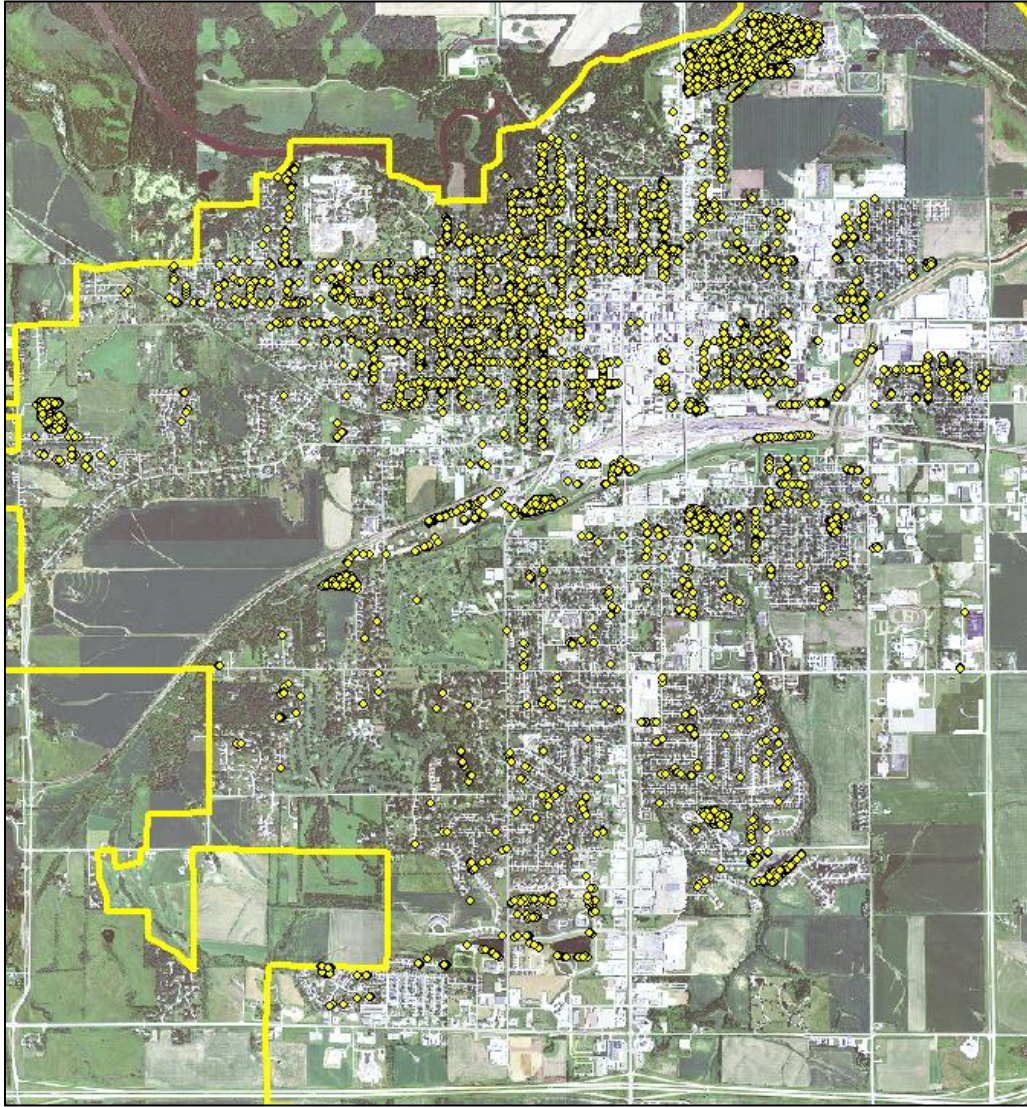


Marshalltown, IA



2016 Urban Forest Management Plan
Bureau of Forestry, Iowa DNR



Table of Contents

Executive Summary	3
Overview.....	3
Inventory and Results.....	3
Recommendations	3
Introduction	4
Inventory	4
Inventory Results	5
<i>Annual Benefits</i>	5
Annual Energy Benefits	5
Annual Stormwater Benefits	5
Annual Air Quality Benefits	5
Annual Carbon Benefits	5
Annual Aesthetics Benefits	5
Financial Summary of all Benefits	6
<i>Forest Structure</i>	6
Species Distribution	6
Size Class/Age	6
Condition: Wood and Foliage	6
Management Needs	6
Canopy Cover	7
Land Use and Location	7
Recommendations	7
Risk Management	7
Pruning Cycle.....	7
Planting	8
Continual Monitoring.....	8
Recommended Six-Year Maintenance Plan	8
Emerald Ash Borer	9
Monitoring	9
Ash Tree Removals	9
Wood Disposal.....	10
EAB Quarantines	10
Canopy Replacement	10
Works Cited	11

Executive Summary

Overview

This plan was developed to assist the City of Marshalltown with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management allows the community to take full 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 15% of Marshalltown'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 2015, a tree inventory was conducted by trained citizen volunteers using Global Positioning System (GPS) data collectors. This was a complete inventory of both street and park trees.

Below are some key findings of the 5,186 trees inventoried.

- Marshalltown's trees provide \$949,038 of benefits annually, an average of \$187 a tree
- There are over 30 species of trees
- The top three genera are: Maple 32%, Oak 19%, and Ash 15%
- 26% of trees are in need of some type of management
- 110 trees are recommended for removal

Recommendations

- 1,368 trees were identified as needing some form of maintenance (either staking/training, crown cleaning or reduction, or removal) which represents 26% of the population
- Of the 110 trees recommended for removal, 42 were deemed "critical concerns" and should be reviewed without delay.
City ownership of the trees recommended for removal should be verified prior to any removal
- 54 of the 795 ash trees should be carefully examined, as they have one or more symptoms that could be related to an EAB infestation
- All trees should be pruned on a routine schedule- approximately one-third of the city every other year
- Encourage ongoing tree planting using a diverse mix of recommended species
- Check ash trees with a visual survey yearly

Introduction

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

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

Inventory

In 2015, 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 by citizen volunteers who were trained in tree identification and inventory techniques. 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 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 5,186 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. Marshalltown's trees reduce energy related costs by approximately \$259,094 annually (Appendix A, Table 1). These savings are both in Electricity (1,236.7 MWh) and in Natural Gas (168,597 Therms).

Annual Stormwater Benefits

Marshalltown's trees intercept about 13.4 million gallons of rainfall or snowmelt a year (Appendix A, Table 2). This interception provides \$363,469 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 Marshalltown, it is estimated that trees remove 15,799 lbs of air pollution (ozone (O₃), particulate matter less than 10 microns (PM₁₀), carbon monoxide (CO), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂)) per year with a net value of \$44,281 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Marshalltown, trees sequester about 2.6 million lbs of carbon a year with an associated value of \$19,912 (Appendix A, Table 5). In addition, the trees store 53.2 million lbs of carbon, with a yearly benefit of \$399,188 (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. Marshalltown receives \$263,672 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, Marshalltown's trees provide \$949,038 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 5,186 trees in Marshalltown provide approximately \$183 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Marshalltown has over 30 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	1,681	32%
Oak	1,004	19%
Ash	795	15%
Hackberry	269	5%
Crabapple	198	4%
Other spp.		<3% ea.

Size Class/Age

Size class is used as a surrogate predictor of age distribution within the population. Most of Marshalltown's trees (38%) are between 12 and 24 inches in diameter at 4.5 ft (Appendix A, Figure 2). The ideal size class distribution to maintain canopy cover would be flat across the y-axis or skewed slightly left (with more young trees than old trees) to account for unexpected mortality over time. Marshalltown's current size distribution is skewed slightly right, indicating an older than average stand. This suggests a need for more planting to balance the population.

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 Marshalltown indicate that 85% of the trees are in good health, with only 3% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 70% of Marshalltown'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 4% of the population. The 3-4% of trees with poor, dead, or dying foliage and/or wood represent trees that should be checked for maintenance, removal, and replacement.

Management Needs

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

<u>Recommended Mgmt.</u>	<u># of Trees</u>	<u>Pct. of Total Population</u>
Crown Cleaning	900	17%
Crown Raising	167	3%
Tree Staking	38	<1%
Tree Removal	110	2%
Crown Reduction	153	3%

Canopy Cover

The total amount of tree/forest canopy (including both private and public trees) currently in Marshalltown is 15%, or approximately 1,900 acres. The canopy cover recorded in the Marshalltown inventory includes approximately 140 acres (Appendix A, Figure 5).

Land Use and Location

The majority of Marshalltown's city-owned trees are in planting strips in single family residential neighborhoods as well as in city parks (Appendix A, Figure 6 & Appendix A, Figure 7).

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.

Hazardous trees

Marshalltown has 57 critical concern trees that were identified during the inventory as being public safety concerns. Of this number, 42 trees were recommended for immediate removal, while the other 15 were seen to be in need of some sort of immediate pruning (crown cleaning, reduction, or raising). 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 largest diameter critical concern trees first. There are 3 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.

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 three main categories of routine pruning to be addressed: 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 for the purpose of providing clearance for pedestrians or vehicles. Crown reduction is removing individual limbs from interference with

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

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 Marshalltown. If we assume the average useful lifespan of an urban street tree is 100 years, then the annual goal should be to plant approximately 50-60 new trees per year to maintain Marshalltown's street and parks tree population.

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 (32%) (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, boxelder, Oriental elm, evergreens, willow, or black walnut, as outlined in section 27-20 of the city ordinance.

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.

Recommended Six-Year Maintenance Plan

Year 1: Deal with "critical concern" trees:

- 15 trees in need of trimming (crown cleaning, reduction, or raising)
- 42 trees recommended for removal
- Plant 50-60 new trees where feasible
- Monitor for signs/symptoms of EAB

Years 2 and 3: Deal with trees that need "immediate" assistance (after the critical concerns):

- 194 trees in need of trimming (crown cleaning, reduction, or raising)
- 48 trees recommended for removal
- 14 trees in need of staking/training
- Plant 50-60 new trees where feasible
- Monitor for signs/symptoms of EAB

Years 3, 4, and 5: Deal with trees that need “routine” assistance:

- 1,011 trees in need of trimming (crown cleaning, reduction, or raising)
- 20 trees recommended for removal
- 24 trees in need of staking/training
- Plant 50-60 new trees where feasible
- Monitor for signs/symptoms of EAB

Years 6 and on:

- Review trees in dying or poor condition and remove as needed
- Perform routine trimming (crown cleaning, reduction, or raising) on approximately 1/6 of the tree population each year
- Do staking/training on new young trees as needed
- Plant 50-60 new trees where feasible
- Monitor for signs/symptoms of EAB

Emerald Ash Borer Recommendations

The City of Marshalltown has 795 ash trees along its city streets and in city parks as tallied by this inventory, which represents 15% of the tree population. Although the city is not known to have Emerald Ash Borer present, 54 trees that were inventoried had *some* signs or symptoms that are commonly associated with EAB such as: canopy dieback, woodpecker flecking, and/or basal sprouts.

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.

Ash Tree Removals

Nineteen ash trees were recommended for removal during the 2015 inventory (for various reasons). After removing those trees, it is recommended the City begin pre-emptively removing and replacing ash trees that are categorized as being either in poor health or are dead/dying (leaf health or wood health ratings) (Appendix B, Figure 3). At that point, the City can opt to maintain its residual population of healthy ash trees until the beetle is discovered since the current number of ash trees is below the 20% threshold for a particular genus.

Treatment of Ash Trees

The City may wish to invest in treatment of certain high quality ash trees that are of exceptional value or importance to the surrounding landscape. Chemical treatment can be effective tool for communities to spread removal costs out over several years while allowing certain trees to continue to provide benefits. Treatment is not recommended if EAB is still more than 15 miles

away from the community. For more information on treatment strategies visit <http://www.extension.iastate.edu/psep/EmeraldAshBorer.html>

Wood Disposal

Wood waste can be disposed of at the City's Composting Facility via chipping, burning, and/or composting. It's recommended that raw ash materials not be allowed to leave the premises for citizen firewood use in order to prevent spreading the insect to other parts of the city and county.

EAB Quarantines

The State of Iowa is currently under both a State and Federal quarantine which prohibits the intrastate movement of regulated articles outside the quarantine area. 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.

For more information, please visit http://www.iowatreepests.com/eab_regulations.html.

Canopy Replacement

As budget permits, all removed trees should be replaced. The new plantings should be a diverse mix excluding species prohibited by City Code 27-20.

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