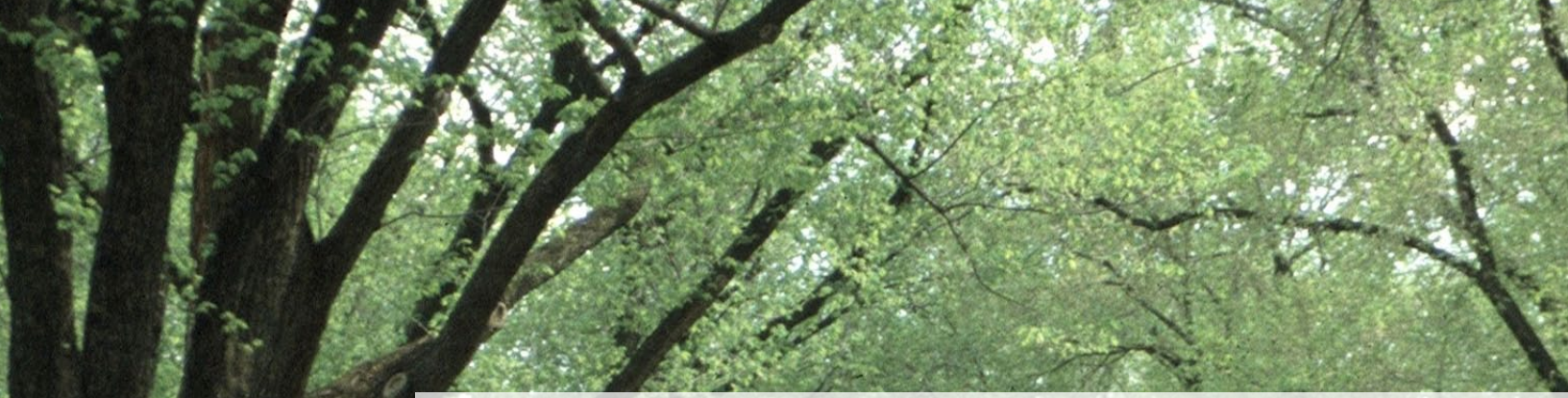

Street Tree Assessment Report

Abingdon, Virginia

Overview

Street trees are a vital community asset that enhance our day-to-day lives and mitigate many of the negative impacts of urbanization. In 2007, a complete street tree inventory was conducted in Abingdon, Virginia to assess tree abundance, composition, functional benefits, and monetary value. Trees residing within the right-of-way along public streets were surveyed to determine their species, size, condition, and placement. Inventory data were provided by Abingdon for this assessment report. The inventory data were analyzed using i-Tree Streets assessment software developed by the U.S. Forest Service.

Key Findings

- Abingdon has an estimated 1,193 street trees.
- Abingdon's five most abundant street tree species are flowering dogwood, eastern white pine, sugar maple, red maple, and eastern hemlock.
- Each year, Abingdon's street trees intercept about 2.5 million gallons of rainfall and sequester over 300 thousand pounds of carbon dioxide.
- In total, Abingdon's street trees provide over $65 thousand in benefits annually or roughly $55 per tree.
- The replacement value of Abingdon's street trees is estimated at nearly $3 million.

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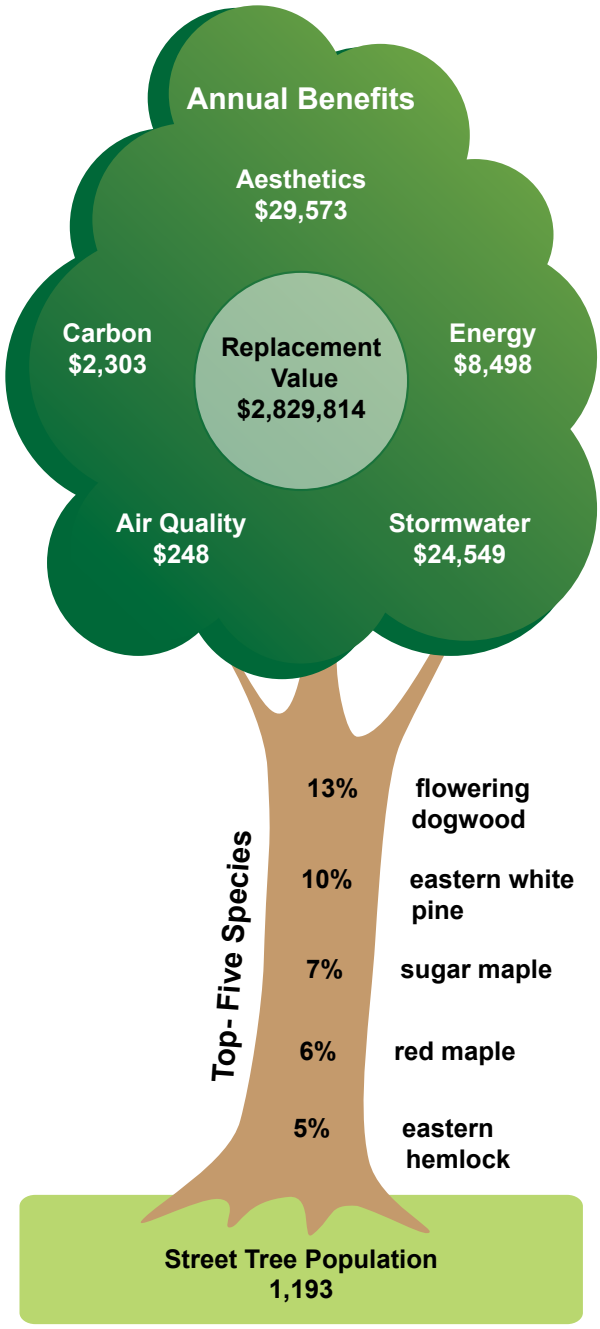
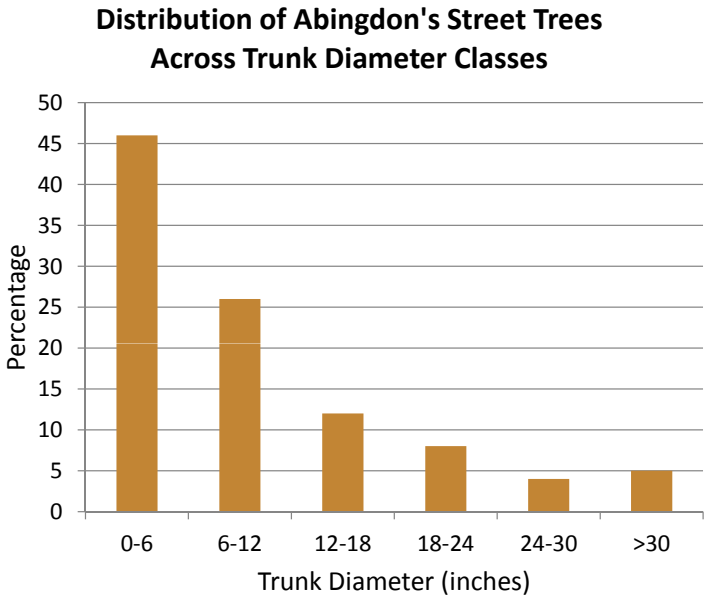
Street Tree Abundance and Composition

Abingdon's estimated street tree population is 1,193. Abingdon's street trees provide about 15 acres of canopy, which cover roughly 0.3% of the land area. The five most abundant species are flowering dogwood (13%), eastern white pine (10%), sugar maple (7%), red maple (6%), and eastern hemlock (5%). The most important species (accounting for leaf area and canopy cover in addition to tree count) include sugar maple (17%), white ash (10%), eastern white pine (9%), silver maple (7%), and flowering dogwood (6%).

Small-stature, broadleaf deciduous trees are the most common tree form amongst Abingdon's street trees. Over 70% of Abingdon's street trees are smaller than 12 in. trunk diameter while less than 5% are larger than 30 in. The majority of Abingdon's street trees (~88%) were rated in fair to good condition.





Relative abundance of Abingdon's street trees by foliage type and mature height class.

Foliage Type	Small (< 25')	Medium (25 - 45')	Large (> 45')	Total	% of Total
Broadleaf Deciduous	428	130	284	842	71
Broadleaf Evergreen	42	8	0	50	4
Conifer Evergreen	6	99	196	301	25
Total	**476**	**237**	**480**	**1,193**	**100**
% of Total	**40**	**20**	**40**	**100**	

Street Tree Benefits and Value

Gross annual benefits provided by Abingdon's street trees are valued at $65,171. These benefits come from contributions that street trees make to real estate aesthetics, rainfall interception, energy conservation, air pollution reduction, and CO_2 sequestration. Each year, Abingdon's street trees intercept roughly 2.5 million gallons of rainfall, conserve a combined 75 megawatt-hours of electricity and 2.5 thousand therms of natural gas for home cooling and heating, absorb 386 pounds of air pollution, and remove about 300 thousand pounds of carbon from the atmosphere. In addition, Abingdon's street trees currently store about 4 million pounds of carbon, which is valued at over $30 thousand.

On a per-tree basis, the most beneficial tree species are white ash ($233 per year), silver maple ($176 per year), sugar maple ($149 per year), black walnut ($117 per year), and black cherry ($105 per year). These values reflect the large size that these trees have attained, providing abundant leaf area and canopy cover. The average street tree in Abingdon provides about $55 in gross benefits annually. Gross benefits do not account for annual costs associated with planting, maintenance, or removal, which were not available for this analysis.

The replacement value of Abingdon's street trees is estimated at $2,829,814. This is the value of street trees as a structural asset, and reflects the cost to replant trees in a quantity sufficient to replace their current level of functional benefits. Because a large street tree produces the same amount of benefits as numerous nursery-sized trees, replacing a large tree would require significant resources that may not be feasible due to both spatial and budgetary constraints.

Gross annual benefits provided by Abingdon's street trees.

Benefit Type	Resource Units	Total $	Avg. $/Tree
Aesthetic enhancements	–	29,573	24.79
Rainfall Interception (gallons)	2,479,524	24,549	20.58
Energy Conservation[1]	–	8,498	7.12
Electricity (MWh)	75	5,702	–
Natural Gas (therms)	2,673	2,796	–
Air Pollution reduction (lb)[2]	386	248	0.21
CO_2 sequestration (lb)[3]	307,056	2,303	1.93
Total Benefits	**–**	**65,171**	**54.63**

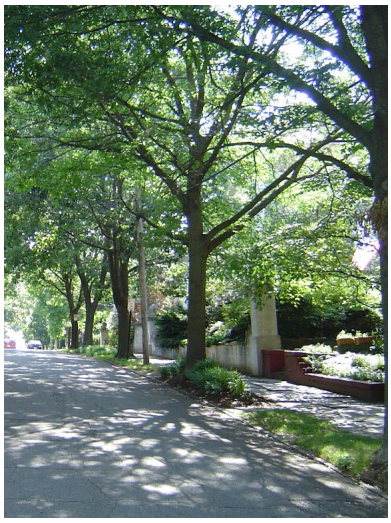
[1]Sum of electricity and natural gas conservation.

[2]Net pollution reduction (O3, NO2, PM10, and SO2) accounting for pollutant deposition, pollutant avoidance, and BVOC emissions. Note, if Resource Units value is negative, BVOC emissions exceeded pollution reduction. If only total $ is negative, then BVOC pricing exceeded pollutant pricing, but pollution reduction still occurred.

[3]Net sequestration accounting for gross tree sequestration, tree decomposition emissions, and tree maintenance machinery emissions.

Street Tree Opportunities

Abingdon has a highly valuable street tree population. To sustain this resource and its benefits, the town should continue to focus on planting diverse, functional species and maintaining trees to ensure their health, safety, and appearance. Urban forestry experts generally recommend that a municipal tree population comprise no more than 10% of a single species and 20% of a single genus in order to minimize impacts of pest outbreaks and other species-specific disorders. At 13% of the total street tree population, flowering dogwood is above this threshold. Similarly, the maple genus is very close to the 20% threshold. Planting efforts should temper the use of flowering dogwood and maples to ensure the diversity and heath of Abingdon's street trees.



One of the most noxious pests threatening Virginia's street trees is emerald ash borer, an insect introduced from Asia that has killed millions of native ash trees in the United States. Although native ash species comprise just 3.52% of Abingdon's street trees, they tend to be very large trees and therefore account for over 10% of the street tree canopy cover. Abingdon faces the potential loss of many valuable ash trees and must remain vigilant in managing street tree diversity because there is ongoing risk of unforeseen introduction of noxious tree pests into the United States.

About 40% of Abingdon's street tree population comprises small-stature species such as flowering dogwood, which make a substantially smaller contribution to annual benefits than large-maturing trees. For example, the average white ash in Abingdon provides over 18 times the gross annual benefits of the average flowering dogwood. While flowering dogwood is an attractive, resilient species, preference should be given to planting large-maturing trees whenever landscape conditions allow.

The size distribution of Abingdon's street trees suggests a stable age structure. Because street trees inevitably grow old and die or must be removed to accommodate land use changes, an ample number of young trees must always exist in order to sustain street tree benefits. The fact that the two diameter classes that encompass the largest percentage of the total street tree population are the 0-6 and 6-12 inch diameter classes, respectively, is a source of optimism. However, ongoing planting efforts, with particular focus on large stature, highly functional tree species, should be taken to ensure a high level of benefits will be provided by Abingdon's street trees for the future.

This assessment has reported gross benefits of Abingdon's street trees, which may not fully reflect the true value of this vital resource. Direct and indirect costs of administering and managing street trees can vary considerably based on species composition, tree size distribution, and other local environmental and economic factors. Therefore, findings of this report should be carefully interpreted in the context of local circumstances that impact tree benefits and costs.

About This Report

This report was co-authored by Eric Wiseman and Julia Bartens with the Department of Forest Resources and Environmental Conservation at Virginia Tech. Report layout and design by Sarah Gugercin.

This report was made possible through grants from the Virginia Department of Forestry and the U.S. Forest Service. Technical assistance was graciously provided by the Davey Resource Group.

Inventory data were analyzed using i-Tree Streets assessment software version 4.0.4. Benefit estimates were based on i-Tree modeling data from the Charlotte, North Carolina reference city in the South Climate Zone. The 2010 median home price, used to calculate street tree aesthetic benefits for Abingdon was $164,700 as reported by the U.S. Census Bureau in http://quickfacts.census.gov/qfd/index.html. Additional information about methods used in this street tree assessment can be found on our website.

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