, northern seed source, Zone 3
- 'PNI 0268' (October Glory<sup>®</sup>): not hardy, zone 5b-6a, broadly oval to rounded form, 40' tall, 35' wide, red fall color for a longer period, female, produces seeds, old cultivar

'Polara' (Ruby Frost<sup>™</sup>): upright, dense, broad oval form, 45' tall, 40' wide, ruby-red fall color, selected in NW Wisconsin, Zone 3  
 'Red Rocket': narrow, columnar form, 35' tall, 8' wide, red fall color, northern seed source, tolerant to leaf hopper  
 'Schlesinger': broadly vase-shaped to rounded, 45' tall, 35' wide, very early orange to purplish-red fall color, female, produced seed  
 'Somerset': broadly oval to rounded form, 45' tall, 35' wide, red fall color, leaf hopper resistant newer cultivar  
 'Summer Red<sup>®</sup>': dense, broad oval form, 20' tall, 10' wide, burgundy red new leaves that turn purplish-green, yellow to orange to purple fall color, leaf hopper resistant, Zone 5  
 'Sun Valley': oval, symmetrical form, densely branched, 40' tall, 35' wide, bright red fall color

***Acer saccharum***: sugar maple, hardy to zone 3a-5 (depends on cultivar), native to eastern U.S., Canada, and Wisconsin (our state tree), upright, oval to rounded form, 60-75' tall, 35-50' wide, showy, bright yellow to orange-red fall color, prefers a fertile, moist, well-drained soil, will not tolerate heavy clay, poorly drained, or dry soils, sensitive to drought, salt and air pollution, susceptible to leaf tatter and leaf scorch, verticillium wilt, basal rot, girdling roots, leaf hoppers

'Astis' (Steeple<sup>®</sup>): narrow oval form, 45' tall, 20' wide, yellow-orange fall color  
 'Autumn Splendor': broadly oval to rounded form, 45' tall, 40' wide, glossy leaves, orange-red fall color, resistant to heat drought and leaf tatter, Zone 5, newer cultivar  
 'Bailsta' (Fall Fiesta<sup>®</sup>): broadly ovate to rounded form, 50' tall, 40' wide, glossy, leathery leaves, yellow-orange to red fall color, leaf tatter and leaf hopper resistant, faster grower, newer cultivar  
 'Barrett Cole' (Apollo<sup>®</sup>): symmetrical, narrow, columnar form, 35' tall, 10' wide, yellow-orange to red fall color  
 'Bonfire<sup>™</sup>': broadly oval form, 50' tall, 40' wide, orange to red fall color, more heat tolerant, fast grower  
 'Commemoration<sup>®</sup>': oval to rounded, dense form, 50' tall, 35' wide, thick, glossy, dark green leaves, yellow-orange to red fall color, vigorous, faster grower, resistant to leaf tatter  
 'Endowment': broad columnar form, 50' tall, 20' wide, bright yellow fall color, no leaf scorch  
 'Heartland' (Autumn Faith<sup>™</sup>): oval to vase-shape, dense form, 35' tall, 20' wide, new leaves are bronze opening to dark green, bronze fall color, slow grower  
 'Flax Mill' (Majesty<sup>®</sup>): broadly oval, symmetrical form, 50' tall, 40' wide, thicker leaves, orange to reddish fall color  
 'Jefcan' (Unity<sup>®</sup>): upright, oval form, 50' tall, 30' wide, yellow to orange-red fall color, selected for harsh prairie climate, from Canada, slower grower, resistant to frost crack, newer cultivar, zone 3  
 'Legacy<sup>®</sup>': oval to rounded, dense form, 50' tall, 35' wide, glossy, thick, dark green leaves, later reddish-orange to red fall color or none, leaf scorch and leaf tatter resistant, faster grower, heat tolerant,  
 'Morton' (Cresendo<sup>™</sup>): broadly oval form, 45' tall, 40' wide, orange-red to red fall color, heat tolerant  
 'PNI 0285' (Green Mountain<sup>®</sup>): broadly oval form, 45-50' tall, 35' wide, reddish-orange to red fall color, leathery leaves less subject to leaf scorch, faster growing, more heat tolerant  
 'Wright Brothers': oval form, 50' tall, 35' wide, yellow-orange to red fall color, resistant to leaf scorch and frost crack, faster growing

***Celtis occidentalis***: common hackberry, zone 3b, native to eastern and central U.S., Canada, and Wisconsin, vase-shaped when young becoming rounded with drooping branches,

moderate to fast growth rate, 50-70' tall, 40-60' wide, corky, warty looking bark, small, pea-sized, purplish-black fruit in fall, adaptable to most soils and pH, tolerates dry, sandy, rocky, and compact, heavy clay soils, slow to establish, plant in spring, drought, urban, wind, and wet soils tolerant, but sensitive to salt, susceptible to hackberry nipple gall on leaves, witches' brooming of twigs, resistant to DED, sensitive to Dicamba herbicides used near tree, branches tend to break in storms, prone to included bark formation, need to train to develop good branch structure

'Chicagoland': broad pyramidal form with upright branches, 55' tall, 40' wide, forms a straight central leader, rich green leaves, yellow fall color, warty bark

'Windy Village': upright, spreading form, straight, central leader, fast grower

***Corylus colurna***: Turkish filbert, hardy to zone 4b, native to southeastern Europe and western Asia, broad, pyramidal form, formal looking even with age, dense, coarse texture, 40-50' tall, 20-25' wide, no fall color, scaly to corky, gray-brown bark, long, pendulous catkins in early spring are showy, may produce nuts, difficult to transplant, heat, urban, and drought tolerant, once established, sensitive to salt

***Ginkgo biloba***: ginkgo, maidenhair tree, hardy to zone 4b, native to eastern China, living fossil, found in fossil records dating back 150 million years ago, deciduous gymnosperm, pyramidal when young, becoming wide-spreading with age to upright, slow grower, 50-80' tall, 30-60' wide, very interesting, fan-shaped leaves, golden-yellow fall color, dioecious (separate male and female flowers produced on separate plants), female trees produce smelly, messy fruit, but not until 20 years old, so plant male cultivars only, tolerant to most soils and pH, prefers a sandy, deep soil, difficult to transplant, plant in spring, heat, salt, urban, and drought tolerant, no pests

'Autumn Gold': broadly pyramidal, symmetrical form, 45' tall, 35' wide, golden yellow fall color, male, no fruit, good, uniform branching

'Fairmount': dense, upright, pyramidal form, straight central leader, male, no fruit

'Halka': broadly pyramidal becoming oval, 45' tall, 40' wide, bright yellow fall color, male, no fruit

'Golden Globe<sup>™</sup>: broad, rounded form, 60' tall, 40' wide, slightly faster growth rate, male, no fruit, dense form, golden yellow fall color, Zone 5

'Magyar': upright form, 50' tall, 30' wide, bright yellow fall color, male, no fruit

'PNI 22720' (Belleville Sentry<sup>®</sup>): narrow pyramidal, upright form, 50' tall, 20-30' wide, bright yellow fall color, male, no fruit

'Saratoga': compact, dense, rounded form, with straight central leader, 20-30' tall, 15-20' wide, pendulous leaves, soft yellow fall color, slower and smaller than other ginkgos, male, no fruit

Shangri-La<sup>®</sup>: moderately pyramidal form, 45' tall, 25' wide, slightly faster growth rate, bright yellow fall color, male, no fruit

'Windover Gold<sup>®</sup>: upright, oval form, 40-60' tall, 30-40' wide, golden yellow fall color, strong grower, male, no fruit

'Woodstock' (Emperor<sup>™</sup>): uniform, oval form, strong, central leader, good branching, male, no fruit

***Gleditsia triacanthos var. inermis***: thornless honeylocust, hardy to zone 4a, native to central U.S. and southern Wisconsin (thorny type native, not var. *inermis*), fine texture, fast growing, vase-shaped form becoming flat-topped, spreading branches, open, 50-70' tall, 40-50' wide, early, bright golden-yellow fall color, no thorns, dioecious (separate male and female flowers produced on separate plants), female plants produce long, twisted, black pods that make a slippery, litter mess, tolerant to most soils and pH, tolerant to compacted, heavy clay soil, drought, salt, and urban tolerant, tolerant to periodic flooding, susceptible to leaf hoppers,

plant bug, cankers, sunscald on trunk, high maintenance pruning, tends to develop co-dominant branches, can break in storms

- 'Christie' (Halka™): broad, oval to rounded form, 40' tall, 40' wide, horizontal branches, some pods, fast growing, yellowish fall color
- 'Emerald Cascade': irregular, weeping form with pendulous branches, grafted, 16' tall, male, no pods
- 'Harve' (Northern Acclaim®): symmetrical, upright, spreading form, 45' tall, 35' wide, yellow fall color, male, no pods, developed in North Dakota, hardy to zone 3b
- 'Impcole' (Imperial®): rounded form, symmetrical, wide-spreading, with good branching, 35' tall, 35' wide, seedless but can throw a few pods, susceptible to leaf hoppers and plant bug
- 'Moraine': uniform, rounded crown with vase-shaped branching, male, no pods, older cultivar
- 'PNI 2835' (Shademaster®): vase-shaped to rounded, irregular form, 45' tall, 35' wide, uniform, ascending branches, occasionally, some trees may produce pods
- 'Skycole' (Skyline®): broadly pyramidal form, ascending branches with wider crotch angles, 45' tall, 35' wide, develops a strong, central leader better than any other cultivar, male, no pods, bright golden yellow fall color
- 'Suncole' (Sunburst®): irregular, oval form, 40' tall, 35' wide, 8" of new leaves are bright yellow then fades to green, yellowish fall color, susceptible to leaf hoppers, plant bug, and canker, male, no pods
- True Shade®: broadly oval form, 40' tall, 35' wide, wider branch angles, yellow fall color, faster grower, male, no pods
- 'Wandell' (Perfection™): develops a good crown at a younger age, 35' tall, 30' wide, dark green leaves, male, no pods

***Gymnocladus dioica***: Kentucky coffeetree, hardy to zone 4a, native to central U.S., southern Ontario, and Wisconsin (scattered distribution), vase-shaped form with upright branches becoming irregular and open, 50-75' tall, 40-50' wide, slow to moderate grower, coarse texture in winter with sparse branching when young, lacy texture when in leaf, yellow fall color, large, bluish-green leaves, ashy-gray, deeply furrowed bark with exfoliating plates, dioecious (separate male and female flowers produced on separate plants), females produce thick, sausage-like, pendulous pods, that can be a litter problem along with the leaf rachis in fall, adaptable to most soils and pH, slow to establish, tolerates compacted, heavy clay soil, salt, drought, periodic flooding, and urban conditions, no pests, can look a bit "gauntly" when young due to sparse branching

- 'Espresso': oval to vase-shaped form with arching branches, 50' tall, 35' wide, large, blue-green leaves, yellowish fall color, male, no pods, newer cultivar
- 'J.C. McDaniel' (Prairie Titan™): oval to vase-shaped form, 50' tall, 35' wide, large, blue-green leaves, yellowish fall color, male, no pods, newer cultivar

***Phellodendron amurense*** 'Macho': Macho Amur corktree, hardy to zone 3b, native to northern China and Japan, broadly vase-shape, upright form, 40' tall, 30' wide, ascending branches, thick, dark green leaves, yellowish-green fall color, male, no fruit, corky bark when older, adaptable to most soils and pH, slow to establish, urban tolerant, moderate salt tolerance, no pests, shallow roots, low branching, avoid female trees as they produce invasive seeds

***Quercus bicolor***: swamp white oak, hardy to zone 4a, native to eastern U.S. and Wisconsin, pyramidal when young, becoming broad, rounded, wide-spreading with age, 50-60' tall, 50-60' wide, slow to moderate growth rate, easier to transplant than bur oak, prefers acidic to neutral pH, but will tolerate a bit higher, but at very high pH, it will get chlorotic, adaptable to most soils including heavy clay, tolerant to wet soil, drought, and urban conditions

***Quercus macrocarpa***: bur oak, hardy to zone 3a, native to eastern and midwestern U.S. and Wisconsin, pyramidal when young, becoming very wide-spreading, rounded, 70-80' tall, 60-80' wide, slow growing, coarse texture, deeply furrowed bark, no fall color, adaptable to most soils and pH, drought and urban tolerant, difficult to transplant

***Quercus* × *macdenielli* 'Clemon's'**: Heritage<sup>®</sup> oak, hardy to zone 4, hybrid of *Q. robur* × *Q. macrocarpa*, broadly pyramidal becoming oval form, 60-80' tall, 40-50' wide, dark green, glossy leaves, no fall color, mildew resistant, vigorous, zone 4

***Quercus* × *schuettei***: swamp bur oak, hybrid of *Q. bicolor* × *Q. macrocarpa*, broad, rounded form, 75' tall, 70' wide, faster growing, better tolerance to high pH and easier to transplant, may be susceptible to leaf/twig galls, zone 3b

***Tilia americana***: American linden, basswood, hardy to zone 3a, native to northeast and central U.S., Canada, and Wisconsin, pyramidal when young becoming upright-oval with age, 60-80' tall, 40-50' wide, fragrant, pale yellow flowers in early summer, small nutlet fruit attached to bract, large, heart-shaped leaves, prefers a deep, fertile soil, pH adaptable, easy to transplant, tolerant to wetter soils, sensitive to salt and air pollution, susceptible to Japanese beetle, linden borer, gypsy moth, basal and stem rots, sunscald on bark, tends to sucker at base, can break in storms, prone to included bark formation and narrow, branch crotch angles, girdling roots

'Bailyard' (Front Yard<sup>®</sup>): broadly pyramidal when young becoming rounded and dense, symmetrical form, 60-75' tall, 40' wide

'Boulevard': narrowly pyramidal form, 50' tall, 25' wide, ascending branches, yellow fall color

'DTR 123' (Legend<sup>®</sup>): broadly pyramidal form, 40' tall, 30' wide, well-spaced branches, thicker leaves, single leader, yellow fall color

'Lincoln': pyramidal, compact, dense form, 40' tall, 25' wide, upright branches, dark green leaves, yellow fall color

'Mcksentry' (American Sentry<sup>™</sup>): symmetrical, pyramidal form with straight central leader, 45' tall, 30' wide, better branch angles, lighter gray bark, yellow fall color

***Tilia* 'Redmond'**: Redmond linden, hardy to zone 4, hybrid of *T. americana* × *T. × euchlora*, pyramidal to oval form, upright branches with terminal leader above the foliage, reddish stems and buds, can sucker at base, 50-70' tall, 30-40' wide, fragrant, pale yellow flowers in early summer, small nutlet fruit attached to bract, large, heart-shaped leaves

***Tilia tomentosa***: silver linden, hardy to zone 4b, native to southeastern Europe and western Asia, broad-pyramidal form becoming upright-oval, formal looking, dark green leaves with silvery-white undersides, pale yellow flowers in summer, small nutlet fruit attached to a bract, no fall color, prefers a deep, fertile soil, but is adaptable, pH adaptable, easy to transplant, more heat, drought, and urban tolerant than other lindens, does not tolerate poorly-drained, compacted soils, same pests as American linden

'PNI 6051' (Green Mountain<sup>®</sup>): broadly pyramidal to oval form, 50' tall, 35' wide, dark green leaves with silvery undersides, yellowish fall color, prone to included bark formation

'Wandell' (Sterling<sup>®</sup>): broadly pyramidal form, 45' tall, 35' wide, green leaves with silvery undersides, yellowish fall color, prone to included bark formation

***Ulmus americana***: American elm (DED resistant cultivars), hardy to zone 3a, native to eastern and central U.S., Canada and Wisconsin, all have vase-shaped form with pendulous branches, 70-80' tall, 60-70' wide, yellow fall color, adaptable to most soils and pH, tolerant to

compacted, heavy clay soils, easy to transplant, tolerant to periodic flooding, salt, urban, air pollution, and drought tolerant, pest prone

- 'New Harmony' (from U.S. National Arboretum): broad, vase-shaped form, arching branches, good form, easier to grow
- 'Belleville': (from Belleville Nursery) large, leathery leaves, vase-shaped form, more resistant to elm leaf beetle
- 'Valley Forge' (from U.S. National Arboretum): broad, vase-shaped form with arching branches, 70' tall, 70' wide, wild looking form and branching, vigorous, needs training

***Ulmus* hybrids:** hybrid elms, most are hardy to zone 4-5, all Dutch elm disease resistant, needs pruning in nursery to develop good form, adaptable to most soils and pH, tolerant to compacted, heavy clay soils, moderate salt tolerance, drought, urban, and air pollution tolerant

- 'Cathedral' (UW-Madison intro): hybrid of *U. japonica* × *U. pumila*, broadly vase-shaped, spreading form, 40-50' tall, 40-60' wide, prone to elm leaf beetle, zone 4
- 'Frontier' (from U.S. National Arboretum): hybrid of *U. carpinifolia* × *U. parvifolia*, broadly oval form, 35' tall, 25' wide, ascending branches, glossy, small, dark green, glossy leaves, late, burgundy fall color, can get elm leaf beetle, Zone 5
- 'Homestead' (from U.S. National Arboretum): hybrid of *U. pumila* × (*U.* × *hollandica* × *U. carpinifolia*), upright, narrow to oval form, 55' tall, 35' wide, upright, arching branches, prone to elm leaf beetle, fast growing, Zone 4b
- 'Morton' (Accolade<sup>®</sup>) (from Morton Arboretum): hybrid of *U. japonica* × *U. wilsoniana*, vase-shaped form with arching branches, 70' tall, 60' wide, resistant to elm leaf beetle, vigorous, resistant to elm leaf beetle, dark green, glossy leaves, zone 4
- 'Morton Glossy' (Triumph<sup>™</sup>) (from Morton Arboretum): hybrid of *U.* 'Morton Plainsman' × *U.* 'Morton', upright oval to vase-shape, 55' tall, 45' wide, very glossy, dark green leaves, good form, some elm leaf beetle, excellent drought tolerance, zone 4
- 'Morton Plainsman' (Vanguard<sup>™</sup>) (from Morton Arboretum): hybrid of *U. japonica* × *U. pumila*, rounded, vase-shaped form, 45' tall, 40' wide, glossy, dark green leaves, prone to elm leaf beetle, zone 4
- 'Morton Red Tip' (Danada Charm<sup>™</sup>) (from Morton Arboretum): complex hybrid of (*U. japonica* × *U. wilsoniana*) × *U. pumila* vase-shape form with arching branches, 70' tall, 60' wide, reddish new leaves, new leaves, prone to elm leaf beetle, zone 4
- 'Morton Stalwart' (Commendation<sup>™</sup>) (from Morton Arboretum): complex hybrid of *U.* 'Morton' × (*U. pumila* × *U. carpinifolia*), upright, oval form, 60' tall, 50' wide, zone 5
- 'New Horizon' (UW-Madison intro): hybrid of *U. japonica* × *U. pumila*, upright, compact form, 50' tall, 25' wide, dark green leaves, wide crotch angles, susceptible to verticillium wilt, zone 3b
- 'Patriot' (from U.S. National Arboretum): complex hybrid of *U. wilsoniana* × *U. pumila* × *U. carpinifolia* × *U. glabra*, stiffly upright branches, narrow, vase-shape form, 50' tall, 40' wide, dark green leaves, straight central leader, zone 5
- 'Pioneer' (from U.S. National Arboretum): hybrid of *U. glabra* × *U. carpinifolia*, rounded form, 50' tall, 50' wide, dark green, glossy leaves, prone to elm leaf beetle, zone 5
- 'Regal' (UW-Madison intro): complex hybrid of *U. carpinifolia* × (*U. pumila* × *U.* × *hollandica*), upright, pyramidal form, 50-60' tall, 30' wide, prone to double leaders and narrow crotches, stiff branches, zone 4

***Ulmus japonica* 'Discovery':** Discovery Japanese elm, hardy to zone 3, native to Japan and Asia, upright, vase-shape, compact form, 35-40' tall, 35-40' wide, resistant to DED and elm leaf beetle, yellow fall color

### **Small Sized Trees (suitable for growing under power lines)**

***Acer tataricum* subsp. *ginnala*:** Amur maple, Zone 3a, native to China, Manchuria, and Japan, very invasive, do not plant near any natural areas, multi-stemmed, rounded form, low branches, 15-18' tall and wide (smaller cultivars are available), dagger-shaped leaves, orange to bright red fall color, red samaras in summer turn brown in fall, adaptable to most soils and pH, easy to transplant, drought, salt, and urban tolerant, very susceptible to verticillium wilt

'Compactum' or 'Bailey Compact': dense, compact, rounded, shrubby form, 6-8' tall, 6-8' wide, slower grower, orange to scarlet fall color

'Embers': rounded form, 15-20' tall, 15' wide, bright red samaras, scarlet fall color

'Emerald Elf': compact, rounded, dense, shrubby form, 5-6' tall and wide, scarlet to purple fall color

'Flame': multi-stemmed, spreading, irregular form, 15-20' tall, 20-25' wide, bright orange-red to deep red fall color

'JFS-UGA' (Red November<sup>™</sup>): multi-stemmed, low, rounded form, 18' tall, 24' wide, later, bright red fall color, heat tolerant, Zone 5

***Amelanchier* × *grandiflora*:** apple serviceberry, hardy to zone 3a, native hybrid of downy and Allegheny serviceberry, multi or single-stemmed tree to large shrub, upright to irregular form, no suckers, 15-30' tall, 15-25' wide, produces bronze to purplish-red, fuzzy leaves in spring that turn smooth and green, white flowers in early spring, edible fruit in June, smooth, gray bark, yellowish-orange to red fall color, can develop chlorosis at high pH, prefers loamy soil, does poorly in poorly drained soils, difficult to transplant, plant in spring

'Autumn Brilliance': upright, spreading form, 20-25' tall, 15' wide, orange-red fall color, leaf spot resistant, multi-stemmed

'Cole's Select': upright, spreading form, 15-20' tall, 15' wide, multi-stemmed, orange-red fall color, leaf spot resistant, thicker, glossier leaf

'Forest Prince': oval form, 20' tall, 15' wide, red-orange fall color

'Princess Diana': wide spreading form, 15-20' tall, 15' wide, multi-stemmed, red-orange fall color, leaf spot resistant

'Robin Hill': upright, open form, 20-30' tall, 15-20' wide, flowers pink in bud open to pale pink fading to white, red fall color, single-stemmed

***Amelanchier laevis*:** Allegheny serviceberry, hardy to zone 4a, native to eastern and central U.S., Canada, and Wisconsin, upright form, single or multi-stemmed tree, 15-25' tall, 15-20' wide, can sucker, produces white flowers in early spring, bronze to purplish-red new leaves in spring that turn green, edible fruit in June, orange to reddish-bronze fall color, prefers moist, loamy soils, does poorly in poorly drained soils, difficult to transplant, plant in spring

'Cumulus<sup>®</sup>': upright, open form, 20-30' tall, 15' wide, orange-red fall color, minimal suckering, single-stemmed

'JFS-Arb' (Spring Flurry<sup>®</sup>): upright, oval form, 30-35' tall, 20' wide, orange fall color, single-stemmed, straight central leader, newer cultivar

'Rogers' (Lustre<sup>®</sup>): upright, open form, 20-30' tall, 15-20' wide, orange-red fall color, minimal suckering, single-stemmed

'Snowcloud': upright, oval form, 25' tall, 15' wide, scarlet fall color, single-stemmed

***Cornus mas*:** Corneliancherry dogwood (more of a boulevard tree), hardy to zone 4b, native to Europe and western Asia, bright yellow flowers in early spring, long lasting, fruit is in summer and is bright red changing to dark purple and becoming edible, but tart, adaptable to most soils, but prefers rich soils, pH adaptable, easy to transplant, tolerates partial shade, straight species is sensitive to drought, but cultivars are more tolerant, sensitive to salt, no pest problems, hardy to zone 4b

'Golden Glory': narrow, upright form, 20-25' tall, 10' wide, much better form and darker green, glossy, thicker leaves, more flowers and fruit, good substitute to invasive tall hedge buckthorn!

'Pyramidalis': upright, pyramidal to upright form, 20' tall, 10-15' wide, dark green leaves

***Crataegus crus-galli var. inermis***: thornless cockspur hawthorn, hardy to zone 4a, native to eastern and central U.S., Canada, and Wisconsin, multi-stemmed tree, broad, spreading, horizontal, low branches, flat-topped crown, 20-30' tall, 20-35' wide, adaptable to most soils and pH, difficult to transplant, plant in spring, drought, salt, and urban tolerant, susceptible to cedar quince rust (on fruit) or cedar hawthorn rust (leaves), this variety has no thorns, white flowers in late spring, deep red fruit in early to mid fall that drops creating a litter problem, bronzy-orange to reddish fall color, dark green, leathery, spoon-shaped leaves

'Cruzam' (Crusader<sup>®</sup>): rounded form, 15' tall, 15' wide, thornless, bright red fruit, orange fall color

***Crataegus phaenopyrum***: Washington hawthorn, hardy to zone 4b, native to eastern U.S. and Canada, multi-stemmed tree, vase-shaped to broadly oval form, horizontal, low branches, 20-30' tall, 20-25' wide, adaptable to most soils and pH, difficult to transplant, plant in spring, tolerant to poor, sandy soils, drought and urban tolerant, moderate salt tolerance, susceptible to cedar quince rust (on fruit) or cedar hawthorn rust (leaves), has long, sharp thorns, white flowers in late spring to early summer, showy, persistent, glossy, bright-orange-red fruit fall to winter

'Westwood I' (Washington Lustre<sup>®</sup>): rounded, upright form, 20-25' tall, 20-25' wide, has fewer thorns than species, vigorous

***Crataegus viridis*** '**Winter King**': Winter King hawthorn, hardy to 4b, native to eastern U.S., vase-shaped to rounded, wide-spreading form, horizontal, low branches, adaptable to most soils and pH, difficult to transplant, plant in spring, drought and urban tolerant, moderate salt tolerance, less susceptible to cedar hawthorn rust but can get cedar quince rust on fruit, white flowers in late spring, very showy, bright orange-red, persistent fruit from mid fall to winter, silvery-gray bark that exfoliates on the trunk revealing orange inner bark, has few if any thorns, yellowish-purple fall color

***Maackia amurensis***: Amur maackia, hardy to zone 4a, native to Manchuria, vase-shaped to rounded form, upright, arching branches, 20-30' tall, 20-30' wide, slow grower, silvery and fuzzy leaves in spring turn olive-green and smooth, coppery-green to bronzy-brown, slightly exfoliating bark, off-white flowers in summer, small pods in fall, tolerant to most soils and pH, roots fix atmospheric N, tolerant to poor, infertile soils, urban and salt tolerant, prone to included bark formation, needs pruning when young, no pests, not invasive

'Starburst': upright, vase-shaped form with rounded crown, 25-30' tall, 20' wide, dark green leaves

'Summertime<sup>®</sup>': upright, rounded form, 18-20' tall, 12-15' wide, white flowers in summer

***Malus spp.***: flowering crabapple, most are hardy to zone 4a and are hybrids with parents originating from Asia, Europe and U.S., size and form are quite variable, adaptable to most soils and pH, prefers low nitrogen to decrease disease susceptibility, drought and urban tolerant, apple scab resistant species and cultivars listed below and have smaller fruit, some cultivars prone to suckering and watersprouts on branches

White Flowers/Red Fruit

'Adirondack': narrow, upright form, 18' tall, 10' wide, persistent fruit  
 'Guinzam' (Guinevere<sup>®</sup>): rounded form, 8-10' tall, 10' wide, persistent fruit  
 'Jewelcole' (Red Jewel<sup>®</sup>): upright, pyramidal form, 15' tall, 12' wide, persistent fruit, can get fireblight  
 'Kinarzam' (King Arthur<sup>®</sup>): upright, rounded form, 12' tall, 10' wide, can sucker from base  
 'Sutyzam' (Sugar Tyme<sup>®</sup>): upright, spreading, oval form, 18' tall, 15' wide, persistent fruit  
Malus baccata 'Jackii': Jackii crabapple, hardy to zone 3, rounded form, 20' tall, 20' wide, glossy leaves, zone 3  
Malus sargentii: Sargent crabapple, low, spreading form, 8' tall, 12' wide, alternate bearing, persistent fruit  
     'Select A' (Firebird<sup>®</sup>): rounded, spreading form, 7' tall, 9' wide, persistent fruit, bears annually, persistent fruit  
     'Tina': small, rounded, dwarf form, 5' tall, 6' wide, slow growing  
Malus × zumi var. calocarpa: redbud crabapple, rounded, spreading form, 20' tall, 24' wide, persistent fruit

#### White Flowers/Yellow Fruit

'Bob White': dense, rounded form, 20' tall, 20' wide, persistent fruit, but is a watersprouter  
 'Cinzam' (Cinderella<sup>®</sup>): dwarf, rounded to upright form, 8' tall, 5' wide, persistent fruit  
 'Excizam' (Excalibur<sup>™</sup>): upright form, 10' tall, 8-10' wide, good form  
 'Hargozam' (Harvest Gold<sup>®</sup>): upright, oval form, 22' tall, 18' wide, persistent fruit, may get some scab  
 'Lanzam' (Lancelot<sup>®</sup>): compact, upright, dense form, 8-10' tall, 8' wide, persistent fruit  
 'Ormiston Roy': broad, rounded form, 20-25' tall, 25' wide, furrowed, orangish bark, yellow fruit with a rosy blush turn orange-brown after a hard frost

#### Pink or Reddish Flowers/Red to Purplish-Red Fruit

'Camzam' (Camelot<sup>™</sup>): rounded form, 10' tall, 8' wide, pinkish-white flowers, burgundy-green leaves, persistent fruit  
Malus sargentii 'Candy mint': low, spreading, horizontal form, 10' tall, 15' wide, purple tinted foliage becoming bronze-green  
 'Canterzam' (Canterbury<sup>™</sup>): rounded, compact form 10' tall, 8-10' wide, light, pinkish-white flowers  
 'Cardinal': irregular, spreading form, 16' tall, 22' wide, dark purplish-red, glossy leaves  
 'JFS-KW5' (Royal Raindrops<sup>®</sup>): upright, spreading form, 20' tall, 15' wide, cutleaf, purple leaves, orange-red fall color, persistent fruit  
 'Orange Crush': spreading form, 12-15' tall, 12-15' wide, bronze to purplish-green leaves  
 'Parsi' (Pink Princess<sup>®</sup>): low, spreading form, 8' tall, 12' wide, purple leaves become bronze-green  
 'Prairifire': upright, spreading to rounded form, 20' tall, 20' wide, slower growing, purple leaves become reddish-green  
 'Prairie Maid': rounded to spreading form, 20' tall, 25' wide, burgundy tinged leaves in spring, but is a watersprouter  
 'Purple Prince': rounded form, 20' tall, 20' wide, purple leaves become bronzish-green,  
 'Coral Cascade': semi-weeping form, 15' tall, 20' wide, white flowers, coral fruit,  
 'Louisa': graceful weeper, 15' tall, 15' wide, pink flowers, fruit are yellow turning orange-brown, not showy or persistent  
 'Luwick': graceful, low weeper, 7' tall, 14' wide, deep pink buds open to light pink to whitish flowers, bright red fruit  
 'Manbeck Weeper' (Anne E.<sup>®</sup>): wide spreading, horizontal weeper, 10-12' tall, 10-12' wide, white flowers, cherry-red fruit, persistent fruit, is difficult to find, but is one of the nicest crabs  
 'Molazam' (Molten Lava<sup>®</sup>): broadly weeping form, 14' tall, 20' wide, white flowers, bright red fruit

***Pyrus calleryana***: callery pear, hardy to zone 4b, native to China and Korea, upright, pyramidal to oval form, 25-35' tall, 20-30' wide, adaptable to most soils and pH, drought, urban, and salt tolerant, can get fireblight, fast grower, dark green, glossy, leathery leaves, late, reddish-orange to purple fall color, white flowers in mid spring, small, brown, rounded fruit

- Aristocrat<sup>®</sup>: pyramidal form with open branching, 35' tall, 25' wide, yellow to red fall color but is inconsistent for fall color, wider branch crotch angles
- 'Autumn Blaze': rounded form, 30' tall, 25' wide, earlier, bright red to purplish fall color, wide crotch angles, less prone to included bark formation
- 'Cambridge': upright, narrowly pyramidal form, 35' tall, 15' wide, bright orange fall color
- 'Capital': narrow, columnar form, 30' tall, 12' wide, reddish-purple fall color, susceptible to limb breakage in storms, susceptible to fireblight, zone 5
- 'Cleveland Select' or 'Glenn's Form' (Chanticleer<sup>®</sup>): formal, upright, narrowly pyramidal form, 25-30' tall, 15' wide, late orangish to reddish fall color, not as good as other cultivars for fall color, rarely produces fruit
- 'Redspire': pyramidal, dense, symmetrical form, 35' tall, 25' wide, yellow to reddish fall color or none at all, susceptible to fireblight, slower grower
- 'XP-005' (Trinity<sup>®</sup>): broadly oval to rounded form, 30' tall, 25' wide, glossy, lighter green leaves, orange-red fall color

***Syringa reticulata***: Japanese tree lilac, hardy to zone 3a, native to Japan and Manchuria, upright with a rounded to oval form, 20-25' tall, 15-20' wide, no fall color to yellowish, reddish-brown, shiny bark, creamy-white, large flowers in early summer that do not smell like lilacs but rather like a privet, tends to flower heavily every other year, adaptable to most soils and pH, easy to transplant, salt and urban tolerant, susceptible to bacterial blight and verticillium wilt, resistant to mildew

- 'Elliott' (Snowcap<sup>™</sup>): upright, more compact form, 15-20' tall 10-12' wide, uniform branching, thick, dark green leaves, good form
- 'Golden Eclipse': upright, compact form, 18-24' tall, 8-14' wide, new leaves in spring emerge green with a darker center, the edge of the leaf gradually turns bright gold with the dark green center remaining
- 'Ivory Silk': over used, upright, spreading becoming oval to rounded, 20' tall, 15' wide, susceptible to bacterial blight
- 'Summer Snow': broad, rounded, compact form, 20' tall, 15' wide, good form, glossy, dark green leaves
- 'Williamette' (Ivory Pillar<sup>™</sup>): upright, pyramidal, narrower form, 20-25' tall, 10-15' wide

# Attachment 3: Sources of Information

Additional sources of information include:

[www.emeraldashborer.wi.gov/](http://www.emeraldashborer.wi.gov/) - EAB portal for the state of Wisconsin

[www.emeraldashborer.info/](http://www.emeraldashborer.info/) - EAB web page administered by Michigan State University

[www.dnr.state.wi.us/org/land/Forestry/Ash/index.htm](http://www.dnr.state.wi.us/org/land/Forestry/Ash/index.htm) - WI-DNR EAB web site

[www.entomology.wisc.edu/emeraldashborer/](http://www.entomology.wisc.edu/emeraldashborer/) - UW-Extension, Dept of Entomology EAB website

[www.datcp.state.wi.us/arm/environment/insects/emerald-ash-borer/index.jsp](http://www.datcp.state.wi.us/arm/environment/insects/emerald-ash-borer/index.jsp) - WI DATCP EAB website

<http://dnr.wi.gov/forestry/uf/eab/> - EAB toolkit developed by the WI DNR

<http://dnr.wi.gov/forestry/fh/pdf/WIEABResponsePlan.pdf> - State of Wisconsin EAB response plan

[www.entomology.wisc.edu/emeraldashborer/](http://www.entomology.wisc.edu/emeraldashborer/) - University of Wisconsin Cooperative Extension Entomology website describing pesticide treatments for EAB

<http://dnr.wi.gov/forestry/UF/index.htm> - WI DNR tree planting guidelines

[www.woodindustry.forest.wisc.edu/apps/search.asp](http://www.woodindustry.forest.wisc.edu/apps/search.asp) - Wisconsin Primary Wood Using Facilities

**EAB HOTLINE 1-800-462-2803**

Village of Belleville EAB Readiness Plan  
Prepared by Bluestem Forestry Consulting Inc.  
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