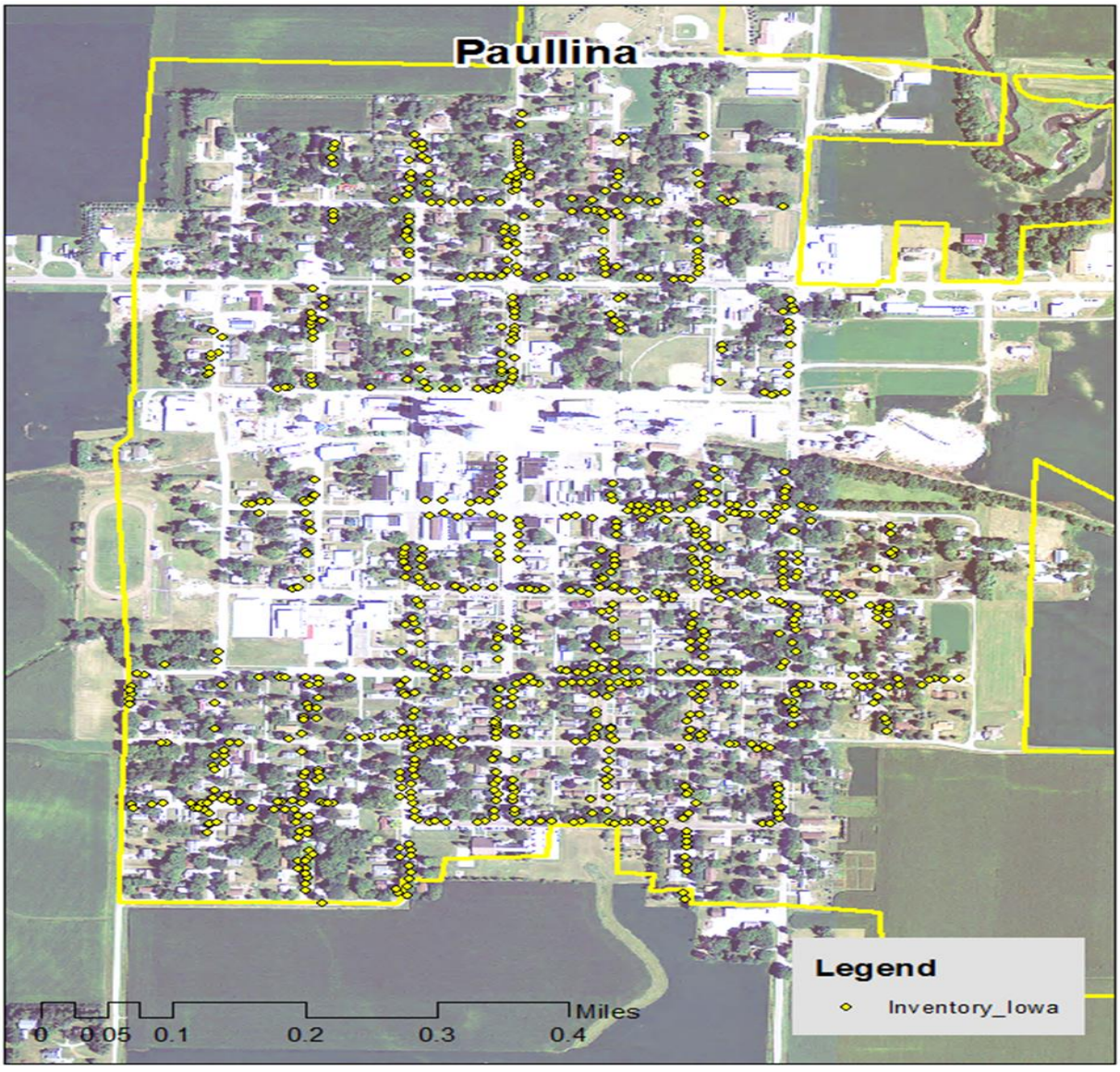
PAULLINA, IA



2014 Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Paullina with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management allows Paullina to take advantage of these benefits. Management is especially important considering the serious threats posed by forest pests such as the emerald ash borer (EAB). EAB is an invasive insect imported from Eastern Asia on wood shipping crates that kills all species of ash trees (this does not include mountain ash). There is a strong possibility that 20% of Paullina's city owned trees (ash) will die once EAB becomes established in the community. With proper planning and management, the costs of removing dead and dying trees can be extended over years, mitigating public safety issues.

Inventory and Results

In 2013, a tree inventory was conducted using Global Positioning System (GPS) data collectors. The inventory was a complete inventory of street trees. Listed below are (some) key findings of the 639 'public' trees within the 813 trees inventoried. When street curbs and sidewalks were not present they were tallied as 'privately' managed trees (by the homeowner) and are 'only' included in the main spreadsheet. Privately managed trees number 183. 'Private' trees were not included in the percentages and values for Paullina.

- Paullina's trees provide $117,792 of benefits annually, an average of $184 per tree.
- There are 35 species of trees.
- The top three genera are: Maple 40%, Ash 20%, and Apple 11%.
- 40% of trees are in need of some type of management.
- 25 trees are recommended for removal.

Recommendations

The core recommendations are detailed in the Recommendations Section. The Emerald Ash Borer Plan includes management recommendations as well. Below are some key recommendations.

- Of the 25 trees needing removal, 15 trees are over 24 inches in diameter at 4.5 ft. and must be addressed immediately. See Appendix B, Figure 5. *City ownership of the trees recommended for removal should be verified prior to any removal*.
- 25 of the 138 ash trees are in need of follow up because they are displaying signs and symptoms associated with EAB. See Appendix B, Figure 2.
- All trees should be pruned on a routine schedule- one third of the city every other year.
- Plant a diverse mix of trees that do not include: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow, apple, or black walnut.
- Check ash trees with a visual survey yearly. See Appendix B, Figures 1 & 2, visual locations.
- With the current budget it could take 5 years to remove all ash (138 ash trees) if infested with ash borer, the 9 'critical concern' trees, and the 25 'removal' trees (172 total trees) based on an estimated removal cost of $550 per tree – Suggestion: apply for utility grants to plant replacement trees.
- Review a later section entitled 'Other Hazardous Ash Trees with Decay.'

Introduction

This plan was developed to assist Paullina with the management, budgeting and future planning of their urban forest. Across the state, forestry budgets continue to decrease with more and more of that money spent on tree removal. With the anticipated arrival of Emerald Ash Borer (EAB), an invasive pest that kills native ash trees, it is time to prepare for the increased costs of tree removal and replacement planting. With proper planning and management of the current canopy in Paullina, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

Trees are an important component of Paullina's infrastructure and one of the greatest assets to the community. The benefits of trees are immense. Trees provide the community with improved air quality, stormwater runoff interception, energy conservation, lower traffic speeds, increased property values, reduced crime, improved mental health and create a desirable place to live, to name just a few benefits. It is essential that these benefits be maintained for the people of Paullina and future generations through good urban forestry management.

Good urban forestry management involves setting goals and developing management strategies to achieve these goals. An essential part of developing management strategies is a comprehensive public tree inventory. The inventory supplies information that will be used for maintenance, removal schedules, tree planting and budgeting. Basing actions on this information will help meet Paullina's urban forestry goals.

Inventory

In 2013, a tree inventory was conducted that included 100% of the city owned trees along streets. The tree data was collected using a handheld Global Positioning System (GPS) receiver. The data collector gives Geographic Information Systems (GIS) coordinates with an accuracy of 3 meters, which can be used in Arc GIS as an active GIS data layer. Because the inventory is a digital document the data can be updated with new information and become a working document.

The programming used to collect tree information on the data collectors was written to be compatible with a state-of-the-art software suite called i-Tree. i-Tree was developed by the USDA Forest Service to quantify the structure of community trees and the environmental services that trees provide. The i-Tree suite is a public domain which can be accessed for free.

To quantify the urban forest structure and benefits, specific data is collected for each tree. This data includes: location, land use, species, diameter at 4.5 ft., recommended maintenance, priority of that maintenance, leaf health, and wood condition. Additionally, signs and symptoms of EAB were noted for all ash trees. The signs and symptoms noted were canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Inventory Results

The data collected for the 813 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management (STRATUM), part of the i-Tree suite. The following are results from the i-Tree STRATUM analysis.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Paullina's trees reduce energy related costs by approximately $30,677 annually (Appendix A, Table 1). These savings are both in Electricity (144.7 MWh) and in Natural Gas (20,092.5 Therms).

Annual Stormwater Benefits

Paullina's trees intercept about 1,649,148 gallons of rainfall or snowmelt a year (Appendix A, Table 2). This interception provides $44,695 of benefits to the city.

Annual Air Quality Benefits

Air quality is a persistent public health issue in Iowa. The urban forest improves air quality by removing pollutants, lowering air temperature, and reducing energy consumption, which in turn reduces emissions from power plants, and emitting volatile organic matter (ozone). In Paullina, it is estimated that trees remove 1,907 lbs total of air pollution (ozone (O_3), particulate matter less than 10 microns (PM10), carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2)) per year with a net value of $5,397 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere. In Paullina, trees sequester about 367,930 lbs of carbon a year with an associated value of $4,344 (Appendix A, Table 5). In addition, the trees store 6,537,380 lbs of carbon, with a yearly benefit of $49,030 (Appendix A, Table 4).

Annual Aesthetics Benefits

Social benefits of trees are hard to capture. The analysis does have a calculation for this area that includes: aesthetic value, property values, lowered rates of mental illness and crime, city livability and much more. Paullina receives $32,679 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STRATUM analysis, Paullina's trees provide $117,792 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 813 trees in Paullina provide approximately $184 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Paullina has over 35 different tree species along city streets. The distribution of public street trees and privately-managed street trees by GENUS is as follows:

Maple	366	45%
Ash	139	17%
Oak	118	15%
Spruce	51	6%

Apple (Crab)	24	3%
Linden/Basswood	14	2%
Mountain Ash	11	1%
Birch	10	1%
Dogwood	10	1%
Hackberry	10	1%
Walnut	10	1%
Lilac	8	1%
Locust	8	1%
Cottonwood	7	1%
Cherry	3	<1%
Pine	3	<1%
Elm	2	<1%
Hornbeam	1	<1%
Juniper	1	<1%
Other Large Evergreen	17	2%
	813	

See also, Appendix A, Figure 1 showing the ten most common PUBLIC street trees (by species). See also the most comprehensive list of single tree species in Appendix A, Table 10 entitled Replacement Value for Public Trees by Species, in the left-hand column.

Age Class

Most of Paullina's trees (44%) are between 6 and 18 inches in diameter at 4.5 ft. (Appendix A, Figure 2). For age, it is preferred that the highest amount of trees the smallest to prepare for natural mortality and to maintain canopy cover. Paullina's size curve is on the smaller side, indicating a younger than average stand.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The **foliage** condition indicates that 61% of the trees are in good health, with only 3% of the **foliage** in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 52% of the street trees have good **woody** health (Appendix A, Figure 4 & Appendix B, Figure 3). The **woody** condition for 7% of the population is poor health, dead or dying. This 7% is an estimate of trees that will need management follow-up.

Management Needs

The following outlines the specific management needs of the street and park trees by number of trees and percent of canopy (Appendix B, Figure 3).

Crown Cleaning	173	27%
Crown Raising	18	3%
Tree Removal	25	4%
Crown Reduction	41	6%

Canopy Cover

The canopy cover of Paullina is nearly 17 acres (Appendix A, Figure 4). According to the 2010 census, Paullina occupies 1,344 acres. The tree canopy cover on city land is about 1%.

Land Use and Location

The majority of Paullina's city and park trees are in planting strips in single family residential neighborhoods (Appendix A, Figure 6 & Appendix A, Figure7). The following describes the land use and locations for the street and park trees.

Land Use	
Single family residential	99.5%
Park/vacant/other	.5%

Location	
Planting strip	85%
City Street central medians	9%
Cutout (surrounded by pavement)	4%
Front yard	2%

Recommendations

Risk Management

Hazardous trees can be a significant threat to both people and property. Trees that are dead or dying, or that have large issues such as trunk cracks longer than 24 inches should be removed. A few trees have main trunks which are forked between 2 feet and 8 feet above the ground. Any of these forked trees, with open splits exposing interior wood, should be removed. Broken branches and branches that interfere with motorist's vision of pedestrians, vehicles, traffic signs and signals, etc. should be removed.

Hazardous Trees

Paullina has 9 'critical concern' trees of 25 that need immediate removal without regard to the species.*, ** These trees can be seen as dark purple diamonds on the map titled Location of Trees with Recommended Maintenance (Appendix B, Figure 4). It is recommended to start with the largest diameter, critical concern trees, first. There are 7 trees over 24 inches in diameter at 4.5 ft. or mid-chest height that should be addressed immediately. Please refer to the **Six Year Maintenance Plan,** at the end of this section, years one and two for their removal. After all of the critical concern trees are addressed, continue removing the 16 remaining 'critical concern' trees of smaller trunk diameter's (where trimming is not needed).

Poor and Dead/Dying Trees

Refer to Appendix A, Table 9 and Appendix B, Figures 3 and 4. After the removal of the 'critical concern' trees, other trees in poor health or dead and dying (without regard to the species) should be assessed for removal or postponement (their visual locations are shown on aerial maps as Appendix B, Figure 3 and Appendix B, Figure 4). Standing dead trees should always be removed. In Appendix B, Figure 4, the different colored diamonds indicate 'critical concern' trees and the young or mature trees needing

'immediate' maintenance. Trees needing 'immediate' maintenance number 99 of the 813 inventoried trees. The 99 trees is breakdown into 11 young trees and 88 mature trees. Of the 99 trees, only 28 are Green ash. A few of the other trees species needing 'immediate' work are Norway maple, Silver maple, Basswood, and Norway maple. Of the 28 Green ash trees, 20 ashes show at least 3 of the 5 EAB symptoms. And, looking at all of the data from a different point of view, there are 139 ash trees in the survey, 50 ash trees show 3 of the 5 signs or symptoms that have been associated with EAB. City ownership of the trees recommended for removal should be verified prior to any removal. EAB symptoms are: canopy dieback, epicormic (woody) sprouts on the trunk, bark splitting, D-shaped insect exit holes, and wood pecker damage.

Other Hazardous Green Ash trees with Decay

These trees are listed by their addresses, or house color if no address, or possession on the city block. In some cases, the entire tree is recommended for removal by the district forester; or the homeowner should remove the ash tree since the main trunk or the main forks are decaying. These trees are being brought to your attention because decay caused by a fungus dissolves the cellulose portion of the wood fibers, resulting in weakened branches, limbs, or main trunks. Once weaken, the decayed portion simply breaks off without the benefit of winds, ice or snow, and fall onto anything below it.

Tree number:

1. 221 Cannon Street, Beige house, red trim, has a large ash on the south side of the driveway, on the parking, decay is 20 feet up on the main trunk.
2. 214 N. Mickley Street, tree next to and hanging over driveway and parking, decay on the main trunk.
3. 221 Maple Street, decay is 20 feet up the main trunk.
4. 205 E. Day Street, on the corner of S. Mickley, light gray house, very large tree, top 40 feet is dead, decay is on large limb hanging over the road.

Other Hazardous Trees

1. 317 N. Rutledge Street, south of house is an empty lot, the south Silver maple, has a large branch barely attached to the tree, and hanging over the road.

Pruning Cycle

Proper pruning can extend the life and good health of trees, as well as reduce public safety issues. In the Management Needs section of the Findings there are four main maintenance issues to be addressed: routine pruning, crown cleaning, crown-raising, and crown reduction. Crown cleaning removes dead, diseased, and damaged limbs. Crown-raising is the removal of lower branches that are 2 inches in diameter or larger in the case of providing clearance for pedestrians or vehicles. Crown reduction is removing individual limbs from structures or utility wires. It is recommended that all trees be pruned on a routine schedule every five to seven years. Please refer to the six year maintenance plan for further information.

Proper Pruning

Proper pruning is now based on the ridge of bark located within the crotch of every limb or branch. After nearly forty years of research by Dr. Alex Shigo, U. S. Forest Service researcher, on how trees heal, internally and externally, some of the old rules of pruning are obsolete, or just plain wrong. This forester is recommending some minor changes to the Trimming or Pruning section (Article 9, 9.02, Section 2, parts A and F initially) of the city's code (if the city has this section), or adding new language to correct the old language.

Planting

Most of the planting over the next 5 years will replace the trees that are removed. It is recommended to plant 1.2 trees for every tree removed, since survival rates will not be 100%. Please refer to the six year maintenance plan at the end of this section. It is not essential that the new trees be planted in the same location of the trees being removed. However, maintaining the same number of trees helps ensure continuation of the benefits of the existing forest in Paullina.

It is important to plant a diverse mix of species in the urban forest to maintain canopy health, since most insects and diseases target a genus (ash) or species (green ash) of trees. Current diversity recommendations advise that a genus (i.e. maple, oak) not make up more than 20% of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 10% of the total urban forest. Presently, the forest is heavily planted with Maple (45%) (Page 6 of Plan and Appendix A, Figure 1). Silver maple and Norway maple should not be planted until there percentages can be lowered or offset by other tree species. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: cottonwood, hybrid poplar, Boxelder, Chinese elm, evergreen, willow or Black walnut. State Forestry recommends that you consult the State Tree Code and add willows and Black walnut to your city code Chapter 5, Article 7, part 7.03, item number 3 (Appendix C).

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. It is recommended that ash trees be checked with a visual survey every year for tree death and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Six Year Maintenance Plan with No Additional Funding

Year 1

- Removal: all 9 of the critical concern trees. *
- Prune or remove: the ash trees listed in the Decay section on page 8 and page 9. **
- Planting and Replacement: 9 trees to be planted in open locations.
- Visual Survey for signs and symptoms of EAB

Year 2

- Removal: assess a dozen of the young or mature trees needing 'immediate' and shown on page 33 in Appendix B, Figure 4. *, **
- Planting and Replacement: plant 6 trees in open locations made from year one removals.
- Routine trimming: Contract to trim 1/4 of the city trees.
- Visual Survey for signs and symptoms of EAB

Year 3

- Removal: 8 trees needing 'immediate' attention. *, **
- Planting and Replacement: 9 trees to be planted in open locations and locations from previous removals.
- Visual Survey for signs and symptoms of EAB

Year 4

- Removal: 6 trees needing 'immediate' attention. *, **
- Planting and Replacement: 7 trees in open locations from previous removals.

Routine trimming: Contract to trim 1/4 of the city trees.
Visual Survey for signs and symptoms of EAB

Year 5

Removal: 8 trees - removal of any new critical concern trees and 'immediate' attention trees. *, **
Planting and Replacement: 9 trees to be planted in open locations.
Visual Survey for signs and symptoms of EAB

Year 6

Removal: 6 trees needing 'immediate' attention. *, **
Planting and Replacement: 7 trees in open locations from previous removals.
Routine trimming: Contract to trim 1/4 of the city trees.
Visual Survey for signs and symptoms of EAB

Year 7

Removal: continue working on the trees needing 'immediate' attention. *, **
Planting and Replacement: 7 trees in open locations, or made from prior removals.
Routine trimming: contract to trim the final ¼ of the city trees.

*Elimination of all nine (9) trees labeled 'critical concern' and 40 of the 99 trees needing 'immediate' attention will partially reduce the number of Green ash trees showing EAB symptoms (20 of 28 ash trees). It will take approximately 6 more years to prune or remove all ash showing EAB symptoms and all the remaining trees needing 'immediate' attention or removal. If EAB enters Paullina, it could potentially kill all ash within 4 years of its arrival.

** To remove all of the 'critical concern' trees (9) and those needing 'immediate' attention (99 trees of mixed species) within the next 7 years may cost the city $59,400 at an estimated cost of $550 per tree.

Emerald Ash Borer Plan

Ash Tree Removal

Tree removal will be prioritized with dead, dying, hazardous trees to be removed first (Appendix B, Figure 4 and the Hazardous Trees with Decay on page 8). Next will be all ash in poor condition and displaying signs and symptoms of EAB (Appendix B, Figures 2 & 3). *City ownership of the tree recommended for removal should be verified prior to any removal*

Treatment of Ash Trees

Chemical treatment can be effective, spreading removal costs out over several years while allowing trees to continue to provide benefits. Chemical treatment is being used on the better ash trees in Burlington, Iowa, to postpone their immediate removal. Each ash tree in Burlington was appraised for immediate removal or for treatment and located by GPS coordinates or by street address. Paullina has the benefit of not finding any actual infestations of EAB, so the yearly removal of the worst trees, now, can lower future removal costs. Chemical treatment is not recommended if EAB is more than 15 miles away from the community. For more information on the cost of treatment strategies visit http://extension.entm.purdue.edu/treecomputer/

EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of over 25 million ash trees. Ash in both forested and urban settings constitute a significant portion of the canopy cover in the United States. Current tools to detect, control, suppress and eradicate this pest are not as robust as the USDA would desire. In order to stay ahead of this hard to detect beetle, the USDA is attempting to contain the beetle before it spreads beyond its known positions by regulating articles.

A regulated article under the USDA's quarantine includes any of the following items:
• Emerald ash borer
• firewood of all hardwood species (for example ash, oak, maple and hickory)
• nursery stock and green lumber of ash
• any other ash material, whether living, dead, cut or fallen, including logs, stumps, roots, branches, as well as composted and not composted chips of the genus ash (Mountain ash is not included)

In addition, any other article, product or means of conveyance not listed above may be designated as a regulated article if a USDA inspector determines that it presents a risk of spreading EAB once a quarantine is in effect for your county.

Wood Disposal

A very important aspect of planning is determining how wood infested with EAB will be handled, keeping in mind that quarantines will restrict its movement. Consider who will cut and haul the dead and dying trees? Is there an accessible, secured site big enough to store and sort the hundreds of trees and the associated brush and chips? How will wood be disposed of or utilized? Do you have equipment capable of handling the amount and size of ash trees your tree inventory has identified? Once your county is under quarantine for EAB, contact USDA-APHIS-PPQ at 515-251-4083, or visit their website http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/regulatory.shtml. Wood waste can be disposed of as you normally would if your county is not part of any quarantine.

Canopy Replacement

As budget permits, all removed ash trees will be replaced. All trees will meet the restrictions in Chapter 5, Article 7 of the city ordinance, if amended. (Appendix C). The new plantings will be a diverse mix and will not include ash, maple, cottonwood, poplar, Box elder, Chinese elm, evergreen, willow or Black walnut.

Postponed Work

While finances, staffing and equipment are focused on the management of ash, usual services may be delayed. Tree removal requests on trees other than ash will be prioritized by hazardous or emergency situations only.

Monitoring

It is recommended that ash trees be checked with a visual survey every year for tree death and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB. Currently, Paullina City Code does not contain any section dealing with EAB- Emerald Ash Borer, or ash trees on private property. State Code 151.06 states "If it is determined with reasonable certainty that any such condition exists (trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests) on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails

to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property."
It is recommended that Paullina make additions to their current Code dealing with Emerald Ash borer in general, and specifically on private property.

Budget

Budget Status for earlier years
FY 2012
Tree removal and stump grinding: $22,536
FY 2013
Tree removal and stump grinding: $21,395

Current Budget
FY 2014 Budget
Removal and grinding: $24,000 estimated
Planting: $0
Routine trimming: $0
Watering & Maintenance: $0
FY 2015 Budget
Removal and grinding: $25,000
Planting: $0
Watering & Maintenance: $0
FY 2016 Budget
Removal and grinding: $26,000
Planting: $0
Routine trimming: $0
Watering & Maintenance: $0

Reduction of only city controlled ash over 3 to 4 years: approximately 138 ash trees removed. It is currently estimated that Paullina has twice as many ash (275) on private land as on public lands. The total ash number rises to 400 trees. If public tree removal costs are applied to removing private ash trees, it may take 6 to 7 years to remove them, at a cost of $151,000 to homeowners. No costs are implied for replanting, routine trimming, and watering and other maintenance.

Purposed Budget Increase
EAB could potentially kill all ash trees (138 public and 275 private) in Paullina within 4 years of its arrival. Your current budget is setup to remove all 138 public ash trees within 3 to 4 years. Can allowances be made for replanting along city streets and in parks which also covers several years of maintenance? Additionally, it is recommended that Paullina apply for grants to fund replacement trees. Utility Company grants are usually between $500 and $10,000 for community-based, tree-planting projects that include parks, gateways, cemeteries, nature trails, libraries, nursing homes, and schools.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Paullina

Annual Energy Benefits of Public Trees by Species

12/13/2013

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	33.7	2,555	4,543.4	4,453	7,008	(N/A)	20.0	22.8	54.75
Silver maple	36.1	2,739	4,734.9	4,640	7,379	(N/A)	19.4	24.1	59.51
Norway maple	24.3	1,844	3,606.8	3,535	5,379	(N/A)	15.8	17.5	53.25
Apple	5.2	395	841.6	825	1,220	(N/A)	10.8	4.0	17.68
Littleleaf linden	3.8	288	560.0	549	836	(N/A)	6.0	2.7	22.01
American basswood	11.3	860	1,624.3	1,592	2,452	(N/A)	5.3	8.0	72.12
Sugar maple	5.2	393	703.2	689	1,082	(N/A)	3.0	3.5	56.96
Northern hackberry	7.7	584	1,091.2	1,069	1,653	(N/A)	3.0	5.4	87.02
Honeylocust	4.9	372	634.6	622	994	(N/A)	2.4	3.2	66.28
White ash	0.8	62	104.7	103	164	(N/A)	1.7	0.5	14.94
Northern red oak	0.4	28	50.1	49	77	(N/A)	1.4	0.3	8.57
Red maple	0.6	45	80.2	79	124	(N/A)	1.3	0.4	15.46
Black walnut	2.3	173	304.6	298	471	(N/A)	1.3	1.5	58.90
Other street trees	8.5	649	1,212.8	1,189	1,837	(N/A)	8.8	6.0	32.81
Citywide total	144.7	10,986	20,092.5	19,691	30,677	(N/A)	100.0	100.0	48.01

Table 2: Annual Stormwater Benefits

Paullina

Annual Stormwater Benefits of Public Trees by Species

12/13/2013

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	374,544	10,151	(N/A)	20.0	22.7	79.30
Silver maple	517,899	14,036	(N/A)	19.4	31.4	113.19
Norway maple	251,677	6,821	(N/A)	15.8	15.3	67.53
Apple	18,996	515	(N/A)	10.8	1.2	7.46
Littleleaf linden	32,886	891	(N/A)	6.0	2.0	23.45
American basswood	145,772	3,951	(N/A)	5.3	8.8	116.20
Sugar maple	59,895	1,623	(N/A)	3.0	3.6	85.43
Northern hackberry	84,884	2,301	(N/A)	3.0	5.2	121.08
Honeylocust	50,638	1,372	(N/A)	2.4	3.1	91.49
White ash	4,963	135	(N/A)	1.7	0.3	12.23
Northern red oak	2,003	54	(N/A)	1.4	0.1	6.03
Red maple	3,289	89	(N/A)	1.3	0.2	11.14
Black walnut	22,953	622	(N/A)	1.3	1.4	77.76
Other street trees	78,748	2,134	(N/A)	8.8	4.8	38.11
Citywide total	1,649,148	44,695	(N/A)	100.0	100.0	69.95

Table 3: Annual Air Quality Benefits

Paullina

Annual Air Quality Benefits of Public Trees by Species

12/13/2013

Species	Deposition (lb) O_3	NO_2	PM_{10}	SO_2	Total Depos. ($)	Avoided (lb) NO_2	PM_{10}	VOC	SO_2	Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	Standard Error	% of Total Trees	Avg. $/tree
Green ash	48.8	7.8	23.1	2.2	259	160.1	23.4	22.3	152.6	999	0.0	0	440.3	1,258	(N/A)	20.0	9.83
Silver maple	90.0	15.2	44.2	4.0	485	170.0	24.9	23.8	163.2	1,064	-47.5	-178	487.8	1,371	(N/A)	19.4	11.06
Norway maple	53.9	9.3	26.2	2.4	291	118.7	17.1	16.3	110.2	733	-12.4	-47	341.7	977	(N/A)	15.8	9.67
Apple	4.1	0.7	2.2	0.2	23	26.0	3.7	3.5	23.6	159	0.0	0	64.0	182	(N/A)	10.8	2.63
Littleleaf linden	4.9	0.9	2.6	0.2	27	18.5	2.7	2.5	17.2	114	-2.5	-9	47.0	132	(N/A)	5.9	3.47
American basswood	21.6	3.7	10.3	1.0	115	54.9	7.9	7.6	51.4	340	-17.8	-67	140.4	389	(N/A)	5.3	11.43
Sugar maple	8.0	1.4	4.0	0.4	43	24.6	3.6	3.4	23.5	154	-6.3	-24	62.6	173	(N/A)	3.0	9.13
Northern hackberry	14.8	2.6	7.3	0.7	80	37.1	5.4	5.1	34.9	230	0.0	0	107.9	311	(N/A)	3.0	16.34
Honeylocust	9.8	1.6	4.5	0.4	52	23.0	3.4	3.2	22.2	144	-7.5	-28	60.7	168	(N/A)	2.3	11.21
White ash	0.2	0.0	0.2	0.0	1	3.8	0.6	0.5	3.7	24	0.0	0	9.0	25	(N/A)	1.7	2.29
Northern red oak	0.3	0.1	0.2	0.0	2	1.8	0.3	0.2	1.7	11	-0.4	-2	4.0	11	(N/A)	1.4	1.23
Red maple	0.5	0.1	0.3	0.0	3	2.8	0.4	0.4	2.7	18	-0.2	-1	7.0	20	(N/A)	1.3	2.46
Black walnut	2.6	0.4	1.3	0.1	14	10.8	1.6	1.5	10.3	67	0.0	0	28.7	82	(N/A)	1.3	10.20
Other street trees	12.2	2.1	6.6	0.7	68	41.2	6.0	5.7	38.7	256	-6.5	-24	106.6	299	(N/A)	8.8	5.34
Citywide total	271.8	45.8	132.9	12.2	1,463	693.4	100.8	96.0	655.9	4,313	-101.1	-379	1,907.6	5,397	(N/A)	100.0	8.45

Table 4: Annual Carbon Stored

Paullina

Stored CO2 Benefits of Public Trees by Species

12/13/2013

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	1,621,420	12,161	(N/A)	20.0	24.8	95.01
Silver maple	2,089,216	15,669	(N/A)	19.4	32.0	126.36
Norway maple	891,421	6,686	(N/A)	15.8	13.6	66.19
Apple	73,177	549	(N/A)	10.8	1.1	7.95
Littleleaf linden	109,942	825	(N/A)	6.0	1.7	21.70
American	808,653	6,065	(N/A)	5.3	12.4	178.38
Sugar maple	231,565	1,737	(N/A)	3.0	3.5	91.41
Northern	232,224	1,742	(N/A)	3.0	3.6	91.67
Honeylocust	124,833	936	(N/A)	2.4	1.9	62.42
White ash	8,749	66	(N/A)	1.7	0.1	5.97
Northern red oak	4,882	37	(N/A)	1.4	0.1	4.07
Red maple	6,515	49	(N/A)	1.3	0.1	6.11
Black walnut	85,420	641	(N/A)	1.3	1.3	80.08
Other street trees	113,110	1,870	(N/A)	8.8	3.8	33.40
Citywide total	6,537,380	49,030	(N/A)	100.0	100.0	76.73

Table 5: Annual Carbon Sequestered

Paullina

Annual CO_2 Benefits of Public Trees by Species

12/13/2013

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	74,965	562	-7,783	-25	-59	56,466	423	123,623	927	(N/A)	20.0	21.3	7.24
Silver maple	152,103	1,141	-10,028	-24	-75	60,521	454	202,571	1,519	(N/A)	19.4	35.0	12.25
Norway maple	22,647	170	-4,279	-20	-32	40,753	306	59,102	443	(N/A)	15.8	10.2	4.39
Apple	7,642	57	-351	-13	-3	8,734	66	16,011	120	(N/A)	10.8	2.8	1.74
Littleleaf linden	9,849	74	-528	-7	-4	6,356	48	15,669	118	(N/A)	6.0	2.7	3.09
American basswood	44,033	330	-3,882	-7	-29	19,014	143	59,159	444	(N/A)	5.3	10.2	13.05
Sugar maple	11,948	90	-1,112	-4	-8	8,685	65	19,518	146	(N/A)	3.0	3.4	7.70
Northern hackberry	10,629	80	-1,115	-4	-8	12,905	97	22,416	168	(N/A)	3.0	3.9	8.85
Honeylocust	11,586	87	-599	-3	-5	8,228	62	19,211	144	(N/A)	2.4	3.3	9.61
White ash	1,555	12	-42	-2	0	1,364	10	2,875	22	(N/A)	1.7	0.5	1.96
Northern red oak	513	4	-23	-2	0	618	5	1,106	8	(N/A)	1.4	0.2	0.92
Red maple	936	7	-31	-2	0	997	7	1,899	14	(N/A)	1.3	0.3	1.78
Black walnut	5,329	40	-410	-2	-3	3,816	29	8,733	66	(N/A)	1.3	1.5	8.19
Other street trees	14,196	106	-1,197	-11	-9	14,339	108	27,327	205	(N/A)	8.8	4.7	3.66
Citywide total	367,930	2,759	-31,379	-125	-236	242,797	1,821	579,223	4,344	(N/A)	100.0	100.0	6.80

Table 6: Annual Social and Aesthetic Benefits

Paullina

Annual Aesthetic/Other Benefits of Public Trees by Species

12/13/2013

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	6,341	(N/A)	20.0	19.4	49.54
Silver maple	11,916	(N/A)	19.4	36.5	96.10
Norway maple	2,186	(N/A)	15.8	6.7	21.64
Apple	430	(N/A)	10.8	1.3	6.24
Littleleaf linden	1,179	(N/A)	6.0	3.6	31.03
American basswood	2,976	(N/A)	5.3	9.1	87.52
Sugar maple	1,228	(N/A)	3.0	3.8	64.63
Northern hackberry	1,291	(N/A)	3.0	4.0	67.93
Honeylocust	2,745	(N/A)	2.4	8.4	182.99
White ash	263	(N/A)	1.7	0.8	23.89
Northern red oak	57	(N/A)	1.4	0.2	6.31
Red maple	147	(N/A)	1.3	0.5	18.44
Black walnut	451	(N/A)	1.3	1.4	56.34
Other street trees	1,468	(N/A)	8.8	4.5	26.22
Citywide total	32,679	(N/A)	100.0	100.0	51.14

Table 7: Summary of Benefits in Dollars

Average Annual Benefits of Public Trees by Species

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Green ash	7,008	927	1,258	10,151	6,341	$25,685.26	(±0)	21.81
Silver maple	7,379	1,519	1,371	14,036	11,916	$36,221.18	(±0)	30.75
Norway maple	5,379	443	977	6,821	2,186	$15,805.99	(±0)	13.42
Apple	1,220	120	182	515	430	$2,467.05	(±0)	2.09
Littleleaf linden	836	118	132	891	1,179	$3,156.54	(±0)	2.68
American basswood	2,452	444	389	3,951	2,976	$10,210.91	(±0)	8.67
Sugar maple	1,082	146	173	1,623	1,228	$4,253.29	(±0)	3.61
Northern hackberry	1,653	168	311	2,301	1,291	$5,723.05	(±0)	4.86
Honeylocust	994	144	168	1,372	2,745	$5,423.66	(±0)	4.60
White ash	164	22	25	135	263	$608.35	(±0)	0.52
Northern red oak	77	8	11	54	57	$207.50	(±0)	0.18
Red maple	124	14	20	89	147	$394.25	(±0)	0.33
Black walnut	471	65	82	622	451	$1,691.06	(±0)	1.44
Other street trees	1,837	205	299	2,134	1,468	$5,944.12	(±0)	5.05
Citywide total	30,677	4,344	5,397	44,695	32,679	$117,792.19	(±0)	100.00

Appendix A, Table 8

Paullina										
Priority Task Summary for Public Trees										
	DBH (diameter at breast height of 4.5 feet) Classes in inches									
Maintenance	0-3	3-6inch	6-12inch	12-18inch	19-24inch	24-30inch	30-36inch	36-42inch	>42inch	Total	% of trees
Type											
None	22	51	93	58	47	49	36	17	9	382	59.78
Stake and Train	0	0	0	0	0	0	0	0	0		0
Clean	4	9	33	18	33	22	31	14	9	173	27.07
Raise Crown	0	1	1	2	3	4	6	0	1	18	2.82
Reduce Crown	1	0	2	6	3	6	9	11	3	41	6.42
Remove Tree	1	0	2	4	3	8	4	3	0	25	3.91
Treat Pest/Dis	0	0	0	0	0	0	0	0	0	0	0
City total	28	61	131	88	89	89	86	45	22	639	100

Appendix A, Table 9

Paullina											
Recommended Maintenance for Public Trees											
		DBH (diameter of breast height, 4.5 feet) Classes in Inches									
Maintenance	0-3inch	3-6inch	6-12inch	12-18inch	18-24inch	24-30inch	30-36inch	36-42inch	>42inch	Total	% of trees
Type											
Young tree routine	18	48	82	17	0	0	0	0	0	165	25.82
Young tree immediate	2	3	6	0	0	0	0	0	0	11	1.72
Mature tree routine	7	9	37	64	71	71	59	34	14	366	57.28
Mature tree immediate	1	1	6	6	17	16	24	10	7	88	13.77
Critical Concern (public safety)	0	0	0	1	1	2	3	1	1	9	1.41
City Wide Total	28	61	131	88	89	89	86	45	22	639	100

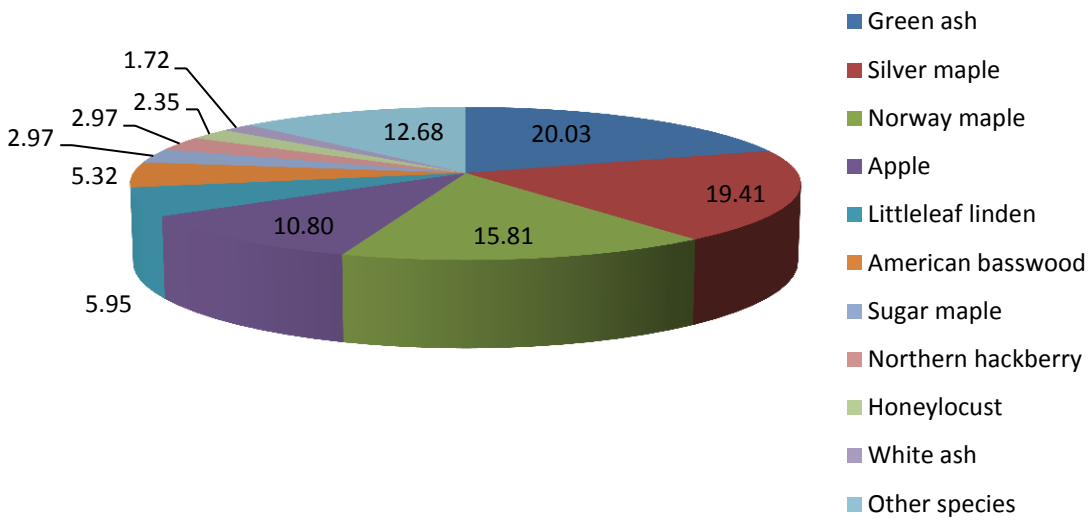
Appendix A, Table 10

Replacement Value for Public Trees by Species

Species	DBH Class in inches or Size									
	0-3 inch	3-6inche	6-12inch	12-18inch	18-24inch	24-30inch	30-36inch	36-42inch	>42inch	Total $
Green ash	127	1,462	10,233	27,796	41,924	28,510	32,807	41,909	15,839	200,608
Silver Maple	1,822	1,674	6,790	14,057	18,404	64,589	77,815	71,002	66,339	322,493
Norway Maple	643	2,570	9,191	5,626	41,677	36,769	83,238	18,767	10,430	208,912
Amer. Basswood	0	0	678	3,224	1,642	22,377	64,869	37,371	12,085	142,245
Northern Hackberry	0	0	0	0	6,292	20,791	28,637	17,531	5,943	79,195
Sugar Maple	0	436	1,468	2,880	9,998	21,815	5,677	13,299	0	55,573
Apple	1,084	5,232	30,600	10,284	0	1,703	0	0	0	48,902
Littleleaf Linden	224	5,594	8,809	2,674	10,943	2,572	10,583	0	0	41,400
Honeylocust	0	0	0	3,232	7,032	10,879	7,844	0	4,380	33,367
White ash	322	1,961	2,522	1,196	0	0	0	0	0	6,000
Nor. Red Oak	2,086	436	734	1,440	0	0	0	0	0	4,696
Red maple	541	1,081	1,355	1,337	0	0	0	0	0	4,314
Black walnut	0	0	0	4,010	1,915	7,288	5,292	0	0	18,505
Callery pear	0	392	1,981	1,196	0	0	0	0	0	3,568
Bur oak	0	0	0	1,667	5,907	14,006	0	0	0	21,580
Spruce	0	284	465	2,687	0	0	0	0	0	3,435
Birch	0	0	405	1,092	1,319	1,264	0	0	0	4,081
Mountain ash	0	308	734	339	0	0	0	0	0	1,381
Conifer evergreen	0	0	1,315	0	0	0	0	0	0	1,315
Mulberry	0	0	0	0	3,529	1,703	0	0	0	5,231
Blue spruce	0	0	876	0	1,380	0	0	0	0	2,256
Willow	227	0	0	0	0	0	6,473	0	0	6,700
Amur maple	0	400	295	0	0	0	0	0	0	695
Broadleaf Deciduous	348	0	0	1,440	0	0	0	0	0	1,788
Hickory	0	0	0	1,037	1,758	0	0	0	0	2,795
S. magnolia	227	0	631	0	0	0	0	0	0	858
Austrian pine	0	197	0	815	0	0	0	0	0	1,012
E. white pine	0	0	465	896	0	0	0	0	0	1,361
Ohio buckeye	0	0	759	0	0	0	0	0	0	759
Catalpa	0	0	0	0	0	0	0	4,061	0	4,061
E. redbud	0	0	0	750	0	0	0	0	0	750
Kentucky coffeetree	0	316	0	0	0	0	0	0	0	316
East. Red cedar	0	269	0	0	0	0	0	0	0	269
Amer. Sycamore	0	0	0	0	0	2,720	0	0	0	2,720
North. Pin oak	0	0	0	1,440	0	0	0	0	0	1,440
city wide total	7,651	22,612	80,307	91,113	153,721	236,986	323,236	203,940	115,016	1,234,581

Appendix A

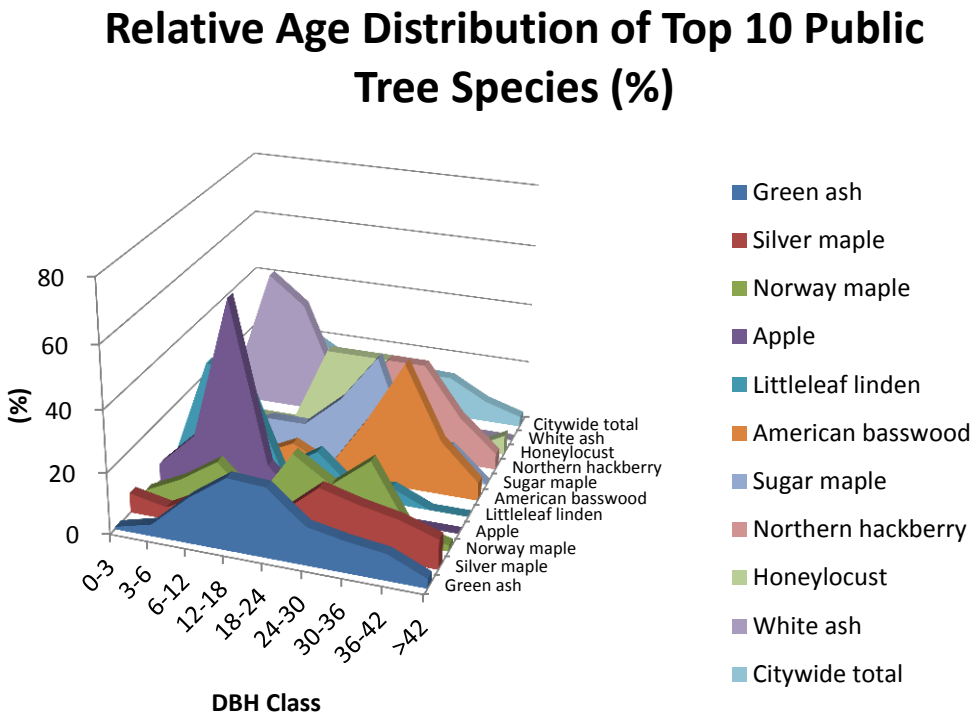
Figure 1: Species Distribution
12/13/2013



Paullina
Species Distribution of Public Trees (%)
12/13/2013

Species	Percent
Green ash	20.03
Silver maple	19.41
Norway maple	15.81
Apple	10.80
Littleleaf linden	5.95
American basswood	5.32
Sugar maple	2.97
Northern hackberry	2.97
Honeylocust	2.35
White ash	1.72
Other species	12.68
Total	100.00

Figure 2: Relative Age Class
12/13/2013

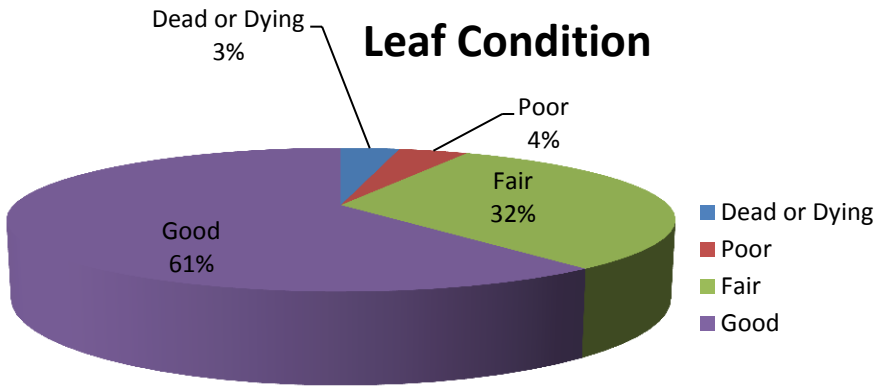


Paullina
Relative Age Distribution of Top 10 Public Tree Species (%)
12/13/2013

DBH class (in)

Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Green ash	0.78	3.91	14.84	23.44	22.66	12.50	10.16	8.59	3.13
Silver maple	6.45	4.03	10.48	11.29	8.87	19.35	16.13	13.71	9.68
Norway maple	1.98	7.92	15.84	4.95	22.77	14.85	24.75	4.95	1.98
Apple	5.80	17.39	63.77	11.59	0.00	1.45	0.00	0.00	0.00
Littleleaf linden	2.63	36.84	34.21	5.26	13.16	2.63	5.26	0.00	0.00
American basswood	0.00	0.00	2.94	8.82	2.94	20.59	41.18	17.65	5.88
Sugar maple	0.00	5.26	10.53	10.53	21.05	36.84	5.26	10.53	0.00
Northern hackberry	0.00	0.00	0.00	0.00	15.79	31.58	31.58	15.79	5.26
Honeylocust	0.00	0.00	0.00	26.67	26.67	26.67	13.33	0.00	6.67
White ash	9.09	45.45	36.36	9.09	0.00	0.00	0.00	0.00	0.00
Citywide total	4.38	9.55	20.50	13.77	13.93	13.93	13.46	7.04	3.44

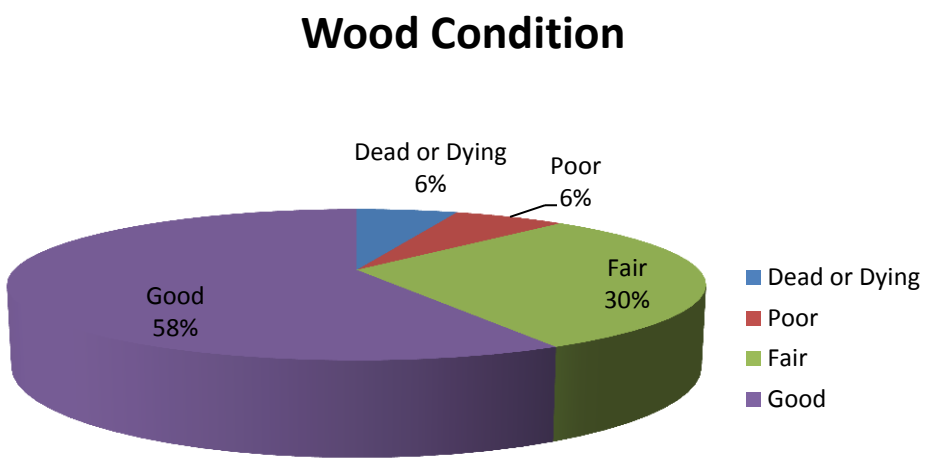
Figure 3: Foliage Condition of Public Trees by Species (%)
12/13/2013



Paullina
Condition (Foliage) of Public Trees by Species (%)
12/13/2013

Species Name	Dead or Dying	Poor	Fair	Good
Green ash	8.59	7.81	36.72	46.88
Silver maple	3.25	4.07	31.71	60.98
Norway maple	0.99	5.94	34.65	58.42
Apple	1.45	1.45	10.14	86.96
Littleleaf linden	0.00	0.00	5.26	94.74
American basswood	2.94	2.94	38.24	55.88
Sugar maple	0.00	0.00	21.05	78.95
Northern hackberry	0.00	0.00	57.89	42.11
Honeylocust	0.00	0.00	80.00	20.00
White ash	0.00	0.00	0.00	100.00
Northern red oak	0.00	0.00	0.00	100.00
Red maple	0.00	0.00	25.00	75.00
Black walnut	12.50	0.00	37.50	50.00
Citywide total	3.45	4.08	31.66	60.82

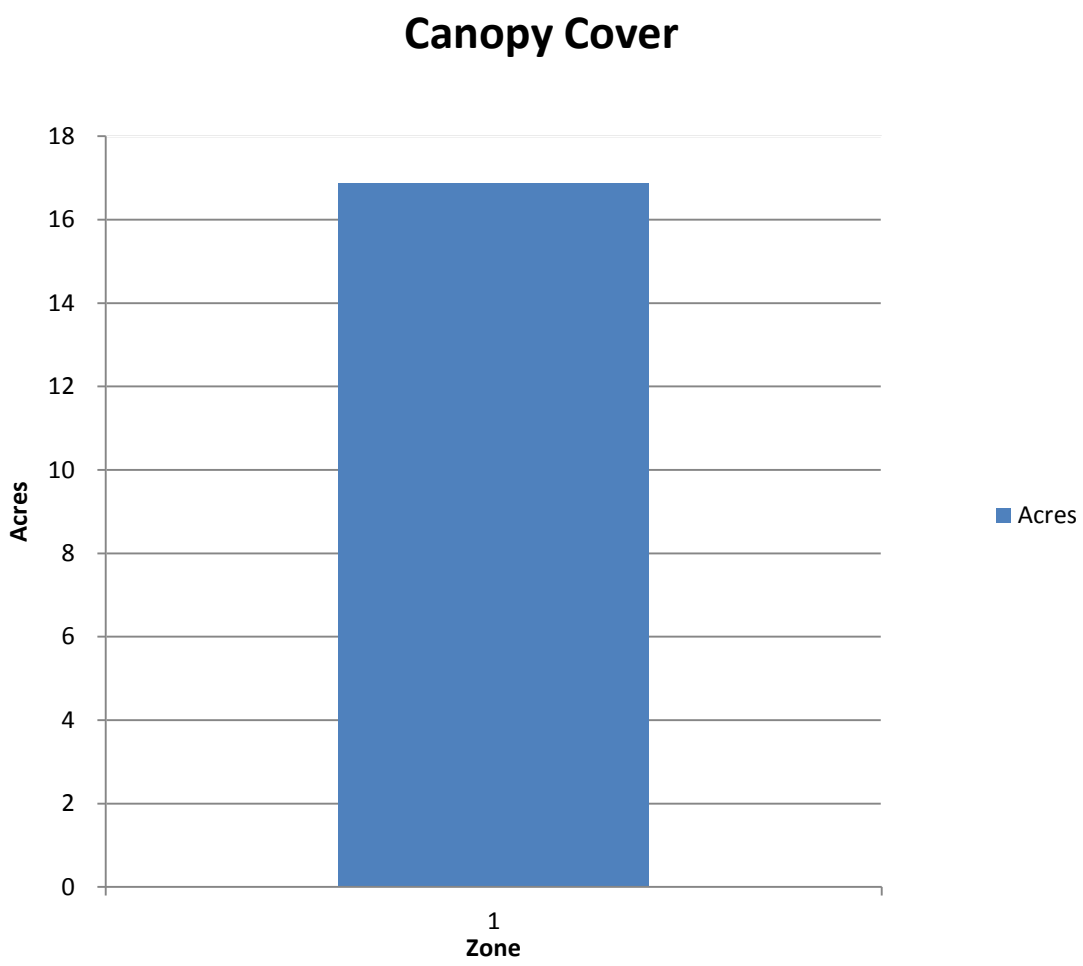
Figure 4: Wood Condition



Paullina
Condition (Woody) of Public Trees by Species (%)
12/13/2013

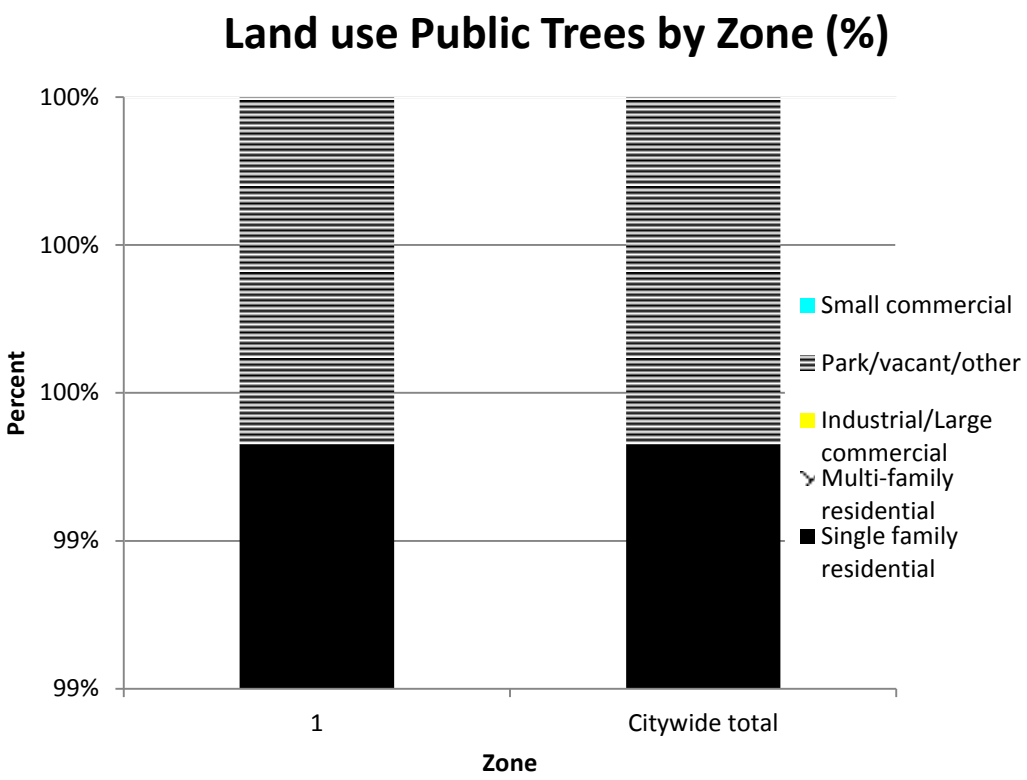
Species Name	Dead or Dying	Poor	Fair	Good
Green ash	7.03	8.59	29.69	54.69
Silver maple	4.07	4.88	34.96	56.10
Norway maple	12.87	11.88	36.63	38.61
Apple	1.45	7.25	27.54	63.77
Littleleaf linden	0.00	5.26	10.53	84.21
American basswood	5.88	2.94	41.18	50.00
Sugar maple	5.26	5.26	15.79	73.68
Northern hackberry	0.00	0.00	36.84	63.16
Honeylocust	0.00	0.00	26.67	73.33
White ash	0.00	0.00	18.18	81.82
Northern red oak	0.00	0.00	0.00	100.00
Red maple	0.00	0.00	37.50	62.50
Black walnut	12.50	0.00	12.50	75.00
Citywide total	5.64	6.27	30.09	57.99

Figure 5: Canopy Cover in Acres



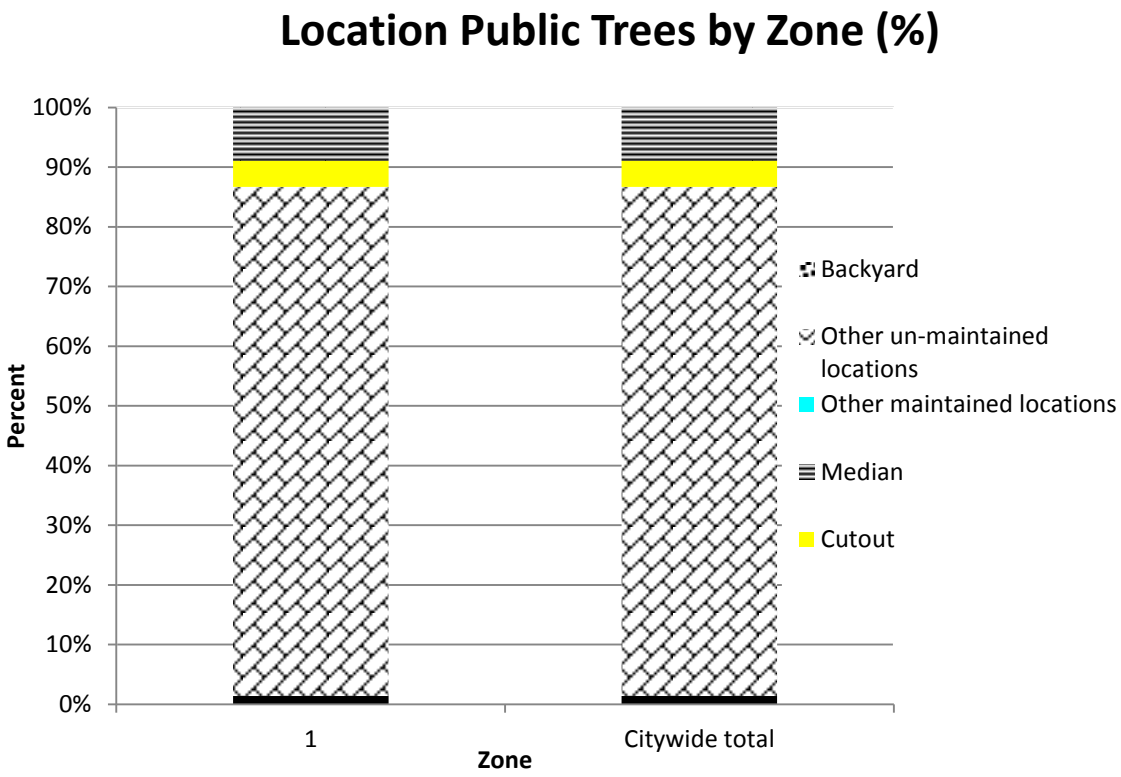
	Total Land Area	Total Canopy Cover	Canopy Cover as % of Total Land Area
Citywide total	1344	16.87	1.2%

Figure 6: Land Use of city/park trees



Zone	Single family residential	Multi-family residential	Industrial/Large commercial	Park/vacant/other	Small commercial
1	99.53	0.00	0.00	0.47	0.00
Citywide total	99.53	0.00	0.00	0.47	0.00

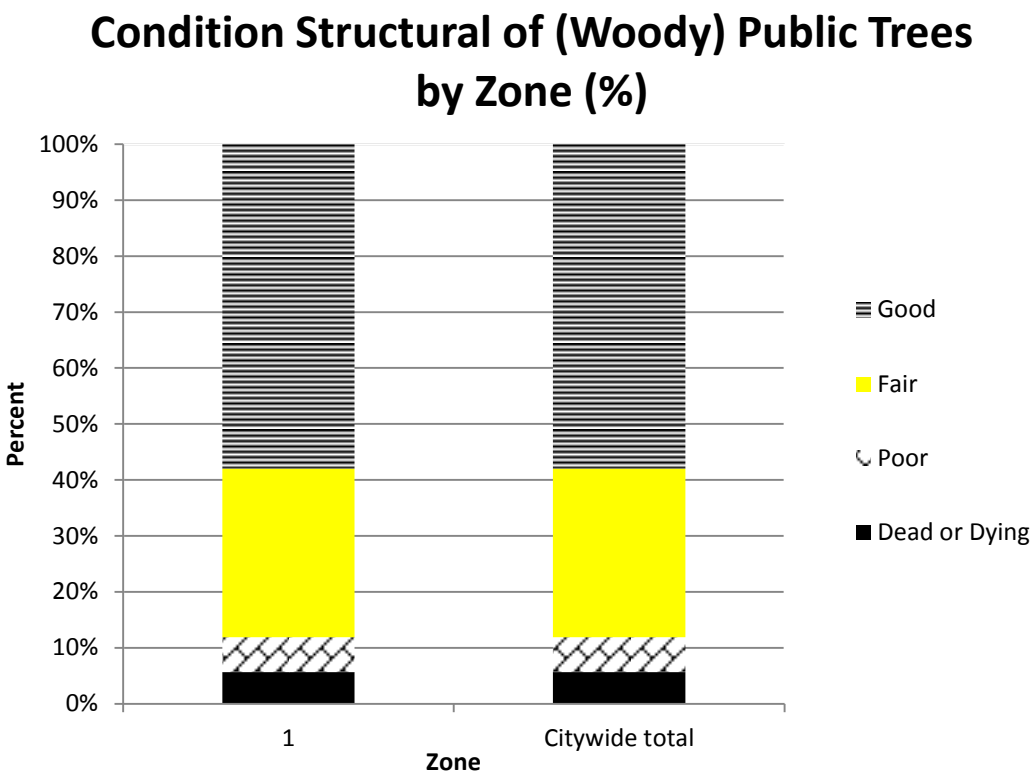
Figure 7: Location of city/park trees



Location Public Trees by Zone (%)
12/13/2013

Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
1	1.41	85.29	4.38	8.92	0.00	0.00	0.00
Citywide total	1.41	85.29	4.38	8.92	0.00	0.00	0.00

Figure 8. Woody Structural Condition of Public Trees



Condition Structural of (Woody) Public Trees by Zone (%)
12/13/2013

Zone Segment	Dead or Dying	Poor	Fair	Good
1	5.64	6.27	30.09	57.99
Citywide total	5.64	6.27	30.09	57.99

Appendix B: ArcGIS Mapping

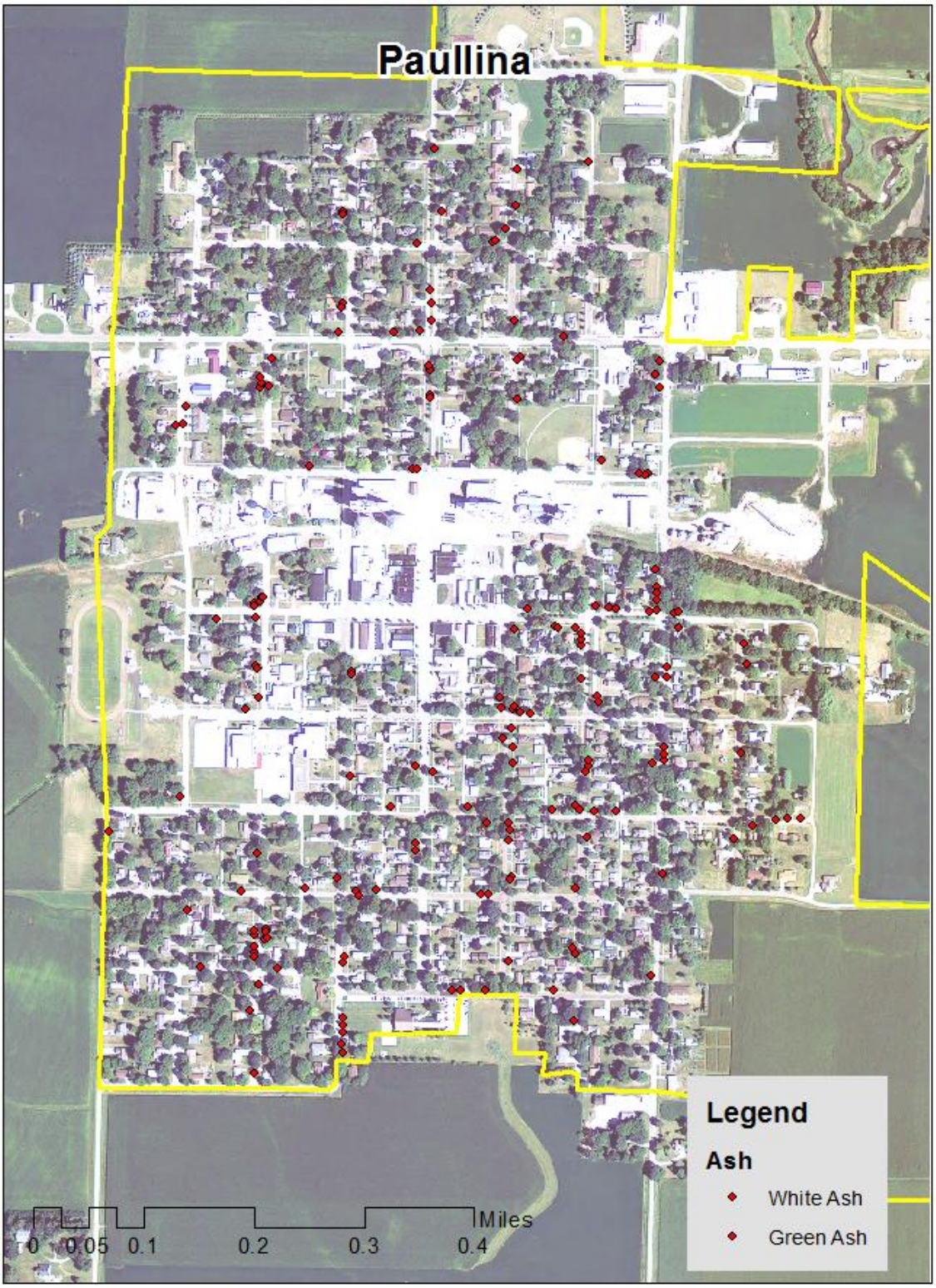


Figure 1: Location of Ash Trees

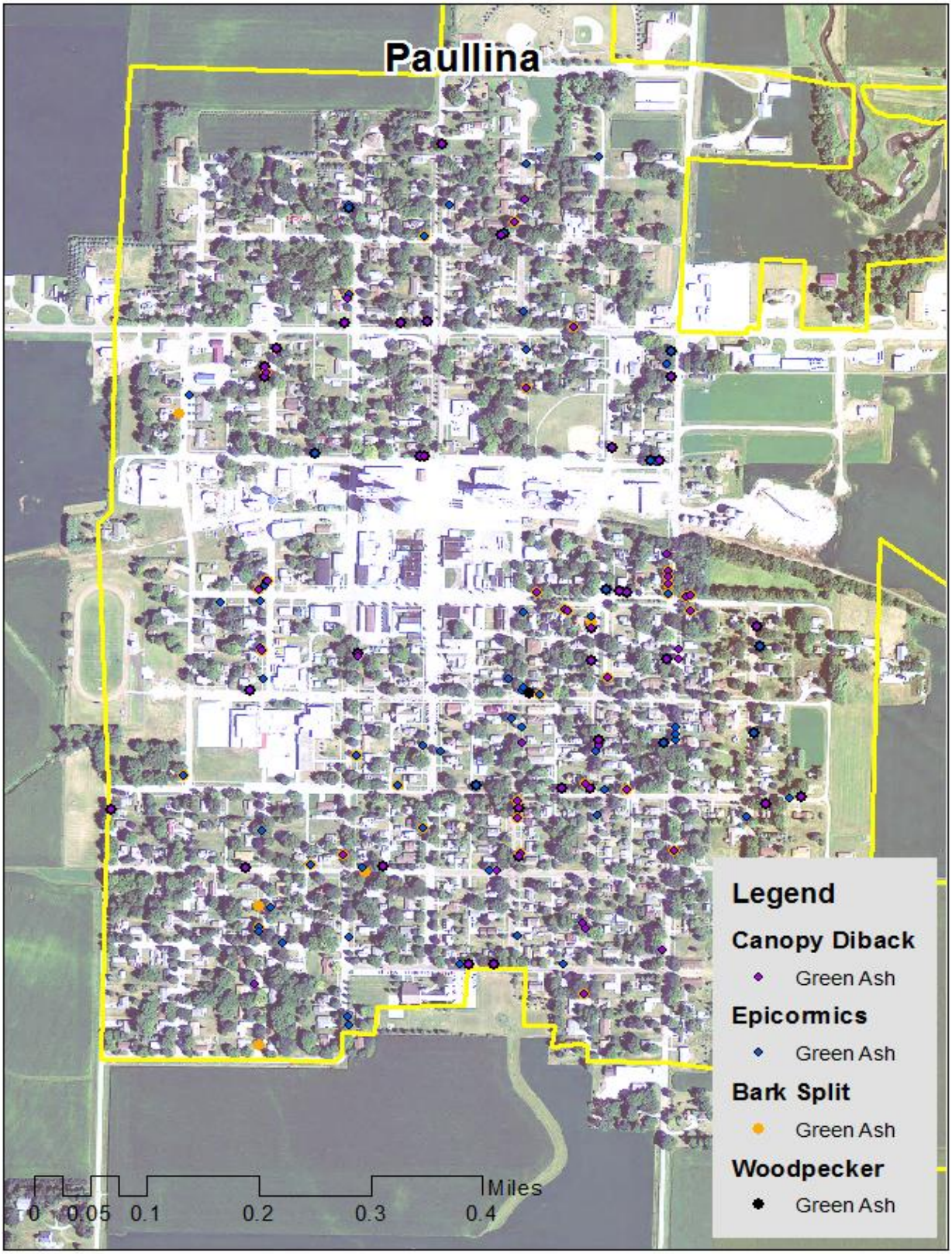


Figure 2: Location of EAB symptoms

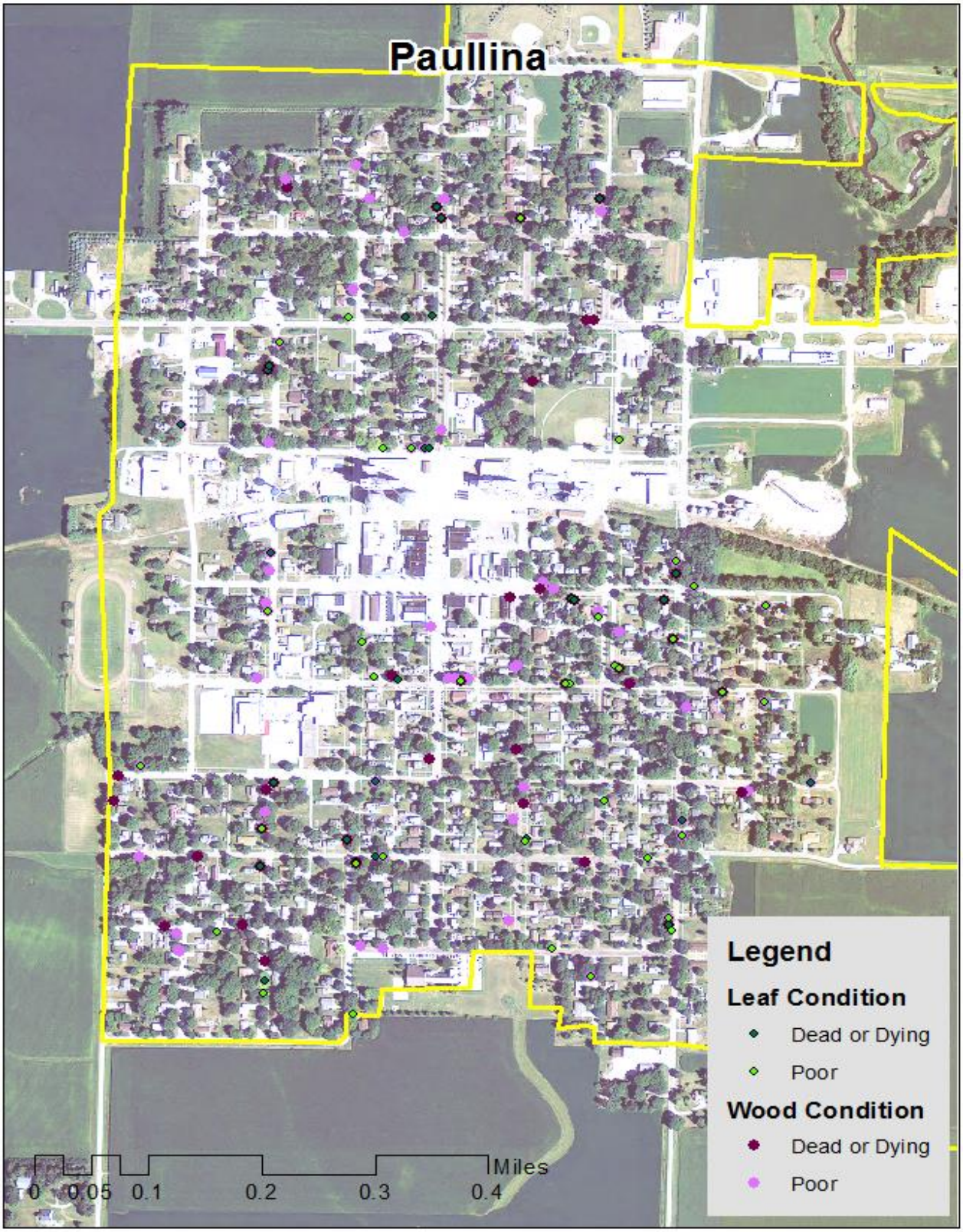


Figure 3: Location of Poor Condition Trees

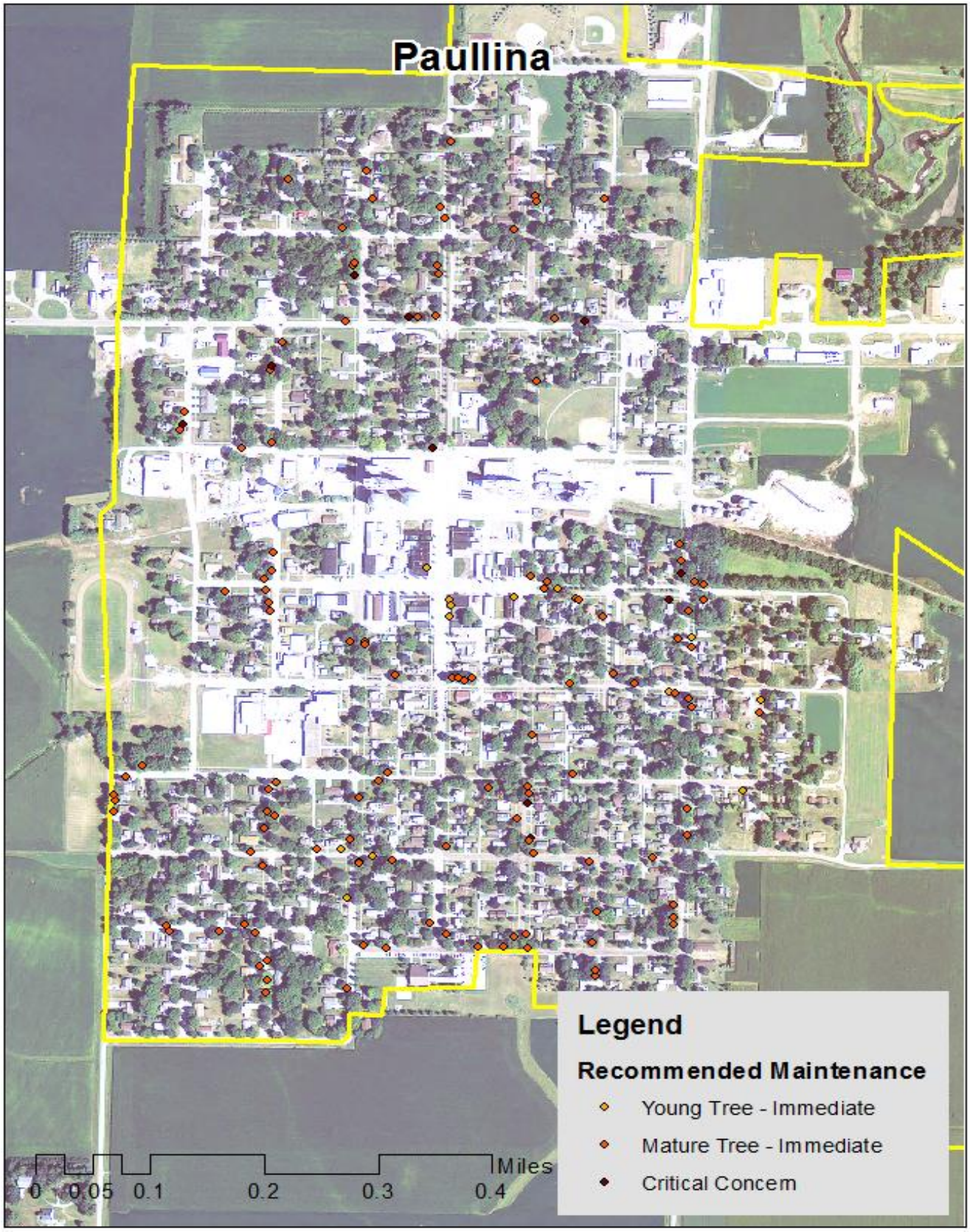


Figure 4: Location of Trees with Recommended Maintenance

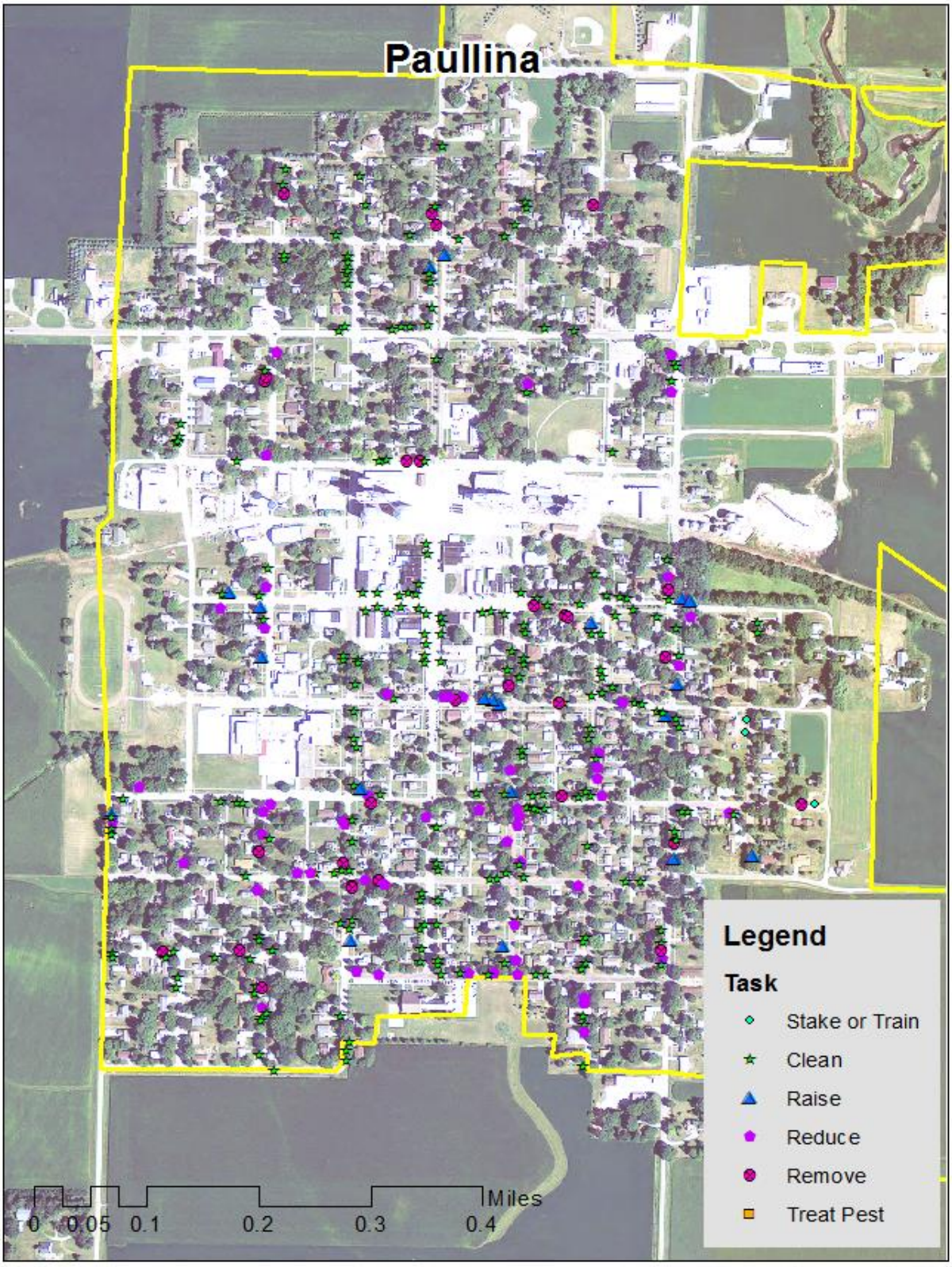


Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Paullina Tree Ordinances

CHAPTER 5: TREES

ARTICLE 7 - GENERAL PROVISIONS

7.01 PURPOSE. The purpose of this chapter is to beautify and preserve the appearance of the city by regulating and providing for the planting, care and removal of trees.

7.02 DEFINITIONS. For use in this chapter, the following term is defined:

1. "Parking" means that part of the street, avenue or highway in the city not covered by sidewalk and lying between the lot line and the curb line, or, on unpaved streets, that part of the street, avenue or highway lying between the lot line and that portion of the street usually traveled by vehicular traffic.

2. "Superintendent": shall mean the superintendent of utilities or such other person as may be designated by the council.

7.03 PLANTING RESTRICTIONS. No tree shall be planted in any street or parking except in accordance with the following:

1. Alignment. All trees hereafter planted in any street shall be planted in the parking midway between the outer line of the sidewalk and the curb. In the event a curb line is not established, trees shall be planted on a line ten (10) feet from the property line.

2. Spacing. Trees shall not be planted on the parking if it is less than nine (9) feet in width or contains less than eighty-one (81) square feet of exposed soil surface per tree. Trees shall not be planted closer than twenty (20) feet to street intersections (property lines extended) and ten (10) feet to driveways. If it is at all possible, trees should be planted inside the property lines and not between the sidewalk and the curb.

3. Prohibited Trees. No person shall hereinafter plant in any street any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, Boxelder, Chinese elm or evergreen.

7.04 DUTY TO TRIM TREES. The owner or agent of the abutting property shall keep the trees on or overhanging the street trimmed to that all branches will be at least fifteen (15) feet above the surface of the street and eight (8) feet above the sidewalks.

(Code of Iowa, Sec. 364.12 (2)(c) and 364.12(3)(g))

7.05 ASSESSMENT. If the abutting property owner fails to trim the trees as required in this chapter, the City may serve notice on the abutting property owner requiring the owner to do so within five (5) days. If the property owner fails to trim the trees within that time, the City may perform the required action and assess the costs against the abutting property for collection in the same manner as a property tax.

(Code of Iowa, Sec. 364.12(2)(d) & (e) and 364.12(3)(g) & (h))

7.06 TRIMMING TREES TO BE SUPERVISED. It shall be unlawful for any person to trim or cut any tree in a street or public place unless the work is done under the supervision of the City.

7.07 REMOVAL OF TREES. The superintendent shall remove, on the order of the council, any tree on the streets of the city which interferes with the making of improvements or with travel thereon. The superintendent shall additionally remove any trees on the street, not on private property, which have become diseased, or which constitute a danger to the public, or which may otherwise be declared a nuisance.

(Code of Iowa, Sec. 364.12(2)(c) & 372.13(4))

CHAPTER 5: TREES

ARTICLE 8 - DUTCH ELM DISEASE CONTROL

8.01 TREES SUBJECT TO REMOVAL. The council having determined that the health of the elm trees within the city is threatened by a fatal disease known as the Dutch elm disease hereby declares the following shall be removed:

1. LIVING OR STANDING TREES. Any living or standing elm tree or part thereof infected with the Dutch elm disease fungus or which harbors any of the Elm bark beetles, that is Scolytus multistriatus (eichb.) or Hylurgopinus rufipes (marsh.).

2. DEAD TREES. Any dead elm tree or part thereof including logs, branches, stumps, firewood or other elm material from which the bark has not be removed and burned or sprayed with an effective elm bark beetle destroying insecticide.

8.02 DUTY TO REMOVE. No person, firm or corporation shall permit any tree or material infected with Dutch elm disease to remain on the premises owned, controlled or occupied by him within the city.

(Code of Iowa, Sec, 364.12(3b))

8.03 INSPECTION. The city shall inspect or cause to be inspected all premises and places within the city to determine whether any condition as defined in Article 7.01 of this ordinance exists thereon, and shall also inspect or cause to be inspected any elm trees reported or suspected to be infected with the Dutch elm disease or any elm bark bearing material reported or suspected to be infected with the elm bark beetles.

8.04 REMOVAL FROM CITY PROPERTY. If the city, upon inspection or examination, in person or by some qualified person acting for the city, shall determine that any condition as herein defined exists in or upon any public street, alley, park or any public place, including the strip between the curb and the lot line of private property within the city, and that the danger of other elm trees within the city is imminent, he or she shall immediately cause it to be removed and burned or otherwise correct the same in such manner as to destroy or prevent as fully as possible the spread of Dutch elm disease or the insect pests or vectors known to carry such disease fungus.

8.05 REMOVAL FROM PRIVATE PROPERTY. If the city upon inspection or examination, in person or by some qualified person acting for the city, shall determine with reasonable certainty that any condition as herein defined exists in or upon private premises, and that the danger to other elm trees within the city is imminent, he or she shall immediately notify by certified mail the occupant or

person in charge of such property, to correct such condition within 14 days of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt thereof, the council may cause the nuisance to be removed and the cost assessed against the property for collection in the same manner as a property tax.

(Code of Iowa, Sec. 364.12(3b&h))

8.06 REASONABLE CERTAINTY. If the city is unable to determine with reasonable certainty whether or not a tree in or upon private premises is infected with Dutch elm disease, a city representative is authorized to remove or cut specimens from said tree, and obtain a diagnosis of such specimens.