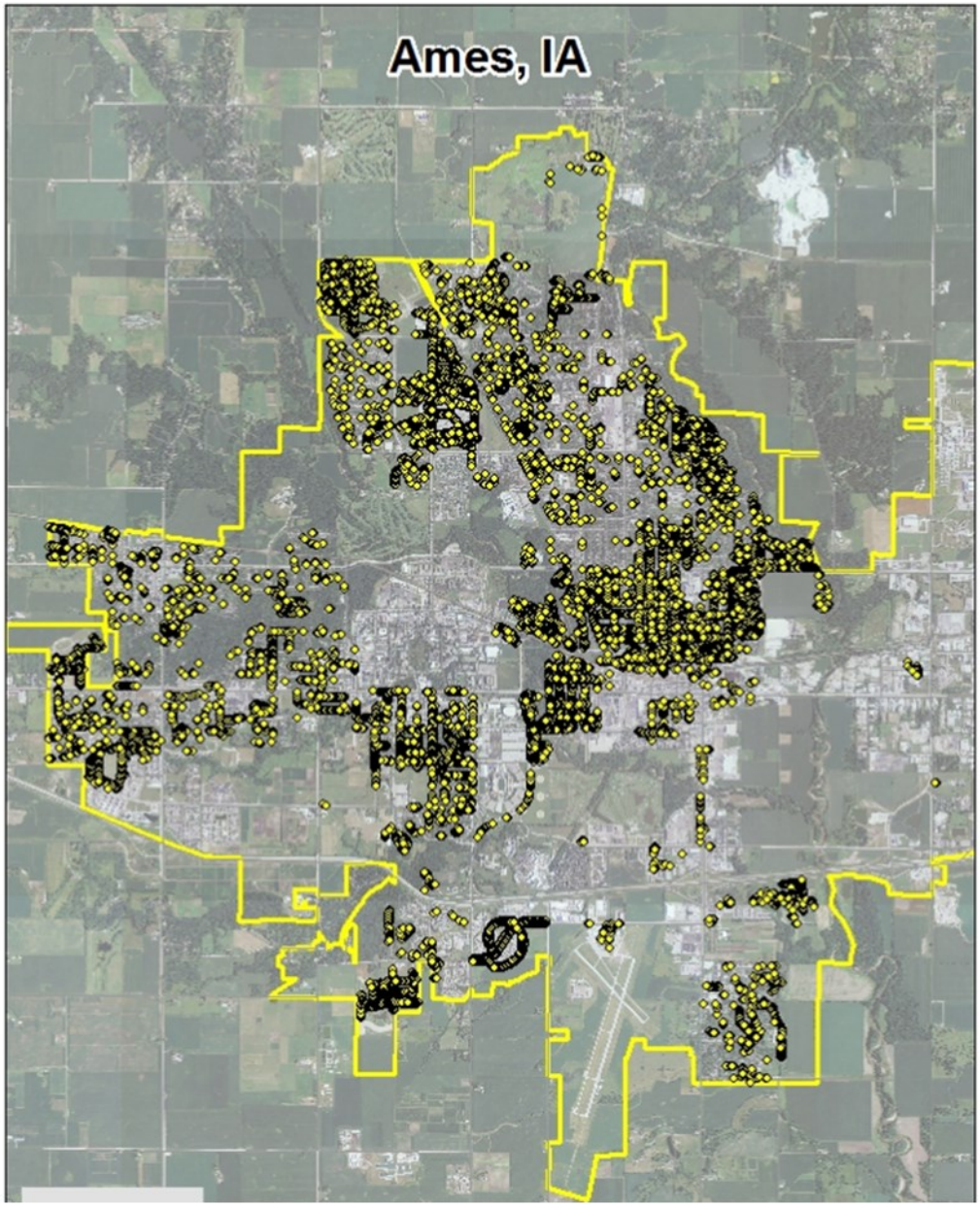
AMES, IA



2013 Management Plan

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EXECUTIVE SUMMARY

Overview

This plan was developed to assist the City of Ames 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 about 16% of Ames'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 2012, a tree inventory was conducted using Apple iPads. The inventory was an inventory of street and most park trees. Below are some key findings of the 14,567 trees inventoried.

- Ames's trees provide $665,773 of benefits annually, an average of $45.70 a tree
- There are over 72 species of trees
- The top three genera are: Maple 26%, Ash 16%, and Oak 11%
- 21% of trees are in need of some type of management
- 275 trees are recommended for removal
- 32% of trees on City facilities and parks and 68% of trees in City Rights-of-way (ROW)

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 275 trees needing removal, 16 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately *City ownership of the trees recommended for removal should be verified prior to any removal*
- 352 of the 2322 ash trees are in need of follow up because they are displaying signs and symptoms associated with EAB
- 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: maple or ash
- Check ash trees with a visual survey yearly
- Use the budget estimates to maintain current level of service on trees and establish a timeline related to the EAB plan.

INTRODUCTION

This plan was developed to assist Ames 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 Ames, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

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

GOALS

- To maintain and promote a healthy urban forest
- To perform maintenance on City trees for the safety, aesthetic and environmental benefits to the citizens of Ames
- To maintain Tree City USA status
- To use inventory and policies to increase the diversity of tree species throughout the community
- To educate property owners of value and responsibilities related to the urban forest

INVENTORY

In 2012, a tree inventory was conducted that included the city owned trees on both streets and most parks (68% ROW, 32% Parks and Facilities). The tree data was collected using an iPad. 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 in Ames. 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 14,566 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. Ames's trees reduce energy related costs by approximately $178,899 annually (Appendix A, Table 1). These savings are both in Electricity (860.2 MWh) and in Natural Gas (116,945.4 Therms).

Annual Stormwater Benefits

Ames's trees intercept about 9,169,030 gallons of rainfall or snowmelt a year (Appendix A, Table 2). This interception provides $248,498 of benefits to the city. Trees intercept water in a few ways. One way is the rain gets caught on leaves and branches and later evaporates. Also, trees slow down the amount of water reaching the soil giving the rain more time to soak into the soil where the tree can then uptake the water through its roots, rather than the rain quickly running off into storm sewers.

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 (VOCs). In Ames, it is estimated that trees remove 10,471.7 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 $29,092 (Appendix A, Table 3). Trees are able to remove a lot of these pollutants when they open up pores in their leaves to take in CO_2, they also take in and store many other pollutants. They can also remove pollutants from the air by simply catching them on the surface of the tree, where they will later be washed away by rain.

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. Trees also reduce the production of carbon by lowering heating and cooling strain on buildings, thereby requiring less energy to be produced overall, which reduces emissions from power plants. In Ames, trees sequester about 2,992,361 lbs of carbon a year with an associated value of $22,443 (Appendix A, Table 4). In addition, the trees store 29,205,536 lbs of carbon, with a yearly benefit of $219,042 (Appendix A, Table 5).

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. Ames receives $185,840 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, Ames's trees provide $665,773 of benefits annually. Benefits of individual trees vary based on size, species, health, and location, but on average each of the 14,566 trees in Ames provide approximately $46 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Ames has over 72 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	3790	26%
Ash	2322	16%
Oak	1563	11%
Apple	972	7%
Other genera	5920	40%

Age Class

Most of Ames's trees (38.4%) 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 to fall into the small category to prepare for natural mortality and to maintain canopy cover. Ames's size curve falls in the middle, indicating a middle-aged 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 results for Ames indicate that 99% of the trees are in good health, with only 1% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 97.5% of Ames's trees are in good health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that falls into the categories of poor health or dead or dying is about 2.5% of the population. This 3% is an estimate of trees that 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). These needs are managed continually.

Crown Cleaning	2337	16%
Tree Staking	501	3%
Tree Removal	275	2%
Crown Raising	9	<1%

Canopy Cover

A canopy cover survey was conducted using iTree canopy. With i-Tree Canopy, you review Google Maps aerial photography at random points to conduct a cover assessment within a defined project area. This surveyed showed that Ames has 24% tree canopy cover. It is notable that Ames also 38% grass cover, a lot which could potentially be space for more trees.

Land Use and Location

The majority of Ames'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	100%
Location	
Planting strip	99.7%
Cutout (surrounded by pavement)	.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 18 inches, or other structural deficiency 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

Ames has 30 critical concern trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). It is recommended to start with the large diameter critical concern trees first. There are 16 trees over 24 inches in diameter at 4.5 ft that should be addressed immediately. Please refer to the six year maintenance plan at the end of this section. After all of the critical concern trees are addressed, there should be follow up on the trees marked as needing maintenance that do not include trimming. There are a total of 667 trees with these needs.

Poor tree species

After the removal of the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 275 removals, 26 are ash trees. There are a total of 2322 ash trees, not including some parks, and 352 of those have signs and symptoms that have been associated with EAB. In addition, there are 423 trees that are in poor health. *City ownership of the trees recommended for removal should be verified prior to any removal*

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, and crown raising, which has been worked on continuously. 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%. 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 Ames.

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 (26%) (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. All 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 death 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

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. (Appendix B, Figure 2 & Appendix B, Figure 3). *City ownership of the tree recommended for removal should be verified prior to any removal*

After removing based on condition removals should be prioritized on location, as determined by potential to be a public hazard. Locations would be prioritized by hazard to the public. This would be high traffic areas like arterial streets, parks and City facilities, moderate traffic areas such as residential streets and parks with limited traffic, and low moderate areas that are maintained with little to no traffic. Trees in wooded areas would no be removed unless adjacent to a trail.

The City should also consider removing all ash trees with infrastructure projects that would have impact on the trees.

Treatment of Ash Trees

Chemical treatments are mainly recommended for spreading 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. 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.

With the benefit of Ames having the Resource Recovery Plant it should be explored as a means to dispose of Ash waste. Due to the large amount that will be generated by public and private trees a new approach will be needed versus conventional options. Working with the Resource Recovery and Electric staff options should be explored to convert the ash waste into energy.

Open burning is allowable as long is it done in compliance with section 23.2(3)b of the Iowa code (appendix D).

Calculating tree volume is very difficult and it is even harder to estimate the volume of a large group of trees. It is calculated the Ames has approximately 6,933.75 cubic yards of ash; however this is a rough calculation with lots of variables, the range could be 100%. There are several factors that make calculating volume difficult.

- It is tough to judge volume of wood chips just by the diameter at breast height.
- Health of the tree and the canopy density will affect volume.
- Moisture content of the wood will affect chip size, which will affect the total volume.
- With deciduous trees, the time of the year and the foliage will be a factor in volume.

After consulting with industry professionals it was decided to go with a tree with an 8in DBH equaling 1 cubic yard of chips, a 16in DBH equaling 3 cubic yards, 24in DBH equaling 6 cubic yards, and the rest extrapolated from there. Below you can see how the volume for the City of Ames was calculated.

Size Class	Volume (cubic yards)	Trees	Total (cubic yards)
0-3	0.25	61	15.25
3-6	0.5	473	236.5
6-12	1	568	568
12-18	3	522	1566
18-24	6	410	2460
24-30	6	165	990
30-36	9	79	711
36-42	12	21	252
42+	13.5	10	135
Total		2309	6933.75

Canopy Replacement

As budget permits, all removed ash trees will be replaced. All trees will meet the restrictions in city ordinance chapter 27 (Appendix C).

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 mortality 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.

The City of Ames should begin a strong public education program to help private property owners. This should be an approach that let them know the impacts to trees in the right-of-way adjacent to their properties and also to their private trees. This campaign will allow them to identify ash trees and to know their options on treatment, removals, and expected costs. This will assist them in making informed decisions on their trees and to avoid unnecessary treatments and costs for their trees.

BUDGET

Current Budget

In 2013 the City of Ames Public Works department removed 46 trees at a cost of approximately $46,500 of contract labor and $3,000 of department labor. We budget $75,000 for the contract, with remaining funds going towards trimming. Our total tree management budget for Public Works including the contract is $264,000.

EAB Management Costs

Currently it is estimated to cost around $1000/tree for removals. It should be noted that this cost is an average, younger trees will cost significantly less to remove and larger, older trees can cost more. Therefore it would be beneficial when planning removals to balance what is being removed at one time to control expenditures. Replacement costs are not factored into the $1000/tree figure, so that will need to be budgeted for separately.

The inventory found 2,322 city owned ash at $1000/tree the total cost for removing all of the city-owned ash would be approximately $ 2,322,000. When you factor in the cost of replacing these trees, which can be offset a little through various planting grants, and well as the loss of benefits from the mature ash, the cost for Emerald Ash Borer to the City of Ames will be higher.

Many municipalities begin removing ash before Emerald Ash Borer is discovered in their community. If the City of Ames waits until an infestation is discovered then the city will only have approximately 3-5 years to remove all ash before they start becoming hazards. By beginning removals early cities are able to spread the removal and replacement costs out over more time. This is especially key when considering replacement. It is important to start replacing the ash you are losing before they all need to be removed. This gives the new trees a chance to get established and start providing benefits. If all the ash are removed in one year it will take a long time for the replacement trees to be mature enough to start replacing the benefits that were lost from the ash trees that were removed.

This estimated cost is on top of the funds that need to be spent every year to accomplish the city's regular maintenance goals. Without an increase in funding the city will not be able to keep up with removals, replanting, and regular pruning on all of the other city owned trees.

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APPENDIX A: i-Tree Data

Table 1: Annual Energy Benefits

Ames, IA

Annual Energy Benefits of Public Trees by Species

5/7/2013

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	98.5	7,474	13,083.6	12,822	20,296	(N/A)	9.4	11.3	45.71
Eastern white pine	40.9	3,101	5,213.6	5,109	8,210	(N/A)	8.1	4.6	21.61
Northern hackberry	106.0	8,049	15,088.4	14,787	22,836	(N/A)	8.0	12.7	60.57
Bur oak	110.7	8,398	15,338.1	15,031	23,430	(N/A)	7.2	13.0	68.91
Norway spruce	26.1	1,980	3,277.0	3,211	5,192	(N/A)	4.4	2.9	25.32
Apple	15.2	1,154	2,354.5	2,307	3,461	(N/A)	4.1	1.9	18.03
Northern red oak	31.2	2,371	4,302.4	4,216	6,587	(N/A)	4.0	3.7	35.04
Black walnut	43.4	3,292	5,952.1	5,833	9,125	(N/A)	3.7	5.1	52.44
White oak	55.2	4,191	7,682.0	7,528	11,720	(N/A)	3.7	6.5	67.35
Silver maple	36.9	2,799	4,745.8	4,651	7,450	(N/A)	3.4	4.1	46.86
Black maple	35.7	2,709	4,630.5	4,538	7,247	(N/A)	3.1	4.0	49.64
Swamp white oak	7.9	598	1,197.1	1,173	1,771	(N/A)	2.4	1.0	15.54
Spruce	6.7	506	881.8	864	1,370	(N/A)	2.3	0.8	12.93
Honeylocust	30.7	2,328	4,024.6	3,944	6,272	(N/A)	2.2	3.5	59.74
Broadleaf Deciduous	6.2	471	921.1	903	1,374	(N/A)	2.2	0.8	13.34
Conifer Evergreen Large	12.7	968	1,662.0	1,629	2,596	(N/A)	2.0	1.4	27.62
Lilac	0.4	27	65.3	64	91	(N/A)	1.8	0.1	1.07
Hickory	17.1	1,298	2,210.7	2,167	3,464	(N/A)	1.7	1.9	42.24
Northern white cedar	1.9	141	246.6	242	383	(N/A)	1.6	0.2	5.03
Sugar maple	11.8	898	1,584.6	1,553	2,451	(N/A)	1.5	1.4	34.52
American sycamore	22.1	1,676	3,044.0	2,983	4,659	(N/A)	1.5	2.6	66.56
Blue spruce	5.7	431	777.1	762	1,193	(N/A)	1.4	0.7	17.80
White ash	10.8	822	1,366.0	1,339	2,161	(N/A)	1.4	1.2	32.74
Basswood	14.9	1,132	2,045.6	2,005	3,137	(N/A)	1.2	1.7	55.03
Norway maple	11.3	860	1,593.6	1,562	2,421	(N/A)	1.2	1.4	44.03
Broadleaf Deciduous	4.4	331	590.0	578	909	(N/A)	1.2	0.5	16.53
Red maple	7.6	576	993.4	974	1,549	(N/A)	1.1	0.9	30.99
Other street trees	88.4	6,712	12,073.6	11,832	18,544	(N/A)	14.4	10.3	27.27
Citywide total	860.2	65,293	116,945.4	114,606	179,899	(N/A)	100.0	100.0	38.15

Table 2: Annual Stormwater Benefits

Ames, IA

Annual Stormwater Benefits of Public Trees by Species

5/7/2013

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	910,469	24,675	(N/A)	9.4	9.9	55.58
Eastern white pine	604,031	16,370	(N/A)	8.1	6.6	43.08
Northern hackberry	888,637	24,084	(N/A)	8.0	9.7	63.88
Bur oak	1,442,944	39,107	(N/A)	7.2	15.7	115.02
Norway spruce	426,746	11,566	(N/A)	4.4	4.7	56.42
Apple	60,427	1,638	(N/A)	4.1	0.7	8.53
Northern red oak	289,144	7,836	(N/A)	4.0	3.2	41.68
Black walnut	459,320	12,448	(N/A)	3.7	5.0	71.54
White oak	705,628	19,124	(N/A)	3.7	7.7	109.91
Silver maple	433,712	11,754	(N/A)	3.4	4.7	73.93
Black maple	289,222	7,838	(N/A)	3.1	3.2	53.69
Swamp white oak	46,470	1,259	(N/A)	2.4	0.5	11.05
Spruce	86,712	2,350	(N/A)	2.3	1.0	22.17
Honeylocust	331,775	8,992	(N/A)	2.2	3.6	85.64
Broadleaf Deciduous	39,322	1,066	(N/A)	2.2	0.4	10.35
Conifer Evergreen Large	239,640	6,495	(N/A)	2.0	2.6	69.09
Lilac	890	24	(N/A)	1.8	0.0	0.28
Hickory	136,637	3,703	(N/A)	1.7	1.5	45.16
Northern white cedar	29,439	798	(N/A)	1.6	0.3	10.50
Sugar maple	95,848	2,598	(N/A)	1.5	1.1	36.59
American sycamore	306,131	8,297	(N/A)	1.5	3.3	118.52
Blue spruce	76,354	2,069	(N/A)	1.4	0.8	30.89
White ash	97,942	2,654	(N/A)	1.4	1.1	40.22
Basswood	167,466	4,539	(N/A)	1.2	1.8	79.63
Norway maple	93,553	2,535	(N/A)	1.2	1.0	46.10
Broadleaf Deciduous	37,247	1,009	(N/A)	1.2	0.4	18.35
Red maple	55,709	1,510	(N/A)	1.1	0.6	30.20
Other street trees	817,614	22,159	(N/A)	14.4	8.9	32.59
Citywide total	9,169,030	248,498	(N/A)	100.0	100.0	52.70

Table 3: Annual Air Quality Benefits

Ames, IA

Annual Air Quality Benefits of Public Trees by Species

5/7/2013

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	98.2	15.7	49.9	4.4	531	466.6	68.2	65.1	446.3	2,916	0.0	0	1,214.4	3,447	(N/A)	9.4	7.76
Eastern white pine	67.0	13.3	56.9	8.2	447	191.2	28.1	26.9	185.0	1,200	-252.1	-945	324.6	702	(N/A)	8.1	1.85
Northern hackberry	124.9	21.6	66.4	5.6	689	512.2	74.2	70.6	481.0	3,177	0.0	0	1,356.5	3,867	(N/A)	8.0	10.26
Bur oak	202.5	32.4	93.0	9.1	1,067	530.1	77.0	73.4	501.4	3,298	0.0	0	1,519.0	4,365	(N/A)	7.2	12.84
Norway spruce	48.8	9.7	40.5	6.0	322	121.6	17.9	17.1	118.1	765	-191.8	-719	187.9	368	(N/A)	4.3	1.79
Apple	16.3	2.7	8.0	0.7	88	75.0	10.7	10.2	68.9	461	-0.1	0	192.4	548	(N/A)	4.1	2.86
Northern red oak	59.2	10.2	29.1	2.6	320	149.1	21.7	20.7	141.5	929	-83.9	-315	350.3	934	(N/A)	4.0	4.97
Black walnut	54.5	8.7	26.5	2.4	291	207.2	30.2	28.8	196.6	1,290	0.0	0	554.8	1,582	(N/A)	3.7	9.09
White oak	96.7	15.5	44.7	4.3	511	264.8	38.5	36.7	250.3	1,647	0.0	0	751.4	2,157	(N/A)	3.7	12.40
Silver maple	64.1	10.9	32.9	2.8	349	173.0	25.4	24.3	166.9	1,085	-36.3	-136	463.9	1,298	(N/A)	3.4	8.16
Black maple	68.2	11.6	31.9	3.0	363	168.0	24.6	23.5	161.7	1,052	-23.1	-87	469.4	1,329	(N/A)	3.1	9.10
Swamp white oak	5.7	1.0	3.4	0.3	32	38.8	5.6	5.3	35.8	239	-1.7	-6	94.0	265	(N/A)	2.4	2.32
Spruce	8.9	1.8	7.9	1.1	61	31.5	4.6	4.4	30.2	197	-32.0	-120	58.4	137	(N/A)	2.2	1.30
Honeylocust	64.5	10.6	29.5	2.9	341	144.6	21.2	20.2	138.8	905	-49.7	-186	382.7	1,059	(N/A)	2.2	10.09
Broadleaf Deciduous	5.6	1.0	3.1	0.2	31	30.3	4.4	4.2	28.2	187	-1.5	-6	75.5	213	(N/A)	2.2	2.07
Conifer Evergreen Large	27.9	5.5	22.8	3.4	183	60.0	8.8	8.4	57.7	376	-115.9	-434	78.6	124	(N/A)	2.0	1.32
Lilac	0.1	0.0	0.1	0.0	0	1.9	0.3	0.2	1.6	11	0.0	0	4.1	12	(N/A)	1.8	0.14
Hickory	12.5	2.0	6.8	0.6	69	80.5	11.8	11.3	77.5	504	0.0	0	202.9	573	(N/A)	1.7	6.99
Northern white cedar	3.1	0.6	2.6	0.4	20	8.8	1.3	1.2	8.4	55	-14.1	-53	12.3	23	(N/A)	1.6	0.30
Sugar maple	10.4	1.8	5.8	0.5	58	56.1	8.2	7.8	53.6	350	-8.6	-32	135.5	376	(N/A)	1.5	5.30
American sycamore	46.3	7.4	20.9	2.1	243	105.6	15.4	14.6	100.1	658	0.0	0	312.4	901	(N/A)	1.5	12.87
Blue spruce	10.1	2.0	8.5	1.2	67	27.0	3.9	3.8	25.7	169	-27.4	-103	54.9	133	(N/A)	1.4	1.99
White ash	12.5	2.0	6.2	0.6	67	50.6	7.4	7.1	49.1	318	0.0	0	135.4	385	(N/A)	1.4	5.83
Basswood	20.8	3.3	9.9	0.9	111	71.2	10.4	9.9	67.6	444	0.0	0	194.0	554	(N/A)	1.2	9.72
Norway maple	17.8	3.1	8.9	0.8	97	54.6	7.9	7.5	51.4	339	-4.3	-16	147.7	419	(N/A)	1.2	7.63
Broadleaf Deciduous	3.9	0.6	2.1	0.2	21	20.7	3.0	2.9	19.7	129	0.0	0	53.1	151	(N/A)	1.2	2.74
Red maple	12.1	2.1	5.8	0.5	65	35.8	5.2	5.0	34.4	224	-4.2	-16	96.6	273	(N/A)	1.1	5.46
Other street trees	118.3	20.4	66.6	6.9	667	421.8	61.4	58.6	400.8	2,629	-106.1	-398	1,048.8	2,898	(N/A)	14.4	4.26
Citywide total	1,280.7	217.4	690.5	71.8	7,113	4,098.5	597.4	569.7	3,898.5	25,553	-952.7	-3,573	10,471.7	29,092	(N/A)	100.0	6.17

Table 4: Annual Carbon Stored

Ames, IA

Annual CO_2 Benefits of Public Trees by Species

5/7/2013

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	220,796	1,656	-15,508	-87	-117	165,175	1,239	370,376	2,778	(N/A)	9.4	12.4	6.26
Eastern white pine	41,118	308	-2,775	-74	-21	68,529	514	106,797	801	(N/A)	8.1	3.6	2.11
Northern hackberry	120,739	906	-8,672	-74	-66	177,883	1,334	289,876	2,174	(N/A)	8.0	9.7	5.77
Bur oak	261,732	1,963	-32,032	-66	-241	185,602	1,392	415,236	3,114	(N/A)	7.2	13.9	9.16
Norway spruce	27,667	208	-2,190	-40	-17	43,759	328	69,195	519	(N/A)	4.4	2.3	2.53
Apple	25,091	188	-1,281	-37	-10	25,502	191	49,274	370	(N/A)	4.1	1.7	1.92
Northern red oak	38,565	289	-5,905	-37	-45	52,394	393	85,017	638	(N/A)	4.0	2.8	3.39
Black walnut	103,211	774	-8,513	-34	-64	72,747	546	167,411	1,256	(N/A)	3.7	5.6	7.22
White oak	132,811	996	-15,228	-34	-114	92,627	695	210,177	1,576	(N/A)	3.7	7.0	9.06
Silver maple	126,494	949	-6,912	-31	-52	61,862	464	181,413	1,361	(N/A)	3.4	6.1	8.56
Black maple	73,041	548	-3,556	-28	-27	59,869	449	129,326	970	(N/A)	3.1	4.3	6.64
Swamp white oak	15,677	118	-496	-22	-4	13,222	99	28,381	213	(N/A)	2.4	1.0	1.87
Spruce	6,434	48	-322	-21	-3	11,183	84	17,274	130	(N/A)	2.3	0.6	1.22
Honeylocust	71,266	534	-3,965	-20	-30	51,454	386	118,735	891	(N/A)	2.2	4.0	8.48
Broadleaf Deciduous	11,529	86	-476	-20	-4	10,413	78	21,446	161	(N/A)	2.2	0.7	1.56
Conifer Evergreen	14,451	108	-1,360	-18	-10	21,382	160	34,455	258	(N/A)	2.0	1.2	2.75
Lilac	843	6	-10	-17	0	596	4	1,412	11	(N/A)	1.8	0.1	0.12
Hickory	37,307	280	-1,970	-16	-15	28,676	215	63,997	480	(N/A)	1.7	2.1	5.85
Northern white cedar	1,958	15	-152	-15	-1	3,114	23	4,905	37	(N/A)	1.6	0.2	0.48
Sugar maple	21,354	160	-1,405	-14	-11	19,850	149	39,785	298	(N/A)	1.5	1.3	4.20
American sycamore	49,187	369	-7,421	-14	-56	37,046	278	78,798	591	(N/A)	1.5	2.6	8.44
Blue spruce	4,515	34	-328	-13	-3	9,533	72	13,707	103	(N/A)	1.4	0.5	1.53
White ash	26,481	199	-1,209	-13	-9	18,169	136	43,429	326	(N/A)	1.4	1.5	4.94
Basswood	35,387	265	-3,261	-11	-25	25,012	188	57,127	428	(N/A)	1.2	1.9	7.52
Norway maple	17,405	131	-1,408	-11	-11	18,998	142	34,985	262	(N/A)	1.2	1.2	4.77
Broadleaf Deciduous	9,230	69	-654	-11	-5	7,310	55	15,875	119	(N/A)	1.2	0.5	2.16
Red maple	17,063	128	-649	-10	-5	12,724	95	29,129	218	(N/A)	1.1	1.0	4.37
Other street trees	179,159	1,344	-12,532	-133	-95	148,326	1,112	314,820	2,361	(N/A)	14.4	10.5	3.47
Citywide total	1,690,510	12,679	-140,187	-919	-1,058	1,442,957	10,822	2,992,361	22,443	(N/A)	100.0	100.0	4.76

Table 5: Annual Carbon Sequestered

Ames, IA

Stored CO2 Benefits of Public Trees by Species

5/7/2013

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	3,230,780	24,231	(N/A)	9.4	11.1	54.57
Eastern white pine	578,153	4,336	(N/A)	8.1	2.0	11.41
Northern	1,806,569	13,549	(N/A)	8.0	6.2	35.94
Bur oak	6,673,290	50,050	(N/A)	7.2	22.9	147.20
Norway spruce	456,300	3,422	(N/A)	4.4	1.6	16.69
Apple	266,846	2,001	(N/A)	4.1	0.9	10.42
Northern red oak	1,230,196	9,226	(N/A)	4.0	4.2	49.08
Black walnut	1,773,589	13,302	(N/A)	3.7	6.1	76.45
White oak	3,172,413	23,793	(N/A)	3.7	10.9	136.74
Silver maple	1,439,905	10,799	(N/A)	3.4	4.9	67.92
Black maple	740,748	5,556	(N/A)	3.1	2.5	38.05
Swamp white oak	103,310	775	(N/A)	2.4	0.4	6.80
Spruce	67,085	503	(N/A)	2.3	0.2	4.75
Honeylocust	825,991	6,195	(N/A)	2.2	2.8	59.00
Broadleaf	99,078	743	(N/A)	2.2	0.3	7.21
Conifer Evergreen	283,312	2,125	(N/A)	2.0	1.0	22.60
Lilac	2,066	15	(N/A)	1.8	0.0	0.18
Hickory	410,383	3,078	(N/A)	1.7	1.4	37.54
Northern white	31,588	237	(N/A)	1.6	0.1	3.12
Sugar maple	292,635	2,195	(N/A)	1.5	1.0	30.91
American	1,546,096	11,596	(N/A)	1.5	5.3	165.65
Blue spruce	68,425	513	(N/A)	1.4	0.2	7.66
White ash	251,824	1,889	(N/A)	1.4	0.9	28.62
Basswood	679,359	5,095	(N/A)	1.2	2.3	89.39
Norway maple	293,301	2,200	(N/A)	1.2	1.0	40.00
Broadleaf	136,256	1,022	(N/A)	1.2	0.5	18.58
Red maple	135,152	1,014	(N/A)	1.1	0.5	20.27
Other street trees	1,184,280	19,582	(N/A)	14.4	8.9	28.80
Citywide total	29,205,536	219,042	(N/A)	100.0	100.0	46.46

Table 6: Annual Social and Aesthetic Benefits

Ames, IA

Annual Aesthetic/Other Benefits of Public Trees by Species

5/7/2013

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	20,460	(N/A)	9.4	11.0	46.08
Eastern white pine	10,771	(N/A)	8.1	5.8	28.35
Northern hackberry	17,879	(N/A)	8.0	9.6	47.42
Bur oak	19,645	(N/A)	7.2	10.6	57.78
Norway spruce	6,810	(N/A)	4.4	3.7	33.22
Apple	1,435	(N/A)	4.1	0.8	7.47
Northern red oak	3,045	(N/A)	4.0	1.6	16.20
Black walnut	8,833	(N/A)	3.7	4.8	50.76
White oak	10,079	(N/A)	3.7	5.4	57.92
Silver maple	11,229	(N/A)	3.4	6.0	70.62
Black maple	9,322	(N/A)	3.1	5.0	63.85
Swamp white oak	1,873	(N/A)	2.4	1.0	16.43
Spruce	1,943	(N/A)	2.3	1.1	18.33
Honeylocust	16,815	(N/A)	2.2	9.1	160.14
Broadleaf Deciduous	1,399	(N/A)	2.2	0.8	13.58
Conifer Evergreen Large	3,353	(N/A)	2.0	1.8	35.67
Lilac	9	(N/A)	1.8	0.0	0.11
Hickory	3,660	(N/A)	1.7	2.0	44.64
Northern white cedar	714	(N/A)	1.6	0.4	9.40
Sugar maple	2,458	(N/A)	1.5	1.3	34.63
American sycamore	3,592	(N/A)	1.5	1.9	51.32
Blue spruce	1,223	(N/A)	1.4	0.7	18.25
White ash	3,316	(N/A)	1.4	1.8	50.25
Basswood	2,942	(N/A)	1.2	1.6	51.61
Norway maple	1,716	(N/A)	1.2	0.9	31.20
Broadleaf Deciduous	1,150	(N/A)	1.2	0.6	20.91
Red maple	2,261	(N/A)	1.1	1.2	45.22
Other street trees	17,908	(N/A)	14.4	9.6	26.33
Citywide total	185,840	(N/A)	100.0	100.0	39.41

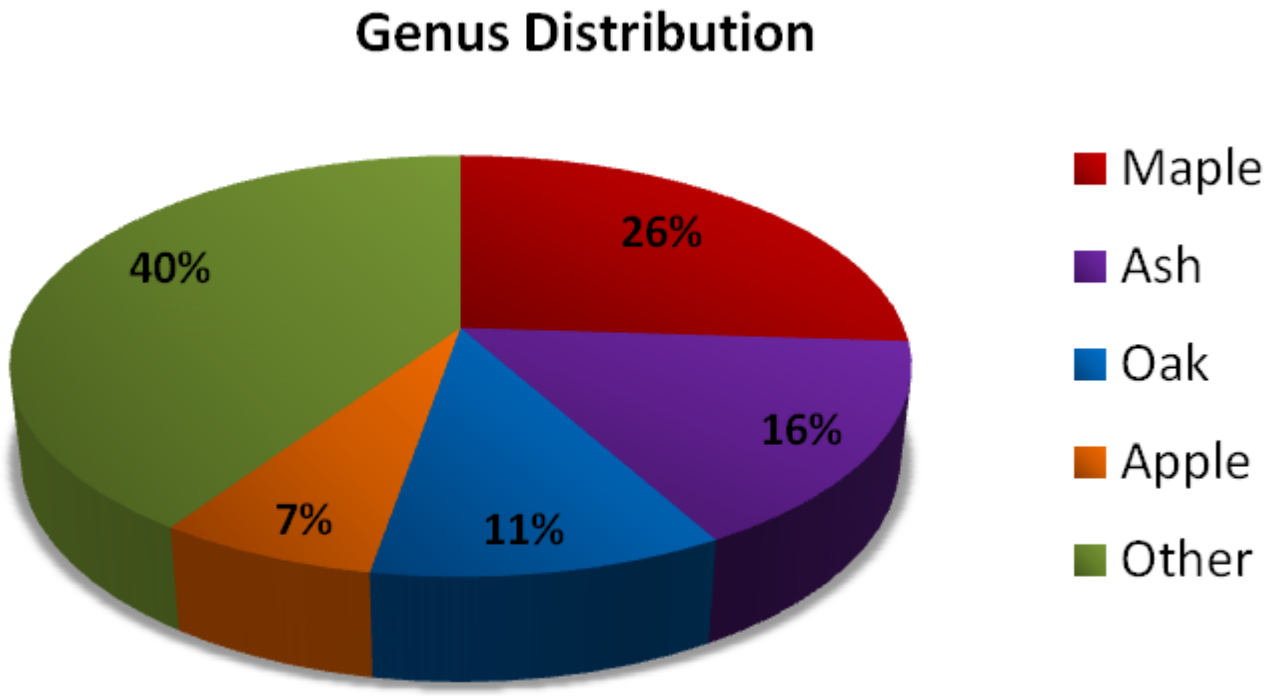
Table 7: Summary of Benefits in Dollars

Ames, IA

Total Annual Benefits of Public Trees by Species ($)

5/7/2013

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Green ash	20,296	2,778	3,447	24,675	20,460	71,656	(±0)	10.8
Eastern white pine	8,210	801	702	16,370	10,771	36,855	(±0)	5.5
Northern hackberry	22,836	2,174	3,867	24,084	17,879	70,839	(±0)	10.6
Bur oak	23,430	3,114	4,365	39,107	19,645	89,660	(±0)	13.5
Norway spruce	5,192	519	368	11,566	6,810	24,454	(±0)	3.7
Apple	3,461	370	548	1,638	1,435	7,452	(±0)	1.1
Northern red oak	6,587	638	934	7,836	3,045	19,040	(±0)	2.9
Black walnut	9,125	1,256	1,582	12,448	8,833	33,244	(±0)	5.0
White oak	11,720	1,576	2,157	19,124	10,079	44,656	(±0)	6.7
Silver maple	7,450	1,361	1,298	11,754	11,229	33,092	(±0)	5.0
Black maple	7,247	970	1,329	7,838	9,322	26,707	(±0)	4.0
Swamp white oak	1,771	213	265	1,259	1,873	5,382	(±0)	0.8
Spruce	1,370	130	137	2,350	1,943	5,930	(±0)	0.9
Honeylocust	6,272	891	1,059	8,992	16,815	34,029	(±0)	5.1
Broadleaf Deciduous	1,374	161	213	1,066	1,399	4,212	(±0)	0.6
Conifer Evergreen	2,596	258	124	6,495	3,353	12,827	(±0)	1.9
Lilac	91	11	12	24	9	146	(±0)	0.0
Hickory	3,464	480	573	3,703	3,660	11,880	(±0)	1.8
Northern white cedar	383	37	23	798	714	1,954	(±0)	0.3
Sugar maple	2,451	298	376	2,598	2,458	8,182	(±0)	1.2
American sycamore	4,659	591	901	8,297	3,592	18,040	(±0)	2.7
Blue spruce	1,193	103	133	2,069	1,223	4,721	(±0)	0.7
White ash	2,161	326	385	2,654	3,316	8,842	(±0)	1.3
Basswood	3,137	428	554	4,539	2,942	11,600	(±0)	1.7
Norway maple	2,421	262	419	2,535	1,716	7,354	(±0)	1.1
Broadleaf Deciduous	909	119	151	1,009	1,150	3,338	(±0)	0.5
Red maple	1,549	218	273	1,510	2,261	5,812	(±0)	0.9
Other street trees	18,544	2,361	2,898	22,159	17,908	63,869	(±0)	9.6
Citywide Total	179,899	22,443	29,092	248,498	185,840	665,773	(±0)	100.0



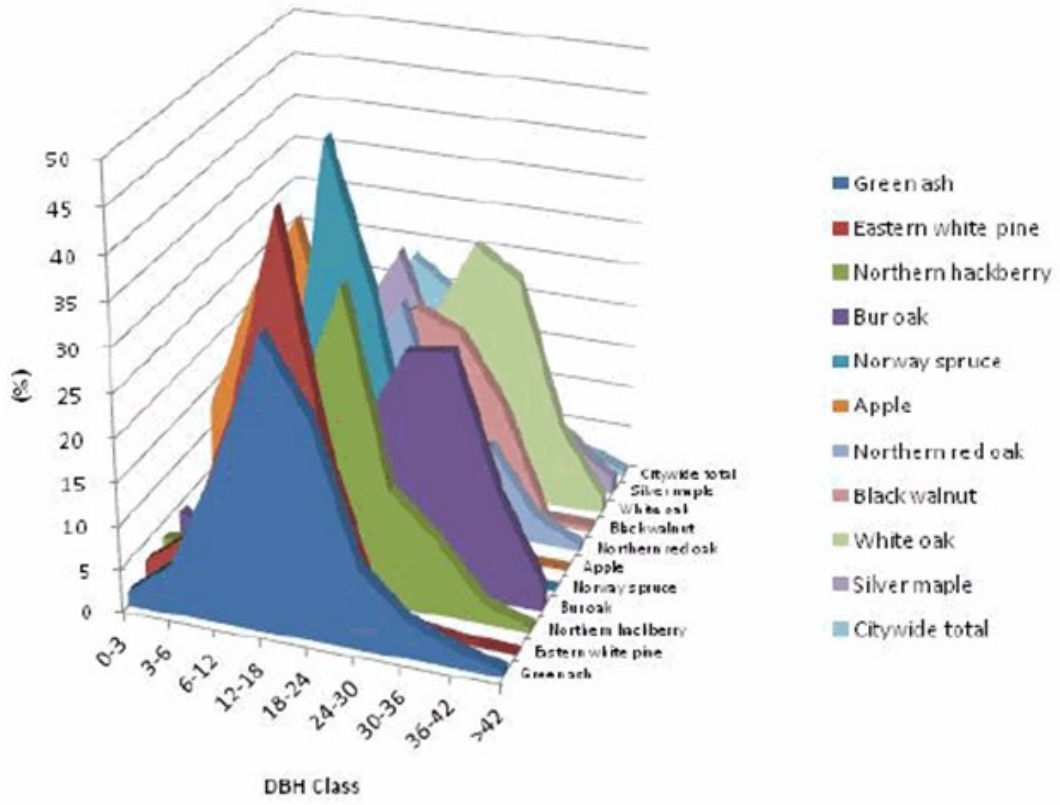
Species	Pop.	Percent
Maple	3790	26%
Ash	2322	16%
Oak	1563	11%
Apple	972	7%
Other species	5920	40%

Figure 1: Species Distribution

Ames, IA

Relative Age Distribution of Top 10 Public Tree Species (%)

5/7/2013



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Green ash	1.6	5.9	18.0	33.3	25.0	9.2	4.3	2.0	0.7
Eastern white pine	2.9	6.8	22.4	44.7	19.2	2.9	0.8	0.3	0.0
Northern hackberry	3.2	4.0	10.9	21.2	35.5	13.5	8.8	2.4	0.5
Bur oak	4.1	0.9	2.4	5.3	17.1	27.1	27.9	12.6	2.6
Norway spruce	2.0	2.9	8.8	47.3	30.7	6.8	1.5	0.0	0.0
Apple	12.5	27.1	35.9	17.2	6.8	0.5	0.0	0.0	0.0
Northern red oak	12.8	9.6	10.1	17.6	26.1	9.6	10.6	3.2	0.5
Black walnut	2.3	3.4	16.1	19.0	23.6	21.3	13.2	0.6	0.6
White oak	4.0	2.3	1.1	5.2	19.5	29.9	26.4	9.8	1.7
Silver maple	5.0	9.4	16.4	25.8	12.6	13.8	9.4	5.7	1.9
Citywide total	12.6	8.8	14.9	23.5	19.6	10.0	7.1	2.7	0.8

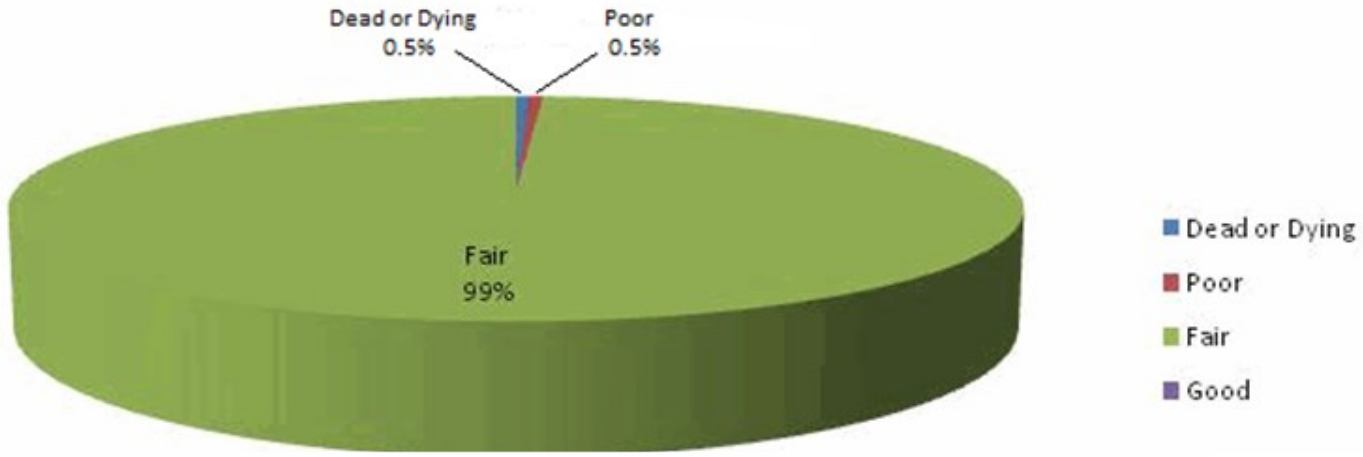
Figure 2: Relative Age Class

Ames, IA

Functional (Foliage) Condition of Public Trees by Species (%)

5/7/2013

Citywide total



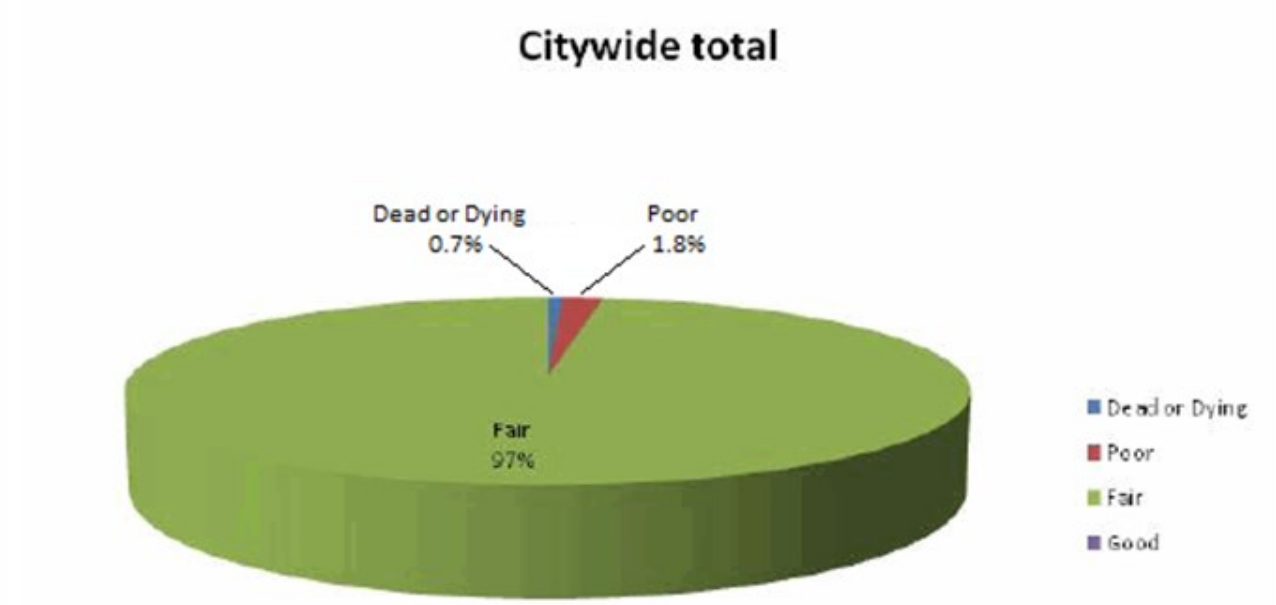
Species	Dead or Dying	Poor	Fair	Good
Green ash	0.2	0.7	99.1	0.0
Eastern white pine	0.0	0.0	100.0	0.0
Northern hackberry	0.0	0.0	100.0	0.0
Bur oak	0.3	0.6	99.1	0.0
Norway spruce	0.0	0.0	100.0	0.0
Apple	0.0	0.0	100.0	0.0
Northern red oak	0.0	4.3	95.7	0.0
Black walnut	0.0	0.0	100.0	0.0
White oak	0.0	0.0	100.0	0.0
Silver maple	0.0	0.6	99.4	0.0
Black maple	0.0	0.0	100.0	0.0
Swamp white oak	0.0	0.0	100.0	0.0
Spruce	0.9	0.0	99.1	0.0
Honeylocust	0.0	0.0	100.0	0.0
Broadleaf Deciduous	1.0	0.0	99.0	0.0
Conifer Evergreen	0.0	0.0	100.0	0.0
Lilac	0.0	0.0	100.0	0.0
Hickory	0.0	0.0	100.0	0.0
Northern white cedar	0.0	0.0	100.0	0.0
Sugar maple	0.0	1.4	98.6	0.0
American sycamore	0.0	0.0	100.0	0.0
Blue spruce	0.0	0.0	100.0	0.0
White ash	0.0	0.0	100.0	0.0
Basswood	0.0	0.0	100.0	0.0
Norway maple	0.0	0.0	100.0	0.0
Broadleaf Deciduous	25.5	1.8	72.7	0.0
Red maple	0.0	2.0	98.0	0.0
Citywide total	0.5	0.5	99.0	0.0

Figure 3: Foliage Condition

Ames, IA

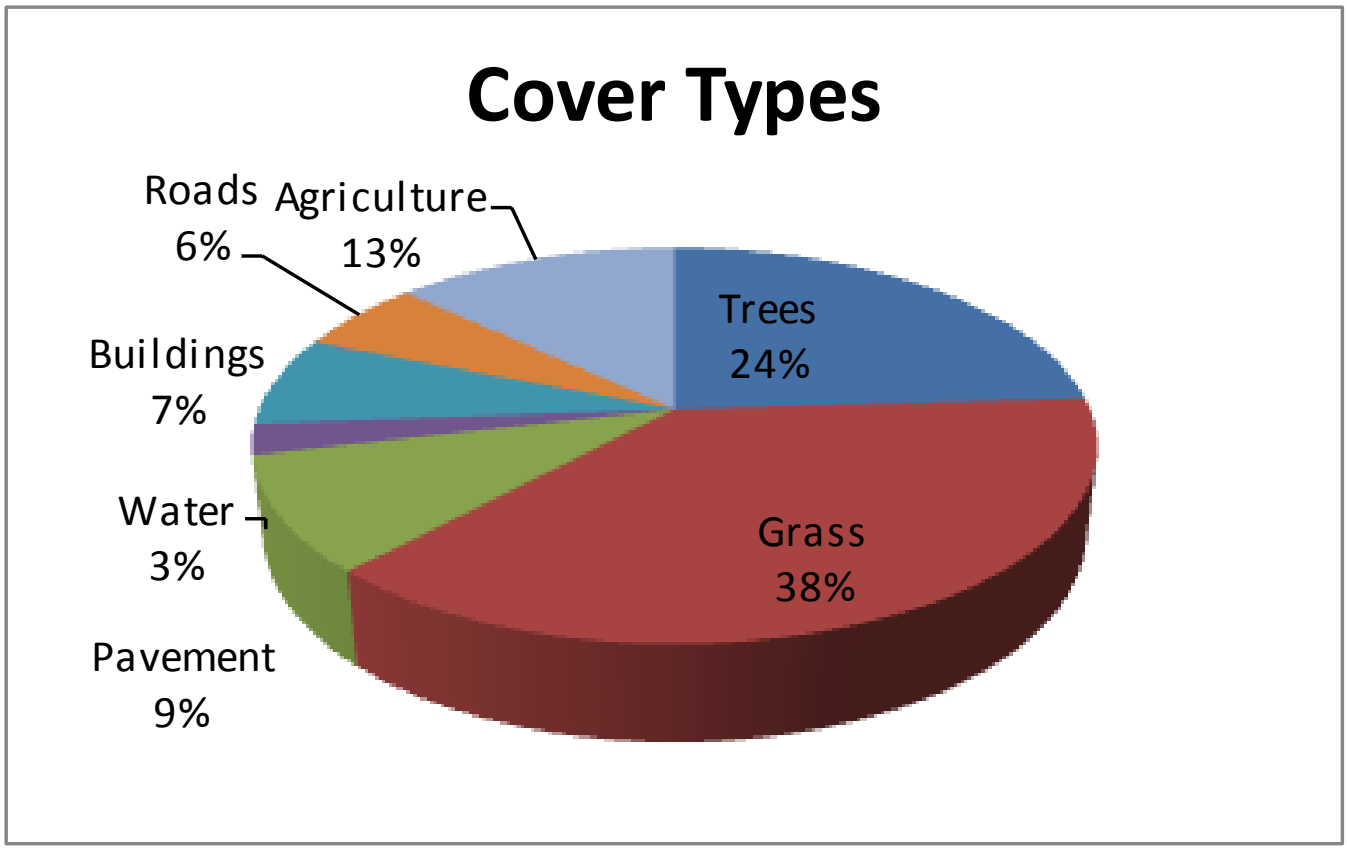
Structural (Woody) Condition of Public Trees by Species (%)

5/7/2013



Species	Dead or Dying	Poor	Fair	Good
Green ash	0.0	2.0	98.0	0.0
Eastern white pine	0.3	0.0	99.7	0.0
Northern hackberry	0.0	1.9	98.1	0.0
Bur oak	0.9	2.1	97.1	0.0
Norway spruce	0.0	0.0	100.0	0.0
Apple	0.0	1.6	98.4	0.0
Northern red oak	0.0	3.2	96.8	0.0
Black walnut	0.0	4.0	96.0	0.0
White oak	0.0	1.7	98.3	0.0
Silver maple	0.0	3.8	96.2	0.0
Black maple	0.0	1.4	98.6	0.0
Swamp white oak	0.9	0.9	98.2	0.0
Spruce	0.0	0.0	100.0	0.0
Honeylocust	0.0	1.9	98.1	0.0
Broadleaf Deciduous	1.0	2.9	96.1	0.0
Conifer Evergreen	0.0	0.0	100.0	0.0
Lilac	0.0	0.0	100.0	0.0
Hickory	0.0	1.2	98.8	0.0
Northern white cedar	0.0	1.3	98.7	0.0
Sugar maple	0.0	1.4	98.6	0.0
American sycamore	0.0	0.0	100.0	0.0
Blue spruce	1.5	0.0	98.5	0.0
White ash	1.5	0.0	98.5	0.0
Basswood	0.0	0.0	100.0	0.0
Norway maple	0.0	3.6	96.4	0.0
Broadleaf Deciduous	29.1	3.6	67.3	0.0
Red maple	2.0	8.0	90.0	0.0
Citywide total	0.7	1.8	97.5	0.0

Figure 4: Wood Condition



Total acres: 15532.8

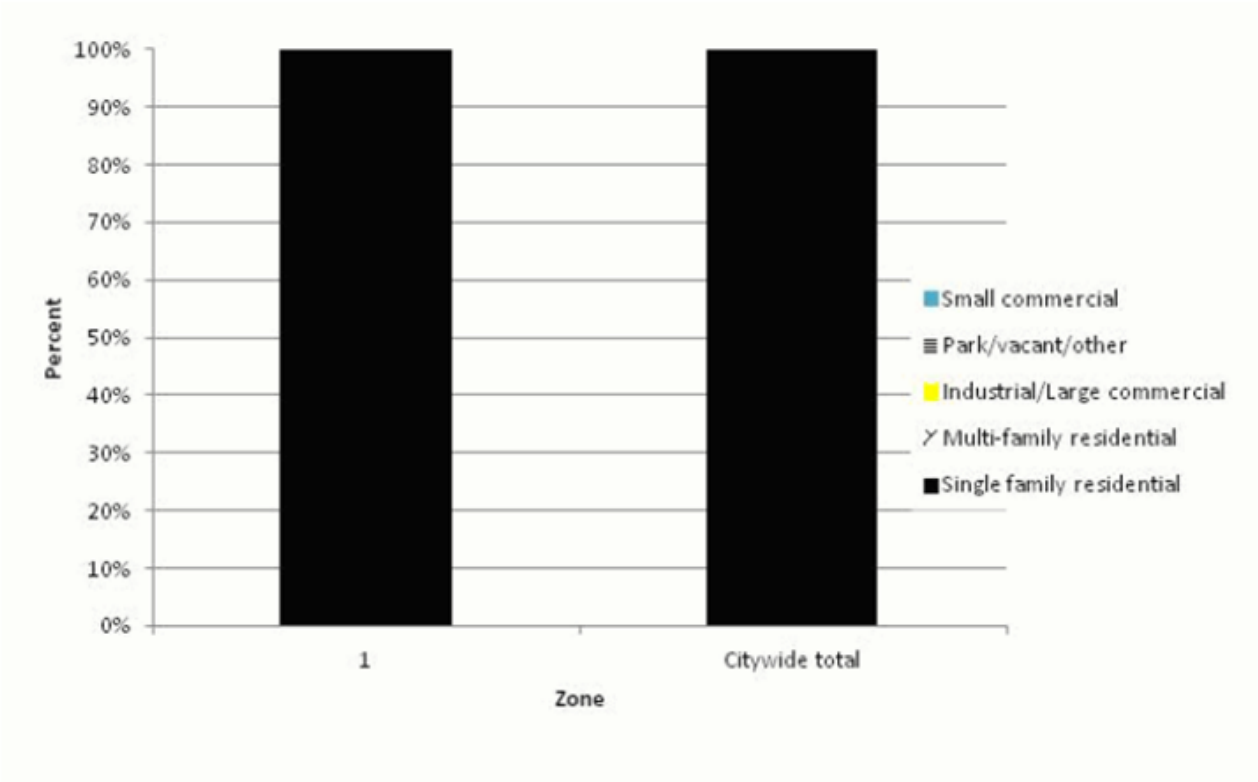
Grass:	5902.5 acres
Trees:	3727.9 acres
Agriculture:	2019.3 acres
Pavement:	1398.0 acres
Buildings:	1087.3 acres
Roads:	932.0 acres
Water:	466.0 acres

Figure 5: Canopy Cover

Ames, IA

Land Use of Public Trees by Zone (%)

5/7/2013



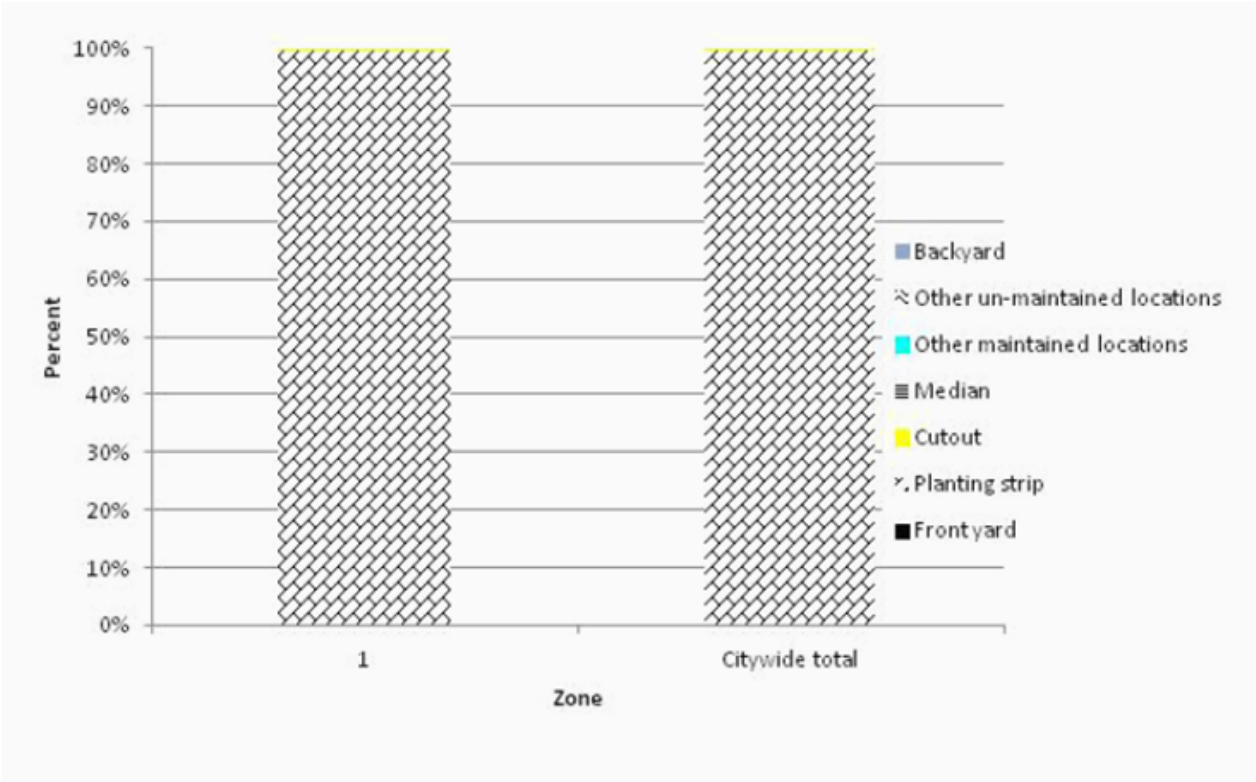
Zone	Single family residential	Multi-family residential	Industrial/ Large commercial	Park/vacant/ other	Small commercial
1	100.0	0.0	0.0	0.0	0.0
Citywide total	100.0	0.0	0.0	0.0	0.0

Figure 6: Land Use of city/park trees

Ames, IA

Location of Public Trees by Zone (%)

5/7/2013



Zone	Front yard	Planting strip	Cutout	Median	Other maintained locations	Other un-maintained locations	Backyard
1	0.0	99.7	0.2	0.0	0.0	0.0	0.0
Citywide total	0.0	99.7	0.2	0.0	0.0	0.0	0.0

Figure 6: Land Use of city/park trees

APPENDIX B: ArcGIS Mapping

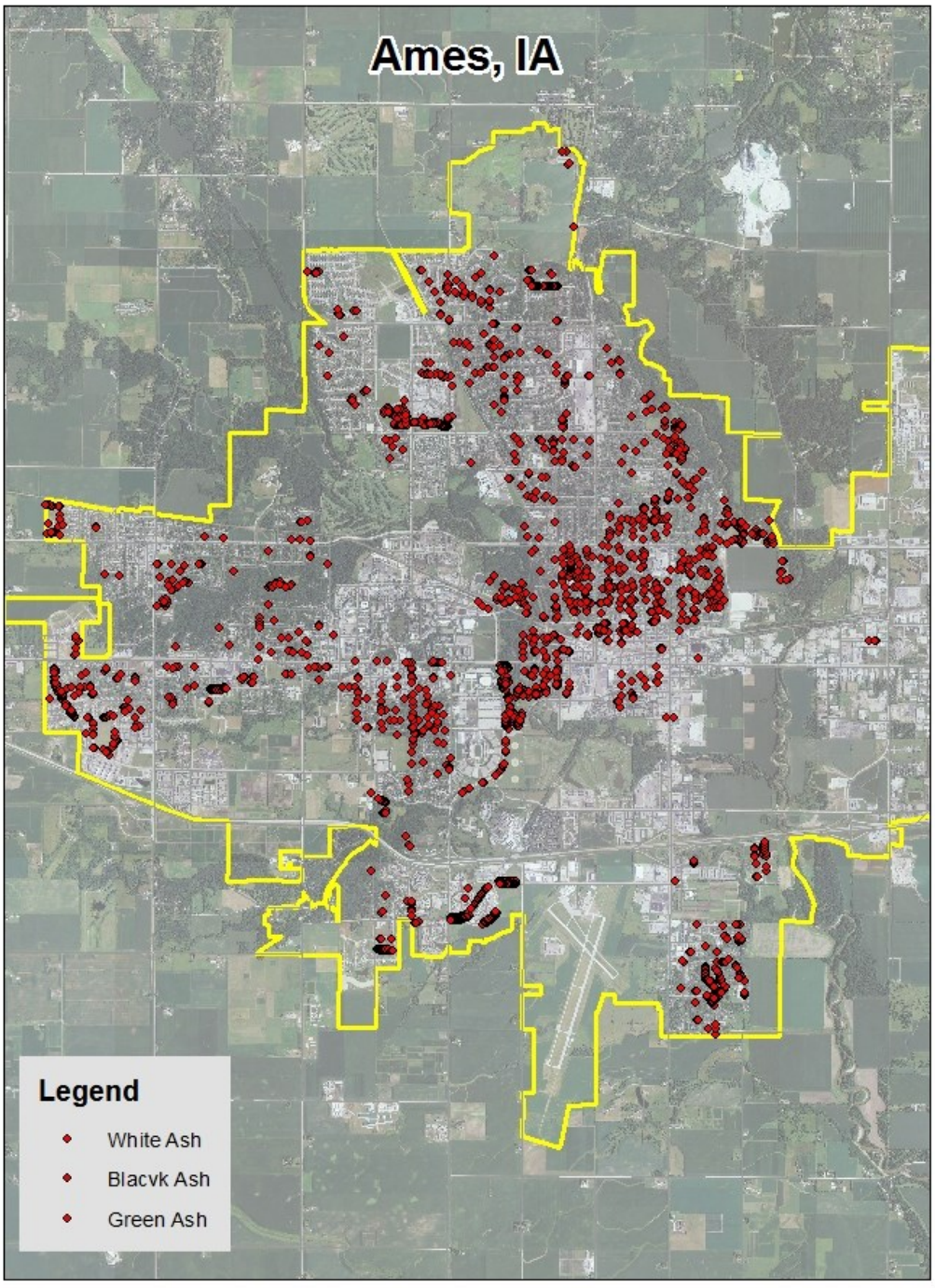


Figure 1: Location of Ash Trees

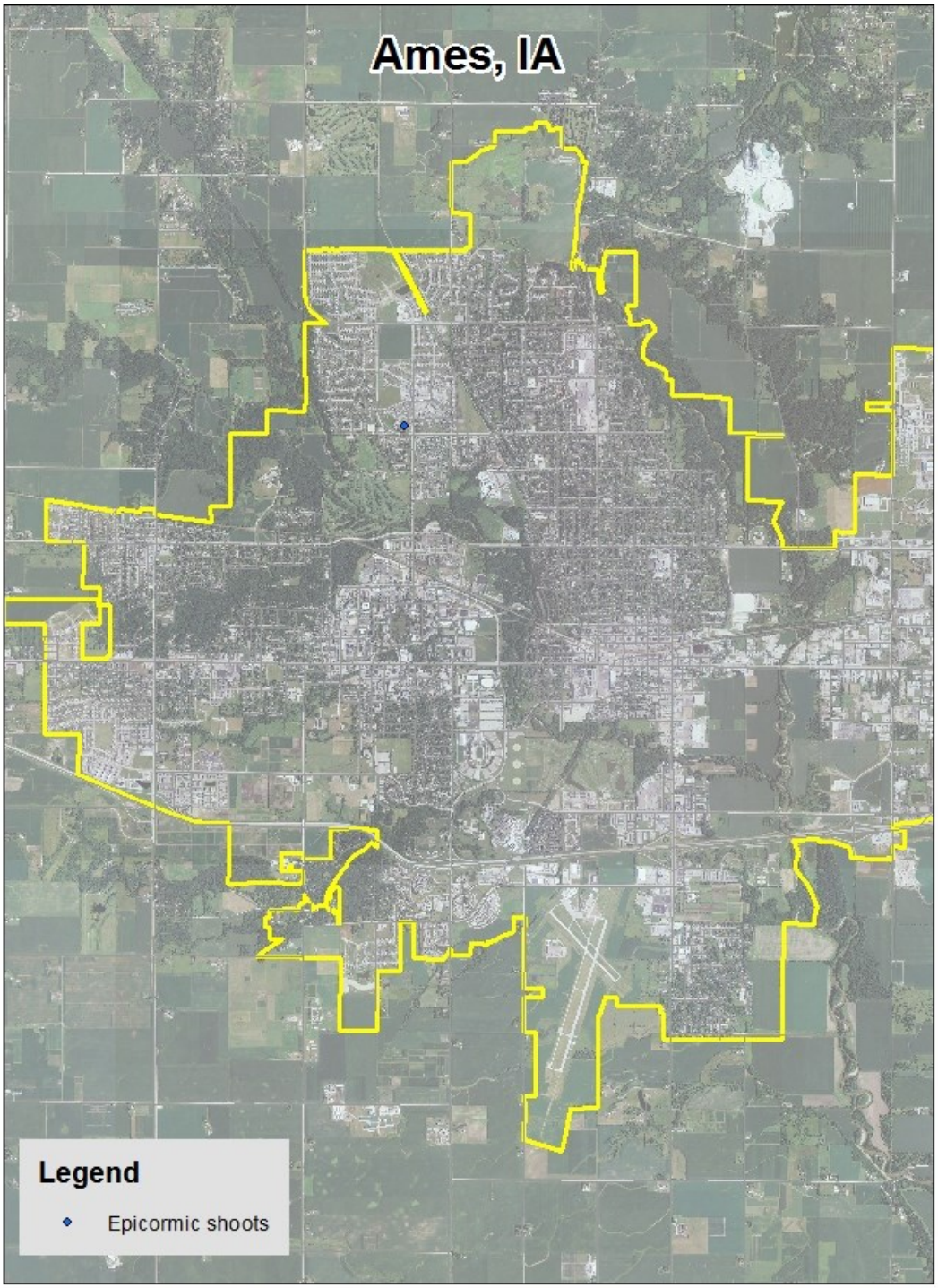


Figure 2: Location of EAB symptoms

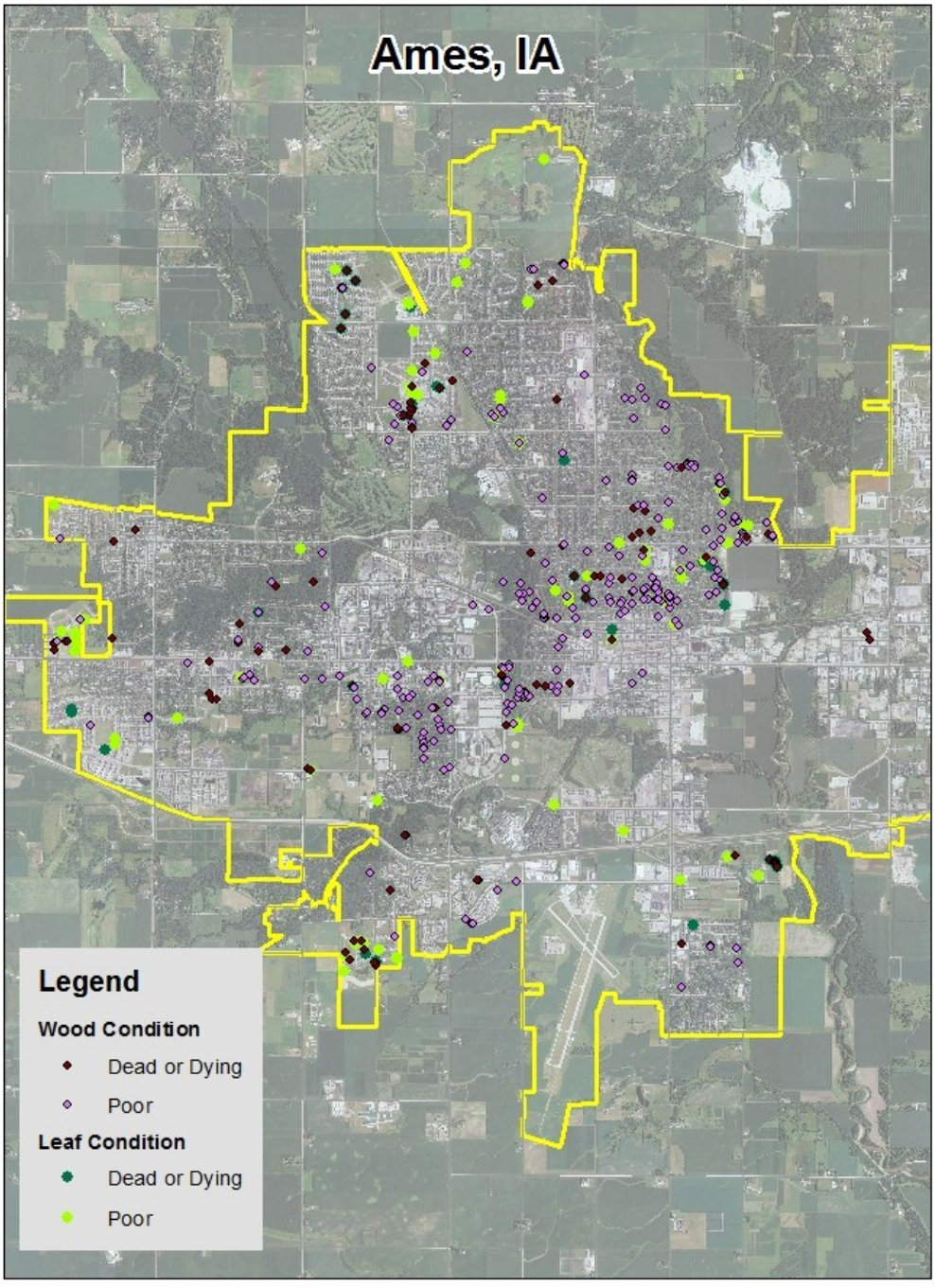


Figure 3: Location of Poor Condition Trees

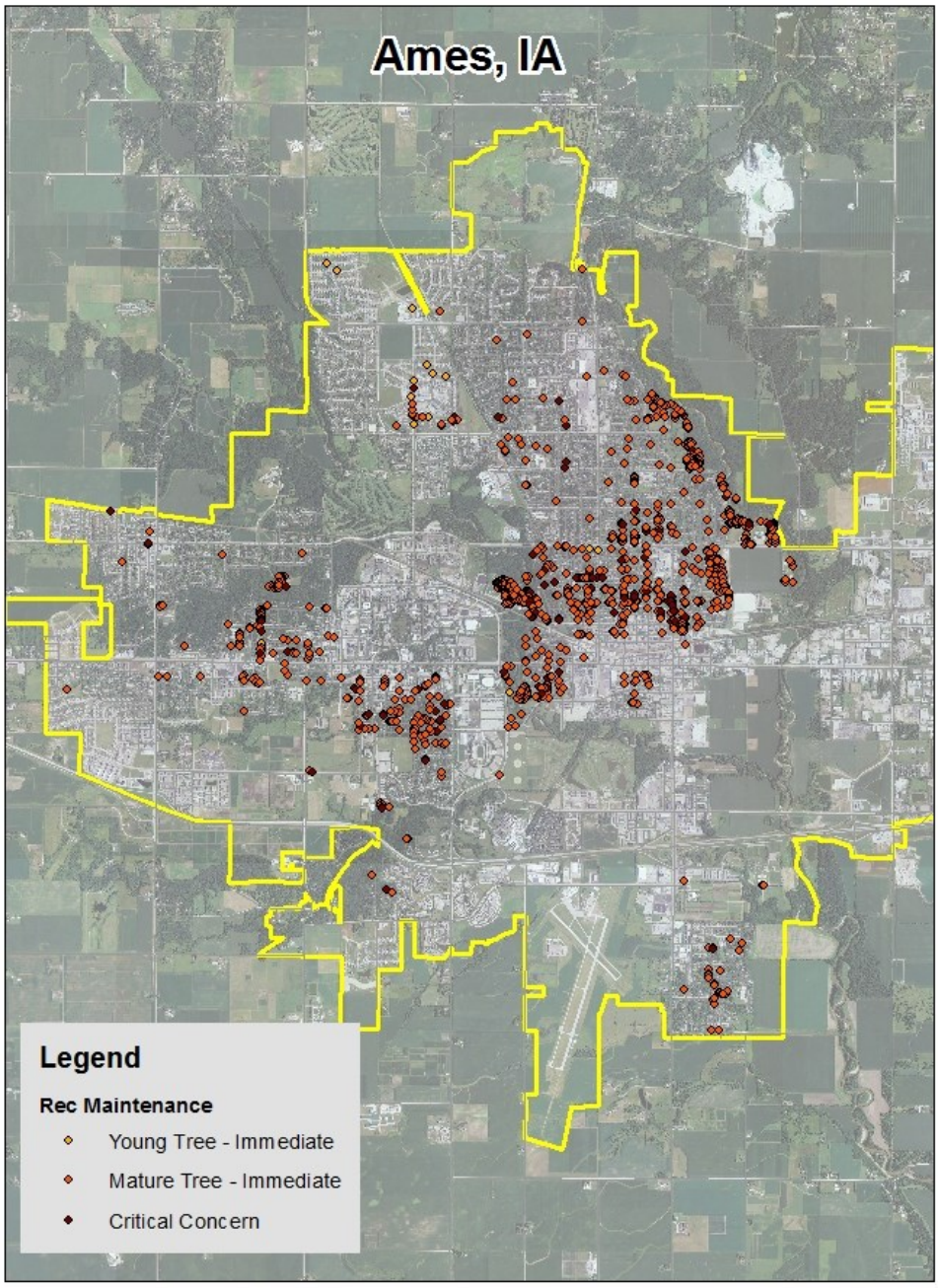


Figure 4: Location of Trees with Recommended Maintenance *City ownership of the trees recommended for removal should be verified prior to any removal*

APPENDIX C: Ames Tree Ordinances

CHAPTER 27

TREES AND SHRUBS

Sec. 27.1. CITY CONTROL, TREES AND SHRUBS IN STREET RIGHT-OF-WAY.

The City has charge, custody and control of all trees and shrubbery upon the parking and other portions of the public streets; and has the right and power to plant, prune, care for, remove and maintain all trees and shrubbery upon the public street; and, to prune limbs and branches of trees and shrubbery that extends onto or over public streets. 'Public Streets' means all land lying between property lines on either sides of all public streets, avenues, highways, boulevards and alleys within the corporate limits of the City.

(Ord. No. 876, Sec. 4, 10-1-57; Ord. No. 3044, Sec. 1, 4-11-89; Ord. No. 3065, Sec. 1, 11-21-89; Ord. No. 3101, Sec. 1, 10-23-90)

Sec. 27.2. STREET TREES, PLANTING PERMITS.

Trees and shrubs planted within the street limit, and trees having a trunk more than 50% within the public street as defined above, are referred to as 'street trees'. The planting of street trees shall be done by the City or owner of abutting private property only in accordance with the planting plan approved by the City Manager and on file in the City Department of Public Works. Permits will be issued without charge.

(Ord. No. 3101, Sec. 1, 10-23-90)

Sec. 27.3. REMOVAL OF STREET TREES

(1)Street trees which are dead or which for some other reason constitute a clear and present danger to the public safety may be removed at the direction of the City Manager or designee at any time without notice.

(2) To remove a street tree for any reason other than as stated above the City Manager shall cause a notice of intention to do so to be posted on the subject tree or trees. The notice shall remain posted for a period of not less than fifteen (15) days, during which period any local resident may file a written objection with the City Manager. if no objections are filed after fifteen days' notice as aforesaid, the City Manager may cause or permit the tree to be removed. If objections are filed within the fifteen days of notice as aforesaid, they shall be referred to the City Council and a hearing held thereon at its next regular meeting and the Council may thereafter sustain the objection or authorize the tree removed as is deemed in the best interest of the public.

(Ord. No. 3101, Sec. 1, 10-23-90)

Sec. 27.4. CUTTING, REMOVAL OF TREES, SHRUBS BY OWNER OR AGENT.

(1) The owner of adjoining property shall keep all street and private trees and shrubs trimmed so as not to interfere with the pedestrian use of sidewalks.

(2) Cutting or removing street trees shall be done only with permission and under the supervision of the City Manager's designee.

(Ord. No. 3101, Sec. 1, 10-23-90; Ord. 3309, 12-13-94)

(3) Cutting or trimming a tree where there is a risk of limbs, branches or any other portion of the tree falling or coming into contact with electric utility lines is prohibited without the express permission of the electric utility.

(Ord. No. 3309, 12-13-94)

Sec. 27.5. TREE SURGEON LICENSE REQUIREMENTS.

(1) No person shall solicit or engage in the work of felling trees or trimming trees where there is a risk of limbs, branches or any other portion of the tree falling into the public right of way without first obtaining a tree surgeon's license from the City Clerk and paying the license fee in such amount as shall be established for all such licenses by resolution of the City Council to cover costs of administration.

(Ord. No. 3309, 12-13-94)

(2) However, a property owner may trim or fell trees on his or her own property without a license except where there is risk of limbs, branches or any other portion of the tree falling or coming in contact with electric utility lines.

(Ord. No. 3309, 12-13-94)

(3) All licenses shall terminate on June 30th of the year issued.

(Ord. No. 3101, Sec. 1, 10-23-90)

Sec. 27.6. INSURANCE REQUIRED.

The applicant shall procure and maintain, for the duration of the license period, insurance against claims for injuries to persons or damages to property which may arise from or in connection with products, materials and services furnished. The applicant shall furnish the City of Ames with certificates of insurance evidencing the following coverages:

(1) An insurance certificate naming the City of Ames, its officers, and employees as an additional insured with comprehensive general liability limits in the amount of $500,000 combined single limit shall be in full force and effect during the life of the tree surgeons license. The coverage shall be at least as broad as the ISO Form Number CG0001 covering commercial general liability written on an occurrence basis only. A copy of the current insurance certificate shall be maintained on file with the City Clerk.

(Ord. No. 3746, 11-18-03)

(2) Automobile Liability with limits of no less than $500,000 combined single limits per occurrence for bodily injury, personal injury and property damage. The certificate must be on file in the office of the City Clerk before the license shall be issued.

(Ord. No. 876, Sec. 4, 10-1-57; Ord. No. 3044, Sec. 1, 4-11-89; Ord. No. 3065, Sec. 1, 11-21-89; Ord. 3309, 12-13-94; Ord. No. 3599, 11-28-00)

Sec. 27.7. PENALTIES FOR OFFENSES PERTAINING TO TREES AND SHRUBS.

A violation of any provision of Chapter 27, Trees and Shrubs, shall be a municipal infraction punishable by a penalty of $500 for a person's first violation thereof, and a penalty of $750 for each repeat violation.

(Ord. No. 3497, Sec. 44, 8-25-98)

APPENDIX D: Open Burning

23.2(3)b

b. **Trees and tree trimmings**. The open burning of trees and tree trimmings not originated on the premises provided that the burning site is operated by a local governmental entity, the burning site is fenced and access is controlled, burning is conducted on a regularly scheduled basis and is supervised at all times, burning is conducted only when weather conditions are favorable with respect to surrounding property, and the burning site is limited to areas at least one-quarter mile from any inhabited building unless a written waiver in the form of an affidavit is submitted by the owner of the building to the department and to the local governmental entity prior to the first instance of open burning at the site which occurs after November 13, 1996. The written waiver shall become effective only upon recording in the office of the recorder of deeds of the county in which the inhabited building is located. However, when the open burning of trees and tree trimmings causes air pollution as defined in Iowa Code section 455B.131(3), the department may take appropriate action to secure relocation of the burning operation. Rubber tires shall not be used to ignite trees and tree trimmings. This exemption shall not apply within the area classified as the PM10 (inhalable) particulate Group II area of Mason City. This Group II area is described as follows: the area in Cerro Gordo County, Iowa, in Lincoln Township including Sections 13, 24 and 25; in Lime Creek Township including Sections 18, 19, 20, 21, 27, 28, 29, 30, 31, 32, 33, 34 and 35; in Mason Township the W ½ of Section 1, Sections 2, 3, 4, 5, 8, 9, the N ½ of Section 11, the NW ¼ of Section 12, the N ½ of Section 16, the N ½ of Section 17 and the portions of Sections 10 and 15 north and west of the line from U.S. Highway 18 south on Kentucky Avenue to 9th Street SE; thence west on 9th Street SE to the Minneapolis and St. Louis railroad tracks; thence south on Minneapolis and St. Louis railroad tracks to 19th Street SE; thence west on 19th Street SE to the section line between Sections 15 and 16.

APPENDIX E: Cover Type

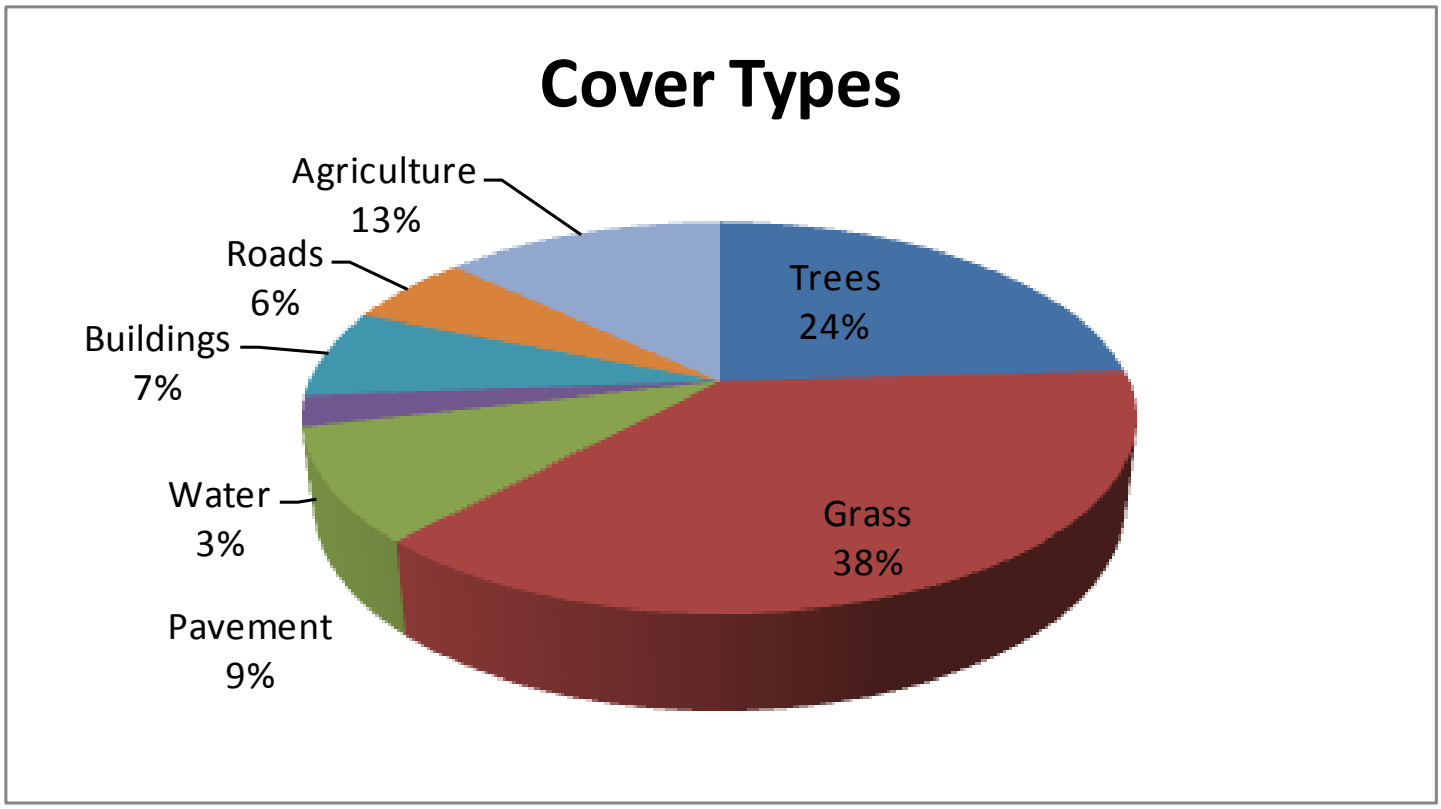


Figure 5: Types of cover

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 DNR Director at 515-281-5918.