

# Emerald Ash Borer Plan

City of West Fargo Forestry Department



Source: ArborDay.org

June 2019



## Acknowledgements

### **West Fargo Forestry Mission Statement**

Promote and maintain a safe, healthy, urban forest that enhances the visual and environmental quality of West Fargo through education and making the citizens aware of the importance of tree planting and proper maintenance.

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## Introduction



### History

First discovered in Michigan in 2002, the Emerald Ash Borer or EAB, is an invasive insect that attacks and kills all species of ash trees. The pest has been moving across the United States decimating tens of millions of ash trees and leaving cities unrecognizable. EAB is currently located in 35 states and will continue to spread. The pest is currently in the Twin Cities in Minnesota, Winnipeg in Manitoba and Sioux Falls in South Dakota. With interstates connecting West Fargo to all of these cities, it is expected to move into the region.

### Purpose

By implementing the provisions in this management program, the City of West Fargo is attempting to mitigate the disruption to its urban forest that can be caused by the infestation of the Emerald Ash Borer. Taking a proactive approach to this infestation enables the City of West Fargo to address public and private needs in an efficient and effective manner.

The City of West Fargo will attempt to distribute costs associated with certain and massive tree death, based on the history of EAB elsewhere in North America. The goal is to do this over a manageable time period and lessen the social and economic impact that an extensive loss would have on the quality of life in our community.

### Management Plan

A complete integrated pest management solution will be laid out in this document. It will include detection techniques, control measures, pesticide integration, management solutions, education and partnerships. It will also associate costs to the different treatment options available.

### SLAM Strategy

The SLAM strategy has been developed based on failures in the past, mainly with Dutch Elm Disease. The SLAM or **S**Low **A**sh **M**ortality strategy calls for sanitizing or removal of infested ash, suppressing EAB populations, slowing the spread of the infestation, and saving the healthy trees. The SLAM strategy is focused on buying time, by reducing EAB numbers and the growth of EAB populations to give the city time to manage existing ash populations.



# The Emerald Ash Borer (EAB)

*Agrilus planipennis* Fairmaire



Actual Size

## What is the Emerald Ash Borer or EAB?

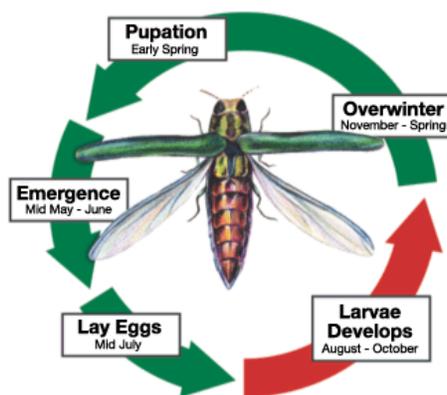
The Emerald Ash Borer is an invasive insect pest that attacks and kills all species of ash trees. The beetles are metallic green in color and have narrow, elongated bodies. Their heads are short and flat with large kidney shaped eyes. The Emerald Ash Borer is native to China and eastern Asia, and is believed to have arrived in the United States in wood packaging or crating material prior to 2002.

## How does EAB kill trees?

In the summer, the beetles lay their eggs on ash trees. Once the eggs hatch and become larvae, they tunnel under the bark to feed. The tunnels cut off the flow of water and precious nutrients needed for the tree to survive. This results in the tree's death after four to five years of decline.

## Biology

The Emerald Ash Borer generally has a one-year life cycle. Adult beetles begin emerging from ash trees from May to early June. The beetles remain active between mid-June and early July continuing into August. The beetle only typically lives for approximately 3 months, but in that 3 months females can lay more than 200 eggs. The eggs hatch in 7 to 10 days and the larvae starts the cycle over. After hatching, the larvae eat through the bark and into the phloem and cambial sections of the tree. They continue to feed for several weeks, creating s-shaped galleries, typically into fall. The larvae then overwinter in the outer sapwood or in the bark until they pupate in April or May. The adults then emerge through a D-shaped exit hole and continue spreading.



EAB Life Cycle

Source: treecarescience.com



Adult Beetles



Larvae & Gallery



Source: US Dept. of Ag.



## Ash Trees

### Ash Trees

The Emerald Ash Borer, obviously gets its name from the type of insect it is and the type of tree it affects. EAB will attack other species in its native Asia, but has only attacked ash and white fringe trees in North America. EAB prefers green and black ash species over white and blue ash species, however at this time all native ash species are at risk.

### The City of West Fargo

The City of West Fargo's urban forest is a tale of two cities when it comes to ash trees. The older part of West Fargo's urban forest is 44 percent ash trees while everything south of Interstate 94, which was developed after 2000, is only 4 percent ash trees. This makes the core part of town more susceptible to damage and will require the majority of the forestry department's focus.

### The Sheyenne River Corridor

The Sheyenne River corridor moves from the south end of West Fargo, through the city and out the north end. This corridor is composed primarily of ash trees, as well as several other native species. The North Dakota Forest Service estimates that 50 percent of those trees are ash. Most of the property adjacent to the corridor is privately owned and therefore the trees are privately maintained. One of the largest concerns over the removal of those trees along the river, is the destabilization of the riverbank. This will cause a large amount of bank erosion and sedimentation in the river, which can change the river's hydrology and negatively affect wildlife.

### West Fargo Parks

There are also many ash trees located in city parks that are the responsibility of the West Fargo Park District. The forestry department will work with park representatives to educate and train for EAB.



Source: heritagelawnskc.com



# The Value of Trees



## Ash Trees

Using the National Tree Benefit Calculator, the value of trees can be clearly seen. The decrease of trees will ultimately cause rising costs for homeowners and the City of West Fargo's public infrastructure. Below are the benefits of one Green Ash tree with a 10-inch diameter.



Source: National Tree Benefit Calculator

## Average Tree

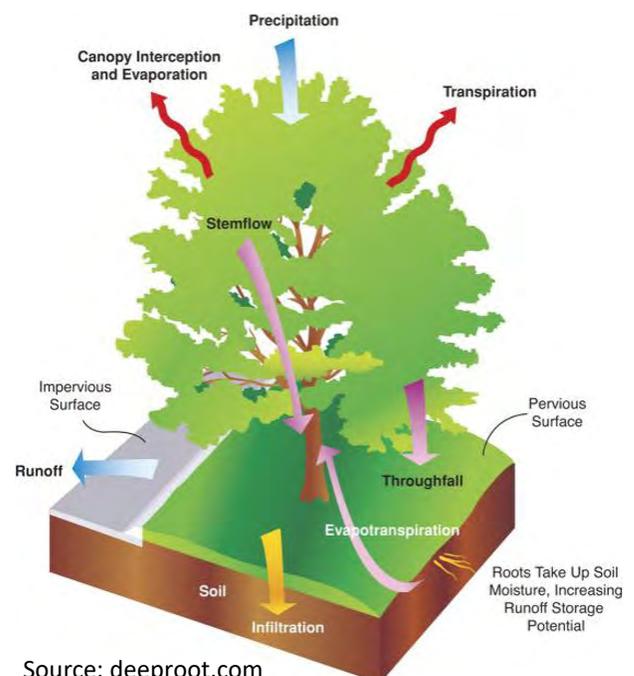
Besides the monetary value of the tree itself, most trees provide additional benefits. The average size Green Ash tree in West Fargo is a 10-inch diameter at breast height or DBH. This size tree located in our region of the country provides \$86 in overall benefits each year.

## Stormwater

That average tree also will intercept 751 gallons of stormwater runoff each year. Urban stormwater runoff washes chemicals and litter from surfaces such as roadways and parking lots into streams, wetlands, rivers and oceans. Drinking water, aquatic life and the health of our entire ecosystem can be adversely affected by this process. Trees act as mini-reservoirs, that control runoff at the source.

### Trees reduce runoff by:

1. Intercepting and holding rain on leaves, branches and bark
2. Increasing infiltration and storage of rainwater through the tree's root system
3. Reducing soil erosion by slowing rainfall before it strikes the soil



Source: deeproot.com



# The Value of Trees



## Property Value

Located in front of a single family home, a 10-inch diameter Green Ash will raise the property value by \$34 each year. Trees in front of single family homes have a greater property value benefit than those in front of multi-family homes, parks or commercial properties. Real estate agents have long known that trees can increase the "curb appeal" of properties thereby increasing sale prices. Research has verified this by showing that home buyers are willing to pay more for properties with ample trees versus few or no trees.

## Energy

A 10-inch diameter Green Ash will conserve 118 kilowatt hours of electricity for cooling and reduce the consumption of oil or natural gas by 16 therms. Strategically placed trees can also increase home energy efficiency.



Source: treesaregood.org

## Trees modify climate and conserve building energy use in three principal ways:

1. Shading reduces the amount of heat absorbed and stored by buildings.
2. Evapotranspiration converts liquid water to water vapor and cools the air by using solar energy that would otherwise result in heating of the air.
3. Tree canopies slow down winds thereby reducing the amount of heat lost from a home, especially where conductivity is high.

## Pavement

Without street trees the life of roadways is extensively shortened. The shade provided to asphalt and concrete roadways can extend the life by 40 to 60 percent.

## Air Quality

Air pollution is a serious health threat that causes asthma, coughing, headaches, respiratory and heart diseases, and cancer. We now know that the urban forest can mitigate the health effects of pollution by:

1. Absorbing pollutants like ozone, nitrogen dioxide and sulfur dioxide through leaves.
2. Intercepting particulate matter like dust, ash and smoke.
3. Lowering air temperatures which reduces the production of ozone.



# The Value of Trees

## High-Value Trees

The value of a tree is directly tied to the size of the tree. On the previous two pages, the values were calculated using the average size of a 10-inch diameter Green Ash. These values grow with the size of the tree, so the largest trees provide the most benefits.

Some of the largest Green Ash trees in West Fargo are around 32-inch DBH. These trees provide much more value, in regards to benefits. A 32-inch diameter Green Ash provides more than \$320 of benefits per year. Comparing the benefits of large trees versus average trees, it shows why the larger ash should be preserved.



A 32-inch DBH Green Ash

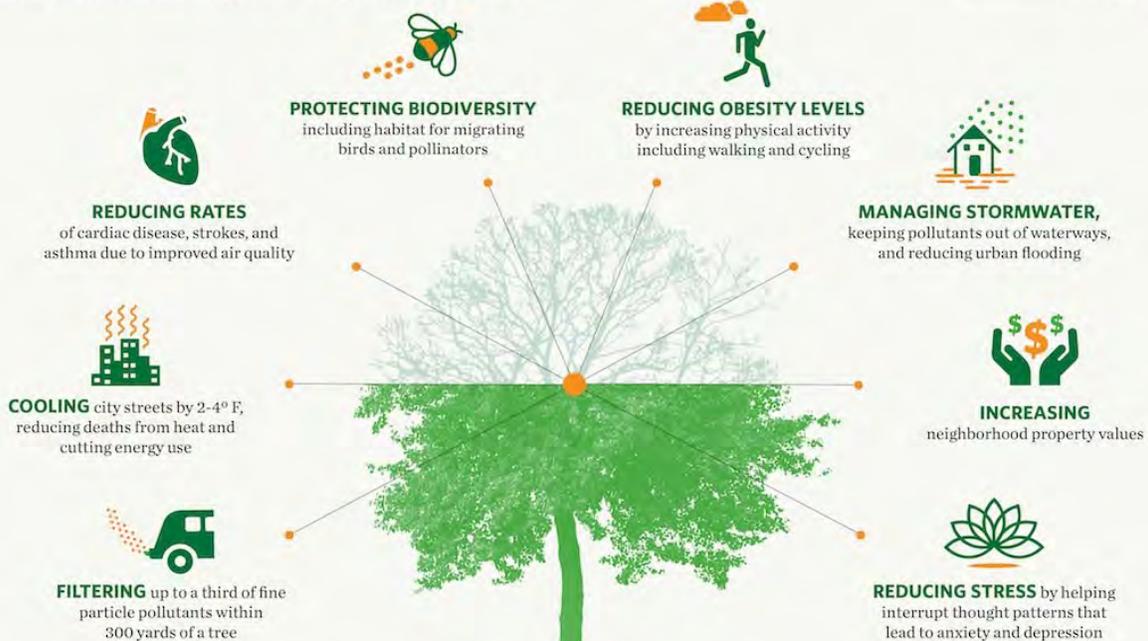


An average 10-inch DBH

Source: National Tree Benefit Calculator

## Benefits of Urban Trees

Research has linked the presence of urban trees to...



Source: The Nature Conservancy, [www.treeforcities.com](http://www.treeforcities.com)



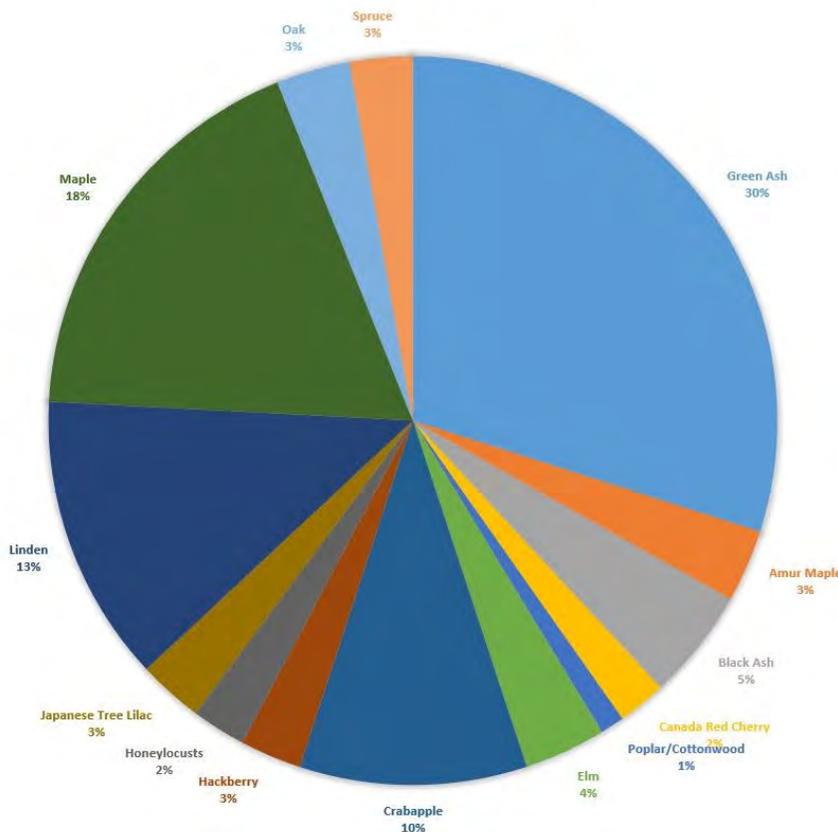
# Boulevard Tree Inventory



## Complete Inventory

The City of West Fargo's tree inventory is the most important tool in helping manage EAB and the city's ash trees. Keeping the inventory up to date and accurate will be an ongoing task for years to come, especially if/when EAB is detected. The first time a tree inventory was completed in the city was 2007, since then it has been updated more regularly and will continue to be updated annually. The city uses a combination of Geographical Information System (GIS) and Cartegraph, the City's asset management software, to manage the urban forest.

2017 TREE INVENTORY - 17,082 TREES



Name	Number of
Green Ash	4,866
Alder	9
Amur Chokecherry	157
Amur Maple	524
Black Ash	804
Boxelder	56
Canada Red Cherry	349
Corktree	7
Poplar/Cottonwood	174
Elm	590
Crabapple	1,639
Hackberry	443
Hawthorne	11
Honeylocusts	393
Ironwood	3
Japanese Tree Lilac	468
Kentucky	27
Linden	2,078
Maple	2,944
Mt. Ash	83
Oak	532
Other	336
Pine	67
Prairie Gem Pear	53
Shrub	7
Spruce	454

## Cartegraph

The city will use Cartegraph to inspect and rate all ash trees as part of this plan. The rating and inspection tasks in Cartegraph will determine which trees can be treated versus those that should be removed. The software will also track those treatments over time.

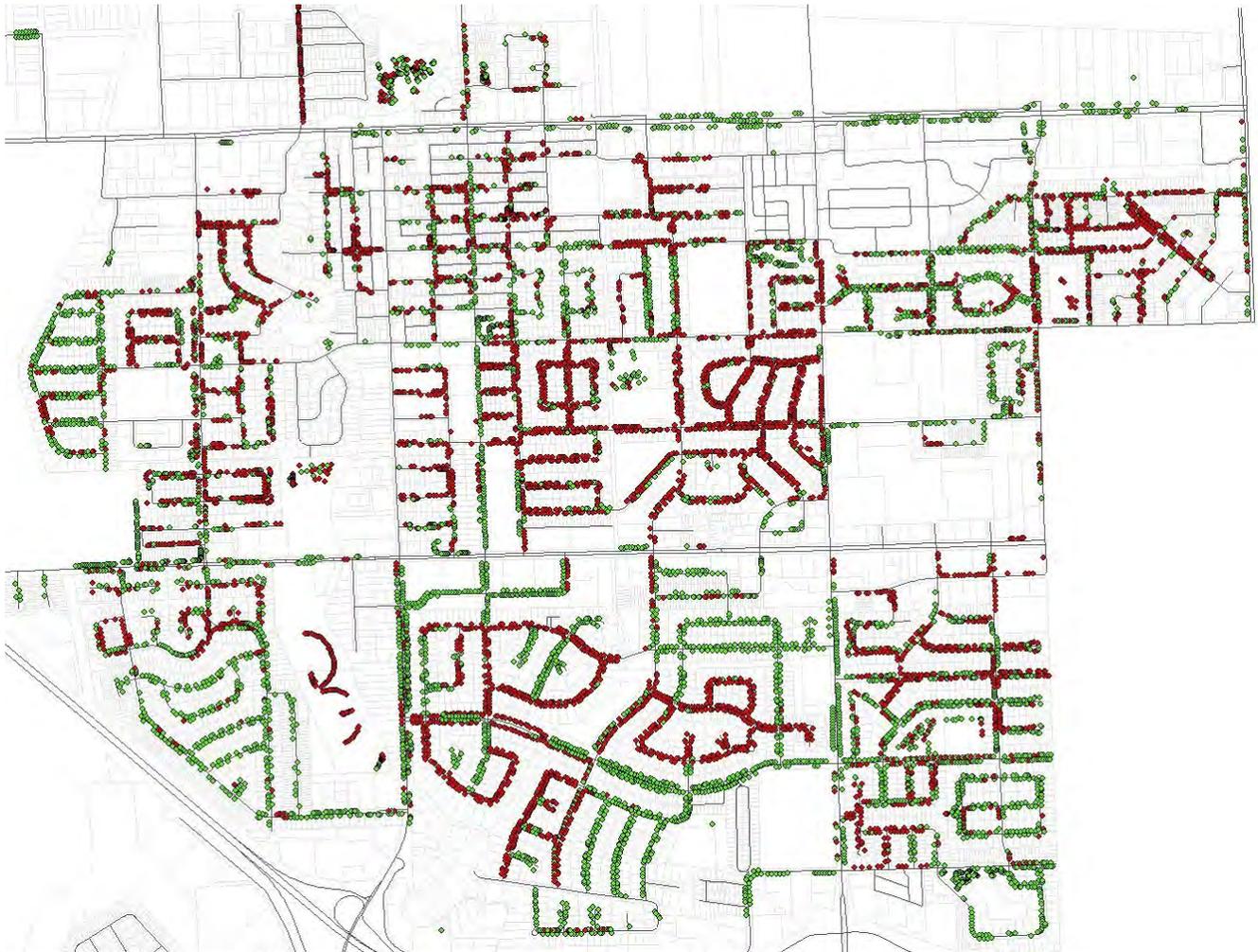


# Tree Inventory



## Current Ash Inventory

Currently most of the ash are located in the core part of the City of West Fargo. Of the 6,321 ash trees within the city, 5,425 are located north of Interstate 94. The below map shows the areas with the most ash trees, which are depicted in red. (See appendix 2 for full-size map)



## Ash Trees South of Interstate 94

Unlike the core part of West Fargo, the southern half was mainly developed after the EAB was detected in United States. Therefore, only about 200 green ash and 15 black ash are located in the southern half off the city. There is still a lot of private properties that contain ash along the river or within the private property. (See appendix 3 for map)



# Tree Inspections



## Cartegraph Inspections

To ensure consistency and uniformity, all West Fargo ash inspections will be documented in Cartegraph. They will be rated using the University of Purdue's Tree Appraisal Method, which is the standard in Cartegraph. The method examines health, location, size and species to determine a consistent tree rating.

## Location Details

The location details involves the landscape value of the site and placement of the tree on the property. It considers the location of the property, overall quality of the landscape, hardscape and related site factors. The "Site," "Contribution," and "Placement" ratings are valued between 1-100 based on site locations. (See below for full ratings chart)

Location Rating	Site Position	Site Contribution	Site Placement	Formula Values
Excellent	Arboretum	Air filtration	Specimen trees in a functional landscape design	90-100
	Well-maintained residential area	Water purification	Single, historic or specimen tree	
	Historical district	Noise abatement	Outstanding aesthetic value in the landscape	
	Designated parks and recreation areas	Erosion control		
Good	Suburban residential areas	Windbreaks	Considerable element in the landscape for design quality or function	75-90
	Golf course	Shade/cooling effects	Plants in a windbreak, screen or other integral planting	
	School/corporate campus	Specific plant aesthetic factors	Planting allows maximum functional benefits	
	Green spaces/memorials	Structural accents		
	Cemetery			
Fair	City streets/boulevards	Framing views	Well-spaced planting site	50-75
	Rural residential areas	Space definition	Tree installation in planting pits or lawn strips	
	Urban streets	Privacy	Mass, unplanned plantings on a site	
	Industrial/commercial areas			
Poor	Streets/roadways in rural areas	Traffic management	Trees with utility interaction	30-50
	Woodlots, managed	Create vistas	Improper spacing with infrastructure conflicts	
	Freeways/interstates	Screening	Species with fruit or leaf litter issues	
	Countryside, naturally occurring woodlands		Invasive species	
	Woodlots, unmanaged			

Source: Purdue Univ. - tree appraisal



# Tree Inspections

## Condition Details

The condition details section of the inspection looks at the tree's structural integrity and health at the time of the inspection. Subcategories are rated on a scale from 1 to 4 and an overall condition rating is automatically calculated. Its current existing condition is what is rated and can be subjective. The chart shown below is meant to standardize the conditions/ratings.

Condition Rating	Tree Structure Consider root condition/formation, trunk condition and branch assembly and arrangement	Tree Health Consider crown indicators including vigor, density, leaf size, quality and stem shoot extensions	Formula Values
Excellent	Root plate undisturbed and clear of any obstructions. Root flare has normal development. No visible trunk defects or cavities. Branch spacing/structure and attachments are free of any defects.	Perfect specimen with excellent form and vigor, well-balanced crown. Trunk is sound and solid. No apparent pest problems. Normal to exceeding shoot length on new growth. Leaf size and color normal. Exceptional life expectancy for the species.	4
Good	Root plate appears normal; only minor damage may be found. Possible signs of root dysfunction around trunk flare. Minor trunk defects from previous injury, with good closure; less than 25% of bark section missing. Good branch habit, minor dieback with some signs of previous pruning. Codominant stem formation may be present. Minor corrections required.	Imperfect canopy density in few parts of the tree, 10% or less, lacking natural symmetry. Less than half normal growth rate and minor deficiency in leaf development. Few pest issues or damage, controllable. Normal branch and stem development with healthy growth. Typical life expectancy for the species.	3
Fair	Root plate reveals previous damage or disturbance and dysfunctional roots may be visible around main stem. Evidence of trunk damage or cavities with decay or defects present. Less than 30% of bark sections missing on trunk. Codominant stems are present. Branching habit and attachments indicate poor pruning or damage, which requires moderate corrections.	Crown decline and dieback up to 30% of the canopy. Overall poor symmetry. Leaf color somewhat chlorotic with smaller leaves. Shoot extensions indicate some stunting and stressed growing conditions. Obvious signs of pest problems contributing to lesser condition. Some decay areas found in main stem and branches. Below average life expectancy.	2
Poor	Root plate disturbance and defects indicate major damage with girdling roots around the trunk flare. Trunk reveals more than 50% of bark section missing. Branch structure has poor attachments, with several structurally important dead or broken. Canopy reveals signs of severe damage or topping, with major corrective actions required.	Lacking full crown, more than 50% decline and dieback, especially affecting larger branches. Stunting obvious with little evidence of growth on smaller stems. Leaf size and color reveals overall stress in the plant. Insect or disease infestation may be severe. Extensive decay or hollow. Life expectancy is low.	1

Source: Purdue Univ. - tree appraisal

## Condition Categories

The condition categories that are also collected include a 5-star rating system for foliage and trunks.

## Species and Size Rating

The species rating is predefined in the Cartegraph tree library and automatically assigned to the tree. The DBH is the only measurement required.



## Ash Management Policy

### SLAM Strategy

When EAB is detected within the City of West Fargo, the SLAM strategy will be implemented. This calls for the treatment of the healthiest trees, removal of the deficient trees and trying to slow the spread of the pest within the city.

### Diversity

Until EAB is detected, one of the city's main goals is to increase diversity in the core part of West Fargo where a majority of the ash are located. Trying to plant as many trees in that area as we can right now will ensure trees will remain and continue to provide benefits as ash are being removed and replaced. Trying to "fill in the gaps" is a strategy the forestry department has been using for three years now.

### Treatment

Using Cartegraph, the city will inspect all ash trees within city limits. The inspection will then give each tree a star-based rating. The forestry department will use these ratings to determine if treatment is a viable option for each tree.

### Goals

1. Inspect all existing city-owned ash trees using Cartegraph to track ratings
2. Increase diversity on boulevards by "filling in the gaps" with alternate species in core part of town
3. Preserve highest rated ash trees with treatment
4. Removal of lowest rated ash trees
5. Slow the natural spread of the pest with early detection, trap trees and responsive removals
6. Control city costs with the help of this plan, annual assessments and budgeting
7. Managing debris with a combination of private and public trees being removed at the same time
8. Outreach to help in educate West Fargo residents about the pest and treatments



# Firewood Management



## Spread

Firewood is how the pest will move into the state and/or area. The USDA, along with state agencies, impose quarantines in areas that EAB has been found. This quarantine restricts anyone from moving firewood out of the region or county.

## Education Pre EAB

Education of residents, before EAB is discovered, may in fact slow and/or prevent the spread of the pest into the region. A public education campaign on firewood before the bug arrives is recommended. Working with social media and distributing factsheets can be easily accomplished.

## Education Post EAB

Education of residents, after EAB is discovered, will focus on proper disposal of infested wood. Proper firewood quarantine protocols will be enforced and proper information presented to residents.

## City Management

After EAB is discovered, the amount of trees infested and removed each year will also exceed the space the city has for storage, chipping and branch collection. Limiting the number of trees removed each year will help manage storage space. One of our primary ash management goals, is to minimize the effect of debris management. Current city staffing and equipment is not adequate to handle this volume of debris.



# Firewood ALERT

Help stop the spread of exotic pests

**DON'T BRING FIREWOOD INTO NORTH DAKOTA!**

Exotic insects like Emerald Ash Borer are a major threat to North Dakota's trees. Such pests are easily spread to new areas when infested firewood is brought from other states.

If you or someone you know is planning a trip to North Dakota:

- Don't bring firewood from out-of-state
- Use North Dakota sources of firewood



Emerald ash borer is spread to new areas by infested firewood.



The aftermath of the Emerald ash borer: trees killed in Michigan.

If you have already brought firewood into the state, do not leave it or take it with you – **BURN IT IMMEDIATELY!**

### For More Information Contact:

North Dakota Department of Agriculture • (701) 239-7295  
North Dakota Forest Service • (701) 231-5138  
USDA APHIS Plant Protection and Quarantine • (701) 250-4473

Produced by the North Dakota Department of Agriculture, North Dakota Forest Service, North Dakota State University, USDA APHIS, and USDA Forest Service





## Urban Forestry Ordinance 3-02



### Current Ordinance

The current Urban Forestry Ordinance requires West Fargo residents to plant, maintain and remove any boulevard trees adjacent to their property. This would put the costs associated with removing EAB infected trees onto the homeowners and residents of West Fargo. With around 5,700 ash trees on 2,900 properties, those properties would average \$2,940 to \$4,900 in removal costs per property.

### Urban Forestry Committee

The West Fargo Urban Forestry Ordinance does allow the Urban Forestry Committee to declare diseases/pests as a nuisance. Once EAB is detected in our region, the committee will declare ash trees infested with the bug as nuisance trees. These trees will be required to be removed by the property owner.

### Partnerships

The City of West Fargo will partner with other government agencies to ensure proper protocols are followed and that proper information will be given to the public. The ND Forest Service and the ND Department of Agriculture will be helpful partners in public education and outreach to the public and requirements for quarantine protocols. These protocols and/or regulations may supersede city ordinance.



### Access

One of the most important aspects of the ordinance is the access it allows the department for inspections and management of urban trees. Ordinance 3-0205 states that once declared a nuisance, city staff may enter upon private property at any reasonable time for the purpose of determining whether or not a nuisance exists, or for the abatement of a nuisance if it exists. Being able to enter private property, early in the infestation, will be critical in helping slow the spread and get infected trees taken down.



## Monitoring & Early Detection

### Early Detection

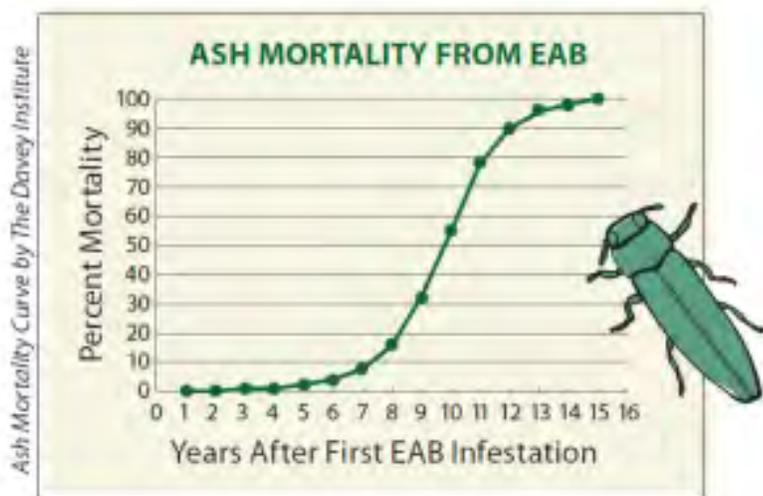
Early detection of the pest when it arrives will be critical for developing a timeline for the trees receiving treatment. Typically most ash trees won't die until four or five years after being infested.

### Partnerships

One of the most valuable tools in early detection is partnering with residents and tree services. Providing residents with some basic EAB knowledge will allow them to contact the forestry department should they notice some of the telltale signs. Tree services that are brought in to remove private or public trees will be one of the first detectors that will see the damage and/or the pest. Since these tree services are hired to remove dead/dying trees, any dead or dying ash tree has the potential for an inspection. The City of West Fargo is currently working with the ND Department of Agriculture to place EAB traps around the city. These traps will be able to catch the pest when it first arrives.

### Residents

The City of West Fargo will work with our Communications Director to create a factsheet that shows homeowners the telltale signs to look for. This fact sheet will be included in utility bills to ensure all residents receive it.



Ash Mortality Curve



An EAB trap in West Fargo

Source: American Tree Experts, [www.atetreecare.com](http://www.atetreecare.com)



# Education and Outreach



## Fact Sheet

One major way that the forestry department gets information out is through the use of fact sheets in utility bills. These fact sheets reach every resident with paper or paperless billing, and are relatively inexpensive to create and distribute. Working with the City’s Communication Director, the fact sheet will best address early detection and signs that EAB may be present in a tree. It will also provide the contact information for the department if a resident suspects an infested tree or finds the pest.



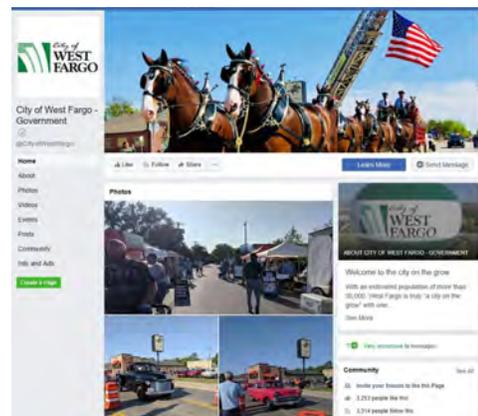
Example of Forestry Factsheet

## Social Media and Online Outreach

The City of West Fargo will use its social media accounts and website to get the most relevant information out to the public as it is needed. Again working with our Communications Director will be a key to a successful outreach campaign. The use of social media will reach a different demographic and allows for responses and questions.



City of West Fargo Website



City of West Fargo Facebook

## After Detection

Once EAB has been discovered in West Fargo, another fact sheet with treatment options will be distributed to residents. This will allow residents to have relevant information for any trees on private property, as well as boulevard trees. This fact sheet will also include information for residents that live along the river on how to prevent erosion should they need to remove trees along the riverbank.



## Budgeting and Funding

### **ND TIP Tool**

Using the ND Forest Service EAB TIP tool the costs can be estimated. Since the first trees infected with EAB die within four to five years of infestation, the costs of a complete removal of ash trees as they succumb to EAB would be \$1,143,995 over a 10-year period. This would average out to approximately \$114,400 per year for removal costs of 550 ash trees per year. Currently those removal costs will be the responsibility of the resident or adjacent property owner. This does not take into account any of the costs on private property.

### **Special Assessment**

The ND Century Code does allow for the City of West Fargo to create special assessment districts for boulevard improvements. This option would be one way to handle the removal costs of dead trees and the replanting of new trees. This option would put the costs onto the residents of the City of West Fargo, but the work could be contracted out to allow city staff to conduct normal forestry operations.

### **Utility Billing**

Another option that has been discussed for several years is that the City of West Fargo would take over maintenance of boulevard trees. This would require a funding source to be set for the budget. The most common and easiest option would be a monthly utility fee. This would allow the forestry department to hire the staff and purchase the equipment needed to handle the workload of EAB.

### **Capital Improvements**

Another option that is available is the use of a capital improvement project. This would be a one-time funding source for the project, that could cover all city ash tree removal and replacement costs associated with EAB. This would more than likely require the removal and replacement of all ash trees at one time, which would have the most dramatic change and loss of tree benefits.



## Treatment



### Effectiveness

The most current information on EAB and ash treatment, concludes that ash trees can be effectively protected from the Emerald Ash Borer. Numerous insecticide products are available and have several treatment methods. The trees that provide the most benefit to residents and city utilities would be candidates for treatment and a staged removal plan. These treatments are registered pesticides and should be done only by trained professionals with pesticide certification in the state of North Dakota.

### Treatment Options

1. The first option is a soil drench/soil injection application. These treatments should be applied in April/May for the same-year protection. They also can be done in fall after the leaves drop for the following year's treatment. The soil drench and injection application have to be re-applied annually, which makes this a very work-intensive treatment.
2. The second option is a tree injection with insecticides. This involves drilling into the tree and applying an insecticide directly into the tree. This treatment method does take longer than soil drenching or injections, but lasts two years, instead of an annual treatment.
3. The last type is a systemic bark spray application. This requires the spraying of the bark from the ground to 5 feet up the trunk. This treatment is also required annually and care must be taken to minimize drift.



1



2



3

Source: Rainbow Treecare



# Treatment

Product Trade Name	Active Ingredient	Application Method
<b>Xytect</b>	imidacloprid	soil injection soil drench
<b>TREE-äge</b>	emamectin benzoate	tree injection
<b>Transtect</b>	dinotefuran	soil injection soil drench systemic bark spray

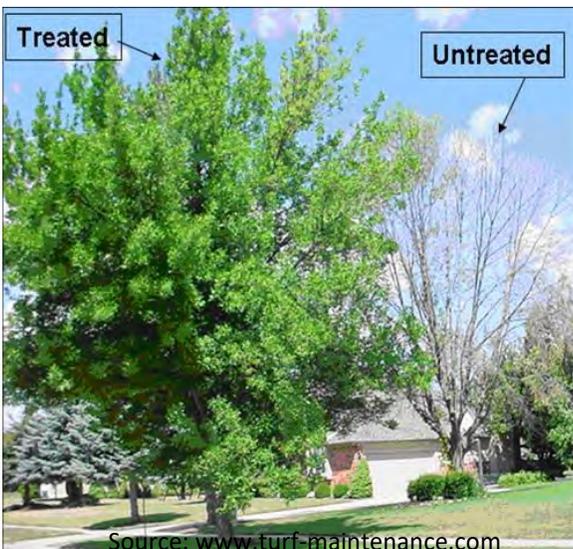
Source: Rainbow Treecare

## Preferred Treatment Method

After evaluating all treatment methods and researching other municipalities, West Fargo’s preferred method of treatment is a tree injection. With the two-year treatment timeframe, it would better allow West Fargo Forestry Staff to treat more trees annually. The tree injection method uses the product TREE-äge®, which is the only product that provides more than one year of protection. Tree injection applications minimize applicator exposure to the chemical and reduces exposure to any environmentally sensitive areas, such as along water. Early-May to mid-June is the optimal time for treatment, however TREE-äge can be effectively applied throughout the growing season.

## Costs

Removal and replacement costs vary depending on whether or not the work is being contracted or done in-house. With West Fargo’s average size ash tree at around 10-inch DBH, this costs approximately \$600 for a contractor to remove and replace the average tree. To treat a 10-inch diameter tree with a tree injection it is approximately \$20 for two years of treatment. This means that an average size West Fargo ash could be treated for 60 years before treatment costs would reach removal/replacement costs. It also is recommended that tree pesticide applications are done in-house, as contractors typically charge three to five times what in-house costs are. However, this is only if the City of West Fargo would take over maintenance of boulevard trees. If this is not done, the City would leave the treatment options open to the homeowner, however it be would recommended that high value trees get treatment.



Source: www.turf-maintenance.com

Product	Application Method	Average Time to Treat a Legacy Tree	Application Timing	Retreatment Period
<b>Xytect</b>	soil injection soil drench	4 minutes	Spring or Fall	Annually
<b>TREE-äge</b>	tree injection	20 minutes	Growing Season	Every 2 years
<b>Transtect</b>	soil injection soil drench systemic bark spray	4 minutes 3 minutes	Spring Spring	Annually

Product Trade Name	In-house Treatment Cost	Removal Costs without Stump Removal	Removal Costs with Stump Removal	Average Replacement and Replanting
<b>Xytect</b>	\$20.00	\$420	\$495	\$200
<b>TREE-äge</b>	\$62.40**			
<b>Transtect</b>	\$35.00			

\* Product costs in this document are based on 2010 market prices. Contact Rainbow for the most recent prices. Removal costs based on average bid prices for removing boulevard trees in upper Midwest municipalities.  
\*\*TREE-äge is applied every two years.

Source: Rainbow Treecare



# Replacement Trees



## Staging

The City of West Fargo would like to start staging replacement trees before the Emerald Ash Borer is detected. This will ensure years of growth on newer trees and will start receiving some benefit from those trees before EAB reaches the city. This will also ensure that not all boulevard tree benefits are lost at the same time. Selectively removing the lesser quality ash and replacing them with more diverse species will improve the health of the urban forest greatly.

Existing Trees

Year One

Year Two



Legend: Existing Trees ● Removals ✕ New Trees ● ● ● ● ●



# Replacement Trees



## Filling in the Gaps

The same strategy used to replace ash trees can be used to fill in the gaps without any removals. By filling in the gaps, or planting trees where there is room, the Forestry Department can begin starting the new growth on young trees. This will allow residents to still receive the benefits of the tree, with new tree growth starting, while the existing trees are still in place. This has been the strategy for the past five years and will continue moving forward.

Year Three

Year Four

Year Five



Legend: Existing Trees ● Removals ✕ New Trees ● ● ● ● ●



## Current/Base Scenario



### Management

If the Emerald Ash Borer shows up today and the existing program would remain in place, the planning, management, cost and removal of those affected trees would be put on the responsibility of the homeowner. The City, however, would be responsible for making sure any nuisance trees are removed in a timely manner.

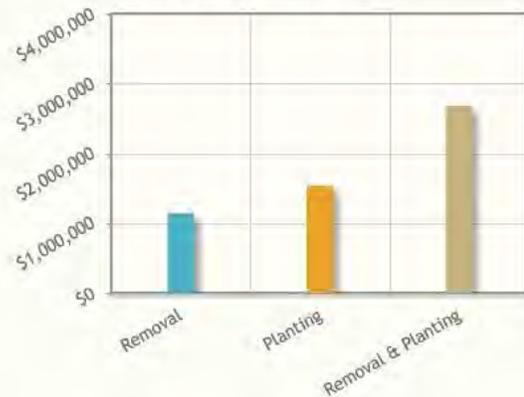
### Costs

Using the ND Forest Service TIP Tool, it is estimated that the total cost for removal and replacement of *just* the boulevard ash trees would be \$2,681,645. This includes an annual cost of \$114,399.50 for the removal of affected trees and \$153,765 for the replacement of those removed trees. These are in-house forestry costs, contractor's cost can be 3 to 5 times the price of internal costs.

#### Summary

Filter (If Applicable)	
Timespan (yr)	10
Total Trees Removed	5,695
Total Removal Cost	\$1,143,995.00
Total Planting Cost	\$1,537,650.00
Total Removal + Planting Cost	\$2,681,645.00

Total Cost by Management Activity



#### Removal Costs

Total Trees Removed	5,695
Removal Cost per Year	\$114,399.50
Total Removal Cost	\$1,143,995.00

Tree Summary			
DBH	Count	\$/Tree	Cost (\$)
<3"	952	45	42,840.00
3"-6"	1,055	85	89,675.00
6"-12"	1,947	195	379,665.00
12"-18"	1,336	325	434,200.00
18"-24"	359	465	166,935.00
24"-30"	41	630	25,830.00
>30"	5	970	4,850.00

#### Planting Costs

Planting Cost (\$/Tree)	\$270.00
% Removals to Replant	100%
Total Trees to Plant	5,695
Total Cost per Year	\$153,765.00
Total Planting Cost	\$1,537,650.00

Source: ND Forest Service, ND TIP Tool



# SLAM Scenario



## SLAM Strategy

The SLAM Strategy uses the tactics of treating of healthy trees, removing affected trees and suppressing the Emerald Ash Borer. This strategy will only be effective if the City of West Fargo assumes control of the boulevard trees.

## Treatment

Using the SLAM Strategy and treating the top 10 percent of healthy trees will allow the City of West Fargo to continue receiving benefits from those trees during the infestation. Ultimately, this will buy time until they impacted trees have to be removed and provide some benefit.



**Treatment Costs** ?

Timespan (yr)	10
Insecticide Cost (\$/DBH) ?	\$3.00
Frequency (yr) ?	2
Total Applications ?	5
Total Trees Treated ?	562
Treatment Cost per Application	\$33,603.00
Total Treatment Cost ?	\$168,015.00

## Removal of Low-Quality Ash Trees

The SLAM Strategy also calls for the removal and replacement of smaller ash trees and/or those ash trees with poor health. This can be done prior to the emergence of EAB as well.

**Summary**

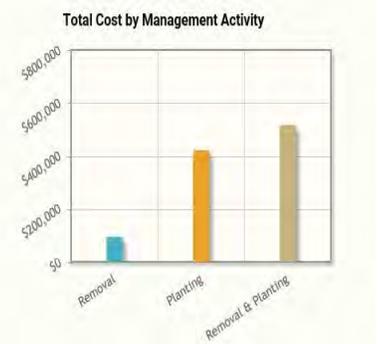
Filter (If Applicable)	
Timespan (yr)	5
Total Trees Removed	1,564
Total Removal Cost	\$94,860.00
Total Planting Cost	\$422,280.00
Total Removal + Planting Cost	\$517,140.00

**Removal Costs**

Total Trees Removed	1,564
Removal Cost per Year	\$18,972.00
Total Removal Cost	\$94,860.00

**Tree Summary**

DBH	Count	\$/Tree	Cost (\$)
<3"	952	45	42,840.00
3"-6"	612	85	52,020.00
6"-12"	0	195	0.00
12"-18"	0	325	0.00
18"-24"	0	465	0.00
24"-30"	0	630	0.00
>30"	0	970	0.00



Source: ND Forest Service, ND TIP Tool



## Summary



In closing, the Emerald Ash Borer will change the landscape of West Fargo's urban forest permanently. The pest will destroy a majority of the canopy cover for the core part of West Fargo. Along with the loss of the trees, residents will lose many of the benefits the trees provided. The loss of street trees will affect everything from their property value, personal budgets, to their quality of life.

The City of West Fargo Public Works Department will also see increased operating costs as benefits from the trees are lost. There will be an increase in costs of stormwater management as less rainwater gets intercepted by the trees. The costs of pumping more stormwater and having less retention in the ponds will affect the way the budget and ponds are operated/maintained. Roads that used to have shade and be protected from the heating and cooling of the day, have the potential to shorten their lifespans by 40 to 60 percent, causing an increase to the street repair/replacement budget.

The Sheyenne River will be greatly affected by the loss of trees along its corridor and for the stabilization they provide for its banks. The loss of more than half the trees along the river corridor will cause increased erosion and sloughing. The loss of wildlife habitat will also alter the ecosystem along the river. The quality of water in the river will also be degraded as erosion increases.

Once detected in West Fargo, the Emerald Ash Borer will cause devastation to the urban forest and everything that trees affect. The consistent statement from those cities that have dealt with Emerald Ash Borer is...

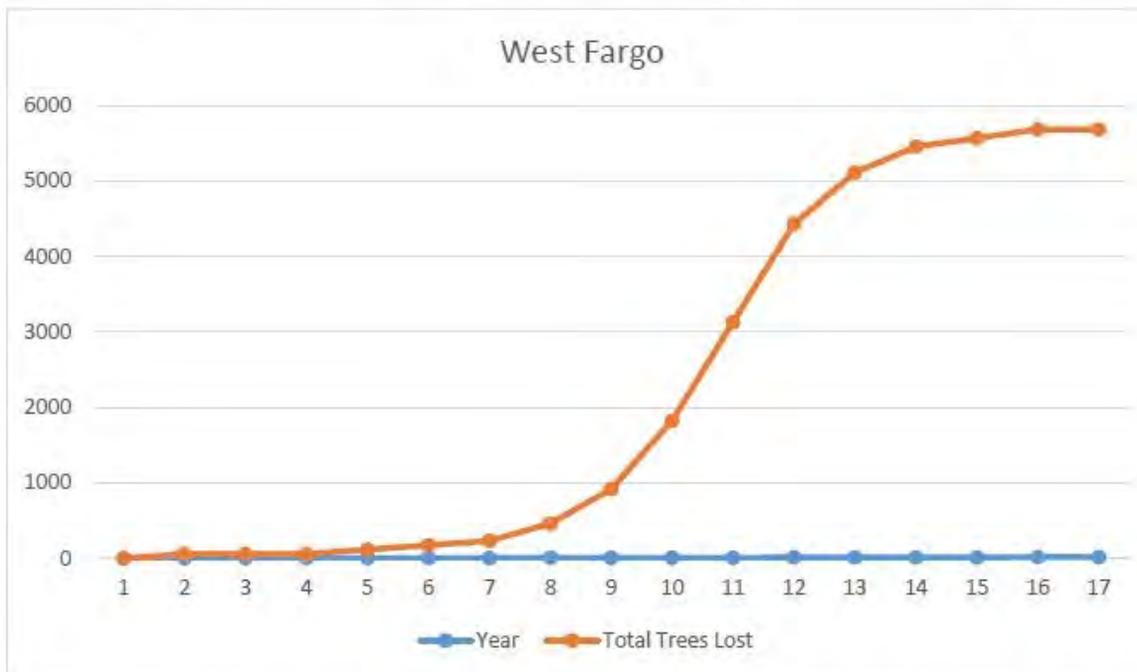
**“it will hit you like a freight train”**

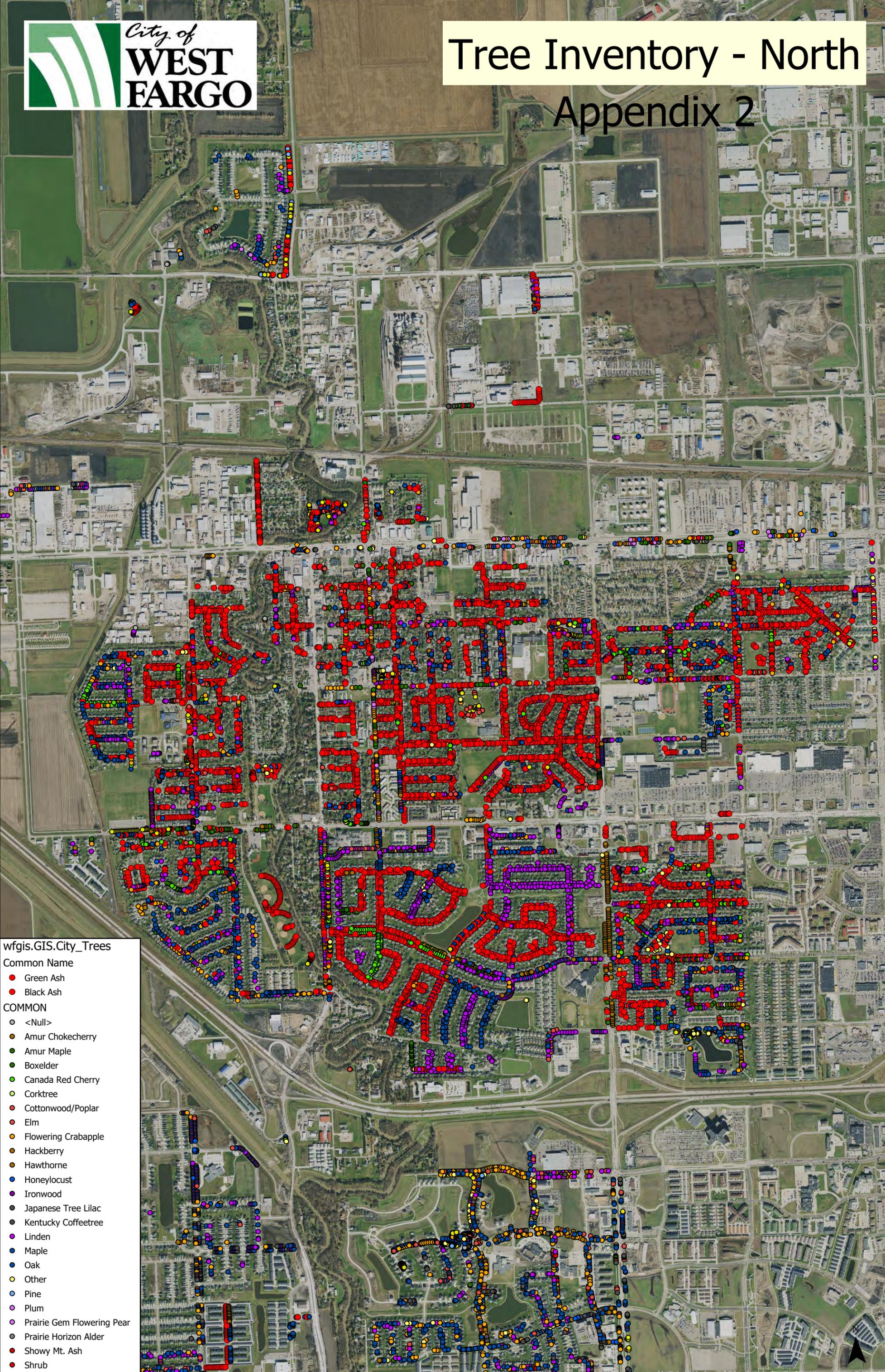


# Appendix 1

## EAB Mortality Curve Applied to West Fargo Tree Inventory

Year	Percentage	Total Trees Lost	Yearly Trees Lost
0	0	0	0
1	1	57	0
2	1	57	0
3	1	57	57
4	2	113	56
5	3	170	57
6	4	227	57
7	8	454	227
8	16	907	453
9	32	1814	907
10	55	3119	1305
11	78	4423	1304
12	90	5103	680
13	96	5443	340
14	98	5557	114
15	100	5670	113
16	100	5670	0

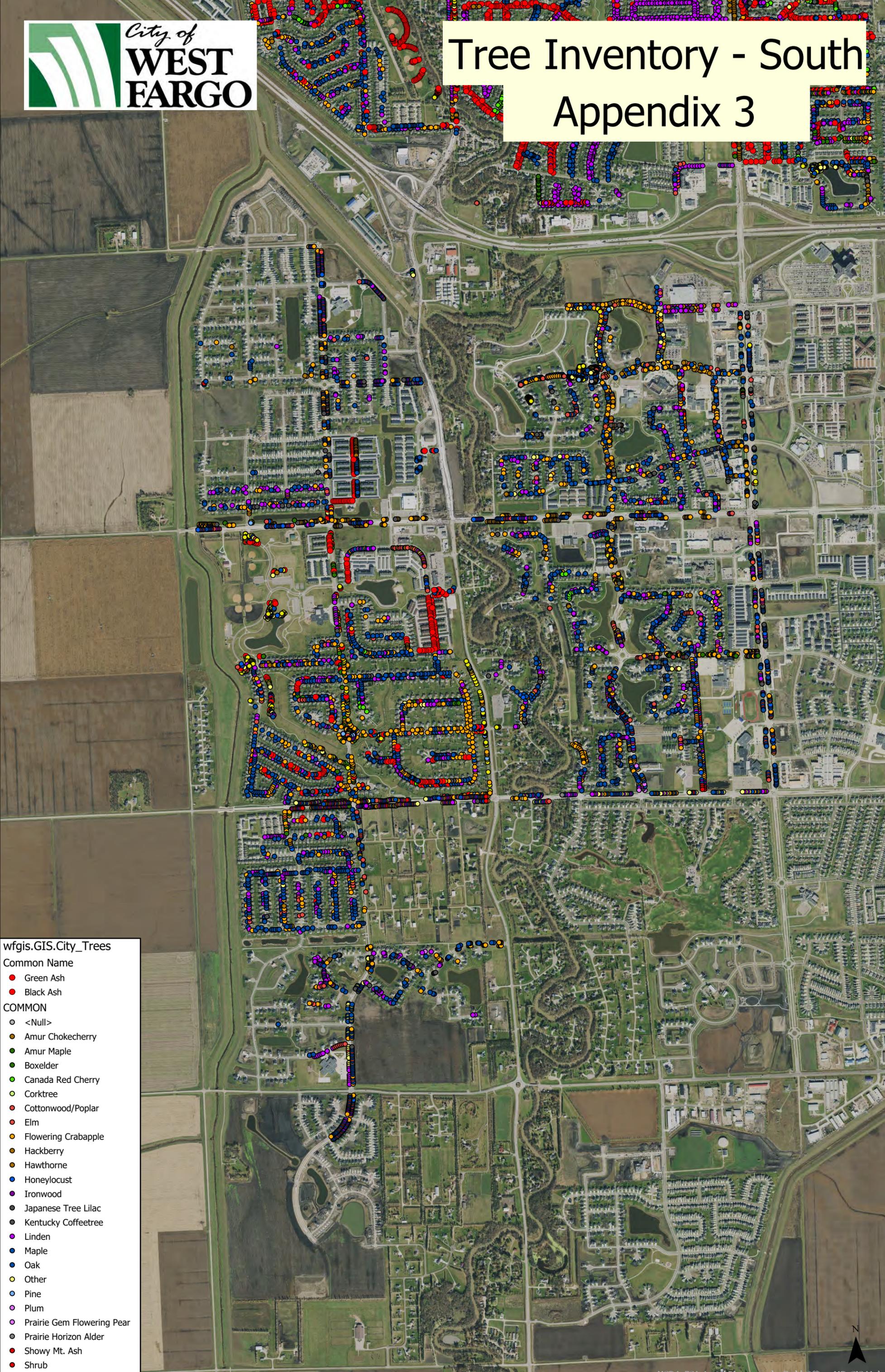




- wfgis.GIS.City\_Trees
- Common Name
- Green Ash
  - Black Ash
- COMMON
- <Null>
  - Amur Chokecherry
  - Amur Maple
  - Boxelder
  - Canada Red Cherry
  - Corktree
  - Cottonwood/Poplar
  - Elm
  - Flowering Crabapple
  - Hackberry
  - Hawthorne
  - Honeylocust
  - Ironwood
  - Japanese Tree Lilac
  - Kentucky Coffeetree
  - Linden
  - Maple
  - Oak
  - Other
  - Pine
  - Plum
  - Prairie Gem Flowering Pear
  - Prairie Horizon Alder
  - Showy Mt. Ash
  - Shrub
  - Spruce

# Tree Inventory - South

## Appendix 3



- wfgis.GIS.City\_Trees
- Common Name
- Green Ash
  - Black Ash
- COMMON
- <Null>
  - Amur Chokecherry
  - Amur Maple
  - Boxelder
  - Canada Red Cherry
  - Corktree
  - Cottonwood/Poplar
  - Elm
  - Flowering Crabapple
  - Hackberry
  - Hawthorne
  - Honeylocust
  - Ironwood
  - Japanese Tree Lilac
  - Kentucky Coffeetree
  - Linden
  - Maple
  - Oak
  - Other
  - Pine
  - Plum
  - Prairie Gem Flowering Pear
  - Prairie Horizon Alder
  - Showy Mt. Ash
  - Shrub
  - Spruce