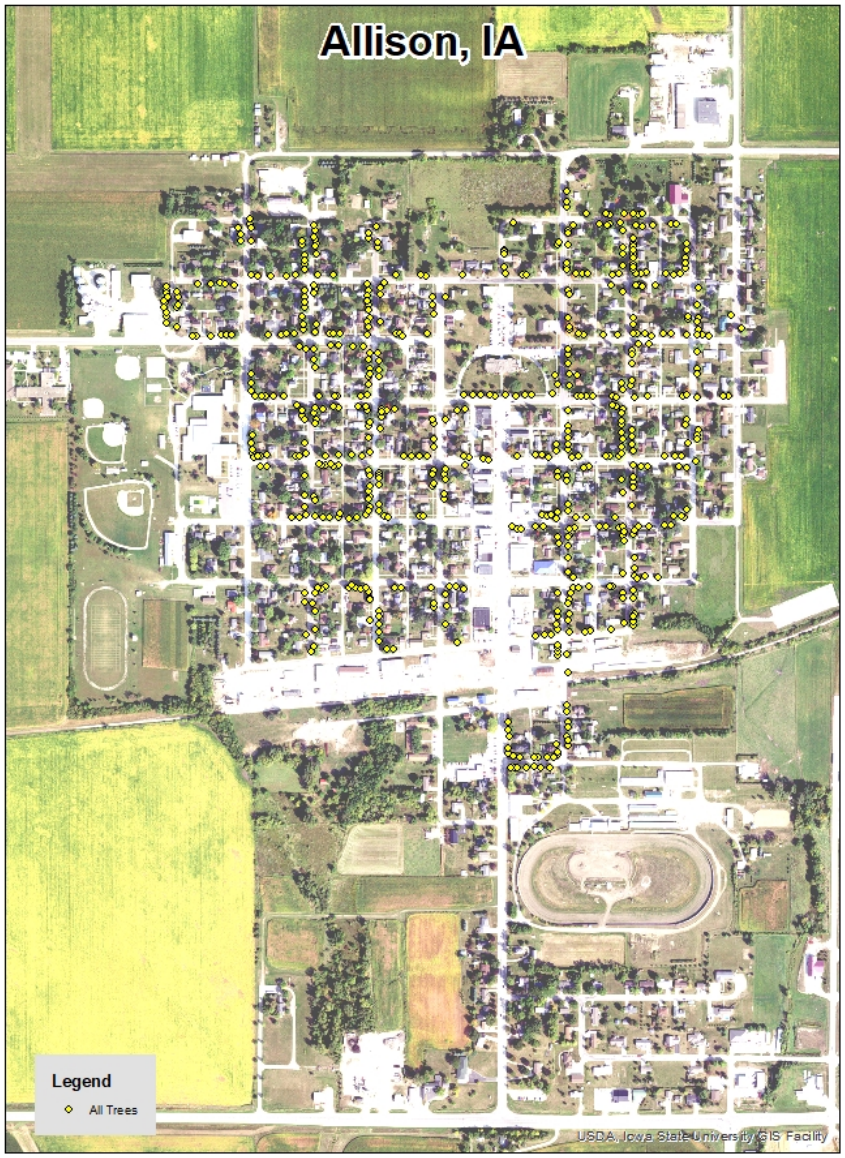
Allison, IA



2020 Urban Forest Management Plan
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Executive Summary

Overview

This plan was developed to assist the City of Allison with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management allows a community to best 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 Allison's city owned trees (ash) will die once EAB becomes established in the community, unless preventative treatment is used. 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 2019, a tree inventory was conducted using Global Positioning System (GPS) data collectors. The inventory was a complete inventory of street and park trees. Below are some key findings of the 602 trees inventoried.

- Allison's trees provide $108,043 of benefits annually, an average of $179 a tree
- We recorded a total of 35 species of trees
- The top three genera are: Maple 43%, Ash 20%, and Hackberry 7%
- Due to a bad contract agreement, it is unclear exactly how many trees in Allison need maintenance or 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.

- EAB was not recorded when the inventory was conducted. There are 118 ash trees within Allison and it is likely that many are currently displaying symptoms and it is recommended that a visual inspection of all ash trees be conducted annually.
- All trees should be pruned on a routine schedule – one sixth of the city every year.
- Plant a diverse mix of trees that do not include: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow, or black walnut.
- Due to the prevalence of EAB, it is likely that many of Allison's ash trees will die over the next ten years. In 2019, Allison's community forestry budget was $17,237, which included $8,346 for removals. With the current budget, if only ash were removed, it could take 11 years to remove all of the city's ash – Suggestion: request a budget increase to $10,000 annually and apply for grants to treat healthy ash, remove unhealthy/dead trees, and plant replacement trees.

Introduction

This plan was developed to assist Allison 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 or treatment and replacement planting. With proper planning and management of the current canopy in Allison, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

Trees are an important component of Allison'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 Allison 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 Allison's urban forestry goals.

Inventory

In 2018, via contract a tree inventory was conducted that included 100% of the city owned trees on both streets and parks. 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 ArcGIS 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 associated with 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 602 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management as part of the i-Tree suite. The following are results from the i-Tree STREETS analysis.

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Allison's trees reduce energy related costs by approximately $30,082 annually (Appendix A, Table 1). These savings are both in Electricity (143.5 MWh) and in Natural Gas (19,585.1 Therms).

Annual Stormwater Benefits

Allison's trees intercept about 1,446,104 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides $39,189 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 Allison, it is estimated that trees remove 1,832.8 lbs 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 $4,265 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Allison, trees sequester about 316,335 lbs of carbon a year with an associated value of $2,373 (Appendix A, Table 5). In addition, the trees store 5,057,842 lbs of carbon, with a yearly benefit of $37,934 (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. Allison receives $31,148 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STREETS analysis, Allison's trees provide $108,043 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 602 trees in Allison provide approximately $179 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Allison has 21 different tree species that were recorded along city streets and parks (Appendix A, Figure 1).
The distribution of trees by genera is as follows:

Species	Count	%
Maple	261	43
Ash	118	20
Hackberry	44	7
Oak	34	6
Apple	31	5
Basswood	25	4
Spruce	22	4
Walnut	20	3
Honeylocust	14	2
Aspen	7	1
CA	6	1
Pear	6	1
Cottonwood	3	<1
Cedar	2	<1
Magnolia	2	<1
Willow	2	<1
Acer	1	<1
Sycamore	1	<1
Birch	1	<1
QURUra	1	<1
Pine	1	<1

Age Class

Most of Allison's trees (39%) are between 6 and 18 inches in diameter at 4.5 ft (Appendix A, Figure 2). For age, it is preferred that the highest amounts of trees are in the smallest size category (a downward slope) to prepare for natural mortality and to maintain canopy cover. Allison's size curve is largely in the middle, indicating a recent slowing in planting.

Condition: Wood and Foliage

Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The foliage condition results for Allison indicate that 62% of the trees are in good health, with only 7% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 62% of Allison's trees are in good health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health, dead or dying is about 7% of the population. This 7% is an estimate of trees that need management follow ups.

Management Needs

There were no specific management needs recorded for Allison trees. It is recommended that the trees that were listed as in need of immediate maintenance be prioritized.

Canopy Cover

The total canopy with both private and public trees is 5%, or 88.73 acres. The canopy cover included in the Allison inventory includes 15.53 acres (Appendix A, Figure 4). The City's Canopy goal is to increase canopy by 3%, in 30 years. To achieve this goal, it is estimated that 91 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of Allison'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	Tree Count	% of Public Trees
Single family residential	598	99.34
Multi-family residential	0	0.00
Small commercial	1	0.17
Industrial/Large commercial	0	0.00
Park/vacant/other	3	0.50
Total	602	100.00

Site Type	Tree Count	% of Public Trees
Front yard	55	9.14
Planting strip	521	86.54
Cutout	0	0.00
Median	0	0.00
Other maintained locations	25	4.15
Other un-maintained locations	0	0.00
Backyard	1	0.17
Total	602	100.00

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 18 inches should be removed. Broken branches and branches that interfere with motorist's vision of pedestrians, vehicles, traffic signs and signals, etc. should be removed.

<u>Hazardous trees</u>

Detailed information was not collected on which trees are potentially hazardous or where they might be located, however the data collectors did note the trees with ID's 281351, 281616, 281654, and

281855 need immediate maintenance but neglected to note what kind of maintenance was needed (Appendix B, Figure 4).

Poor tree species

The data collectors did not collect appropriate data on this either, however it was noted that 118 of the trees present within Allison are ash trees. While the collectors did not gather data on EAB, it is common though out the region and very likely affecting many of the ash trees in Allison. Visual inspections of ash trees should be conducted annually in order track their conditions. Treatment for EAB is an effective preventative measure that can be taken to prevent the death of healthy ash trees. It is not recommended to be used on ash trees already displaying two or more symptoms of EAB. Since data for EAB was not collected, we will present two separate scenarios regarding ash management versus removal. If all 118 ash trees in Allison are healthy and could be treated, it would cost an estimated $38,212.50 every two years, which is an average of $323.83 per tree. If all 118 ash trees in Allison are suffering from EAB, it would cost an estimated $89,600, which is an average of $800 per tree. These scenarios represent two different extremes and while it is likely that many ash trees within Allison are displaying signs of EAB, it is also likely that many are not and would therefore be eligible for treatment. It is recommended that Allison treat many of its larger, healthier ash trees and begin removing ash trees found to be displaying 2 or more symptoms of EAB.

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.

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%. 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 Allison.

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 (43%) (Appendix A, Figure 1). Maples should not be planted until this percentage can be lowered. 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, poplar, box elder, Chinese elm, evergreen, willow or black walnut. Any new trees planted must meet the restrictions in city ordinance 151.02 (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 decline and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

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). Next will be all ash in poor condition and displaying signs and symptoms of EAB (Appendix B, Figure 2 & Appendix B, Figure 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 tool for communities to spread removal costs out over several years while allowing trees to continue to provide benefits. However, treatment is not recommended if EAB is more than 15 miles away from the community or if ash trees are already displaying symptoms of EAB. 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 millions of 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 the 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 a quarantine.

Canopy Replacement

As budget permits, all removed trees will be replaced. All trees will meet the restrictions in city ordinance 151.02 (Appendix C). The new plantings will be a diverse mix and should 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 genera 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 if preventative treatments are not being used. City 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.”

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Annual Energy Benefits of Public Trees

12/10/2019

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standar d Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	30.2	2,292	4,112.1	4,030	6,322	(N/A)	18.1	21.0	58.00
Silver maple	22.8	1,729	2,983.5	2,924	4,653	(N/A)	15.4	15.5	50.03
Norway maple	20.4	1,545	2,885.5	2,828	4,372	(N/A)	14.3	14.5	50.84
Northern hackberry	13.1	991	1,834.0	1,797	2,788	(N/A)	7.3	9.3	63.37
Black maple	10.7	810	1,452.3	1,423	2,233	(N/A)	6.8	7.4	54.46
Apple	2.7	202	419.1	411	613	(N/A)	5.1	2.0	19.76
Sugar maple	5.0	379	660.5	647	1,026	(N/A)	3.5	3.4	48.87
Red maple	4.2	316	522.3	512	828	(N/A)	3.3	2.8	41.38
Black walnut	6.2	471	856.8	840	1,311	(N/A)	3.3	4.4	65.53
American basswood	5.0	379	718.5	704	1,083	(N/A)	2.8	3.6	63.73
Blue spruce	1.6	122	205.8	202	323	(N/A)	2.5	1.1	21.56
Honeylocust	4.6	347	589.3	578	925	(N/A)	2.3	3.1	66.04
Pin oak	3.2	247	438.7	430	677	(N/A)	1.8	2.2	61.50
Northern red oak	1.3	96	172.8	169	266	(N/A)	1.8	0.9	24.17
Norway spruce	0.7	50	86.1	84	134	(N/A)	1.2	0.4	19.14
Quaking aspen	0.8	63	115.9	114	177	(N/A)	1.2	0.6	25.25
Catalpa	1.6	123	226.3	222	344	(N/A)	1.0	1.1	57.40
Black ash	1.3	102	197.6	194	296	(N/A)	1.0	1.0	49.35
Pear	0.2	13	30.7	30	44	(N/A)	0.8	0.1	8.70
Northern pin oak	1.3	99	188.6	185	284	(N/A)	0.8	0.9	56.75
Littleleaf linden	0.8	61	96.2	94	155	(N/A)	0.8	0.5	31.08
Bur oak	1.3	102	191.1	187	289	(N/A)	0.8	1.0	57.89
Basswood	0.8	61	94.7	93	153	(N/A)	0.7	0.5	38.33
Eastern cottonwood	1.1	80	139.6	137	217	(N/A)	0.5	0.7	72.42
White oak	0.3	25	41.2	40	66	(N/A)	0.5	0.2	21.84
White ash	0.9	71	118.5	116	187	(N/A)	0.5	0.6	62.23
Sweetbay	0.0	1	3.1	3	4	(N/A)	0.3	0.0	2.12
Willow	0.6	49	94.8	93	142	(N/A)	0.3	0.5	70.84
Northern white cedar	0.1	9	19.0	19	27	(N/A)	0.3	0.1	13.58
Broadleaf Deciduous Large	0.2	18	27.0	26	44	(N/A)	0.2	0.1	44.23
Callery pear	0.1	8	16.9	17	24	(N/A)	0.2	0.1	24.47
Paper birch	0.2	18	27.0	26	44	(N/A)	0.2	0.1	44.23
Scotch pine	0.1	11	19.7	19	30	(N/A)	0.2	0.1	30.47
Total	143.5	10,889	19,585.1	19,193	30,082	(N/A)	100.0	100.0	49.97

Table 2: Annual Stormwater Benefits

Allison

Annual Stormwater Benefits of Public Trees

12/10/2019

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	314,281	8,517	(N/A)	18.1	21.7	78.14
Silver maple	283,030	7,670	(N/A)	15.4	19.6	82.47
Norway maple	178,960	4,850	(N/A)	14.3	12.4	56.39
Northern hackberry	107,430	2,911	(N/A)	7.3	7.4	66.17
Black maple	97,987	2,655	(N/A)	6.8	6.8	64.77
Apple	10,401	282	(N/A)	5.1	0.7	9.09
Sugar maple	50,252	1,362	(N/A)	3.5	3.5	64.85
Red maple	28,894	783	(N/A)	3.3	2.0	39.15
Black walnut	71,778	1,945	(N/A)	3.3	5.0	97.26
American basswood	59,094	1,601	(N/A)	2.8	4.1	94.20
Blue spruce	20,547	557	(N/A)	2.5	1.4	37.12
Honeylocust	50,366	1,365	(N/A)	2.3	3.5	97.49
Pin oak	30,454	825	(N/A)	1.8	2.1	75.03
Northern red oak	10,415	282	(N/A)	1.8	0.7	25.66
Norway spruce	10,037	272	(N/A)	1.2	0.7	38.86
Quaking aspen	10,663	289	(N/A)	1.2	0.7	41.28
Catalpa	15,771	427	(N/A)	1.0	1.1	71.23
Black ash	12,589	341	(N/A)	1.0	0.9	56.86
Pear	613	17	(N/A)	0.8	0.0	3.32
Northern pin oak	13,288	360	(N/A)	0.8	0.9	72.02
Littleleaf linden	5,045	137	(N/A)	0.8	0.3	27.35
Bur oak	15,943	432	(N/A)	0.8	1.1	86.41
Basswood	5,005	136	(N/A)	0.7	0.3	33.91
Eastern cottonwood	14,195	385	(N/A)	0.5	1.0	128.23
White oak	2,091	57	(N/A)	0.5	0.1	18.89
White ash	11,721	318	(N/A)	0.5	0.8	105.88
Sweetbay	47	1	(N/A)	0.3	0.0	0.64
Willow	7,529	204	(N/A)	0.3	0.5	102.01
Northern white cedar	1,191	32	(N/A)	0.3	0.1	16.14
Broadleaf Deciduous Large	1,466	40	(N/A)	0.2	0.1	39.72
Callery pear	586	16	(N/A)	0.2	0.0	15.88
Paper birch	1,466	40	(N/A)	0.2	0.1	39.72
Scotch pine	2,969	80	(N/A)	0.2	0.2	80.46
Citywide total	1,446,104	39,189	(N/A)	100.0	100.0	65.10

Table 3: Annual Air Quality Benefits

Allison

Annual Air Quality Benefits of Public Trees

12/10/2019

Species	Deposition (lb)				Total Depos. ($)	Avoided (lb)				Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($) Standard Error	% of Total Trees	Avg. $/tree
	O_3	NO_2	PM_{10}	SO_2		NO_2	PM_{10}	VOC	SO_2							
Green ash	39.0	6.2	18.9	1.7	208	144.0	21.0	20.0	136.9	897	0.0	0	387.7	1,106 (N/A)	18.1	10.15
Silver maple	44.0	7.5	22.2	1.9	239	107.3	15.7	15.0	103.1	672	-24.7	-93	292.0	818 (N/A)	15.4	8.80
Norway maple	35.4	6.1	17.6	1.6	192	98.2	14.2	13.6	92.3	610	-8.4	-32	270.7	770 (N/A)	14.3	8.95
Northern hackberry	14.9	2.6	7.9	0.7	82	62.9	9.1	8.7	59.2	390	0.0	0	165.9	473 (N/A)	7.3	10.74
Black maple	24.5	4.2	11.3	1.1	130	50.8	7.4	7.1	48.3	317	-8.1	-30	146.6	417 (N/A)	6.8	10.16
Apple	2.7	0.4	1.3	0.1	14	13.2	1.9	1.8	12.1	81	0.0	0	33.5	95 (N/A)	5.1	3.07
Sugar maple	7.2	1.2	3.6	0.3	39	23.6	3.5	3.3	22.6	148	-5.7	-21	59.6	165 (N/A)	3.5	7.86
Red maple	6.1	1.0	2.9	0.3	33	19.4	2.9	2.7	18.9	122	-2.2	-8	52.1	147 (N/A)	3.3	7.34
Black walnut	9.5	1.5	4.5	0.4	50	29.7	4.3	4.1	28.1	185	0.0	0	82.2	235 (N/A)	3.3	11.76
American basswood	8.4	1.4	4.1	0.4	45	24.2	3.5	3.3	22.7	150	-7.0	-26	60.9	169 (N/A)	2.8	9.92
Blue spruce	2.6	0.5	2.2	0.3	17	7.5	1.1	1.1	7.3	47	-7.4	-28	15.2	37 (N/A)	2.5	2.45
Honeylocust	9.8	1.6	4.5	0.4	52	21.5	3.1	3.0	20.7	135	-7.7	-29	57.0	157 (N/A)	2.3	11.25
Pin oak	4.8	0.8	2.5	0.2	26	15.4	2.3	2.1	14.7	96	-9.1	-34	33.8	89 (N/A)	1.8	8.05
Northern red oak	2.0	0.3	1.0	0.1	11	6.0	0.9	0.8	5.8	38	-2.8	-11	14.2	38 (N/A)	1.8	3.46
Norway spruce	1.1	0.2	0.9	0.1	7	3.1	0.5	0.4	3.0	19	-4.1	-15	5.2	11 (N/A)	1.2	1.59
Quaking aspen	1.5	0.2	0.7	0.1	8	4.0	0.6	0.6	3.8	25	0.0	0	11.3	32 (N/A)	1.2	4.64
Catalpa	1.7	0.3	0.8	0.1	9	7.8	1.1	1.1	7.3	48	0.0	0	20.1	57 (N/A)	1.0	9.54
Black ash	2.5	0.4	1.3	0.1	14	6.6	0.9	0.9	6.1	41	-0.6	-2	18.3	52 (N/A)	1.0	8.70
Pear	0.1	0.0	0.1	0.0	1	0.9	0.1	0.1	0.8	5	0.0	0	2.1	6 (N/A)	0.8	1.20
Northern pin oak	2.9	0.5	1.4	0.1	15	6.3	0.9	0.9	5.9	39	-0.7	-2	18.2	52 (N/A)	0.8	10.43
Littleleaf linden	0.6	0.1	0.3	0.0	4	3.7	0.6	0.5	3.7	24	-0.4	-1	9.2	26 (N/A)	0.8	5.15
Bur oak	2.0	0.3	0.9	0.1	11	6.5	0.9	0.9	6.1	40	0.0	0	17.7	51 (N/A)	0.8	10.15
Basswood	0.4	0.1	0.2	0.0	2	3.7	0.5	0.5	3.6	23	0.0	0	9.0	25 (N/A)	0.7	6.31
Eastern cottonwood	2.1	0.3	0.9	0.1	11	5.0	0.7	0.7	4.8	31	0.0	0	14.7	42 (N/A)	0.5	14.06
White oak	0.1	0.0	0.1	0.0	1	1.5	0.2	0.2	1.5	10	0.0	0	3.7	10 (N/A)	0.5	3.50
White ash	2.3	0.4	1.0	0.1	12	4.4	0.6	0.6	4.2	27	0.0	0	13.6	39 (N/A)	0.5	13.16
Sweetbay	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.2	1 (N/A)	0.3	0.27
Willow	1.7	0.3	0.8	0.1	9	3.1	0.5	0.4	2.9	19	-0.4	-1	9.5	27 (N/A)	0.3	13.58
Northern white cedar	0.1	0.0	0.1	0.0	1	0.6	0.1	0.1	0.5	3	-0.3	-1	1.1	3 (N/A)	0.3	1.48
Broadleaf Deciduous Large	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	0.0	0	2.6	7 (N/A)	0.2	7.42
Callery pear	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.2	3 (N/A)	0.2	3.47
Paper birch	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	0.0	0	2.6	7 (N/A)	0.2	7.42
Scotch pine	0.3	0.1	0.3	0.0	2	0.7	0.1	0.1	0.7	4	-1.4	-5	0.9	1 (N/A)	0.2	1.45
Citywide total	230.5	38.8	114.7	10.6	1,247	684.4	99.7	95.0	650.2	4,265	-91.0	-341	1,832.8	5,170 (N/A)	100.0	8.59

Table 4: Annual Carbon Stored

Allison

Stored CO2 Benefits of Public Trees

12/10/2019

Species	Total Stored CO2 (lbs)	Total ($)	Standar d Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	1,284,585	9,634	(N/A)	18.1	25.4	88.39
Silver maple	1,020,551	7,654	(N/A)	15.4	20.2	82.30
Norway maple	584,040	4,380	(N/A)	14.3	11.5	50.93
Northern hackberry	212,296	1,592	(N/A)	7.3	4.2	36.19
Black maple	262,927	1,972	(N/A)	6.8	5.2	48.10
Apple	44,456	333	(N/A)	5.1	0.9	10.76
Sugar maple	213,119	1,598	(N/A)	3.5	4.2	76.11
Red maple	68,340	513	(N/A)	3.3	1.4	25.63
Black walnut	310,334	2,328	(N/A)	3.3	6.1	116.38
American basswood	311,779	2,338	(N/A)	2.8	6.2	137.55
Blue spruce	16,041	120	(N/A)	2.5	0.3	8.02
Honeylocust	126,966	952	(N/A)	2.3	2.5	68.02
Pin oak	118,948	892	(N/A)	1.8	2.4	81.10
Northern red oak	40,300	302	(N/A)	1.8	0.8	27.48
Norway spruce	9,359	70	(N/A)	1.2	0.2	10.03
Quaking aspen	48,973	367	(N/A)	1.2	1.0	52.47
Catalpa	53,275	400	(N/A)	1.0	1.1	66.59
Black ash	42,331	317	(N/A)	1.0	0.8	52.91
Pear	2,021	15	(N/A)	0.8	0.0	3.03
Northern pin oak	47,565	357	(N/A)	0.8	0.9	71.35
Littleleaf linden	14,393	108	(N/A)	0.8	0.3	21.59
Bur oak	63,277	475	(N/A)	0.8	1.3	94.91
Basswood	12,050	90	(N/A)	0.7	0.2	22.59
Eastern cottonwood	68,874	517	(N/A)	0.5	1.4	172.18
White oak	4,719	35	(N/A)	0.5	0.1	11.80
White ash	35,435	266	(N/A)	0.5	0.7	88.59
Sweetbay	28	0	(N/A)	0.3	0.0	0.10
Willow	28,560	214	(N/A)	0.3	0.6	107.10
Northern white cedar	513	4	(N/A)	0.3	0.0	1.93
Broadleaf Deciduous	3,672	28	(N/A)	0.2	0.1	27.54
Callery pear	1,101	8	(N/A)	0.2	0.0	8.26
Paper birch	3,672	28	(N/A)	0.2	0.1	27.54
Scotch pine	3,343	25	(N/A)	0.2	0.1	25.07
Citywide total	5,057,842	37,934	(N/A)	100.0	100.0	63.01

Table 5: Annual Carbon Sequestered

Allison

Annual CO Benefits of Public Trees

12/10/2019

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total Standar ($) d Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	68,361	513	-6,166	-310	-49	50,652	380	112,536	844 (N/A)	18.1	21.2	7.74
Silver maple	83,687	628	-4,902	-242	-39	38,217	287	116,759	876 (N/A)	15.4	22.0	9.42
Norway maple	30,605	230	-2,806	-205	-23	34,138	256	61,733	463 (N/A)	14.3	11.6	5.38
Northern hackberry	14,765	111	-1,019	-116	-9	21,898	164	35,528	266 (N/A)	7.3	6.7	6.06
Black maple	14,557	109	-1,262	-99	-10	17,896	134	31,092	233 (N/A)	6.8	5.9	5.69
Apple	4,391	33	-213	-38	-2	4,464	33	8,604	65 (N/A)	5.1	1.6	2.08
Sugar maple	10,891	82	-1,024	-54	-8	8,375	63	18,189	136 (N/A)	3.5	3.4	6.50
Red maple	6,941	52	-328	-35	-3	6,980	52	13,558	102 (N/A)	3.3	2.6	5.08
Black walnut	14,688	110	-1,490	-66	-12	10,408	78	23,541	177 (N/A)	3.3	4.4	8.83
American basswood	17,628	132	-1,497	-59	-12	8,383	63	24,455	183 (N/A)	2.8	4.6	10.79
Blue spruce	1,212	9	-77	-27	-1	2,690	20	3,798	28 (N/A)	2.5	0.7	1.90
Honeylocust	9,989	75	-609	-34	-5	7,669	58	17,015	128 (N/A)	2.3	3.2	9.11
Pin oak	12,017	90	-571	-32	-5	5,449	41	16,862	126 (N/A)	1.8	3.2	11.50
Northern red oak	1,969	15	-194	-16	-2	2,131	16	3,891	29 (N/A)	1.8	0.7	2.65
Norway spruce	694	5	-45	-12	0	1,096	8	1,734	13 (N/A)	1.2	0.3	1.86
Quaking aspen	1,863	14	-235	-10	-2	1,396	10	3,014	23 (N/A)	1.2	0.6	3.23
Catalpa	3,941	30	-256	-16	-2	2,711	20	6,380	48 (N/A)	1.0	1.2	7.97
Black ash	2,044	15	-203	-14	-2	2,264	17	4,091	31 (N/A)	1.0	0.8	5.11
Pear	283	2	-10	-3	0	297	2	567	4 (N/A)	0.8	0.1	0.85
Northern pin oak	1,350	10	-228	-14	-2	2,187	16	3,294	25 (N/A)	0.8	0.6	4.94
Littleleaf linden	2,075	16	-69	-8	-1	1,351	10	3,349	25 (N/A)	0.8	0.6	5.02
Bur oak	3,502	26	-304	-15	-2	2,258	17	5,441	41 (N/A)	0.8	1.0	8.16
Basswood	1,545	12	-58	-7	0	1,337	10	2,817	21 (N/A)	0.7	0.5	5.28
Eastern cottonwood	2,317	17	-331	-11	-3	1,777	13	3,752	28 (N/A)	0.5	0.7	9.38
White oak	657	5	-23	-3	0	556	4	1,187	9 (N/A)	0.5	0.2	2.97
White ash	2,950	22	-170	-8	-1	1,560	12	4,331	32 (N/A)	0.5	0.8	10.83
Sweetbay	9	0	0	0	0	28	0	36	0 (N/A)	0.3	0.0	0.13
Willow	0	0	-137	-9	-1	1,077	8	932	7 (N/A)	0.3	0.2	3.49
Northern white cedar	105	1	-2	-2	0	189	1	289	2 (N/A)	0.3	0.1	1.08
Broadleaf Deciduous Large	445	3	-18	-2	0	393	3	819	6 (N/A)	0.2	0.2	6.14
Callery pear	224	2	-5	-1	0	176	1	393	3 (N/A)	0.2	0.1	2.95
Paper birch	445	3	-18	-2	0	393	3	819	6 (N/A)	0.2	0.2	6.14
Scotch pine	187	1	-16	-3	0	246	2	415	3 (N/A)	0.2	0.1	3.11
Citywide total	316,335	2,373	-24,285	-1,474	-193	240,641	1,805	531,217	3,984 (N/A)	100.0	100.0	6.62

Table 6: Annual Social and Aesthetic Benefits

Allison

Annual Aesthetic/Other Benefits of Public Trees

12/10/2019

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	5,832	(N/A)	18.1	18.7	53.50
Silver maple	7,168	(N/A)	15.4	23.0	77.07
Norway maple	2,941	(N/A)	14.3	9.4	34.19
Northern hackberry	2,167	(N/A)	7.3	7.0	49.24
Black maple	1,824	(N/A)	6.8	5.9	44.48
Apple	252	(N/A)	5.1	0.8	8.13
Sugar maple	1,142	(N/A)	3.5	3.7	54.38
Red maple	961	(N/A)	3.3	3.1	48.03
Black walnut	1,165	(N/A)	3.3	3.7	58.24
American basswood	1,227	(N/A)	2.8	3.9	72.20
Blue spruce	334	(N/A)	2.5	1.1	22.25
Honeylocust	2,479	(N/A)	2.3	8.0	177.05
Pin oak	1,017	(N/A)	1.8	3.3	92.43
Northern red oak	162	(N/A)	1.8	0.5	14.75
Norway spruce	188	(N/A)	1.2	0.6	26.84
Quaking aspen	175	(N/A)	1.2	0.6	25.01
Catalpa	342	(N/A)	1.0	1.1	57.03
Black ash	198	(N/A)	1.0	0.6	32.93
Pear	15	(N/A)	0.8	0.0	2.99
Northern pin oak	128	(N/A)	0.8	0.4	25.66
Littleleaf linden	223	(N/A)	0.8	0.7	44.62
Bur oak	277	(N/A)	0.8	0.9	55.42
Basswood	166	(N/A)	0.7	0.5	41.53
Eastern cottonwood	171	(N/A)	0.5	0.5	56.93
White oak	80	(N/A)	0.5	0.3	26.56
White ash	319	(N/A)	0.5	1.0	106.46
Sweetbay	1	(N/A)	0.3	0.0	0.50
Willow	0	(N/A)	0.3	0.0	0.00
Northern white cedar	31	(N/A)	0.3	0.1	15.42
Broadleaf Deciduous Large	46	(N/A)	0.2	0.1	45.86
Callery pear	26	(N/A)	0.2	0.1	26.22
Paper birch	46	(N/A)	0.2	0.1	45.86
Scotch pine	47	(N/A)	0.2	0.2	47.08
Citywide total	31,148	(N/A)	100.0	100.0	51.74

Table 7: Summary of Benefits in Dollars

Allison

Total Annual Benefits of Public Trees by Species ($)

6/3/2020

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Green ash	6,322	844	1,106	8,517	5,832	22,621	(N/A)	20.9
Silver maple	4,653	876	818	7,670	7,168	21,185	(N/A)	19.6
Norway maple	4,372	463	770	4,850	2,941	13,396	(N/A)	12.4
Northern hackberry	2,788	266	473	2,911	2,167	8,605	(N/A)	8.0
Black maple	2,233	233	417	2,655	1,824	7,362	(N/A)	6.8
Apple	613	65	95	282	252	1,306	(N/A)	1.2
Sugar maple	1,026	136	165	1,362	1,142	3,832	(N/A)	3.5
Black walnut	1,311	177	235	1,945	1,165	4,832	(N/A)	4.5
Red maple	828	102	147	783	961	2,820	(N/A)	2.6
American basswood	997	165	154	1,436	1,108	3,861	(N/A)	3.6
Blue spruce	323	28	37	557	334	1,279	(N/A)	1.2
Honeylocust	925	128	157	1,365	2,479	5,053	(N/A)	4.7
Pin oak	677	126	89	825	1,017	2,734	(N/A)	2.5
Northern red oak	220	24	32	227	135	637	(N/A)	0.6
Quaking aspen	177	23	32	289	175	696	(N/A)	0.6
Norway spruce	134	13	11	272	188	618	(N/A)	0.6
CA	0	0	0	0	0	0	(N/A)	0.0
Black ash	296	31	52	341	198	918	(N/A)	0.8
Littleleaf linden	155	25	26	137	223	566	(N/A)	0.5
Pear	44	4	6	17	15	85	(N/A)	0.1
Northern pin oak	284	25	52	360	128	849	(N/A)	0.8
Bur oak	289	41	51	432	277	1,090	(N/A)	1.0
Basswood	153	21	25	136	166	501	(N/A)	0.5
White oak	66	9	10	57	80	221	(N/A)	0.2
Eastern cottonwood	217	28	42	385	171	843	(N/A)	0.8
White ash	187	32	39	318	319	896	(N/A)	0.8
Sweetbay	4	0	1	1	1	7	(N/A)	0.0
Willow	142	7	27	204	0	380	(N/A)	0.4
Northern white cedar	27	2	3	32	31	95	(N/A)	0.1
Paper birch	44	6	7	40	46	143	(N/A)	0.1
QURURA	0	0	0	0	0	0	(N/A)	0.0
Callery pear	24	3	3	16	26	73	(N/A)	0.1
ACER	0	0	0	0	0	0	(N/A)	0.0
Scotch pine	30	3	1	80	47	163	(N/A)	0.2
American sycamore	91	11	19	196	58	375	(N/A)	0.3
Citywide Total	29,652	3,918	5,104	38,698	30,671	108,043	(N/A)	100.0

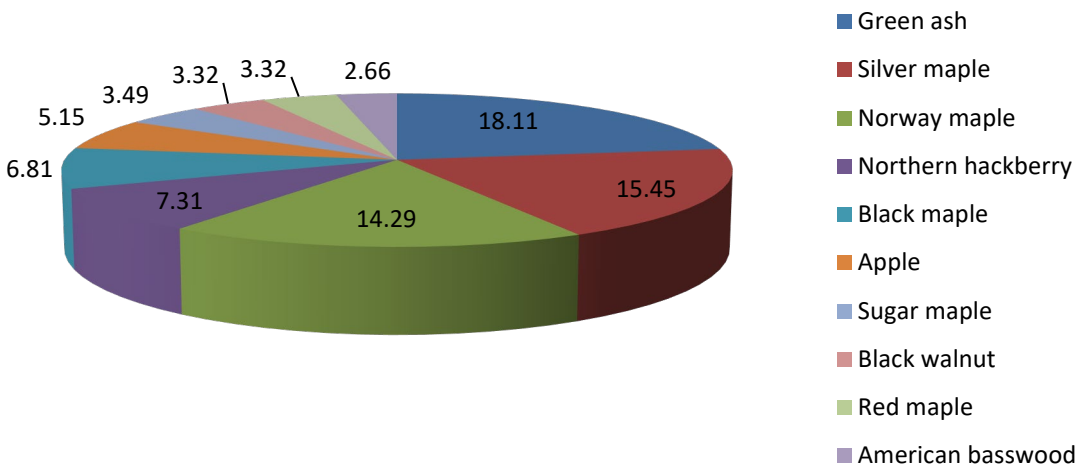

Figure 1: Species Distribution

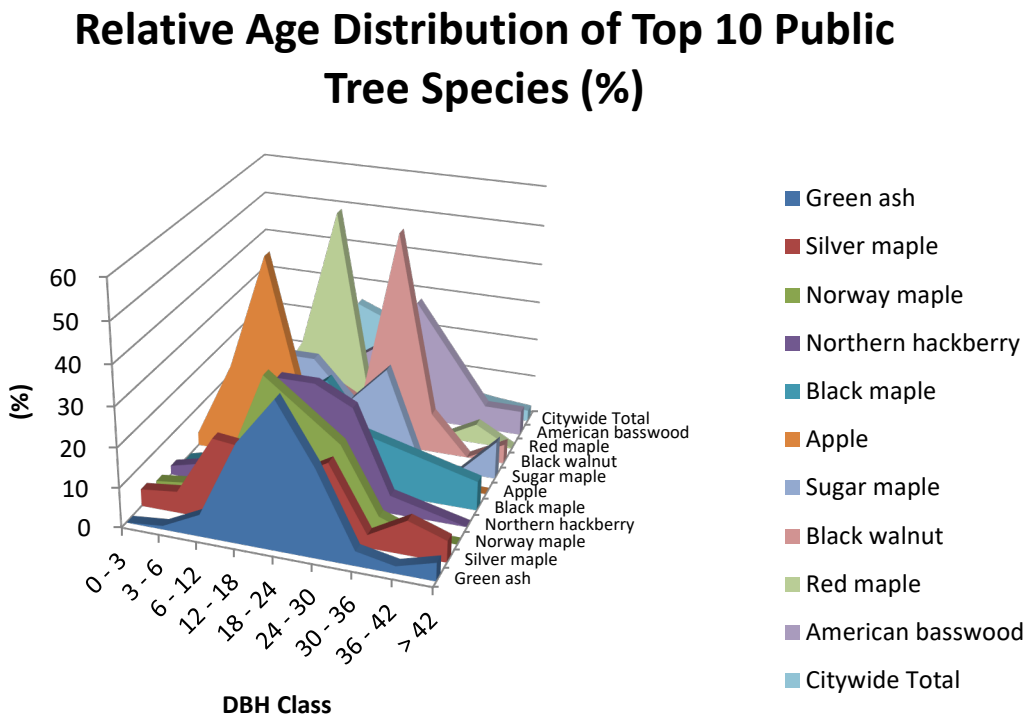

Figure 2: Relative Age Class

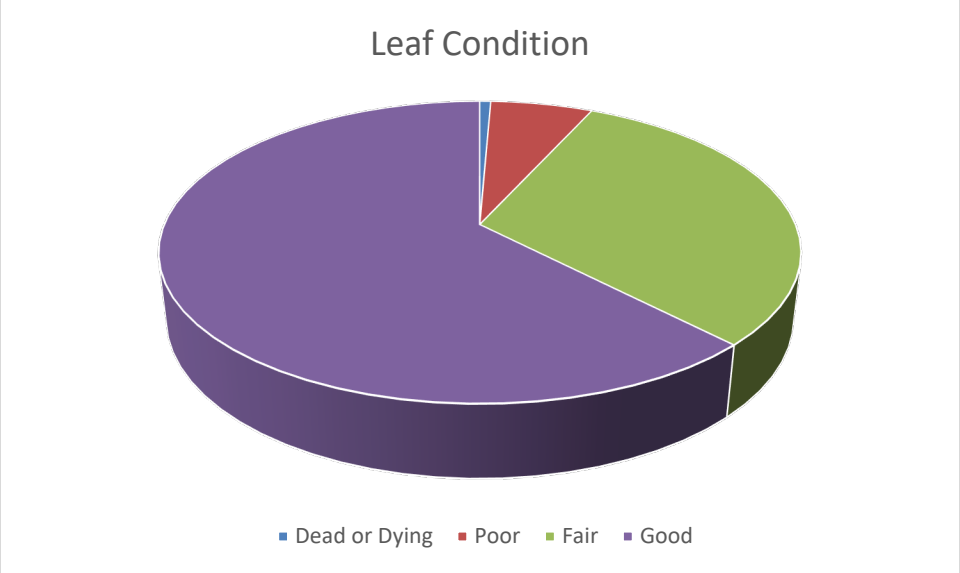

Figure 3: Foliage Condition

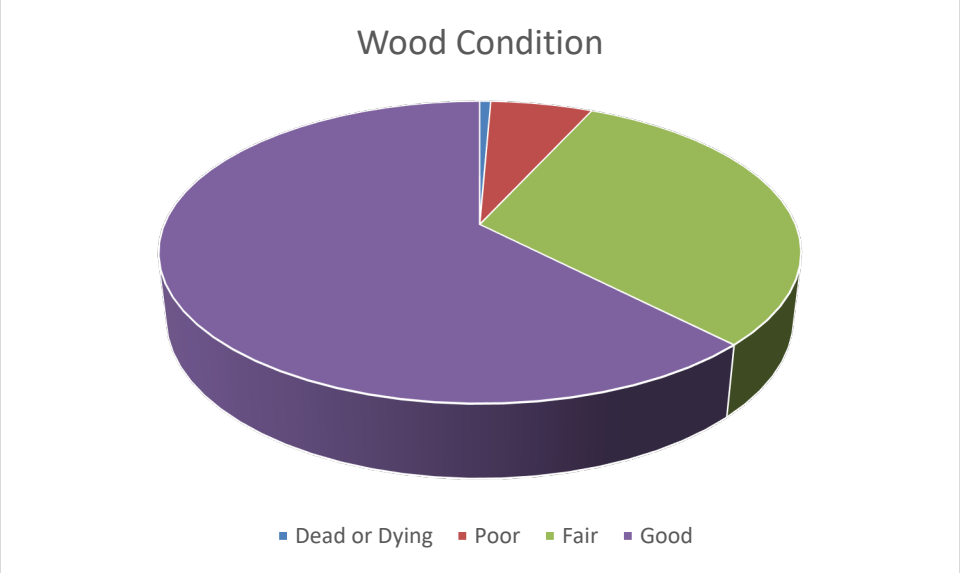

Figure 4: Wood Condition

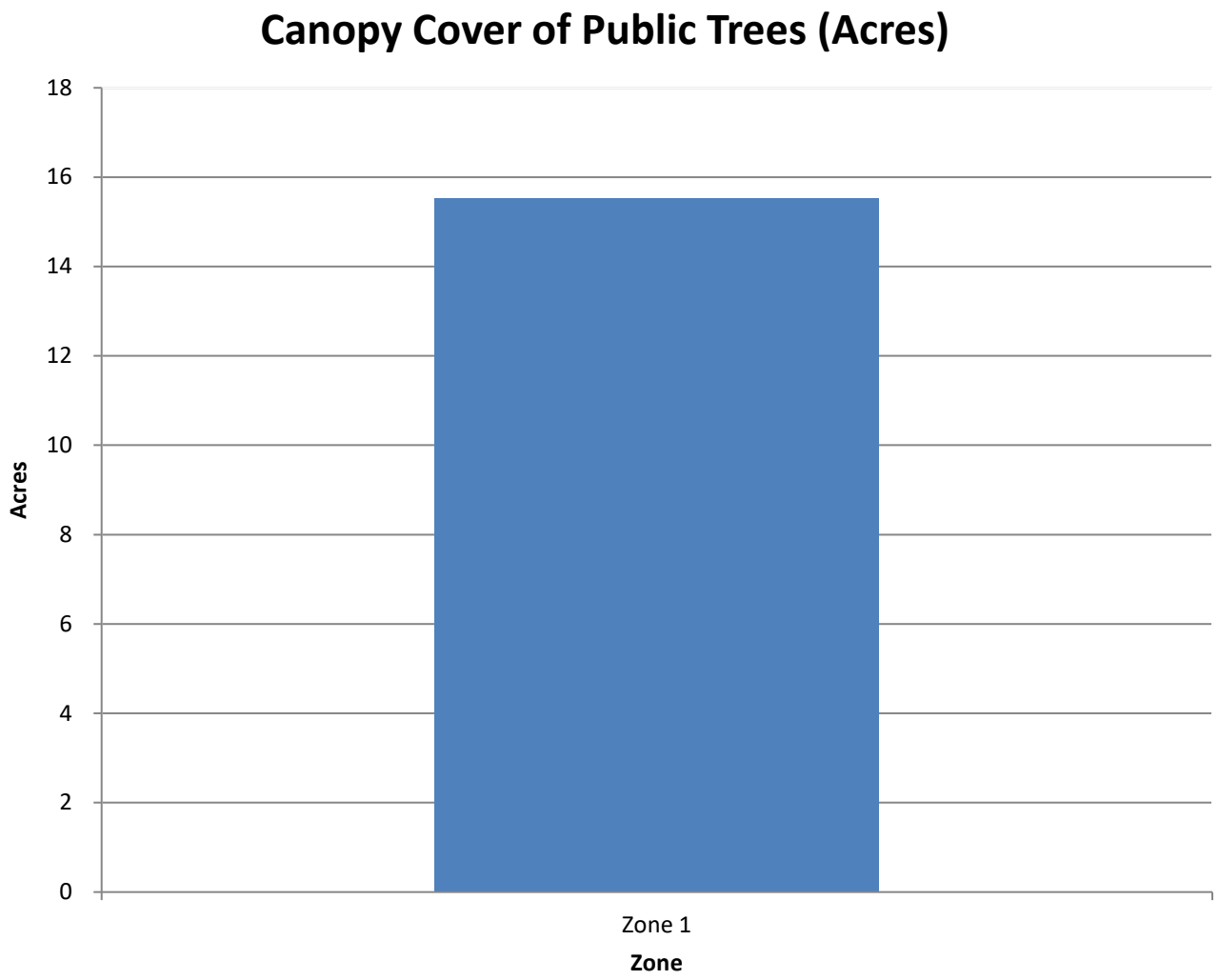

Figure 5: Canopy Cover in Acres

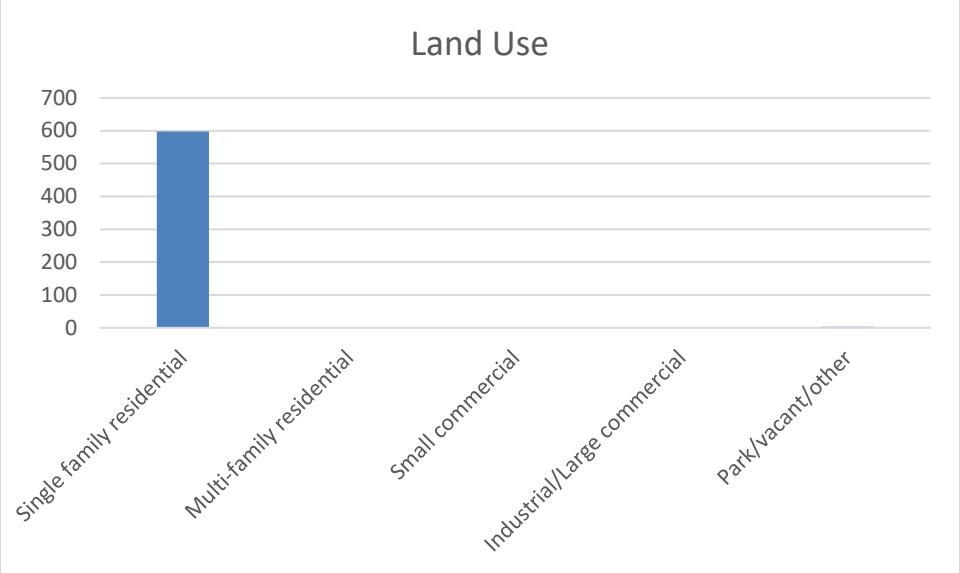

Figure 6: Land Use of city/park trees

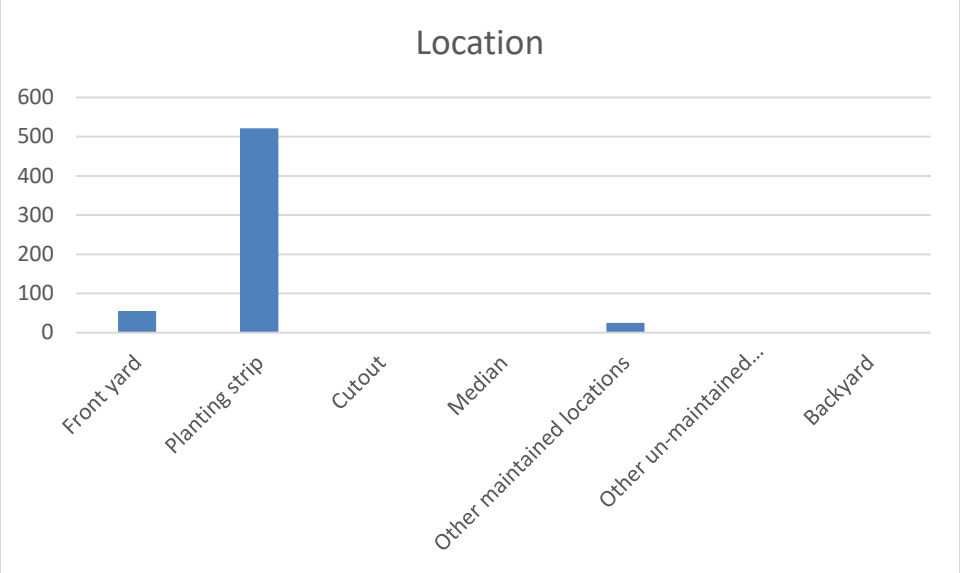

Figure 7: Location of city/park trees

Appendix B: ArcGIS Mapping

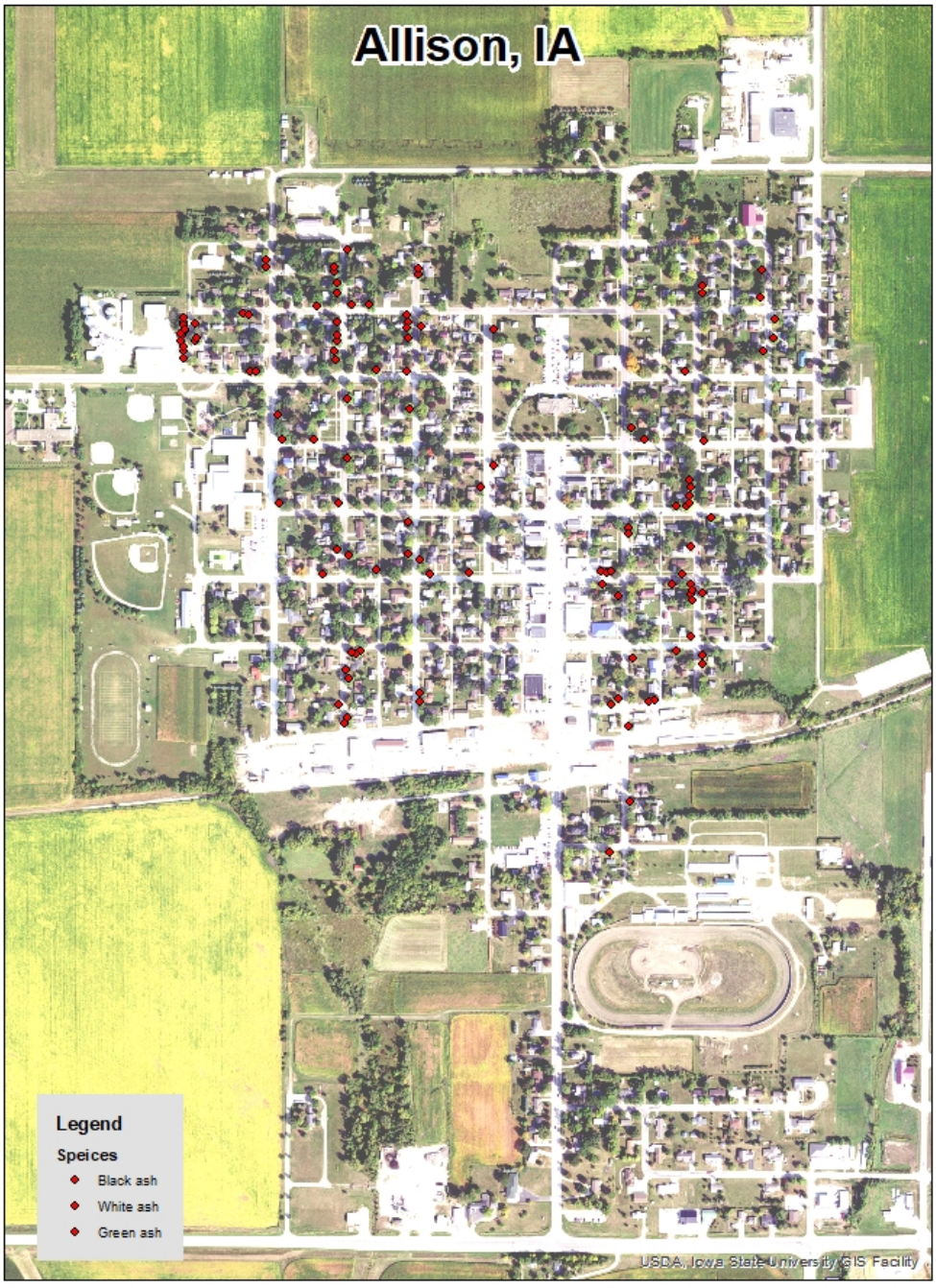

Figure 1: Location of Ash Trees

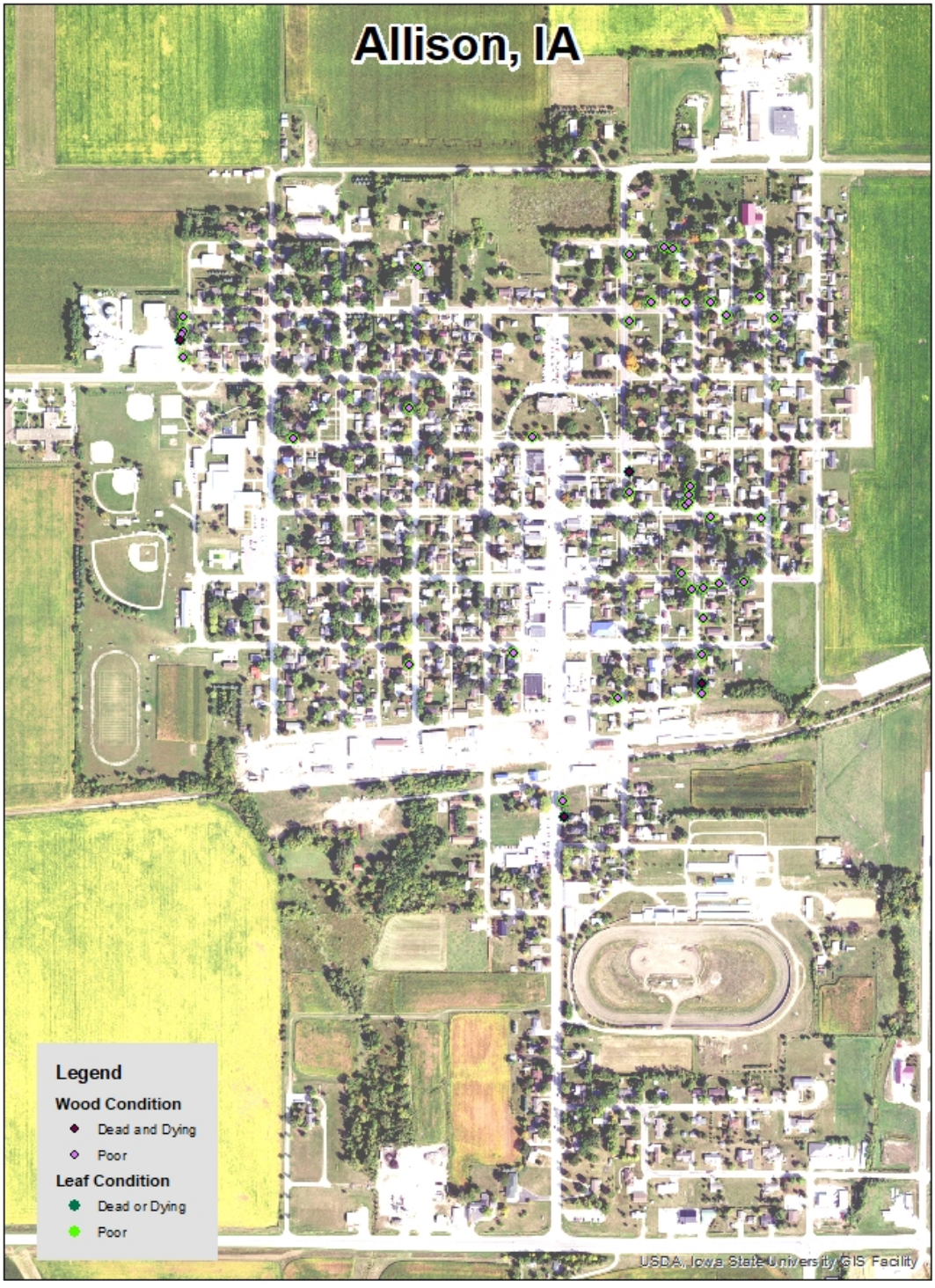

Figure 3: Location of Poor Condition Trees

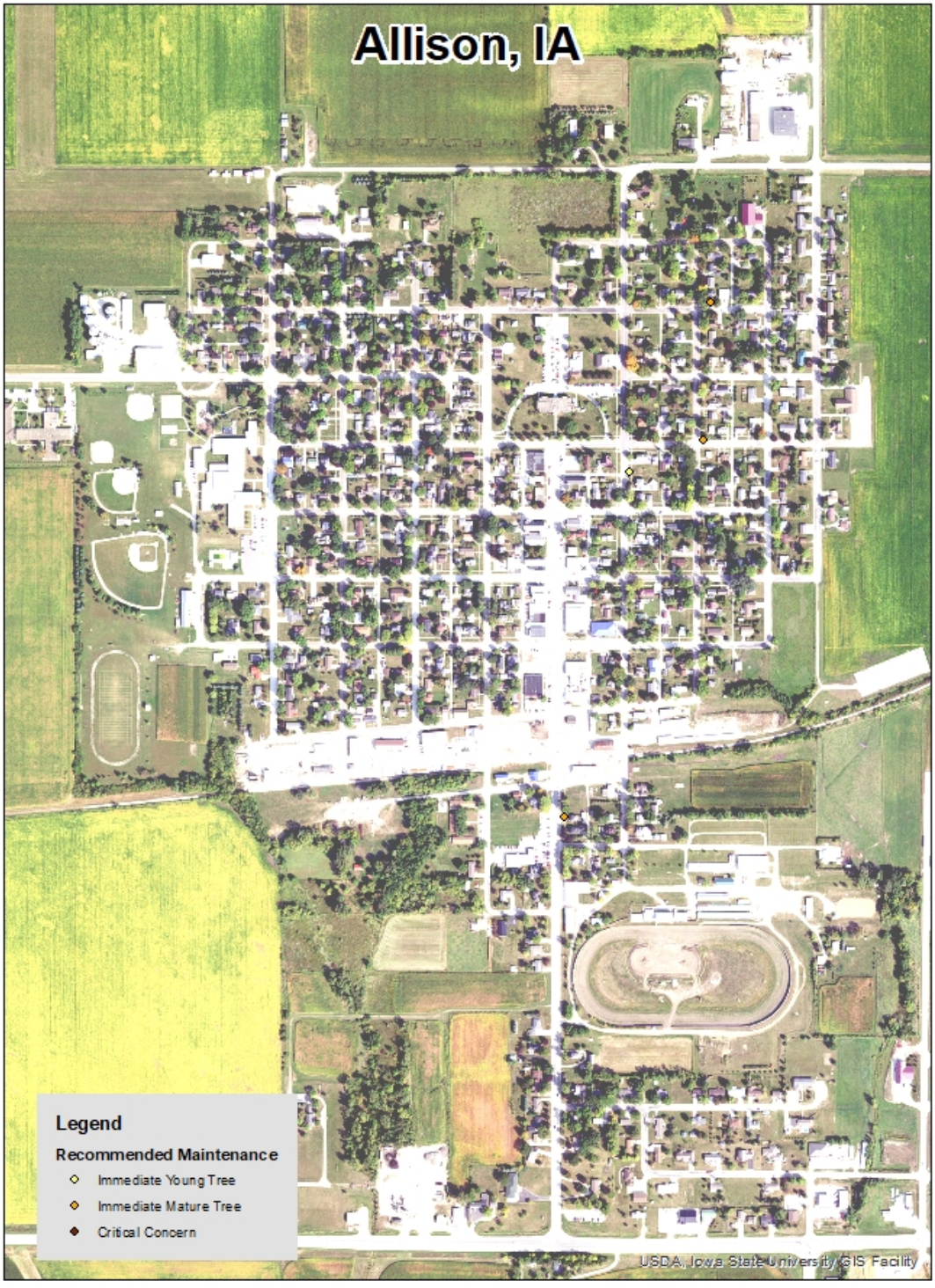

Figure 4: Location of Trees with Recommended Maintenance

Appendix C: Allison Tree Ordinances

CHAPTER 151
TREES

151.01 DEFINITION. For use in this chapter, “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.

151.02 PLANTING RESTRICTIONS. No tree shall be planted in any parking or street except in accordance with the rules and regulations established by the City Tree Board.

151.03 DUTY TO TRIM TREES. The owner or agent of the abutting property shall keep the trees on, or overhanging the street, trimmed so that all branches will be at least 15 feet above the surface of the street and eight feet above the sidewalks. If the abutting property owner fails to trim the trees, the City may serve notice on the abutting property owner requiring that such action be taken within five days. If such action is not taken 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[2c, d & e])

151.04 TRIMMING TREES TO BE SUPERVISED. Except as allowed in Section 151.03, it is 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 Tree Board.

151.05 DISEASE CONTROL. Any dead, diseased, or damaged tree or shrub that may harbor serious insect or disease pests or disease injurious to other trees is hereby declared to be a nuisance.

151.06 INSPECTION AND REMOVAL. The City Tree Board shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be dead, diseased or damaged, and such trees and shrubs shall be subject to the following:

1. City Property. If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, the
Tree Board may cause such condition to be corrected by treatment or removal. The Council may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.

2. Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Tree Board shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal 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 of notice, the Council may cause the condition to be corrected and the cost assessed against the property.
(Code of Iowa, Sec. 364.12[3b & h])

The State of Iowa is an Equal Opportunity Employer and provider of ADA services.

Federal law prohibits employment discrimination on the basis of race, color, age, religion, national origin, sex or disability. State law prohibits employment discrimination on the basis of race, color, creed, age, sex, sexual orientation, gender identity, national origin, religion, pregnancy, or disability. State law also prohibits public accommodation (such as access to services or physical facilities) discrimination on the basis of race, color, creed, religion, sex, sexual orientation, gender identity, religion, national origin, or disability. If you believe you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please contact the Iowa Civil Rights Commission, 1-800-457-4416, or write to the Iowa Department of Natural Resources, Wallace State Office Bldg., 502 E 9th St, Des Moines IA 50319.

If you need accommodations because of disability to access the services of this Agency, please contact the Director at 515-725-8200.