United States
Department of
Agriculture

Forest Service

**Northeastern
Research Station**

General Technical
Report NE-287

Syracuse Urban Forest Master Plan: Guiding the City's Forest Resource Into the 21st Century

Abstract

The Syracuse Urban Forest Master Plan is one of the most comprehensive urban forest assessments ever developed for a city. This report combines a high-resolution digital urban cover map with field vegetation sampling data from all land uses, a 100-percent street-tree inventory, a survey of city residents regarding desirable and undesirable tree characteristics and functions, and a survey of local tree experts on the best trees for various city conditions. These data provide a wealth of information related to the urban forest resource and its management, and were used to develop 10 recommendations to help guide urban forest management in Syracuse in the 21st century.

Manuscript received for publication 22 March 2001

Published by:
USDA FOREST SERVICE
11 CAMPUS BLVD SUITE 200
NEWTOWN SQUARE PA 19073-3294

December 2001

For additional copies:
USDA Forest Service
Publications Distribution
359 Main Road
Delaware, OH 43015-8640
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Syracuse Urban Forest Master Plan: Guiding the City's Forest Resource into the 21st Century

David J. Nowak and Paul R. O'Connor, Compilers

This report was sponsored by the USDA Forest Service and Cornell Cooperative Extension of Onondaga County, New York, in cooperation with the City of Syracuse, Re-Leaf Syracuse Committee, Inc., New York State Department of Environmental Conservation, and SUNY College of Environmental Science and Forestry at Syracuse

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Executive Summary

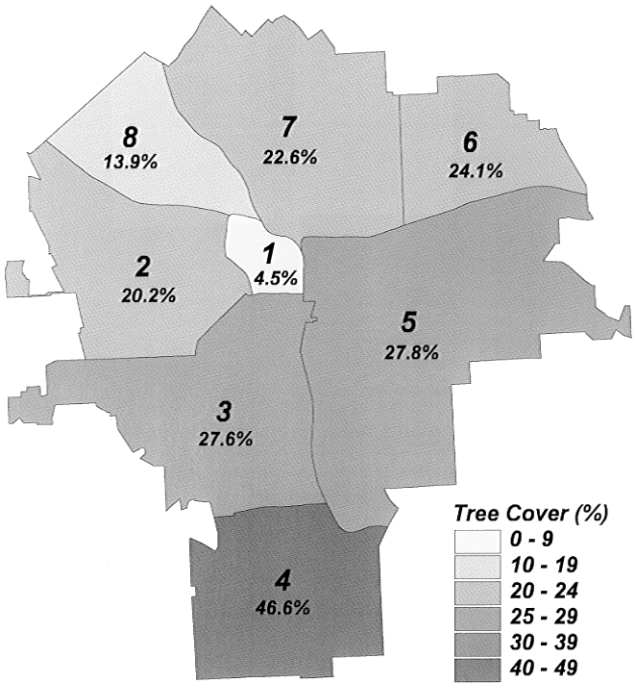
This urban forest master plan for the City of Syracuse includes a vision for the entire forest resource and is a product of the work and input of numerous people. It contains one of the most comprehensive urban forest assessments ever developed for a city. The plan incorporates recent assessments along with input from residents and professional tree experts to establish goals for Syracuse's urban forest and its future management.

The master plan was developed in response to concerns of Representative James Walsh, Andrew Cuomo, former Secretary of Housing and Urban Development (HUD), and Roy Bernardi, Mayor of Syracuse, about the condition and future of Syracuse's urban forest following the 1998 Labor Day Storm. In 1999, Representative Walsh and Mr. Cuomo secured funds for Syracuse through the USDA Forest Service and HUD to assist in tree planting and plan development. Further funding for plan development was provided by the U.S. Environmental Protection Agency through a Sustainable Development Grant to Cornell Cooperative Extension of Onondaga County, New York. This master plan offers suggestions to guide future tree planting, maintenance, and urban forest management in Syracuse, and was developed through the efforts of Mayor Bernardi, the USDA Forest Service, Cornell Cooperative Extension of Onondaga County, New York, Re-Leaf Syracuse Committee, Inc., New York State Department of Environmental Conservation, and the SUNY College of Environmental Science and Forestry at Syracuse.

The vision of this plan is to help direct city management to increase overall tree cover, tree health, and consequent tree benefits in Syracuse in an equitable and sustainable manner. This plan can be integrated with the Syracuse Neighborhood Initiative to help strength communities and improve the quality of life of the city's residents. This report summarizes the findings of data collected on the physical aspects of Syracuse's urban forest as well as public opinion about this resource. These findings are used to formulate 10 goals for Syracuse to help realize the vision for its urban forest.

Tree Cover in Syracuse

Percent tree cover within Syracuse varies with Tomorrow's Neighborhoods Today (TNT) area boundaries and averages 26.6 percent.



Percent Tree Cover in Syracuse by TNT area

Syracuse's Urban Forest Resource

Analyses of field data from 200 randomly located plots in Syracuse reveal that the city contains an estimated 890,000 trees. The most common species are sugar maple (14.2 percent of the population), arborvitae (9.8), European buckthorn (6.8), boxelder (6.3), and Norway maple (6.1). The majority of the trees in Syracuse are rated as good (crown dieback of 1 to 10 percent); 9.2 percent of the population is rated as dead or dying (dieback of 76 to 100 percent).

Total estimated carbon storage by trees in Syracuse is 163,500 tons with an annual net carbon uptake of 3,870 tons. As carbon dioxide is an important greenhouse gas that contributes to global climate change, the value of this forest's carbon effect is $3 million for carbon storage and $71,500 per year for carbon uptake.

Trees also remove air pollutants by absorbing gases in leaves and capturing particles on them. Trees in Syracuse remove an estimated 169 tons of air pollution per year at an annual value of $850,000. Individual large trees (more than 33 inches in diameter) remove about 50 times more air pollution than small trees (less than 3 inches). Large trees also store about 1,000 times more carbon and annually remove about 70 times more carbon than small trees.

Syracuse's Street-Tree Population

A complete inventory of street trees in Syracuse revealed a population total of 34,165 trees. The most common species is Norway maple (24.3 percent of street-tree population), followed by honeylocust (9.3), silver maple (8.9), crabapple (6.1), and littleleaf linden (5.4). Street-tree density (number of trees per mile of road) was lowest in TNT 8 (Lakefront), 2 (Westside), and 3 (Southside).

Park trees in Syracuse also were surveyed. Although this was not a complete survey, trees within and along high trafficked areas were inventoried. In all, 9,132 trees were inventoried within about 900 acres of park property.

Public Survey of Residents Related to Urban Trees

A public survey was conducted to determine what Syracuse residents believe are the most important attributes of the city's urban forest, and whether they are satisfied with the amount of street trees in their neighborhood. Respondents indicated that the ability of trees to clean the air is the most important characteristic, followed by characteristics related to improving environmental quality, economic benefits, and quality of life. Most of the disadvantages of trees that were considered important were related to their potential for causing damage.

Neighborhood responses related to street trees indicate that residents in four areas believe there are too few street trees: TNT 2 (Westside), 3 (Southside), 5 (Eastside) and 7 (Northside). TNT 2, 3, and 5 suffered the most damage from the Labor Day storm. Residents of other neighborhoods, Eastwood and the Valley, generally are comfortable with the current number of street trees. No neighborhood had a significant number of residents who believe there are too many street trees.

Expert Opinions on Best Trees for Syracuse

Numerous local tree experts were asked to rate the suitability of more than 130 species for seven site conditions in the Central New York area: park and lawns, tree pits, streetside strip widths less than 5 feet, 5 to 12 feet, and 13+ feet, streetside with overhead wires, and heavily-used streetside strips. Honeylocust was among the top-rated species in all categories.

Goals of the Urban Forest Master Plan

On the basis of the data compiled for this report, 10 goals were established as a framework for the city to establish specific and detailed management plans (e.g., staffing, budget) that will sustain the health and increase the extent of its urban forest resource.

1. **Increase street-tree stocking levels to a minimum of 60 percent in residential areas of each TNT area.**

2. **Facilitate tree planting on private and public properties to help the city reach an overall tree canopy cover of 30 percent.**

3. **Increase species diversity in Syracuse through the use of a variety of proven well-adapted, but relatively uncommon species.**

4. **Facilitate tree maintenance to minimize hazards and potential damage, and increase tree health.**

5. **Periodically update the city's street-tree inventory.**

6. **Maintain Tree City USA status and annual Arbor Day celebrations.**

7. **Encourage public participation and input in forest management in Syracuse.**

8. **Produce brochures to facilitate public education about urban forestry.**

9. **Sponsor participatory demonstration tree planting and maintenance activities on streets around schools to facilitate public education for all ages.**

10. **Encourage acquisition of donations, grants, and other funds to increase outside funding to sustain Syracuse's urban forest.**

Chapter 1: Planning for a Better Future

Paul O'Connor[1] and David J. Nowak[2]

[1]Cornell Cooperative Extension of Onondaga County, Syracuse, NY
[2]USDA Forest Service, Northeastern Research Station, Syracuse, NY

This urban forest master plan for the city of Syracuse incorporates one of the most wide-ranging assessments of an urban forest resource ever made. Surveys of Syracuse residents and tree experts helped set the mission, vision, and goals for the future management of the city's urban forest.

The master plan was developed in response to concerns of U.S. Representative James Walsh, Andrew Cuomo, former Secretary of Housing and Urban Development (HUD), and Roy Bernardi, Mayor of Syracuse, about the condition and future of the city's urban forest following the 1998 Labor Day Storm. In spring of 1999, Rep. Walsh and Mr. Cuomo secured funds from the USDA Forest Service and HUD to assist Syracuse in tree planting and plan development. Additional funding for plan development was provided by the U.S. Environmental Protection Agency through a Sustainable Development Grant to Cornell Cooperative Extension of Onondaga County, New York. The plan itself was developed through the efforts of Mayor Bernardi and the following agencies:

- USDA Forest Service
- Cornell Cooperative Extension of Onondaga County, NY
- Re-Leaf Syracuse Committee, Inc.
- New York State Department of Environmental Conservation
- SUNY College of Environmental Science and Forestry of Syracuse

This plan can be integrated with the Syracuse Neighborhood Initiative to help improve the quality of life in Syracuse's neighborhoods. To develop this comprehensive management plan, data were gathered on the city's resources and the desires of its residents. The first part of this report summarizes[1] the findings of assessments related to:

- Tree cover in Syracuse
- Syracuse's urban forest resource
- Syracuse's street-tree population[2]
- Attitudes of residents toward urban trees
- Expert opinions on the best trees to plant
- Groups/agencies that influence Syracuse's urban forest resource

Data from these assessments were used to develop recommendations related to comprehensive management and planning of Syracuse's urban forest. The final chapter of this report includes 10 specific management goals.

History of the Master Plan

The Labor Day Storm of 1998 was the most recent major event that has dramatically altered Syracuse's urban forest resource. In response to this disaster, Mayor Bernardi called together local volunteers and "tree experts" to form the Re-Leaf Syracuse Committee. In the years following the storm, Re-Leaf Syracuse Committee has become a nonprofit organization that assists the city in managing its urban forest. Members of the Re-Leaf Board of Directors chair subcommittees composed of technical experts and concerned residents. Their initial task was to develop a comprehensive urban forest master plan.

Urban Forest Management

Urban forests are a complex resource (Fig. 1), with multiple owners, a variety of landscape types, and site-specific management objectives. Trees in Syracuse's urban forest affect the city's residents and their environment both directly and indirectly. Managed properly, this valuable resource can provide some or all of the following benefits:[3]

- Clean air
- Clean water

[1]Detailed information on specific methods and/or results can be obtained by contacting the authors or the agencies cited in this report (see Appendix).

[2]For this analysis, a street tree is defined a tree with a minimum diameter at breast height of 1 inch, located between the edge of the road and an adjacent sidewalk. Where there are no sidewalks, it is a tree located within the estimated city street right-of-way, or within park or other greenspace areas that are within 50 feet of street centerline. Tree stumps are excluded, as are some greenspace trees on large medians that are more than 50 feet from street centerline.

[3]For additional information on urban forest costs and benefits, see Nowak, D.J.; Dwyer, J.F. 2000. Understanding the benefits and costs of urban forest ecosystems. In: Kuser, J., ed. Handbook of urban and community forestry in the Northeast. New York: Kluwer Academic/Plenum Publishers: 11-25.

Figure 1.—Syracuse's urban forest resource can provide numerous benefits to city residents.

- Aesthetic enjoyment/relaxation
- Recreation
- Wildlife habitat
- Emotional and spiritual experiences
- Reduced energy use
- Cooler air temperatures
- Reduced noise
- Reduced ultraviolet radiation
- Reduced greenhouse gases
- Reduced crime
- Increased job satisfaction
- Reduced runoff and soil erosion
- Increased real estate values
- Education
- Community development

Not all benefits are realized at all locations within a city. Improper design, lack of management, or lack of tree maintenance can increase costs and reduce urban forest benefits. Urban foresters often have direct control over street and park trees, which typically account for only 10 to 20 percent of the urban forest resource. However, urban foresters can help guide and direct the remaining portion of the urban forest, which is controlled by private landowners, through education outreach, financial incentives, ordinances, and assistance with planting, maintenance, and management.

Working with city residents, urban foresters can help ensure a viable, healthy, functional, and low-cost resource for many generations. The urban forest master plan for Syracuse is an attempt to integrate public forest management with the goals and desires of residents to provide the foundation for detailed management plans. The plan mission is to facilitate appropriate management to sustain the health and increase the extent of Syracuse's urban forest resource. The plan vision is to increase overall tree cover, tree health, and consequent tree benefits in Syracuse in an equitable and sustainable manner.

Chapter 2: Tree Cover in Syracuse

David J. Nowak,[1] Jeff Walton,[2] Soojeong Myeong,[2] Paul F. Hopkins,[2] and Robert H. Brock, Jr.[2]

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[2]State University of New York, College of Environmental Science and Forestry, Syracuse, NY

Mapping a city's tree cover reveals the extent and variation of the forest resource and provides a more extensive view of its urban forest than typical inventories or sampling assessments. To assist in understanding the urban forest resource in Syracuse, tree cover mapping and analysis were conducted using 1999 color-infrared two-foot-resolution digital images of the city (Figs. 2-3) that were provided by Emerge Corporation.[4]

Computer analysis of the digital information contained in the aerial images was conducted by Soojeong Myeong, Paul Hopkins, and Robert Brock of SUNY College of Environmental Science and Forestry (SUNY-ESF). The image elements were divided into five cover classes: tree/shrub, grass, bare soil, water, and impervious surfaces (Figs. 3-4). Methods of analysis included using a Normalized Difference Vegetation Index (NDVI) band ratio to help distinguish vegetation, and a 3x3 majority filter to reduce the number of small image clumps and improve the accuracy of the analysis.[5] Overall accuracy was 81.75 percent with 81.3 percent accuracy for tree and shrub cover. Researchers with SUNY-ESF and the USDA Forest Service are using stereo-image analysis to help improve the accuracy rate.

Cover information was input into a geographic information system (GIS) to analyze differences in tree cover among land-use types and Tomorrow's Neighborhoods Today (TNT) area boundaries (see Chapter 7). There are eight TNT areas in Syracuse: 1) Downtown, 2) Westside, 3) Southside, 4) Valley, 5) Eastside, 6) Eastwood, 7) Northside, and 8) Lakefront.

Tree cover in Syracuse averages 26.6 percent, with the highest tree cover in TNT 4 – Valley (46.6 percent) and the lowest in TNT 1 – Downtown (4.5 percent) (Fig. 5 and Table 1). The land use with the highest percent tree

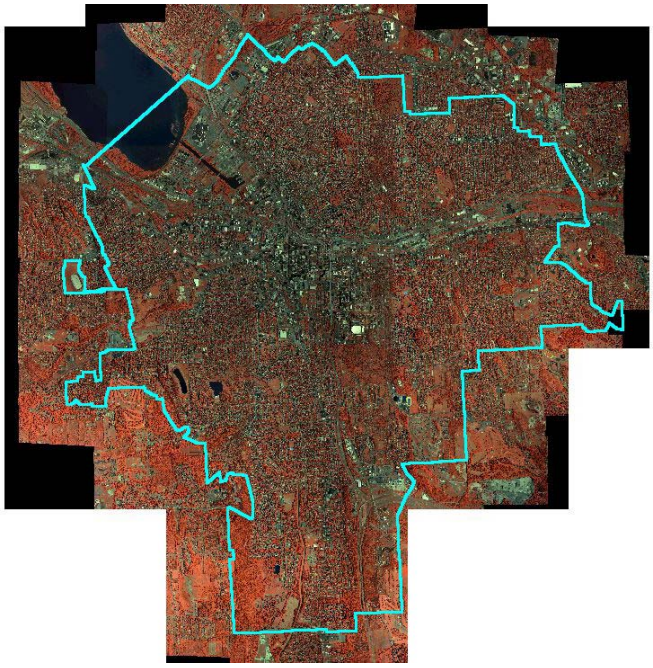

Figure 2.–Color-infrared digital image of Syracuse, New York (July 1999).

Fig. 3—Area southwest of downtown Syracuse (tree cover = 8 percent).

[4]The use of trade, firm, or corporation names in this report is for the information and convenience of the reader. Such does not constitute an official endorsement or approval by the U.S. Department of Agriculture or Forest Service of any product or service to the exclusion of others that may be suitable.

[5]For additional information on methods, see Myeong, S.; Hopkins, P., Brock, R. 2000. Urban cover classification using digital, high-resolution aerial imagery, State University of New York, College of Environmental Science and Forestry. On file at USDA Forest Service, Northeastern Research Station, Syracuse, NY.

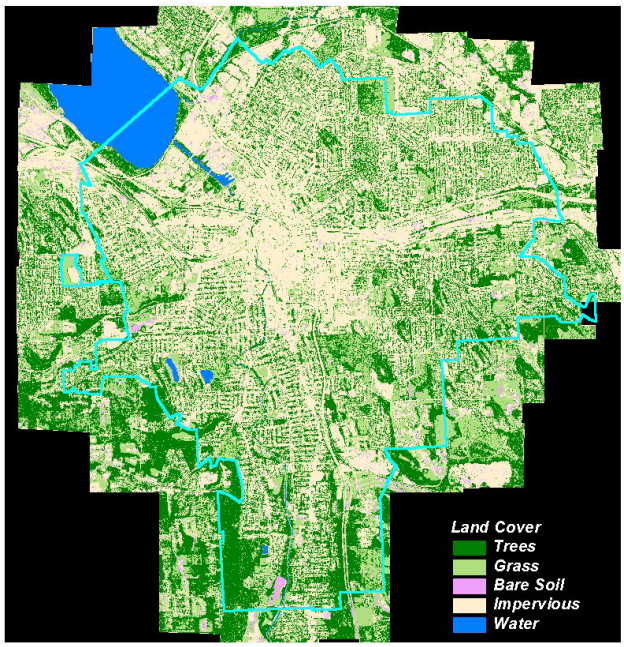

Fig. 4–Land-cover classification of Syracuse (produced by the Mapping Sciences Laboratory at SUNY-ESF).

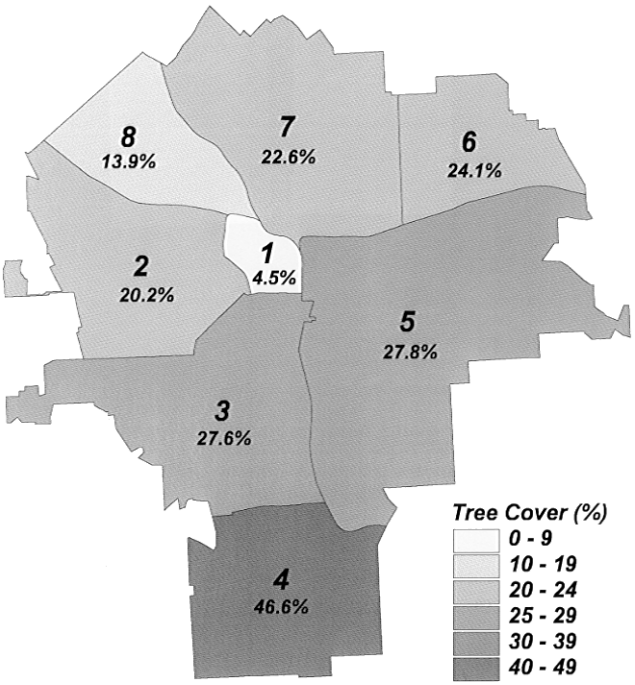

Figure 5. – Percent tree cover in Syracuse by TNT area.

cover is vacant (47.9 percent); tree cover is lowest on commercial/industrial land (12.9 percent) (Table 2).

The smallest proportion of residential land (single and multifamily residences) is in TNT areas 8—Lakefront (0.75 percent) and 1—Downtown (4.2 percent). The other TNT areas have a relatively large proportion of land in residential use: 6—Eastwood (53 percent), 3—Southside (47 percent), 7—Northside (44 percent), 4—Valley (38 percent), 5—Eastside (37 percent), 2—Westside (29). To supplement this cover data set, ground-based field data were collected throughout Syracuse to gather information on forest characteristics and conditions that are difficult to determine from the air (e.g., tree species, diameter, health).

Table 1.—Percent cover in Syracuse by TNT area based on aerial imagery[a]

TNT	Trees[b]	Grass	Nonvegetation[c]	Water	Portion of city
1	4.5	5.0	90.4	0.0	1.9
2	20.2	20.8	59.0	0.0	12.5
3	27.6	22.7	48.5	1.2	15.9
4	46.6	24.8	28.1	0.6	12.4
5[d]	27.8	26.2	45.5	0.0	26.2
6	24.1	21.0	54.9	0.0	7.6
7	22.6	17.5	59.8	0.1	16.2
8	13.9	12.3	45.7	28.1	7.3
City total	26.6	21.6	49.4	2.3	100.0

[a]Low ground-cover variables (grass, nonvegetation, water) can be obscured by overlying tree cover when aerial cover data are used. These cover variables sum to 100 percent on the ground with overlying trees adding an additional 26.6 percent.
[b]Tree and shrub cover.
[c]Mostly impervious surface, but includes a small amount of bare soil.
[d]An additional 0.5 percent of TNT 5 (mostly institutional land use) was outside the tree-cover map boundary (unclassified).

Table 2.—Percent cover in Syracuse by land-use type

Land use	Trees	Grass	Nonvegetation[a]	Water	Portion of city
Commercial/industrial	12.9	11.4	75.6	0.1	12.3
Park and greenspace[b]	40.0	45.5	13.1	1.3	8.6
Institutional[c]	18.0	25.4	54.7	0.0	6.0
Residential[d]	32.7	20.3	47.0	0.0	31.5
Multifamily residential[e]	21.9	24.5	53.5	0.0	5.2
Street ROW[f]	18.1	17.9	64.0	0.1	22.1
Transportation/utility[g]	24.4	24.3	42.8	8.5	2.5
Vacant	47.9	24.9	19.2	8.0	8.2
Unknown[h]	14.0	11.9	38.2	35.9	3.6
City total	26.6	21.6	49.4	2.3	100.0

[a]Mostly impervious surface, but includes a small amount of bare soil.
[b]Parks, cemeteries, golf courses, forests, conservation areas, marinas, etc.
[c]Educational, religious, and government facilities. An additional 2 percent of institutional land in TNT 5 was outside the tree cover-map boundary (unclassified).
[d]1 to 3 family residences and mobile homes.
[e]Apartments.
[f]Road areas not assigned a land-use class (e.g., streets).
[g]Power-generation and communication facilities, bus terminals, taxi garages, railroads, etc.
[h]Nonroad areas not assigned a land-use type on the land-use map.

Chapter 3: Syracuse's Urban Forest Resource

David J. Nowak, Daniel E. Crane, and Jack C. Stevens

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Tree cover is an important variable but it provides only a portion of the picture of the urban forest resource in Syracuse. To obtain additional information on the composition and health of this resource, field data were collected on trees[6] on 212 randomly located 1/10-acre plots throughout the city in the summer of 1999. These data were input into the Urban Forests Effects (UFORE) model[7] to quantify attributes of urban forest structure (e.g., number of trees, species composition) and function (e.g., air pollution removal).

The field data showed there are an estimated 890,000 trees in Syracuse on both public and private property (Table 3). The most common species are sugar maple (*Acer saccharum*), arborvitae (*Thuja occidentalis*), European buckthorn (*Rhamnus cathartica*), boxelder (*Acer negundo*), and Norway maple (*Acer platanoides*).

[6]Species typically considered as trees in the literature with a minimum diameter at breast height (d.b.h.) of 1 inch, single-stemmed shrub species with a minimum d.b.h. of 1 inch, or multistemmed shrub species with at least one stem greater than 5 inches dbh or two stems greater than 3 inches in d.b.h.

[7]For additional information on the UFORE model and field-data and results in Syracuse, see Nowak, D.J.; Crane, D.E. 2000. The Urban Forest Effects (UFORE) Model: quantifying urban forest structure and functions. In: Hansen, M.; Burk, T. Integrated tools for natural resources inventories in the 21st century. Gen. Tech. Rep. NC-212. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station: 714-720.

Table 3.—Estimated composition of tree species in Syracuse[a]

Species	Number of trees	SE[b]	Percent of street trees
Sugar maple[c]	126,700	46,100	14.2
Arborvitae	87,700	32,000	9.8
European buckthorn	60,500	29,700	6.8
Boxelder	56,300	16,100	6.3
Norway maple[c]	54,600	11,600	6.1
Black cherry	50,900	15,600	5.7
Eastern hophornbeam	47,200	25,800	5.3
Norway spruce	45,400	21,900	5.1
Staghorn sumac	43,300	30,900	4.9
Shagbark hickory	30,300	19,700	3.4
Eastern hemlock	21,100	11,700	2.4
Pignut hickory	18,100	11,500	2.0
Eastern cottonwood	17,500	8,700	2.0
Blue spruce	16,900	6,200	1.9
Tree of heaven	12,200	5,800	1.4
Butternut	11,400	5,800	1.3
Gray dogwood	11,100	11,100	1.3
Honeylocust	10,200	3,900	1.1
Austrian pine	9,900	6,100	1.1
Silver maple	9,800	3,200	1.1
Black locust	9,700	6,100	1.1
Cherry	9,400	4,600	1.1
Black walnut	7,800	3,300	0.9
Eastern white pine	7,600	5,100	0.9
Apple	6,400	2,400	0.7

Continued

Table 3.—Continued

Species	Number of trees	SE[b]	Percent of street trees
Slippery elm	6,200	5,700	0.7
Red mulberry	6,200	2,600	0.7
Crabapple	5,800	2,000	0.6
Hawthorn	5,600	4,300	0.6
Red maple	5,400	2,500	0.6
Northern red oak	5,300	2,900	0.6
Kwanzan cherry	5,300	4,400	0.6
White oak	4,400	2,400	0.5
Pine	4,300	4,300	0.5
American elm	4,200	2,000	0.5
Willow	3,900	2,700	0.4
American basswood	3,400	2,400	0.4
Green ash	3,400	1,700	0.4
White spruce	3,000	1,500	0.3
Littleleaf linden	3,000	1,800	0.3
White ash	2,800	2,200	0.3
Hickory	2,800	2,800	0.3
Northern catalpa	2,800	1,900	0.3
Eastern redcedar	2,600	2,600	0.3
Common chokecherry	2,600	2,600	0.3
Saucer magnolia	2,100	1,200	0.2
Amur maple	2,000	2,000	0.2
Scotch pine	2,000	1,200	0.2
Common pear	2,000	1,500	0.2
Black willow	1,700	1,700	0.2
London planetree	1,500	1,100	0.2
Horsechestnut	1,400	1,000	0.2
Elm	1,400	1,000	0.2
Gray birch	1,100	800	0.1
European hornbeam	1,000	1,000	0.1
White willow	1,000	1,000	0.1
Ponderosa pine	900	900	0.1
American bladdernut	900	900	0.1
Japanese maple	700	700	0.1
River birch	700	700	0.1
Kousa dogwood	700	700	0.1
Moraine ash	700	700	0.1
Honeysuckle	700	700	0.1
American plum	700	700	0.1
Douglas-fir	700	700	0.1
Maple	400	400	0.1
Magnolia	400	400	0.1
Black oak	400	400	0.1
Smooth sumac	400	400	0.1
Total	890,700	125,000	100.0

[a]Uncertainty of estimate increases at species level compared to total population estimate. Exact ordering of species in terms of rank order may be different as many species estimates are not significantly different from estimates of other species that are relatively close in ranking.
[b]SE – standard error.
[c]Differences between small sugar and Norway maple trees were difficult to discern partly because of a dry summer, which can inhibit sap flow in leaves that aids in species identification. Field samples are being remeasured to update the database and improve species estimates.

Land Use and Tree Sizes

Most trees are on residential land, greenspace (e.g., parks, cemeteries, golf courses, forests, conservation areas, marinas), and vacant land; the latter has the greatest density (number of trees/hectare) (Figs. 6 - 7).

Most of the trees are less than 6 inches in diameter at 4.5 feet; 36.6 percent of the trees are 1 to 3 inches, and 23.4 percent are 3.1 to 6 inches (Fig. 8). Residential lands have a relatively small proportion of trees less than 3 inches in diameter (23.9 percent) (Table 4).

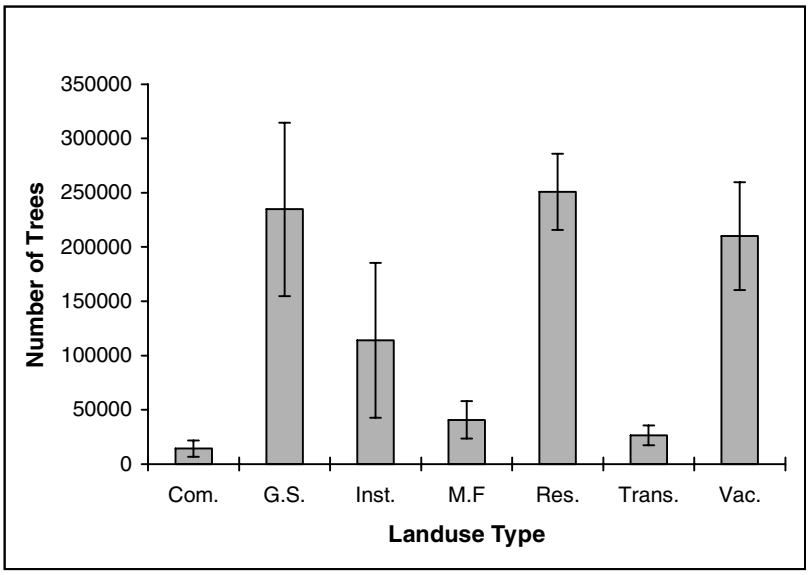

Figure 6.—Tree distribution by land-use type (Com. = commercial/industrial; G.S. = parks and greenspace; Inst. = institutional; M.F. = multifamily residential; Res. = residential; Trans. = transportation/utility; Vac. = vacant).

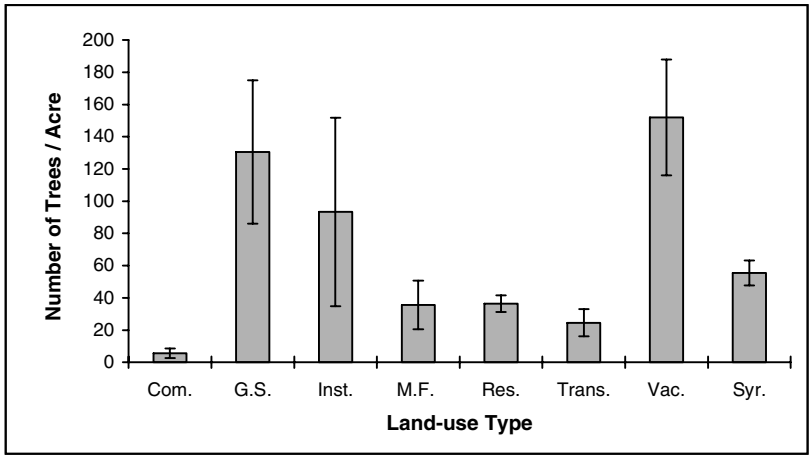

Figure 7.—Tree density by land-use type (Com. = commercial/industrial; G.S. = parks and greenspace; Inst. = institutional; M.F. = multifamily residential; Res. = residential; Trans. = transportation/utility; Vac. = vacant; Syr. = Syracuse).

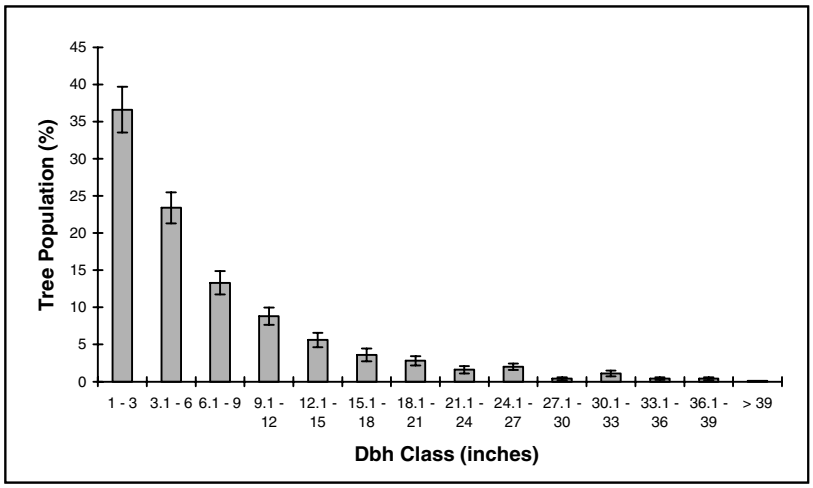

Figure 8.—Distribution of tree diameter in Syracuse.

Table 4.—Percent of tree population in Syracuse by diameter class within land-use classes

	D.b.h. class													
Land use	1-3	3.1-6	6.1-9	9.1-12	12.1-15	15.1-18	18.1-21	21.1-24	24.1-27	27.1-30	30.1-33	33.1-36	36.1-39	> 39
Comm./industrial	0.0	20.0	0.0	40.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0
Greenspace	54.4	13.9	10.9	5.5	6.2	3.6	1.8	1.5	0.4	0.7	0.4	0.0	0.7	0.0
Institutional	26.8	33.0	20.5	9.8	0.9	3.6	1.8	0.0	2.7	0.0	0.0	0.0	0.0	0.9
Multifamily res.	42.1	28.1	15.8	3.5	3.5	1.8	1.8	0.0	3.5	0.0	0.0	0.0	0.0	0.0
Residential	23.9	23.6	11.3	12.1	8.0	4.1	5.5	3.3	4.4	0.3	2.2	1.1	0.3	0.0
Trans./utility	33.3	18.5	25.9	11.1	0.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vacant	38.9	28.7	13.4	6.6	4.7	2.8	1.9	1.1	0.6	0.4	0.2	0.4	0.4	0.0
Total	36.6	23.4	13.3	8.8	5.6	3.6	2.8	1.6	2.0	0.4	1.1	0.4	0.4	0.1

Table 5.—Distribution of tree condition in Syracuse within land-use classes (in percent)

	Condition class[a]						
Land use	Excellent	Good	Fair	Poor	Critical	Dying	Dead
Commercial/Industrial	0.0	80.0	20.0	0.0	0.0	0.0	0.0
Greenspace	1.5	79.6	4.4	2.6	1.8	0.7	9.5
Institutional	1.8	55.4	8.0	4.5	0.9	1.8	27.7
Multifamily residential	7.0	64.9	8.8	10.5	3.5	3.5	1.8
Residential	11.3	69.8	10.2	4.9	1.1	1.1	1.6
Transportation/utility	0.0	85.2	0.0	3.7	0.0	7.4	3.7
Vacant	3.0	81.1	4.2	4.2	1.3	0.0	6.2
Total	4.8	73.6	6.8	4.2	1.4	1.1	8.1

[a]Excellent = < 1 percent dieback; Good = 1 to 10 percent; Fair = 11 to 25 percent; Poor = 26 to 50 percent; Critical = 51 to 75 percent; Dying = 76 to 99 percent; Dead = 100 percent.

Tree Crown Condition by Land-Use Type

Nearly 74 percent of the trees in Syracuse are rated as good (1-10 percent crown dieback); 9.2 percent of the tree population is rated as dead or dying (76-100 percent crown dieback) (Table 5).

Carbon and Pollution Uptake

Total estimated carbon storage by trees in Syracuse is 163,500 tons with an annual carbon uptake of 3,870 tons (Table 6). As carbon dioxide is an important greenhouse gas that contributes to global climate change, the estimated value of the urban forest's carbon effect is $3 million for storage and $71,500/yr for uptake.[8]

Trees also remove air pollutants by absorbing gases in and capturing particles on leaves. Trees and shrubs in Syracuse remove an estimated 169 tons of air pollution per year at an estimated annual value of $850,000 (Table 7).

Individual trees greater than 33 inches in diameter remove about 50 times more air pollution than trees less than 3 inches. Large trees also store about 1,000 times more carbon and annually remove about 70 times more carbon than small trees (Table 8).

[8]Based on estimated social cost of carbon dioxide emissions of $20.3/metric ton. From Faunkhauser, S. 1994. The social costs of greenhouse gas emissions: an expected value approach. Energy Journal. 15(2): 157-184.

Table 6.—Estimated carbon storage (tons) and annual uptake (tons/yr) by trees in Syracuse

Land use	Storage	Gross uptake	Net uptake[a]
Residential	65,110	2,520	2,010
Greenspace	36,840	900	540
Vacant	30,580	780	520
Institutional	17,720	410	310
Commercial/industrial	6,590	240	210
Multifamily residential	4,250	200	150
Transportation/utility	2,430	160	130
Total	163,510	5,200	3,870

[a]Gross uptake minus estimated amount of carbon lost to due tree death and consequent decomposition.

Table 7.—Estimated tons of pollution (dry deposition) removed by trees and shrubs in Syracuse during nonprecipitation periods in 1994 and associated monetary value (thousands of dollars); numbers in parentheses represent expected range of values (no range determined for carbon monoxide). Monetary value of pollution removal by trees estimated using median externality values for United States for each pollutant[a]

Pollutant	Removal	Value
Ozone[b]	82.1 (22-104)	503.1 (132-633)
Particulate matter < 10 microns[c]	49.4 (20-77)	202.2 (79-316)
Nitrogen dioxide	20.2 (10-25)	123.5 (59-153)
Sulfur dioxide	11.9 (6-18)	17.8 (8-27)
Carbon monoxide	5.6	4.9
Total	169.3 (63-229)	851.5 (281-1,133)

[a]Externality values are: NO_2 = $6,125 per ton, PM10 = $4,090 per ton, SO_2 = $1,500 per ton, CO = $870 per ton (Murray, F.J.; Marsh, L.; Bradford, P.A. 1994. New York State energy plan, vol. II: issue reports. Albany: New York State Energy Office). Externality values for ozone were set to equal the value for nitrogen dioxide.
[b]Average national ozone trend data were used to estimate missing data for January and February.
[c]Assumes 50 percent resuspension of particles.

Table 8.—Average carbon storage (lb) and annual uptake (lb/yr) for individual trees in Syracuse by diameter class

Diameter class (inches)	Carbon storage	Carbon uptake
1 – 3.0	7	1.3
3.1 – 6.0	45	4.4
6.1 – 9.0	156	9.2
9.1 – 12.0	327	17.0
12.1 – 15.0	607	21.3
15.1 – 18.0	1,024	30.5
18.1 – 21.0	1,365	41.1
21.1 – 24.0	1,714	41.0[a]
24.1 – 27.0	2,560	61.6
27.1 – 30.0	3,315	58.8[a]
30.1 – 33.0	4,265	99.3
> 33.0	6,641	95.2[a]

[a]Reduction in uptake rate is due to relatively poor tree condition ratings in this diameter class.

Chapter 4: Syracuse's Street Tree Resource

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Street trees in Syracuse traverse the entire city. In 2000, a complete inventory of this important public resource revealed that there are 34,165 street trees, the most common of which are Norway maple, honeylocust, and silver maple (Table 9). In 1978, Syracuse had 39,030 street trees.[9] Species that have increased since 1978 include honeylocust, crabapple, littleleaf linden, green ash, and arborvitae (Table 9). Street-tree composition by d.b.h. class and the top 10 species in each TNT area and landuse type are included in the Appendix.

More than 70 percent of the street trees in Syracuse are in residential areas, with most trees in TNT 5-Eastside (29.7 percent), TNT 7-Northside (20.2), and TNT 3-Southside (16.0). However, because each land use (Table 10) and TNT zone (Table 11) occupy a different amount of land area, a better measure of comparing the street-tree resource is stocking levels, i.e., the number of trees per mile of curb or roadside. Full stocking of street trees is commonly considered to be one tree every 50 feet (106 trees/mile), though few cities attain that stocking level. By considering a 50-foot spacing as full or 100-percent stocking, stocking levels can be calculated.[10] The higher the percent stocking, the greater the density of street trees.

[9]Richards, N.A.; Stevens, J.C. 1979. Streetside space and street trees in Syracuse—1978. Suracuse, NY: State University of New York, College of Environmental Science and Forestry.

Street-Tree Conditions

Most of the street trees in Syracuse were rated as fair (42.3 percent) or good (39.4) based on the Guide for Plant Appraisal[11] that includes assessments of tree roots, trunk, scaffold branches, smaller branches and twigs, and foliage. Less than 20 percent of the tree population was rated as poor (17.6 percent) or dead (0.7).

Land uses with more than 20 percent of the street-tree population rated as poor or dead were transportation/utility (32.7 percent), vacant (24.7), and greenspace (23.2). Because these land uses likely are dominated by natural areas with a forest-like structure, trees often must compete more intensely for light and nutrients than those in other land-use categories. In addition, poor and dead trees remain standing longer in these land uses because they are farther removed from pedestrian and vehicular traffic. Street-tree condition by land-use type and TNT is included in the Appendix.

[10]Percent street-tree stocking is calculated as: FSD/(CD/T) x 100, where FSD = full stocking distance (50 ft); CD = curb or roadside distance (ft); T = number of street trees.

[11]Council of Tree and Landscape Appraisers. 1992. Guide for plant appraisal. Savoy, IL: International Society of Arboriculture. 103 p.

Table 9.—Top 10 street trees in Syracuse in 2000 and 1978

Species	2000 inventory		Species	1978 inventory	
	Number of trees	Percent of population		Number of trees	Percent of population
Norway maple	8,316	24.3	Norway maple	12,194	31.2
Honeylocust	3,181	9.3	Silver maple	6,274	16.1
Silver maple	3,056	8.9	Sugar maple	3,070	7.9
Crabapple	2,078	6.1	Honeylocust	2,000	5.1
Littleleaf linden	1,844	5.4	Apples	1,919	4.9
Sugar maple	1,833	5.4	Littleleaf linden	1,164	3.0
Green ash	1,716	5.0	London planetree	1,107	2.8
Arborvitae	856	2.5	Spruce	983	2.5
Red maple	723	2.1	Green ash	964	2.5
London planetree	717	2.1	Red maple	880	2.3

Street-tree maintenance needs were estimated by the inventory crews.[12] Trees were divided into two removal and four pruning categories:

1. Remove - immediate = Trees with defects that cannot be treated cost-effectively or practically. Includes trees that are potential safety hazards and that pose liability to persons or property.

2. Remove - scheduled = Trees that should be removed but that pose minimal liability to persons or property.

3. Prune - immediate = Trees that require trimming to remove hazardous deadwood, broken branches, or dying or diseased limbs larger than 4 inches in diameter.

4. Prune - high priority = Trees with dead, dying, diseased or weakened branches (2 ot 4 inches in diameter) and are potential safety hazards.

5. Prune - training = Trees that require horticultural pruning to correct structural problems or growth patterns that eventually will obstruct traffic or interfere with utility wires or buildings.

6. Prune - routine = Trees that must be pruned to correct or eliminate weak, interfering, or objectionable branches to minimize future maintenance requirements.

The inventory revealed that most trees (79.8 percent) are rated as needing routine pruning or pruning to train tree shape:

Remove - immediate = 0.6 percent; Remove - scheduled = 5.9; Prune - immediate = 5.3; Prune - high priority = 8.5; Prune - training = 28.2; Prune - routine = 51.6.

[12]All trees were rated as needing some type of maintenance, i.e., there was no category for no maintenance required.

Table 10.—Distribution and stocking of street trees in Syracuse by land-use type

Land use	Number of trees	Percent of population	Percent stocking
Residential	24,107	70.6	58
Commercial/industrial	2,886	8.4	23
Multifamily residential	1,995	5.8	41
Greenspace	1,688	4.9	57
Institutional	1,462	4.3	37
Vacant	1,068	3.1	22
Street right-of-way[a]	566	1.7	na
Unknown[b]	289	0.8	23
Transportation/utility	104	0.3	13
Total	34,165	100.0	47

[a]Trees farther than 500 feet from any land use classified on GIS map. Most of these trees are on medians.
[b]Adjacent to land uses that have not been defined on GIS land use-map.

Table 11.—Distribution and stocking of street trees in Syracuse by TNT area[a]

TNT	Number of trees	Percent of city	Percent of population	Percent stocking	Percent residential stocking[a]
1	1,353	1.9	4.0	62	NA
2	3,255	12.5	9.5	32	39
3	5,466	15.9	16.0	39	47
4	2,858	12.4	8.4	55	63
5	10,160	26.2	29.7	56	79
6	3,801	7.6	11.1	57	61
7	6,913	16.2	20.2	47	54
8	359	7.3	1.1	16	10
Total	34,165	100	100	47	58

[a]Percent stocking in residential land uses within TNT area.

Chapter 5: Public Survey of Residents

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To assist in developing an urban forest master plan for Syracuse, a survey was conducted to determine the attitudes of city residents toward the vegetation in their neighborhood. The survey included questions designed to determine the relative importance or unimportance of tree characteristics to residents, assess the effect of the 1998 Labor Day Storm on their trees, and obtain general demographic information. The survey sample was drawn from a list of the city's 66,329 registered voters. Of a random sample of 450 residents who received the survey, 223 responses were received. There are relatively few residents in TNT 1-Downtown and 8-Lakefront, so results for these TNT areas are not reported.[13]

Characteristics of City Trees

Respondents were asked to read a list of tree characteristics and effects and rate the importance of these properties. All characteristics were rated as important (i.e., mean score less than 3.0), though some clearly were more important than others. Respondents rated the ability of urban trees to "make air cleaner" as their most important beneficial characteristic. Eleven other characteristics were rated as important, i.e., all TNT scores between 1.0 and 2.0; city average ≤ 1.8. These benefits can be grouped into ones that:

- Help keep the environment clean:
  Control soil erosion (rated No. 4)
  Reduce global warming (No. 5)
  Provide cleaner water (No. 5)

- Provide clear economic benefits:
  Strong branching to minimize storm damage (No. 3)
  Reduce energy bills for heating and cooling (No. 7)
  Add value to the property (No. 9)

- Provide personal comfort:
  Provide cool shade in the summer (No. 2)
  Soften harsh glare from the sun (No. 12)

- Have special social significance:
  Make your house look more special (No. 7)
  Provide a feeling of privacy (No. 10)
  Improve sense of neighborhood community (No. 11).

Characteristics that are of lesser importance generally were related to providing personal amenities such as reduced noise and fall leaf color (Table 12).

Respondents also evaluated undesirable tree characteristics as they were asked how important it would be to have trees that did not have these characteristics. In general, the importance ratings for these characteristics are substantially lower than those for desirable tree traits. Characteristics with important drawbacks were related to:

- Potential of trees to do damage:
  Breaking up the sidewalk (No. 1)
  Tree falling over (No. 3)
  Falling limbs (No. 4)
  Damage to telephone, cable TV, and electrical wires to the house (No. 5);

- Having trees of the same type, i.e., increasing the possibility of total tree loss to disease (No. 2).

Respondents placed lesser importance on the possibility that trees may provide a place for criminals to hide (No.6), and placed relatively little importance on:

- Planting nonnative trees that are not suited to Syracuse (No. 7);

- Simple nuisances:
  Tree litter clogging roof gutters (No. 8),
  Children getting hurt falling out of trees (No. 9)
  Leaves and twigs creating a mess in the yard (No. 10)
  Dense shade keeping grass from growing (No. 11)
  Attracting undesirable wildlife (No. 12)
  Creating a mess on parked cars (No. 13).

The two least important undesirable characteristics also could be interpreted as benefits. Trees may block outside floodlights that provide safety (No. 14), but also can keep one awake at night; and while trees may create conditions that are too moist (No. 15), they also keep the soil from drying out so fast (Table 13).

1998 Labor Day Storm

On Labor Day, September 7, 1998, the Syracuse area was struck by a storm with 150-mph winds that damaged thousands of trees and many buildings. All but one of the respondents remembered this devastating storm and most experienced some damage: 47 percent experienced

[13]For additional information on survey methods and results, see Palmer, J.F. 2000. How the public values street trees: a study for ReLeaf Syracuse. Report on file at USDA Forest Service, Northeastern Research Station, Syracuse, NY.

Table 12.—Public response, by TNT, to "how important is it to have trees with the following characteristics in your neighborhood?"

Benefit	TNT						$\bar{x}$
	2	3	4	5	6	7	
1. Makes the air cleaner	1.2	1.3	1.5	1.3	1.8	1.4	1.41
2. Provides cool shade and breezes in the summer	1.4	1.4	1.6	1.7	1.8	1.7	1.61
3. Strong branching that minimizes storm damage	1.5	1.5	1.7	1.7	1.8	1.5	1.62
4. Controls soil erosion	1.2	1.4	1.7	1.7	1.9	1.6	1.63
5. Provides cleaner water	1.3	1.7	1.8	1.7	2.2	1.5	1.68
5. Reduces global warming	1.3	1.6	1.8	1.8	1.8	1.6	1.68
7. Makes your house look more special	1.4	1.6	1.7	1.7	1.8	1.8	1.71
7. Reduces energy bills for heating and cooling	1.3	1.7	1.5	1.9	2.0	1.7	1.71
9. Adds value to the property	1.6	1.4	1.6	1.9	1.9	1.7	1.72
10. Provides a feeling of privacy	1.6	1.6	1.9	1.6	1.9	1.8	1.73
11. Improves sense of neighborhood community	1.7	1.5	1.9	1.8	1.9	1.8	1.78
12. Softens harsh glare from the sun	1.6	1.7	1.8	2.0	1.9	1.8	1.80
13. Reduces noise	1.7	1.7	1.9	1.9	2.2	2.0	1.91
14. Provides colorful leaves in the fall	1.6	1.7	1.8	2.1	1.9	2.1	1.93
15. Attracts birds and wildlife	1.7	1.9	2.0	2.0	2.0	2.0	1.95
16. Screens undesirable views	2.2	1.8	1.9	1.8	2.0	2.2	1.98
16. Attractive flowers in the spring	1.6	2.0	2.3	1.8	2.1	2.1	1.98
18. Has less pollen to reduce allergies	2.1	1.9	2.2	2.1	2.4	1.7	2.04
18. Blocks cold winter winds	1.5	1.9	2.0	2.1	2.3	2.0	2.04
20. Creates pleasant smells	1.7	1.9	2.2	2.2	2.4	2.1	2.09
21. Creates a tree canopy over the street	1.8	2.5	2.6	2.3	2.3	2.6	2.40
21. Provides a place for children to play.	2.4	2.0	2.4	2.7	2.5	2.4	2.40
23. Block bright headlights/streetlights at night	2.1	2.2	2.5	2.5	2.7	2.6	2.52
24. Identifies your property's boundaries for others	1.9	2.6	2.2	2.8	2.8	2.5	2.55

Note: 1= very important; 2= somewhat important; 3= neither important nor unimportant; 4= somewhat unimportant; 5= very unimportant.

tree damage in the front yard, while 67 percent had damage in the side or back yard. Damage to trees was particularly severe in the TNT 2-Westside, 3-Southside and 5-Eastside. Thirty-five percent of the respondents suffered house or other property damage, usually from a falling tree. Thirty-eight percent are concerned that trees in their yard might cause serious damage in the next severe storm. Most respondents generally favored planting of street trees and 72 percent were willing to assist the city in maintaining newly planted street trees (Table 14).

Desire for More Street Trees

Respondents were asked whether there were too few, about the right number, or too many street trees on their block. There are four TNT in which residents believe there are too few street trees: 2-Westside, 3-Southside, 5-Eastside and 7-Northside. TNT 2, 3, and 5 suffered the most damage from the Labor Day storm. Residents of the remaining two neighborhoods-Eastwood and the Valley-generally are comfortable with the current number of street trees. There is no neighborhood with a significant number of people who believe there are too many street trees.

Table 13.—Public response, by TNT, to "how important is it to NOT HAVE trees around your house or your neighborhood with these characteristics?"

Characteristic	TNT						$\bar{x}$
	2	3	4	5	6	7	
1. Roots that breakup the sidewalk	1.8	2.1	2.0	2.0	1.7	1.8	1.92
2. Having all trees of the same type increases the chance they will all be wiped out by disease	1.7	1.8	2.1	2.1	2.1	1.9	1.93
3. Potential damage from a tree falling over	1.9	2.0	1.9	2.4	2.0	1.7	2.00
4. Potential damage from falling limbs	2.2	2.0	2.1	2.3	1.9	1.6	2.02
5. Potential damage to the phone, cable TV, and electricity wires to my house	1.9	2.2	1.8	2.2	2.2	1.9	2.07
6. Provides a place for criminals to hide	2.4	2.0	2.4	2.7	2.2	2.0	2.25
7. Nonnative trees are not suited to Syracuse	2.3	2.4	2.5	2.7	2.6	2.3	2.46
8. Tree litter clogs the roof gutters	2.4	2.5	2.7	2.7	2.9	2.2	2.53
9. Kids can get hurt falling out of trees	2.3	2.7	2.8	3.0	2.6	2.3	2.64
10. Leaves, seeds, and twigs create a mess in yard	2.8	2.9	2.6	3.0	2.6	2.3	2.68
11. Dense shade keeps the grass from growing	2.7	2.5	2.9	2.8	3.0	2.5	2.71
12. Attracts undesirable wildlife	3.1	2.7	2.6	2.9	2.8	2.4	2.72
13. Creates a mess on parked cars	2.6	2.6	2.6	3.0	2.9	2.6	2.74
14. Blocks outside floodlights	3.1	2.7	3.0	3.1	2.9	2.5	2.84
15. Creates too moist conditions	2.9	2.6	3.0	3.0	3.0	2.6	2.85

Note: 1= very important; 2= somewhat important; 3= neither important nor unimportant; 4= somewhat unimportant; and 5= very unimportant.

Table 14.—Percentage of respondents who reported on the effects of the Labor Day Storm by TNT

Item	TNT						$\bar{x}$
	2	3	4	5	6	7	
I remember this Labor Day storm	100	100	100	97.7	100	100	99.5
Trees in the front of my house were damaged	52.6	51.3	40.0	65.1	48.6	29.6	46.8
Trees on the side or in back of my house were damaged	94.4	84.6	52.0	86.0	56.8	45.5	67.4
My house or property was damaged	42.1	53.8	20.0	51.2	32.4	14.5	35.2
This damaged was from a falling tree	46.7	61.5	15.4	48.5	20.0	9.1	33.6
There are trees in my yard now that I fear may cause serious damage during another severe storm	21.1	38.5	48.0	44.2	44.4	32.1	38.4
If there is proper planting space, I would like the city to plant a tree in the public right-of-way in front of my house	52.6	67.6	60.9	70.0	59.5	57.4	62.1
I would assist with the maintenance of a city- owned tree planted in front of my house	66.7	78.4	76.2	75.6	62.2	70.4	71.8

Table 15.—Percentage of respondents who are satisfied with the number of street trees on their block

Item	TNT						$\bar{x}$
	2	3	4	5	6	7	
Too few	73.7	53.8	20.0	59.5	37.8	56.4	50.9
About the right number	26.3	46.2	80.0	38.1	59.5	40.0	47.2
Too many	0.0	0.0	0.0	2.4	2.7	3.6	1.8

Chapter 6: Expert Opinions on Best Trees for Syracuse

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Numerous local tree experts were asked to rate the suitability of more than 130 species for various site conditions in the central New York area. For each site and species, the expert was asked to rate the species as follows: 1 (strongly reject use), 2 (do not recommend except for certain situations), 3 (neither recommend nor reject), 4 (recommend except in certain situations), or 5 (generally recommend, i.e., wide use). If the expert cited a specific cultivar of a species, he or she was asked to note that cultivar. Seven site conditions were evaluated:

- Park and lawns
- Tree pits
- Streetside strip widths < 5 feet
- Streetside strip widths 5 to 12 feet
- Streetside strip widths > 12 feet
- Streetside with overhead wires
- Heavily used streetside strips

Experts were asked to rate only species and cultivars with which they had personal experience. Sixteen of the 27 questionnaires received were returned; 12 were in the proper format for analyses. Scores of the 12 respondents were averaged to produce the final rankings for a species (Table 16). Cultivars, if noted by reviewer, were included in the species ratings and are footnoted for each species. In rating *Amelanchier*, *Crataegus*, *Malus*, *Populus*, *Prunus*, and *Sorbus* genera, some reviewers listed specific species for their rating.[14]

Only species that received at least six expert evaluations for each site condition are reported. Other species may be suitable for the Syracuse area but there was insufficient experience with these species to warrant inclusion in Table 16. Species with an average score above 4 are listed as excellent, 3 to 3.99 as good, 2 to 2.99 as poor, and 1 to 1.99 as not recommended.

The most widely recommended species among all site conditions were Japanese tree lilac (*Syringa reticulata*), Callery pear (*Pyrus calleryana*), hawthorn (*Crataegus* spp.), hedge maple (*Acer campestre*), and flowering crabapple (*Malus* spp.). These species were listed as excellent or good for all site conditions. In addition, honeylocust (*Gleditsia triacanthos*) was listed as excellent or good for all site conditions except streetside strips < 5 feet and streetside strips with overhead wires. Because of space constraints for some sites (e.g., tree pits and overheard wires), small trees tended to be the most widely recommended. However, numerous large trees are recommended for locations with ample space. Two species that were not recommended for all site conditions were boxelder (*Acer negundo*) and ailanthus (*Ailanthus altissima*).

Trees recommended for streetside strips 5 to 12 feet were compared with the existing street tree inventory to determine the best candidates for further testing for use in Syracuse. Recommended trees that currently have less than 50 specimens along Syracuse streets include Japanese tree lilac, serviceberry (*Amelanchier* spp.), black tupelo (*Nyssa sylvatica*), Tartarian maple (*Acer tataricum*), Turkish hazelnut (*Corylus colurna*), Crimean linden (*Tilia* x *euchlora*), goldenrain tree (*Koelrueteria paniculata*), silver linden (*Tilia tomentosa*), Chinese elm (*Ulmus parvifolia*), sweetgum (*Liquidambar styraciflua*), Kentucky coffeetree (*Gymnocladus dioicus*), river birch (*Betula nigra*), Kousa dogwood (*Cornus kousa*), yellowwood (*Cladrastis kentukea*), eastern redbud (*Cercis canadensis*), and English oak (*Quercus robur*).

[14]The listing of cultivars and species at the bottom of Table 16 is for informational purposes and is not intended as a recommendation of any cultivar. Cultivars that may be suitable for Syracuse were not specifically noted by reviewers. The intent of this rating was for genera and species-level information, though cultivar selection is an important consideration in species performance.

Table 16.—Average expert ratings of trees for various site conditions: 1—strongly reject use, 2—do not recommend except for certain situations, 3—neither recommend nor reject, 4—recommend except in certain situations, or 5—generally recommend, i.e., wide use (Count = number of respondents rating species)

Rating	Scientific name	Common name	Score	Count
		Parks and Lawns		
Excellent	*Quercus velutina*	Black oak	5.00	6
	Tilia x *euchlora*	Crimean linden	5.00	6
	*Gingko biloba**	Ginkgo	4.91	11
	Quercus rubra	Northern red oak	4.91	11
	Koelreuteria paniculata	Goldenrain tree	4.89	9
	*Celtis occidentalis**	Northern hackberry	4.80	10
	Cladrastis kentukea	Yellowwood	4.78	9
	Quercus macrocarpa	Bur oak	4.78	9
	*Betula nigra**	River birch	4.75	12
	*Gleditsia triacanthos**	Honeylocust	4.75	12
	*Liquidambar styraciflua**	Sweetgum	4.75	12
	*Fagus sylvatica**	European beech	4.73	11
	*Tilia cordata**	Littleleaf linden	4.73	11
	Aesculus x *carnea**	Red horsechestnut	4.71	7
	Magnolia acuminata	Cucumber tree	4.71	7
	Cercidiphyllum japonicum	Katsura tree	4.70	10
	Gymnocladus dioicus	Kentucky coffeetree	4.70	10
	*Acer rubrum**	Red maple	4.67	12
	*Quercus robur**	English oak	4.67	9
	*Tilia tomentosa**	Silver linden	4.67	9
	Nyssa sylvatica	Black tupelo	4.65	10
	*Amelanchier spp.**	Serviceberry	4.64	11
	Liriodendron tulipifera	Tuliptree	4.64	11
	Quercus bicolor	Swamp white oak	4.64	11
	*Phellodendron amurense**	Amur corktree	4.63	8
	*Ulmus parvifolia**	Chinese elm	4.63	8
	*Sophora japonica**	Japanese pagodatree	4.59	11
	Quercus coccinea	Scarlet oak	4.58	6
	Carya ovata	Shagbark hickory	4.57	7
	Corylus colurna	Turkish hazelnut	4.57	7
	Abies concolor	White fir	4.55	11
	Cercis canadensis	Eastern redbud	4.55	11
	Ostrya virginiana	Eastern hophornbeam	4.55	11
	*Syringa reticulata**	Japanese tree lilac	4.54	12
	Picea abies	Norway spruce	4.50	11
	*Metasequoia glyptostroboides**	Dawn redwood	4.50	10
	Magnolia soulangiana	Saucer magnolia	4.50	6
	Sorbus spp.*	Mountain-ash	4.50	6
	Ulmus hybrids*	Elm hybrids	4.50	6
	*Carpinus betulus**	European hornbeam	4.45	11
	Larix decidua	European larch	4.44	10
	Carya cordiformis	Bitternut hickory	4.43	7
	Thuja occidentalis	Arborvitae	4.40	10
	*Zelkova serrata**	Japanese zelkova	4.40	10
	Picea omorika	Serbian spruce	4.38	8
	Crataegus spp.*	Hawthorn	4.35	10
	*Acer saccharum**	Sugar maple	4.33	12
	*Fraxinus pennsylvanica**	Green ash	4.33	12
	Castanea mollissima	Chinese chestnut	4.33	6

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	Pseudotsuga menziesii	Douglas-fir	4.30	11
	Quercus alba	White oak	4.30	10
	Prunus spp.*	Cherry	4.25	10
	*Acer ginnala**	Amur maple	4.22	10
	*Acer campestre**	Hedge maple	4.22	9
	Carpinus caroliniana	American hornbeam	4.22	9
	*Tilia americana**	American basswood	4.20	11
	*Fraxinus americana**	White ash	4.20	10
	Juglans nigra	Black walnut	4.20	10
	Picea glauca	White spruce	4.18	11
	*Pyrus calleryana**	Callery pear	4.18	11
	Malus spp.*	Flowering crabapple	4.10	10
	Quercus palustris	Pin oak	4.09	11
	Tsuga canadensis	Eastern hemlock	4.06	8
	Pinus nigra	Austrian pine	4.00	12
	Platanus x *acerifolia**	London planetree	4.00	10
	Taxodium distichum	Baldcypress	4.00	10
	Aesculus hippocastanum	Horsechestnut	4.00	9
Good	*Cornus kousa*	Kousa dogwood	3.95	11
	Pinus strobus	Eastern white pine	3.95	11
	Picea engelmannii	Engelmann spruce	3.92	6
	Catalpa speciosa	Northern catalpa	3.91	11
	Fagus grandifolia	American beech	3.89	9
	Picea pungens	Blue spruce	3.86	11
	Acer pseudoplatanus	Sycamore maple	3.67	9
	Sorbus aucuparia	European mountain-ash	3.63	8
	Juglans cinerea	Butternut	3.44	9
	Pinus sylvestris	Scotch pine	3.35	10
	Pinus ponderosa	Ponderosa pine	3.33	6
	Robinia pseudoacacia	Black locust	3.20	10
	Pinus resinosa	Red pine	3.15	10
	Betula papyrifera	Paper birch	3.10	10
	Platanus occidentalis	American sycamore	3.00	8
	Morus alba	White mulberry	3.00	6
Poor	*Acer saccharinum*	Silver maple	2.82	11
	Cornus florida	Flowering dogwood	2.79	12
	Salix nigra	Black willow	2.64	7
	*Ulmus americana**	American elm	2.50	6
	*Acer platanoides**	Norway maple	2.36	11
	Populus spp.*	Aspen	2.00	9
Not Recommended	*Ailanthus altissima*	Tree-of-heaven	1.63	8
	Acer negundo	Boxelder	1.18	11
		Tree Pits		
Good	*Syringa reticulata**	Japanese tree lilac	3.70	10
	Malus spp.*	Flowering crabapple	3.50	10
	*Acer campestre**	Hedge maple	3.33	9
	*Pyrus calleryana**	Callery pear	3.09	11
	*Gleditsia triacanthos**	Honeylocust	3.00	12
	Crataegus spp.*	Hawthorn	3.00	9
Poor	*Ostrya virginiana*	Eastern hophornbeam	2.88	8
	Amelanchier spp.*	Serviceberry	2.82	11

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	*Gingko biloba**	Ginkgo	2.73	11
	*Acer ginnala**	Amur maple	2.63	8
	Carpinus caroliniana	American hornbeam	2.63	8
	*Carpinus betulus**	European hornbeam	2.60	10
	Tilia x euchlora	Crimean linden	2.50	6
	*Fraxinus pennsylvanica**	Green ash	2.45	11
	*Sophora japonica**	Japanese pagodatree	2.45	10
	Cornus kousa	Kousa dogwood	2.38	8
	*Tilia cordata**	Littleleaf linden	2.36	11
	*Phellodendron amurense**	Amur corktree	2.29	7
	*Tilia tomentosa**	Silver linden	2.22	9
	*Zelkova serrata**	Japanese zelkova	2.18	11
	Koelreuteria paniculata	Goldenrain tree	2.14	7
	Prunus spp.*	Cherry	2.13	8
	Quercus palustris	Pin oak	2.09	11
	Aesculus hippocastanum	Horsechestnut	2.00	9
	Cercis canadensis	Eastern redbud	2.00	8
	Corylus colurna	Turkish hazelnut	2.00	6
Not Recommended	*Celtis occidentalis**	Northern hackberry	1.89	9
	Gymnocladus dioicus	Kentucky coffeetree	1.89	9
	Nyssa sylvatica	Black tupelo	1.88	8
	Cornus florida	Flowering dogwood	1.80	10
	*Platanus x acerifolia**	London planetree	1.78	9
	Sorbus aucuparia	European mountain-ash	1.78	9
	*Liquidambar styraciflua**	Sweetgum	1.73	11
	*Tilia americana**	American basswood	1.70	10
	Aesculus x *carnea**	Red horsechestnut	1.67	6
	*Quercus robur**	English oak	1.63	8
	Quercus bicolor	Swamp white oak	1.60	10
	*Betula nigra**	River birch	1.50	10
	Morus alba	White mulberry	1.50	6
	Quercus velutina	Black oak	1.50	6
	*Acer saccharum**	Sugar maple	1.45	11
	*Ulmus parvifolia**	Chinese elm	1.43	7
	Acer saccharinum	Silver maple	1.40	10
	*Fraxinus americana**	White ash	1.38	8
	Ailanthus altissima	Tree-of-heaven	1.30	10
	Liriodendron tulipifera	Tuliptree	1.30	10
	Quercus rubra	Northern red oak	1.30	10
	Acer pseudoplatanus	Sycamore maple	1.29	7
	Cercidiphyllum japonicum	Katsura tree	1.29	7
	Cladrastis kentukea	Yellowwood	1.29	7
	Juglans cinerea	Butternut	1.29	7
	Robinia pseudoacacia	Black locust	1.25	8
	*Acer platanoides**	Norway maple	1.22	9
	*Fagus sylvatica**	European beech	1.22	9
	*Acer rubrum**	Red maple	1.20	10
	Castanea mollissima	Chinese chestnut	1.17	6
	Quercus coccinea	Scarlet oak	1.17	6
	Carya cordiformis	Bitternut hickory	1.14	7
	Carya ovata	Shagbark hickory	1.14	7
	Magnolia acuminata	Cucumbertree	1.14	7

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	Platanus occidentalis	American sycamore	1.14	7
	Salix nigra	Black willow	1.14	7
	Quercus macrocarpa	Bur oak	1.13	8
	Betula papyrifera	Paper birch	1.11	9
	Catalpa speciosa	Northern catalpa	1.11	9
	Fagus grandifolia	American beech	1.11	9
	Populus spp.*	Aspen	1.11	9
	Quercus alba	White oak	1.11	9
	Acer negundo	Boxelder	1.00	10
	Juglans nigra	Black walnut	1.00	7
	Streetside Strips < 5 Feet			
Excellent	*Syringa reticulata**	Japanese tree lilac	4.10	10
Good	*Crataegus* spp.*	Hawthorn	3.70	10
	*Acer campestre**	Hedge maple	3.60	10
	Ostrya virginiana	Eastern hophornbeam	3.56	9
	Malus spp.*	Flowering crabapple	3.50	11
	*Amelanchier spp.**	Serviceberry	3.45	11
	*Pyrus calleryana**	Callery pear	3.45	10
	*Acer ginnala**	Amur maple	3.25	8
	Carpinus caroliniana	American hornbeam	3.00	8
	Sorbus spp.*	Mountain-ash	3.00	6
Poor	*Gleditsia triacanthos**	Honeylocust	2.91	11
	*Gingko biloba**	Ginkgo	2.90	10
	*Carpinus betulus**	European hornbeam	2.89	9
	Cornus kousa	Kousa dogwood	2.89	9
	Prunus spp.*	Cherry	2.69	9
	Tilia x *euchlora*	Crimean linden	2.67	6
	*Celtis occidentalis**	Northern hackberry	2.56	9
	*Tilia cordata**	Littleleaf linden	2.50	10
	*Fraxinus pennsylvanica**	Green ash	2.45	11
	*Sophora japonica**	Japanese pagodatree	2.40	10
	Cercis canadensis	Eastern redbud	2.33	9
	*Phellodendron amurense**	Amur corktree	2.29	7
	Aesculus hippocastanum	Horsechestnut	2.25	8
	Koelreuteria paniculata	Goldenrain tree	2.25	8
	Nyssa sylvatica	Black tupelo	2.25	8
	*Tilia tomentosa**	Silver linden	2.25	8
	*Zelkova serrata**	Japanese zelkova	2.20	10
	Gymnocladus dioicus	Kentucky coffeetree	2.00	9
	Cladrastis kentukea	Yellowwood	2.00	8
	Corylus colurna	Turkish hazelnut	2.00	6
	Magnolia x *soulangiana*	Saucer magnolia	2.00	6
Not Recommended	*Cornus florida*	Flowering dogwood	1.80	10
	*Liquidambar styraciflua**	Sweetgum	1.80	10
	Quercus palustris	Pin oak	1.80	10
	*Fraxinus americana**	White ash	1.78	9
	*Betula nigra**	River birch	1.70	10
	Platanus x *acerifolia**	London planetree	1.67	9
	Morus alba	White mulberry	1.67	6
	*Quercus robur**	English oak	1.63	8
	Quercus rubra	Northern red oak	1.60	10

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	*Tilia americana**	American basswood	1.60	10
	*Ulmus parvifolia**	Chinese elm	1.57	7
	Quercus bicolor	Swamp white oak	1.56	9
	Sorbus aucuparia	European mountain-ash	1.50	8
	*Acer saccharum**	Sugar maple	1.45	11
	Robinia pseudoacacia	Black locust	1.44	9
	Acer pseudoplatanus	Sycamore maple	1.43	7
	Castanea mollissima	Chinese chestnut	1.33	6
	*Acer platanoides**	Norway maple	1.30	10
	*Acer rubrum**	Red maple	1.30	10
	Juglans cinerea	Butternut	1.29	7
	Cercidiphyllum japonicum	Katsura tree	1.25	8
	Catalpa speciosa	Northern catalpa	1.22	9
	*Fagus sylvatica**	European beech	1.22	9
	Quercus coccinea	Scarlet oak	1.17	6
	Carya cordiformis	Bitternut hickory	1.14	7
	Carya ovata	Shagbark hickory	1.14	7
	Magnolia acuminata	Cucumbertree	1.14	7
	Platanus occidentalis	American sycamore	1.14	7
	Salix nigra	Black willow	1.14	7
	Quercus macrocarpa	Bur oak	1.13	8
	Betula papyrifera	Paper birch	1.11	9
	Fagus grandifolia	American beech	1.11	9
	Liriodendron tulipifera	Tuliptree	1.11	9
	Populus spp.*	Aspen	1.11	9
	Quercus alba	White oak	1.11	9
	Acer saccharinum	Silver maple	1.10	10
	Acer negundo	Boxelder	1.00	10
	Ailanthus altissima	Tree-of-heaven	1.00	9
	Juglans nigra	Black walnut	1.00	7
	Streetside Strips 5 to 12 Feet			
Excellent	*Syringa reticulata**	Japanese tree lilac	4.64	11
	*Gleditsia triacanthos**	Honeylocust	4.42	12
	*Acer campestre**	Hedge maple	4.40	10
	*Pyrus calleryana**	Callery pear	4.36	11
	*Celtis occidentalis**	Northern hackberry	4.33	9
	Ostrya virginiana	Eastern hophornbeam	4.33	9
	*Carpinus betulus**	European hornbeam	4.30	10
	*Gingko biloba**	Ginkgo	4.27	11
	Amelanchier spp.*	Serviceberry	4.18	11
	Sorbus spp.*	Mountain ash	4.17	6
	*Tilia cordata**	Littleleaf linden	4.00	11
	Nyssa sylvatica	Black tupelo	4.00	8
	Acer tataricum	Tatarian maple	4.00	6
Good	*Malus* spp.*	Flowering crabapple	3.90	10
	Corylus colurna	Turkish hazelnut	3.86	7
	Tilia x euchlora	Crimean linden	3.83	6
	*Sophora japonica**	Japanese pagodatree	3.82	11
	*Zelkova serrata**	Japanese zelkova	3.80	10
	Crataegus spp.*	Hawthorn	3.78	9
	Carpinus caroliniana	American hornbeam	3.50	8

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	Koelreuteria paniculata	Goldenrain tree	3.50	8
	*Tilia tomentosa**	Silver linden	3.50	8
	*Fraxinus pennsylvanica**	Green ash	3.45	11
	*Acer ginnala**	Amur maple	3.44	9
	*Ulmus parvifolia**	Chinese elm	3.43	7
	*Liquidambar styraciflua**	Sweetgum	3.40	10
	Gymnocladus dioicus	Kentucky coffeetree	3.38	8
	*Betula nigra**	River birch	3.30	10
	Cornus kousa	Kousa dogwood	3.30	10
	Cladrastis kentukea	Yellowwood	3.13	8
	Cercis canadensis	Eastern redbud	3.11	9
	*Acer rubrum**	Red maple	3.10	10
	Prunus spp.*	Cherry	3.06	9
	Platanus x *acerifolia**	London planetree	3.00	10
	*Fraxinus americana**	White ash	3.00	9
	*Quercus robur**	English oak	3.00	8
Poor	*Acer pseudoplatanus*	Sycamore maple	2.88	8
	*Phellodendron amurense**	Amur corktree	2.86	7
	Cercidiphyllum japonicum	Katsura tree	2.75	8
	Sorbus aucuparia	European mountain-ash	2.67	9
	Magnolia x *soulangiana*	Saucer magnolia	2.67	6
	Quercus rubra	Northern red oak	2.60	10
	Quercus bicolor	Swamp white oak	2.40	10
	Quercus palustris	Pin oak	2.30	10
	Aesculus hippocastanum	Horsechestnut	2.25	8
	Morus alba	White mulberry	2.17	6
	*Ulmus americana**	American elm	2.17	6
	Robinia pseudoacacia	Black locust	2.11	9
	*Tilia americana**	American basswood	2.10	10
	Cornus florida	Flowering dogwood	2.00	10
	Quercus macrocarpa	Bur oak	2.00	9
	Magnolia acuminata	Cucumbertree	2.00	7
Not Recommended	*Acer saccharinum*	Silver maple	1.90	10
	Castanea mollissima	Chinese chestnut	1.83	6
	Quercus coccinea	Scarlet oak	1.83	6
	*Acer saccharum**	Sugar maple	1.82	11
	*Acer platanoides**	Norway maple	1.80	10
	Liriodendron tulipifera	Tuliptree	1.67	9
	Carya cordiformis	Bitternut hickory	1.57	7
	Catalpa speciosa	Northern catalpa	1.56	9
	*Fagus sylvatica**	European beech	1.56	9
	Ailanthus altissima	Tree-of-heaven	1.50	10
	Quercus alba	White oak	1.44	9
	Juglans cinerea	Butternut	1.43	7
	Platanus occidentalis	American sycamore	1.43	7
	Juglans nigra	Black walnut	1.29	7
	Carya ovata	Shagbark hickory	1.14	7
	Salix nigra	Black willow	1.14	7
	Betula papyrifera	Paper birch	1.11	9
	Fagus grandifolia	American beech	1.11	9
	Populus spp.*	Aspen	1.11	9
	Acer negundo	Boxelder	1.00	10

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	Streetside Strips > 12 Feet			
Excellent	*Celtis occidentalis**	Northern hackberry	4.80	10
	*Gingko biloba**	Ginkgo	4.70	10
	*Syringa reticulata**	Japanese tree lilac	4.70	10
	*Gleditsia triacanthos**	Honeylocust	4.64	11
	*Acer campestre**	Hedge maple	4.60	10
	Ostrya virginiana	Eastern hophornbeam	4.60	10
	*Tilia tomentosa**	Silver linden	4.56	9
	Gymnocladus dioicus	Kentucky coffeetree	4.40	10
	*Phellodendron amurense**	Amur corktree	4.38	8
	*Quercus robur**	English oak	4.38	8
	*Pyrus calleryana**	Callery pear	4.35	10
	Crataegus spp.*	Hawthorn	4.33	9
	Sorbus spp.*	Mountain-ash	4.33	6
	*Ulmus hybrids**	Elm hybrids	4.33	6
	Amelanchier spp.*	Serviceberry	4.30	10
	*Tilia cordata**	Littleleaf linden	4.30	10
	*Carpinus betulus**	European hornbeam	4.27	11
	*Liquidambar styraciflua**	Sweetgum	4.25	12
	*Sophora japonica**	Japanese pagodatree	4.25	10
	Nyssa sylvatica	Black tupelo	4.25	8
	Malus spp.*	Flowering crabapple	4.18	11
	Quercus rubra	Northern red oak	4.18	11
	Corylus colurna	Turkish hazelnut	4.17	6
	Quercus velutina	Black oak	4.17	6
	Koelreuteria paniculata	Goldenrain tree	4.11	9
	*Zelkova serrata**	Japanese zelkova	4.09	11
	*Fraxinus pennsylvanica**	Green ash	4.00	12
	*Ulmus parvifolia**	Chinese elm	4.00	7
	Acer tataricum	Tatarian maple	4.00	6
Good	*Acer rubrum**	Red maple	3.91	11
	Carpinus caroliniana	American hornbeam	3.88	8
	Quercus bicolor	Swamp white oak	3.82	11
	*Tilia americana**	American basswood	3.82	11
	*Betula nigra**	River birch	3.80	10
	Acer pseudoplatanus	Sycamore maple	3.78	9
	Quercus macrocarpa	Bur oak	3.78	9
	*Acer ginnala**	Amur maple	3.75	8
	Cladrastis kentukea	Yellowwood	3.75	8
	Platanus x *acerifolia**	London planetree	3.70	10
	Quercus palustris	Pin oak	3.64	11
	Aesculus hippocastanum	Horsechestnut	3.63	8
	*Fraxinus americana**	White ash	3.60	10
	Prunus spp.*	Cherry	3.50	9
	Cercidiphyllum japonicum	Katsura tree	3.50	8
	Quercus coccinea	Scarlet oak	3.50	6
	Cercis canadensis	Eastern redbud	3.44	9
	Magnolia x *soulangiana*	Saucer magnolia	3.33	6
	Cornus kousa	Kousa dogwood	3.30	10
	Carya ovata	Shagbark hickory	3.29	7
	Catalpa speciosa	Northern catalpa	3.27	11

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	Carya cordiformis	Bitternut hickory	3.14	7
	Robinia pseudoacacia	Black locust	3.00	9
	Castanea mollissima	Chinese chestnut	3.00	6
Poor	*Liriodendron tulipifera*	Tuliptree	2.90	10
	Quercus alba	White oak	2.89	9
	Magnolia acuminata	Cucumbertree	2.86	7
	Acer saccharinum	Silver maple	2.75	12
	*Acer saccharum**	Sugar maple	2.64	11
	Juglans nigra	Black walnut	2.63	8
	Sorbus aucuparia	European mountain-ash	2.63	8
	*Acer platanoides**	Norway maple	2.60	10
	Platanus occidentalis	American sycamore	2.43	7
	*Fagus sylvatica**	European beech	2.40	10
	Morus alba	White mulberry	2.33	6
	*Ulmus americana**	American elm	2.33	6
	Betula papyrifera	Paper birch	2.22	9
	Cornus florida	Flowering dogwood	2.20	10
	Juglans cinerea	Butternut	2.00	7
Not Recommended	*Ailanthus altissima*	Tree-of-heaven	1.60	10
	Fagus grandifolia	American beech	1.56	9
	Salix nigra	Black willow	1.29	7
	Populus spp.*	Aspen	1.11	9
	Acer negundo	Boxelder	1.00	10
	Streetside Strips with Overhead Wires			
Excellent	*Syringa reticulata**	Japanese tree lilac	4.55	11
	Amelanchier spp.*	Serviceberry	4.42	12
	*Acer ginnala**	Amur maple	4.30	10
	Acer tataricum	Tatarian maple	4.17	6
	Crataegus spp.*	Hawthorn	4.00	10
	Carpinus caroliniana	American hornbeam	4.00	8
Good	*Malus* spp.*	Flowering crabapple	3.91	11
	*Acer campestre**	Hedge maple	3.90	10
	Acer griseum	Paperbark maple	3.83	6
	Cercis canadensis	Eastern redbud	3.78	9
	*Pyrus calleryana**	Callery pear	3.30	10
	Prunus spp.*	Cherry	3.17	9
	*Carpinus betulus**	European hornbeam	3.00	11
	Cornus kousa	Kousa dogwood	3.00	9
Poor	*Koelreuteria paniculata*	Goldenrain tree	2.89	9
	Ostrya virginiana	Eastern hophornbeam	2.89	9
	Magnolia x *soulangiana*	Saucer magnolia	2.83	6
	Sorbus aucuparia	European mountain-ash	2.44	9
	Castanea mollissima	Chinese chestnut	2.33	6
	Morus alba	White mulberry	2.17	6
	Cornus florida	Flowering dogwood	2.10	10
	*Betula nigra**	River birch	2.00	11
	*Gleditsia triacanthos**	Honeylocust	2.00	11
	Gymnocladus dioicus	Kentucky coffeetree	2.00	9
	Cladrastis kentukea	Yellowwood	2.00	7
	*Phellodendron amurense**	Amur corktree	2.00	7
	Aesculus x *carnea**	Red horsechestnut	2.00	6

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
Not Recommended	*Acer rubrum**	Red maple	1.64	11
	*Zelkova serrata**	Japanese zelkova	1.64	11
	Aesculus hippocastanum	Horsechestnut	1.56	9
	*Platanus x acerifolia**	London planetree	1.50	9
	Acer pseudoplatanus	Sycamore maple	1.50	8
	Nyssa sylvatica	Black tupelo	1.50	8
	*Acer saccharum**	Sugar maple	1.45	11
	*Fraxinus pennsylvanica**	Green ash	1.45	11
	Quercus palustris	Pin oak	1.45	11
	*Sophora japonica**	Japanese pagodatree	1.40	10
	Cercidiphyllum japonicum	Katsura tree	1.38	8
	*Celtis occidentalis**	Northern hackberry	1.33	9
	Robinia pseudoacacia	Black locust	1.33	9
	*Ulmus hybrids**	Elm hybrids	1.33	6
	Catalpa speciosa	Northern catalpa	1.30	10
	*Tilia cordata**	Littleleaf linden	1.30	10
	*Quercus robur**	English oak	1.29	7
	*Ulmus parvifolia**	Chinese elm	1.29	7
	*Liquidambar styraciflua**	Sweetgum	1.27	11
	*Tilia tomentosa**	Silver linden	1.25	8
	*Fraxinus americana**	White ash	1.22	9
	Ailanthus altissima	Tree-of-heaven	1.20	10
	Betula papyrifera	Paper birch	1.20	10
	*Fagus sylvatica**	European beech	1.20	10
	*Gingko biloba**	Ginkgo	1.20	10
	Quercus rubra	Northern red oak	1.20	10
	Quercus coccinea	Scarlet oak	1.17	6
	Quercus velutina	Black oak	1.17	6
	Carya cordiformis	Bitternut hickory	1.14	7
	Carya ovata	Shagbark hickory	1.14	7
	Juglans cinerea	Butternut	1.14	7
	Magnolia acuminata	Cucumbertree	1.14	7
	Platanus occidentalis	American sycamore	1.14	7
	Salix nigra	Black willow	1.14	7
	Juglans nigra	Black walnut	1.13	8
	Quercus macrocarpa	Bur oak	1.13	8
	Fagus grandifolia	American beech	1.11	9
	Populus spp.*	Aspen	1.11	9
	Quercus alba	White oak	1.11	9
	Liriodendron tulipifera	Tuliptree	1.10	10
	Quercus bicolor	Swamp white oak	1.10	10
	*Tilia americana**	American basswood	1.10	10
	*Acer platanoides**	Norway maple	1.09	11
	Acer saccharinum	Silver maple	1.09	11
	Acer negundo	Boxelder	1.00	11
	Heavily Used Streetside Strips			
Excellent	*Gleditsia triacanthos**	Honeylocust	4.36	11
	*Celtis occidentalis**	Northern hackberry	4.11	9
	*Gingko biloba**	Ginkgo	4.00	10
Good	*Syringa reticulata**	Japanese tree lilac	3.78	9
	Gymnocladus dioicus	Kentucky coffeetree	3.67	9

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	*Ulmus parvifolia**	Chinese elm	3.67	6
	Crataegus spp.*	Hawthorn	3.63	8
	Malus spp.*	Flowering crabapple	3.50	10
	Nyssa sylvatica	Black tupelo	3.43	7
	*Pyrus calleryana**	Callery pear	3.40	10
	*Carpinus betulus**	European hornbeam	3.38	8
	Sorbus spp.*	Mountain-ash	3.33	6
	Ulmus hybrids*	Elm hybrids	3.33	6
	*Acer campestre**	Hedge maple	3.25	8
	*Sophora japonica**	Japanese pagodatree	3.20	10
	*Zelkova serrata**	Japanese zelkova	3.20	10
	*Fraxinus pennsylvanica**	Green ash	3.14	11
	Platanus x *acerifolia**	London planetree	3.11	9
	*Liquidambar styraciflua**	Sweetgum	3.00	10
	Ostrya virginiana	Eastern hophornbeam	3.00	9
Poor	*Robinia pseudoacacia*	Black locust	2.75	8
	Carpinus caroliniana	American hornbeam	2.71	7
	Koelreuteria paniculata	Goldenrain tree	2.71	7
	*Quercus robur**	English oak	2.71	7
	Quercus rubra	Northern red oak	2.70	10
	*Tilia cordata**	Littleleaf linden	2.70	10
	Aesculus hippocastanum	Horsechestnut	2.63	8
	Prunus spp.*	Cherry	2.63	8
	*Acer ginnala**	Amur maple	2.57	7
	Acer pseudoplatanus	Sycamore maple	2.57	7
	*Phellodendron amurense**	Amur corktree	2.57	7
	*Betula nigra**	River birch	2.56	9
	Amelanchier spp.*	Serviceberry	2.55	11
	*Tilia tomentosa**	Silver linden	2.50	8
	Cladrastis kentukea	Yellowwood	2.50	6
	*Acer rubrum**	Red maple	2.36	11
	Catalpa speciosa	Northern catalpa	2.36	11
	Carya cordiformis	Bitternut hickory	2.33	6
	Quercus palustris	Pin oak	2.30	10
	*Tilia americana**	American basswood	2.20	10
	Morus alba	White mulberry	2.17	6
	Cercidiphyllum japonicum	Katsura tree	2.14	7
	Cercis canadensis	Eastern redbud	2.14	7
	Platanus occidentalis	American sycamore	2.14	7
	Quercus macrocarpa	Bur oak	2.14	7
	Cornus kousa	Kousa dogwood	2.13	8
	Juglans nigra	Black walnut	2.13	8
	Quercus bicolor	Swamp white oak	2.11	9
	Acer saccharinum	Silver maple	2.09	11
	Magnolia acuminata	Cucumbertree	2.00	6
	*Ulmus americana**	American elm	2.00	6
Not Recommended	*Acer platanoides**	Norway maple	1.91	11
	Liriodendron tulipifera	Tuliptree	1.88	8
	Quercus alba	White oak	1.88	8
	*Fraxinus americana**	White ash	1.86	7
	Juglans cinerea	Butternut	1.86	7
	Sorbus aucuparia	European mountain-ash	1.75	8

continued

Table 16.—continued

Rating	Scientific name	Common name	Score	Count
	Salix nigra	Black willow	1.57	7
	Betula papyrifera	Paper birch	1.56	9
	Ailanthus altissima	Tree-of-heaven	1.55	10
	Cornus florida	Flowering dogwood	1.50	10
	Populus spp.*	Aspen	1.44	9
	*Acer saccharum**	Sugar maple	1.42	12
	*Fagus sylvatica**	European beech	1.25	8
	Fagus grandifolia	American beech	1.22	9
	Acer negundo	Boxelder	1.09	11

*Occasionally, cultivars and species were specifically mentioned by reviewers and were incorporated in the rating. Thus, the rating is a combination of general species or genera rating and the following cultivars and/or species:
Acer campestre – 'Schichtel's Upright'
Acer ginnala –'Flame'
Acer platanoides – 'Crimson King', 'Emerald Queen'
Acer rubrum – 'Armstrong', 'Autumn Flame', 'October Glory', 'Red Sunset'
Acer saccharum – 'Legacy', 'Green Mountain'
Aesculus x carnea – 'Briotii', 'Ft. McNair'
Amelanchier spp. – Amelanchier arborea 'Cumulus', 'Robin Hill'
Betula nigra – 'Heritage'
Carpinus betulus – 'Fastigiata'
Celtis occidentalis – 'Prairie Pride'
Crataegus spp. – Crataegus crus-galli var. inermis, Crataegus phaenopyrum, Crataegus Punctata var. inermis, Crataegus viridis 'Winter King'
Fagus sylvatica – 'Atropunicea'
Fraxinus americana – 'Autumn Purple'
Fraxinus pennsylvanica – 'Cimmaron', 'Marshall's Seedless', 'Patmore', 'Summit'
Ginkgo biloba – ' Autumn Gold'
Gleditsia triacanthos – 'Imperial', 'Shademaster', 'Skyline'
Liquidambar styraciflua – 'Moraine'
Malus spp. – 'Madonna', 'Pink Jewel', 'Pink Spires', 'Red Baron', 'Red Jewel', 'Spring Snow'
Metasequoia glyptostroboides – 'Shawnee Brave'
Phellodendron amurense – 'Macho', 'Shademaster'
Platanus x acerifolia – 'BloodGood'
Populus spp. – Populus alba, Populus deltoides, Populus tremuloides
Prunus spp. – (Not including Prunus serotina which was rated independently) Prunus sargentii 'Accolade', 'Columnaris', Prunus serrulata 'Kwanzan', Prunus subhirtella var. autumnalis, Prunus virginiana 'Canada Red'
Pyrus calleryana – 'Aristocrat', 'Chanticleer', 'Redspire' (four reviewers specifically noted to avoid 'Bradford')
Quercus robur – 'Fastigiata', 'Skymaster'
Sophora japonica – 'Princeton Upright', 'Regent'
Sorbus spp. – (Not including Sorbus aucuparia which was rated independently) Sorbus alnifolia, Sorbus americana, Sorbus intermedia, Sorbus thuringiaca
Syringa reticulata – 'Ivory Silk', 'Summer Snow'
Tilia americana – 'Legend', 'Lincoln', 'Redmond'
Tilia cordata – 'Greenspire', 'Shamrock'
Tilia tomentosa – 'Green Mountain', 'Sterling'
Ulmus americana – 'Princeton'
Ulmus hybrids – 'Frontier', 'Homestead', 'New Harmony', 'Valley Forge'
Ulmus parvifolia – 'Dynasty', 'Ohio'

Chapter 7: Agencies and Groups Influencing Urban Forest Management in Syracuse

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The management of Syracuse's urban forest resource is being improved through the efforts and partnering of numerous agencies and groups with city government. The role of these agencies and groups is described in this chapter. A list of key contacts is included in the Appendix.

City Government: The Mayor, Common Council, and city employees are ultimately responsible for the management of public trees within the right-of-ways and parks in Syracuse. Planting, maintaining, and assessing of trees are the responsibility of the Department of Public Works Commissioner. Currently, this department has a Forestry Superintendent and a support staff of five people. On the city's Tree City USA application for 2000, the annual budget for forestry activities is $575,140. The personnel structure and job functions for city forestry activities are:

- *Forestry and Landscape Superintendent:* Responsible for Syracuse's urban forestry program and all work relating to tree care, including emergency tree removal, developing specifications for all tree work done by contract, and supervising the inspector, tree crews, and technical personnel.

- *Tree Trimmer II (Inspector):* Responsible for on-site inspections of street and park trees and provides recommendations on tree removal and pruning. Supervises tree trimming, removal, and tree care work of crew(s). Performs tree removal, trimming, and maintenance activities; does related work as required.

- *Tree Trimmer I:* Performs trimming and maintenance activities, and related work as required. This reoccurring work entails on-the-ground trimming, pruning and cutting of diseased, damaged, or dead limbs using handsaws and chain saws. Tree Trimmer I works under the direction of the Inspector.

- *Laborer:* Works with Tree Trimmer II as part of ground crew.

- *Landscape Architect:* Works with the Forestry Superintendent regarding tree-related work in city parks. Responsible for the design and planting of park and median trees and tracks contractor work schedules and billing.

- *Data Specialist:* Works with the Forestry Superintendent and the Inspector. Responsible for daily input of data, service requests, and resident inquiries, as well as daily tracking of field requests and contractor work schedules. Also responsible for contractor's billing.

Bureau of Research: Syracuse's Bureau of Research provides grant support and serves as a link between city departments and groups, such as Re-Leaf Syracuse.

Park Associations: Some Syracuse residents have taken an active role in the welfare of city parks by forming park associations. These park associations have great potential to influence the management of public parks.

Syracuse City School District: Management of public trees on school property is the responsibility of the school district. Funding for the management of trees on school property is separate from funding to manage city trees. Increased collaboration among city departments and the school district can enhance future forestry-related activities.

Re-Leaf Syracuse Committee, Inc. (Re-Leaf Syracuse): Re-Leaf Syracuse is a nonprofit organization created in response to the 1998 Labor Day Storm. It serves as an advisory council for all aspects of urban forest management in Syracuse. Several subcommittees chaired by members of the Re-Leaf Syracuse Board of Directors facilitate grassroot opportunities for residents to become involved in the management of the city's urban forest. Current subcommittees include:

- Design and Master Plan — develops and updates the city master plan for Syracuse.

- Funding and recognition — procures funding to supplement the city budget for forestry activities.

- Education/Communication — provides technical assistance to city staff, initiates outreach programs, and provides information on forestry activities to city residents.

Tomorrow's Neighborhoods Today: TNT is a neighborhood planning effort that brings together neighborhood stakeholder groups to improve the quality of life in Syracuse. The group consists of eight TNT area planning councils that are led by volunteers and supported by the city's Division of Neighborhood Planning. TNT provides a path for communicating information at the neighborhood level as well as resident-based outreach educational activities, and is a source of volunteers.

USDA Forest Service: Researchers at the USDA Forest Service's Northeastern Research Station unit in Syracuse work with partners to quantify the environmental effects of urban vegetation and develop appropriate management strategies to improve environmental quality in urban areas. Station staff provide research knowledge and links to regional/ national efforts.

Cornell Cooperative Extension of Onondaga County: CCE provides technical expertise and educational outreach serving municipal, residential, and industry audiences. CCE serves as a link to county communities, other professionals, Syracuse residents, and the resources of Cornell University.

New York State Department of Environmental Conservation: DEC serves as a vehicle for cost-share funding of urban forestry activities by the USDA Forest Service. It provides technical expertise and is a partner in educational outreach activities.

Niagara Mohawk Power Corporation: NMPC manages vegetation along its utility corridors throughout Syracuse. It has a strong interest in the management of trees that affect power lines. NMPC has developed cost-share programs and its associated foundation is a potential source of grant funding.

SUNY College of Environmental Science and Forestry: SUNY-ESF is a source of research and environmental knowledge through its undergraduate and graduate study programs, including the development of projects on urban forestry and landscape design.

New York State Arborists Association: NYSA is the state chapter of the International Society of Arboriculture. Members provide tree-care services for residents and municipalities as well as technical expertise in maintenance operations and outreach participation through Arbor Day activities.

Syracuse/Onondaga County Planning Agency: SOCPA provides technical expertise in mapping and planning community resources and provides links to development efforts outside of Syracuse. SOCPA also is staff for the City Planning Commission and Board of Zoning Appeals.

Chapter 8: Recommendations for Syracuse's Urban Forest

David J. Nowak[1] *and Paul O'Connor*[2]

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After integrating information from various sources on the structure, composition, and health of trees, including survey data and the input of tree experts, Re-Leaf Syracuse developed the following 10 goals for facilitating the management of Syracuse's urban forest resource into the 21st century and beyond.

1. Increase street-tree stocking levels to a minimum of 60 percent in residential areas of each TNT area.

Residential areas have street-tree stocking less than 60 percent in four TNT areas: 2-Westside, 3-Southside, 7-Northside, and 8-Lakefront. Increasing street-tree stocking levels in these areas would greatly benefit local residents and allow for a more equitable distribution of street trees for Syracuse residents. To increase stocking of residential street trees to a minimum of 60 percent in TNT areas 2, 3, 7, and 8, approximately 2,925 new street trees need to be established while sustaining the existing population. The new planting would include 1,095 trees in TNT 2, 1,150 trees in TNT 3, 625 trees in TNT 7, and 55 trees in TNT 8.

Establishing these trees over the next 15 years would require about 195 new street trees per year in addition to replacements for removed street trees. This program would increase overall street-tree stocking in Syracuse to nearly 51 percent.

The public survey indicated that TNT 2 and 3 sustained the most damage from the Labor Day Storm. In TNT 2, 3, 5, and 7, more than 50 percent of the respondents indicated there are too few street trees. TNT 5-Eastside also had a relatively large amount of storm damage. However, residential street-tree stocking in TNT 5 is 79 percent, so planting priorities should target TNT areas with relatively low residential stocking, particularly areas 8 (10 percent stocking), 2 (39 percent), and 3 (47 percent), before increasing stocking in Eastside.

Respondents in TNT 6-Eastwood (residential street-tree stocking of 61 percent) generally were satisfied with the amount of street trees (59.5 percent). Although this area could benefit from increased stocking, it should likely receive relatively low priority for planting compared to areas with less than 60 percent stocking.

Nearly 80 percent of the respondents in TNT 4-Valley were satisfied with the amount of street trees in their neighborhood. This area also had the highest percent tree cover in the city (46.6 vs. 27.8 percent in the next closest TNT (5)). Based on these findings, TNT 4 probably should receive the lowest priority with respect to future tree plantings. Once residential areas in all TNT areas have reached 60 percent stocking, efforts to continue to increase stocking levels in an equitable manner among all TNT areas could continue in order to enhance to tree benefits received by local residents.

Street trees should be established in cooperation with homeowners and planting should follow specifications as outlined in the Appendix. About 70 percent of the residents surveyed indicated a willingness to assist with street-tree maintenance. The city's tree planting program should capitalize on this willingness to increase the long-term survival and overall health of street trees.

2. Facilitate tree planting on private properties to help the city attain an overall tree cover of 30 percent.

The overall average tree cover for Syracuse, currently at 26.6 percent, could be reasonably increased to 30 percent. Assuming that the existing cover is maintained, about 1,360 new trees would be needed each year over the next 25 years to attain a canopy-cover level of 30 percent.[15]

Given the existing tree cover distribution, residential land distribution, and public survey responses, the following is suggested priorities for establishing new tree cover:

Highest priority: TNT areas 2, 3, and 7
Medium priority: TNT areas 5 and 6
Lowest priority: TNT areas 1, 4 and 8

Although a priority of TNT areas is suggested here, all TNT areas should be managed to sustain existing tree cover and increase tree cover as needed. Some of these new trees could come from the proposed increase in street-tree stocking. Others could come from natural regeneration in areas that are allowed to revert to forest (e.g., through reduction of mowing or other practices that prohibit regeneration).

Residents would gain the greatest benefit if these new trees are established in residential lots. Programs could be developed to educate homeowners and increase

[15]Based on average tree-crown width of 30 feet at maturity. Given a city area of 25.1 square miles, 34,000 new trees would be needed (550 acres of cover) to increase tree cover by 3.4 percent.

voluntary planting of trees on their lots. Also, ordinances (see Appendix) could be enacted to directly facilitate the establishment of new trees on private property. For example, New York State's Department of Transportation (DOT) initiated a program for public tree planting on private land. DOT will plant a tree in front of a resident's house along a state road, but outside of the state road right-of-way. The homeowner signs an agreement that states that DOT is responsible for the survival of the tree only for the first two years. Homeowners must obtain approval from DOT to perform maintenance activities such as pruning or removal. A similar program could engage city residents in enhancing the community forest.

Tree planting in Syracuse also could be increased through the Syracuse Neighborhood Initiative program. This planting would increase property values, provide community forest parks, develop a sense of community, and strengthen and revitalize communities neighborhoods.

3. Increase species diversity in Syracuse through the use of a variety of proven, well-adapted, but relatively uncommon species.

The results of various analyses revealed that many of the species that are recommended by the tree experts are uncommon within the city. Likely explanations for the limited use of these species are that relatively few people know about these species and/or that the nursery trade does not supply ample stock of these trees. Educating both the public and tree-stock providers about these less common but recommended species might lead to more of the trees being planted in Syracuse.

Of the 10 most common street trees, Norway, silver, and sugar maple were not recommended for use on streetside strips that are 5 to 12 feet. These three species currently account for 38.6 percent of Syracuse's street trees. Reducing plantings of these maples and increasing the planting of other recommended but relatively uncommon street-tree species would increase diversity and likely sustain or enhance overall forest health. Recommended species that are relatively uncommon in the city include Japanese tree lilac, serviceberry (*Amelanchier* spp.), black tupelo (*Nyssa sylvatica*), Tartarian maple (*Acer tataricum*), Turkish hazelnut (*Corylus colurna*), Crimean linden (*Tilia* x *euchlora*), goldenrain tree (*Koelrueteria paniculata*), silver linden (*Tilia tomentosa*), Chinese elm (*Ulmus parvifolia*), sweetgum (*Liquidambar styraciflua*), Kentucky coffeetree (*Gymnocladus dioicus*), river birch (*Betula nigra*), Kousa dogwood (*Cornus kousa*), yellowwood (*Cladrastis kentukea*), eastern redbud (*Cercis canadensis*), and English oak (*Quercus robur*). Some of these species should be tested to ensure that they can adapt to Syracuse's street-tree environment. Common species with proven durability as a street tree should continue to be planted. In establishing new species, managers need to take care not to introduce species with the potential to invade natural forest areas (i.e., exotic invasive trees). When increasing street-tree diversity, effort should be made to increase the use of relatively large trees, depending on site/space constraints.

4. Facilitate tree maintenance to minimize hazards and potential damage, and increase tree health.

The street-tree inventory identified the current health and condition of Syracuse's street trees. City staff should prioritize management activities to: a) remove dead trees, b) remove trees identified as immediate or scheduled removal, c) work to improve the health of trees in poor condition, d) enhance the maintenance program for young trees during the establishment phase to increase survival rates and reduce future maintenance needs (e.g., pruning to train form of young trees or correct structure problems), and e) develop a program to train volunteer citizens to maintain small-diameter trees.

An annual windshield survey to assess drastic, visible changes in tree condition could be conducted by city staff or trained volunteers to improve the health of street trees and minimize potential hazards to residents.

5. Periodically update the street-tree inventory.

The 100 percent street-tree inventory that was completed in 2000 is an important database that will be useful in managing this resource and ensuring future tree health. However, the database can become obsolete quickly if not updated to account for changes in the tree population through planting and removal activities. It is suggested that Syracuse invest resources to maintain the database by updating records as work is performed on trees or as trees are removed or planted. Updated field inventories would help keep the database current. An updated inventory also will allow the city to maintain better records on which trees are performing the best and have the longest lifespan. These data can be used to improve species selections, to reduce maintenance costs, and increase tree longevity.

Annualized inventories in which a portion of the street-tree population is reinventoried each year (e.g., 1/10 of area is reinventoried annually so the entire database is updated after 10 years) should be considered. Enlisting the aid of local students in reinventorying the population would be a relatively low-cost means of updating the inventory and educating the students about urban forests.

6. Maintain Tree City USA status and annual Arbor Day celebrations.

Two newly implemented programs within Syracuse, if sustained, likely will help keep the city's urban forest viable and healthy while educating city residents. Tree

City USA, a national recognition program sponsored by the National Arbor Day Foundation, demonstrates to residents and potential funding agencies a city's level of dedication and commitment to comprehensive urban forest management. The first Syracuse Arbor Day Celebration, held at Thornden Park on April 29, 2000, was sponsored by Re-Leaf Syracuse and included tree planting, maintenance, and removal demonstrations, as well as family-oriented activities. About 500 people, 30 organizations, and 10 tree-care businesses participated in the event, which increases public awareness of urban forestry issues.

7. Encourage public participation and input in forest management in Syracuse.

As Syracuse's urban forest resource is managed for the public, public input is critical to ensure that the urban forest plan and management are meeting the needs of city residents. It is recommended that annual meetings be conducted to facilitate interactions between those who implement the urban forest plan and the public. The meetings can serve as a vehicle for facilitating dialogue and conveying information on current progress and problems (e.g., a state of Syracuse's urban forest report), and exploring new ideas. These meetings could be sponsored by Re-Leaf Syracuse and include residents from various TNT areas and other interested citizens.

8. Produce brochures to facilitate public education about urban forestry.

Public education is a key to improving urban forest health and management throughout Syracuse. It is suggested that a series of educational brochures be developed and distributed to the general public. Brochures could be developed on: a) information presented in the comprehensive management plan, b) how to properly plant, prune, and maintain trees, and c) recommended tree species for the Syracuse area.

9. Sponsor participatory demonstration tree planting and maintenance activities on streets around schools to facilitate public education for all ages.

Another possibility to help facilitate public education is involving local students in tree planting and maintenance activities around their schools. Programs could be developed to educate students about tree planting and tree care. Schools and students could use the trees planted in their areas as living laboratories to better understand trees and tree care, nature, and ecology in urban environments. Education of children on trees and their proper care likely will lead to improved urban forest health and increased interest in urban forest issues.

10. Encourage acquisition of donations, grants, and other funds to increase outside funding to sustain Syracuse's urban forest.

One of the keys to sustaining urban forest structure, health, and benefits is adequate funding to maintain the tree population. New sources of maintenance funding would help sustain tree health and forest viability into the future. Creative funding ideas need to be developed and pursued. Some ideas might include encouraging public donations or corporate sponsorship of Re-Leaf Syracuse or other nonprofit agencies dedicated to improving Syracuse's urban forest. Grant writing by the city or other groups (e.g., in TNT areas) to secure funding also could improve the urban forest resource. A list of groups that may fund urban forestry/community development projects (e.g., New York State Department of Environmental Conservation, Syracuse Neighborhood Initiative, HUD) should be developed and distributed to local groups that might develop proposals for local funding.

Goal Implementation

This urban forest master plan for Syracuse and its recommended goals are not the end of the process but the beginning. On the basis of the plan's findings and recommendations, the city needs to develop and implement specific management plans to attain goals that are most appropriate for the residents of Syracuse. Such plans will have to be developed within the political and managerial structures of the city and should include items such as budget, staffing, timelines, and specific objectives.

Conclusion

Syracuse's urban forest is an important and valuable resource. Properly managed and maintained, these trees will provide important benefits for city residents that will increase in the future. This report contains an extensive database of Syracuse's urban forest and the public attitudes and desires related to it. These data can be used to help improve Syracuse's urban forest and sustain this resource through the 21st century. Ideas presented in this master plan are suggestions for resource managers to enhance this important resource in the future.

This report provides only the framework by which Syracuse can begin to create and enhance its forest environment. Many specific details and new ideas can be developed and fostered by public involvement and interaction among agencies. This plan sets the framework for future discussions and interactions that will ultimately make Syracuse a more healthy and vibrant community through the use and management of urban vegetation.

Acknowledgments

Numerous individuals and agencies participated in the development of this report. We especially acknowledge the contributions of U.S. Rep. James Walsh, former HUD Secretary Andrew Cuomo, and Syracuse Mayor Ray Bernardi.

We also thank the following individuals for their valuable input and comments on the urban forest master plan for Syracuse:

- Craig Allen, Niagara Mohawk Power Corp.
- John Clancy, New York State Department of Environmental Conservation (DEC)
- Sue DePalma, City of Syracuse
- Terry Ettinger, Horticulture Consulting Services
- Peter Frank, DEC
- Lyle Halbert, City of Syracuse
- Lee Herrington, SUNY College of Environmental Science and Forestry (SUNY-ESF)
- Anthony Ilacqua, City of Syracuse
- Otis Jennings, City of Syracuse
- Karen Kitney, Syracuse-Onondaga County Planning Agency
- Alix Krueger, City of Syracuse
- Donna Lapham, City of Syracuse
- Doug Morrison, SUNY-ESF
- Don Robbins, City of Syracuse
- Norman Richards, SUNY-ESF
- Dave Sinclair, DEC
- Brian Skinner, Niagara Mohawk Power Corp.

Finally, we thank the following researchers and tree experts who contributed to the development and analyses of data used in this report:

- Nina Bassuk, Cornell University
- Nathan Beedle, SUNY-ESF
- William Bentley, SUNY-ESF
- Robert Brock, SUNY-ESF
- Stephen Buechner, Reimann Buechner Partnership
- John Clancy, DEC
- Dan Crane, USDA Forest Service
- Chris Dorn, City of Canandaigua, NY
- Gary Gasparini, Gasparini Landscaping Co.
- Sam Gordon, SUNY-ESF
- Katherine Goslee, SUNY-ESF
- Andy Hillman, City of Ithaca, NY
- Paul Hopkins, SUNY-ESF
- Carl Jahn, Carl Jahn and Associates
- Alix Krueger, City of Syracuse
- Dan Kwasnowski, SUNY-ESF
- Donald Leopold, SUNY-ESF
- Soojeong Myeong, SUNY-ESF
- James Palmer, SUNY-ESF
- Andy Plenninger, City of Rochester, NY
- Norman Richards, SUNY-ESF
- David Russo, SUNY-ESF
- Greg Schneider, Horticulture Associates of Rochester
- Scott Shannon, SUNY-ESF
- Brian Skinner, Niagara Mohawk Power Corp.
- James Sollecito, Sollecito Landscaping and Garden Center
- Jack Stevens, USDA Forest Service
- Jeff Walton, SUNY-ESF

Appendix

Street-Tree Composition in Syracuse in 2000 by D.b.h. Class

Tree species	D.b.h. class (inches) 1-5.9	6-11.9	12-17.9	18-23.9	24-29.9	30-35.9	36+	Total	Percent
	Number								
Norway maple	755	1588	2771	2054	917	190	41	8316	24.3
Honeylocust	1056	800	951	332	35	7	0	3181	9.3
Silver maple	44	113	397	681	830	584	407	3056	8.9
Crabapple, spp.	954	875	226	19	1	2	1	2078	6.1
Littleleaf linden	546	497	652	127	21	0	1	1844	5.4
Sugar maple	391	335	434	309	229	104	31	1833	5.4
Green ash	433	403	671	150	40	13	6	1716	5.0
Arborvitae	657	141	51	6	1	0	0	856	2.5
Red maple	184	245	264	25	4	0	1	723	2.1
London planetree	32	70	337	228	32	9	9	717	2.1
Callery pear	360	291	54	7	0	0	0	712	2.1
Norway spruce	99	180	200	55	20	0	1	555	1.6
Boxelder	85	115	165	82	58	17	14	536	1.6
Blue spruce	183	159	151	28	2	1	0	524	1.5
Zelkova (Sawtooth/Japanese)	40	91	277	89	4	0	0	501	1.5
Ginkgo	248	148	83	10	2	0	3	494	1.4
Common hackberry	67	126	158	37	6	2	0	396	1.2
Japanese pagodatree	73	109	129	30	4	0	0	345	1.0
Hedge maple	60	76	134	19	3	0	0	292	0.9
Cherry, spp.	127	82	43	9	1	0	0	262	0.8
Austrian pine	45	81	94	29	12	0	0	261	0.8
Amur maple	130	58	34	1	0	0	1	224	0.7
Basswood/linden	3	29	43	63	49	27	7	221	0.6
Red oak	32	61	64	21	14	13	14	219	0.6
Hawthorn, spp.	94	87	18	0	0	0	0	199	0.6
Ironwood /European hornbeam	31	79	73	0	2	0	0	185	0.5
Catalpa	6	22	45	41	33	18	12	177	0.5
American sycamore	2	12	40	89	14	4	12	173	0.5
Horsechestnut	6	11	45	65	36	6	0	169	0.5
White/paper birch	57	69	12	2	1	0	0	141	0.4
Tuliptree	8	19	69	32	9	2	0	139	0.4
Black locust	19	28	46	25	9	6	4	137	0.4
White ash	31	32	32	10	11	7	2	125	0.4
Eastern cottonwood	11	22	32	23	11	11	6	116	0.3
Paperbark maple	93	0	2	0	1	0	1	97	0.3
Buckthorn, spp.	84	11	0	0	1	1	0	97	0.3
Hornbeam/ hophornbeam	43	37	11	3	0	0	0	94	0.3
White spruce	58	23	7	2	0	0	0	90	0.3
Mountain-ash	38	39	12	0	0	1	0	90	0.3
Tree-of-heaven	11	26	20	14	5	5	3	84	0.2
Littleleaf linden (Redmond)	66	11	3	0	0	0	0	80	0.2
Kwanzan cherry	15	33	26	3	0	0	0	77	0.2
White pine	35	22	9	9	1	0	0	76	0.2
White oak	3	3	8	18	19	16	8	75	0.2
Unknown	31	17	11	6	3	2	0	70	0.2
Eastern hemlock	58	9	2	0	0	0	0	69	0.2

continued

Street-Tree Composition in Syracuse in 2000 by D.b.h. Class—continued

Tree species	D.b.h. class (inches)							Total	Percent
	1-5.9	6-11.9	12-17.9	18-23.9	24-29.9	30-35.9	36+		
	Number								
Magnolia, spp.	42	15	2	1	0	0	0	60	0.2
Spruce, spp.	27	21	10	1	0	0	0	59	0.2
Balsam fir	31	20	6	0	0	0	0	57	0.2
Elm, spp.	36	9	5	5	1	0	1	57	0.2
Eastern redcedar	7	24	22	2	0	0	0	55	0.2
Black walnut	2	8	18	10	7	4	2	51	0.1
Ash, spp.	5	18	22	6	0	0	0	51	0.1
Scotch pine	10	26	14	0	0	0	0	50	0.1
Mulberry, spp.	11	13	16	6	4	0	0	50	0.1
American sweetgum	3	26	18	0	0	1	0	48	0.1
Eastern redbud	24	21	2	0	0	0	0	47	0.1
Douglas-fir	6	14	17	8	1	0	0	46	0.1
Maple, spp.	31	8	6	0	0	0	0	45	0.1
Wild apple	22	16	4	2	0	0	0	44	0.1
Yew, spp.	15	22	6	0	0	0	0	43	0.1
Kentucky coffeetree	1	9	29	1	0	0	0	40	0.1
Norway maple (Crimson King)	28	7	3	0	0	0	0	38	0.1
White fir	16	6	8	6	1	0	0	37	0.1
Black cherry	1	12	14	5	2	1	1	36	0.1
Poplar, spp.	10	9	14	2	0	0	0	35	0.1
Katsura tree	4	17	11	0	0	0	0	32	0.1
Tree lilac	18	11	2	0	0	0	0	31	0.1
Pear, spp.	2	28	1	0	0	0	0	31	0.1
Japanese maple	24	5	1	0	0	0	0	30	0.1
Yellowwood	7	7	11	2	1	0	0	28	0.1
American beech	1	4	14	4	1	3	1	28	0.1
Sycamore maple	1	6	16	2	2	0	0	27	0.1
Washington hawthorn	17	8	0	0	0	0	0	25	0.1
Russian olive	13	10	2	0	0	0	0	25	0.1
Pine, spp.	6	7	10	1	1	0	0	25	0.1
American elm	4	8	4	5	0	4	0	25	0.1
Willow, pussywillow	11	7	3	1	0	0	0	22	0.1
Butternut	7	6	5	1	1	1	1	22	0.1
Hickory, spp.	0	1	10	6	4	1	0	22	0.1
Dogwood, spp.	20	0	1	0	0	0	0	21	0.1
Plum cherry (Newport)	15	4	0	0	0	0	0	19	0.1
Fraser fir	10	7	2	0	0	0	0	19	0.1
Willow, spp.	0	2	4	3	4	3	2	18	0.1
Pignut hickory	1	3	5	5	3	1	0	18	0.1
Siberian elm	0	2	3	2	3	4	3	17	0.0
Shagbark hickory	0	3	3	9	2	0	0	17	0.0
Weeping cherry	10	2	2	0	0	0	0	14	0.0
Red pine	7	1	4	1	1	0	0	14	0.0
Buckeye	2	5	5	0	1	0	0	13	0.0
Black ash	0	4	7	1	0	0	0	12	0.0
Larch/tamarack	2	1	5	2	2	0	0	12	0.0
Ornamental cherry	7	1	2	1	1	0	0	12	0.0
Glenleven linden	11	0	0	0	0	0	0	11	0.0
Pin oak	2	2	1	2	3	1	0	11	0.0

continued

Street-Tree Composition in Syracuse in 2000 by D.b.h. Class—continued

Tree species	D.b.h. class (inches)							Total	Percent
	1-5.9	6-11.9	12-17.9	18-23.9	24-29.9	30-35.9	36+		
	Number								
River birch	8	1	0	1	0	0	0	10	0.0
Black oak	2	2	4	1	1	0	0	10	0.0
Shrub	10	0	0	0	0	0	0	10	0.0
Blue ash	1	1	7	1	0	0	0	10	0.0
Corkscrew willow	0	1	3	1	1	1	2	9	0.0
Juniper, spp.	9	0	0	0	0	0	0	9	0.0
Freeman maple	6	1	2	0	0	0	0	9	0.0
Baldcypress	1	1	2	2	2	0	0	8	0.0
Oak, spp.	2	0	1	0	2	2	1	8	0.0
Sumac, spp.	7	0	0	0	0	0	0	7	0.0
White poplar	0	0	2	4	1	0	0	7	0.0
Weeping willow	0	0	0	0	0	2	4	6	0.0
Carolina silverbell	2	4	0	0	0	0	0	6	0.0
Serviceberry	5	1	0	0	0	0	0	6	0.0
European beech	0	1	4	0	1	0	0	6	0.0
Rose-of-Sharon	6	0	0	0	0	0	0	6	0.0
Korean evodia	0	1	2	2	0	0	0	5	0.0
Red mulberry	2	2	1	0	0	0	0	5	0.0
White mulberry	1	1	2	1	0	0	0	5	0.0
Saucer magnolia	4	1	0	0	0	0	0	5	0.0
Bitternut hickory	0	1	1	1	1	1	0	5	0.0
Goldenrain tree	3	1	0	0	0	0	0	4	0.0
Cockspur hawthorn	3	0	0	0	0	0	0	3	0.0
Black willow	0	0	0	1	1	0	1	3	0.0
Birch, spp.	1	1	1	0	0	0	0	3	0.0
Lilac, spp.	3	0	0	0	0	0	0	3	0.0
Beech, spp.	0	1	2	0	0	0	0	3	0.0
Bigtooth aspen	0	1	1	0	0	0	0	2	0.0
Crape-myrtle	2	0	0	0	0	0	0	2	0.0
Amur corktree	0	2	0	0	0	0	0	2	0.0
Common persimmon	1	1	0	0	0	0	0	2	0.0
Scarlet oak	0	0	0	0	1	0	1	1	0.0
Red elm	0	1	0	0	0	0	0	1	0.0
Smoketree, spp.	1	0	0	0	0	0	0	1	0.0
Quaking aspen	0	1	0	0	0	0	0	1	0.0
Post oak	0	0	0	1	0	0	0	1	0.0
Goldenchain tree (Watereri)	1	0	0	0	0	0	0	1	0.0
Deodar cedar	1	0	0	0	0	0	0	1	0.0
Swamp white oak	1	0	0	0	0	0	0	1	0.0
Silver linden	0	0	0	1	0	0	0	1	0.0
Lombardy poplar	1	0	0	0	0	0	0	1	0.0
English oak	0	0	1	0	0	0	0	1	0.0
Chinese elm	1	0	0	0	0	0	0	1	0.0
Shingle oak	1	0	0	0	0	0	0	1	0.0
Total	8020	7779	9312	4873	2498	1078	605	34165	100

Ten Most Common Street Trees by Land-Use Type and D.b.h. Class

Tree species	D.b.h. class (inches) 0-5.9	6-11.9	12-17.9	18-23.9	24-29.9	30-35.9	36+	Total	Percent
	Number								
Commercial /Industrial									
Honeylocust	507	227	160	24	2	0	0	920	31.9
Littleleaf linden	184	71	34	3	1	0	0	293	10.2
Norway maple	32	73	67	47	18	11	0	248	8.6
Green ash	119	40	44	6	3	2	0	214	7.4
Callery pear	141	66	2	0	0	0	0	209	7.2
Crabapple	94	53	10	0	0	0	0	157	5.4
London planetree	7	23	93	17	0	0	3	143	5.0
Silver maple	11	4	7	14	20	15	8	79	2.7
Japanese pagodatree	17	25	19	2	0	0	0	63	2.2
Zelkova	0	14	29	1	0	0	0	44	1.5
Parks/Greenspace									
Norway maple	21	79	108	61	38	10	5	322	19.1
Honeylocust	31	49	25	16	5	1	0	127	7.5
Sugar maple	16	16	22	23	26	13	1	117	6.9
Austrian pine	1	16	44	22	10	0	0	93	5.5
Silver maple	0	4	17	20	16	8	8	73	4.3
Littleleaf linden	12	25	14	6	1	0	1	59	3.5
Green ash	15	20	15	4	4	0	0	58	3.4
Basswood/linden	3	22	6	7	4	2	3	47	2.8
White oak	1	0	4	14	14	8	5	46	2.7
Black locust	6	18	8	5	4	2	0	43	2.5
Institutional									
Honeylocust	112	68	103	17	0	0	0	300	20.5
Norway maple	19	54	78	58	41	7	0	257	17.6
Green ash	56	31	25	1	0	0	2	115	7.9
Littleleaf linden	35	34	26	8	0	0	0	103	7.0
Crabapple	55	34	2	0	0	0	0	91	6.2
Silver maple	1	0	9	16	19	20	9	74	5.1
London planetree	6	5	31	10	1	0	0	53	3.6
Sugar maple	17	11	11	4	3	2	1	49	3.4
Blue spruce	5	11	16	1	0	0	0	33	2.3
Zelkova	7	8	17	0	0	0	0	32	2.2
Arborvitae	26	6	0	0	0	0	0	32	2.2
Residential									
Norway maple	567	1154	2268	1769	778	153	33	6722	27.9
Silver maple	26	94	330	589	721	486	339	2585	10.7
Crabapple	684	665	189	18	1	2	0	1559	6.5
Sugar maple	296	251	352	248	172	77	24	1420	5.9
Honeylocust	297	278	545	253	24	6	0	1403	5.8
Green ash	204	265	496	118	30	10	3	1126	4.7
Littleleaf linden	217	254	497	103	19	0	0	1090	4.5
Arborvitae	523	91	40	6	1	0	0	661	2.7
Red maple	121	177	232	21	3	0	1	555	2.3
Norway spruce	63	155	154	46	17	0	1	436	1.8

continued

Ten Most Common Street Trees by Land-Use Type and D.b.h. Class—continued

Tree species	D.b.h. class (inches) 0-5.9	6-11.9	12-17.9	18-23.9	24-29.9	30-35.9	36+	Total	Percent
	Number								
Multi-Family residential									
Norway maple	40	118	151	69	15	2	0	395	19.8
Honeylocust	45	108	70	18	3	0	0	244	12.2
Littleleaf linden	27	57	55	5	0	0	0	144	7.2
Silver maple	6	3	21	23	30	30	26	139	7.0
Green ash	22	37	63	8	0	0	1	131	6.6
Sugar maple	38	26	30	13	16	5	2	130	6.5
Crabapple	54	52	7	0	0	0	0	113	5.7
Arborvitae	60	4	0	0	0	0	0	64	3.2
Red maple	17	28	13	1	0	0	0	59	3.0
Zelkova	3	13	19	9	0	0	0	44	2.2
Norway spruce	22	12	9	0	1	0	0	44	2.2
Street right-of-way									
Crabapple	25	26	6	1	0	0	0	58	10.2
Blue spruce	15	19	12	7	1	0	0	54	9.5
Honeylocust	8	33	11	0	1	0	0	53	9.4
Austrian pine	3	20	22	2	1	0	0	48	8.5
Norway maple	5	12	11	9	7	2	1	47	8.3
Green ash	4	5	13	6	2	0	0	30	5.3
Littleleaf linden	5	11	8	1	0	0	0	25	4.4
Zelkova	1	4	9	7	0	0	0	21	3.7
Hawthorn	12	7	2	0	0	0	0	21	3.7
Cherry	4	7	4	2	0	0	0	17	3.0
Transportation / utility									
Norway maple	6	2	6	1	2	0	0	17	16.3
Blue spruce	15	1	0	0	0	0	0	16	15.4
Balsam fir	12	1	0	0	0	0	0	13	12.5
Honeylocust	3	6	2	0	0	0	0	11	10.6
Cottonwood	0	5	3	1	0	0	0	9	8.7
Boxelder	1	3	2	1	0	0	0	7	6.7
Tree-of-heaven	0	5	0	1	0	0	0	6	5.8
Sugar maple	0	0	4	0	0	0	0	4	3.8
Unknown	0	1	0	2	0	0	0	3	2.9
Norway spruce	3	0	0	0	0	0	0	3	2.9
Black locust	0	1	1	1	0	0	0	3	2.9
Vacant									
Norway maple	44	71	68	31	14	3	0	231	21.6
Honeylocust	44	28	25	4	0	0	0	101	9.5
Silver maple	0	7	11	11	18	21	15	83	7.8
Littleleaf linden	49	19	4	1	0	0	0	73	6.8
Boxelder	15	19	19	8	4	0	0	65	6.1
Sugar maple	10	21	9	11	3	2	1	57	5.3
Cottonwood	2	8	21	7	5	2	0	45	4.2
Green ash	13	4	13	6	1	1	0	38	3.6
Callery pear	21	10	1	0	0	0	0	32	3.0
Crabapple	11	14	3	0	0	0	0	28	2.6

Ten Most Common Street Trees by TNT Area

Tree species	Number of trees	Percent of TNT population
TNT 1		
Honeylocust	691	51.1
Littleleaf linden	147	10.9
Callery pear	129	9.5
Green ash	110	8.1
Japanese pagodatree	52	3.8
London planetree	43	3.2
Pear, spp.	31	2.3
Basswood/linden	29	2.1
Cherry, spp	21	1.6
Red oak	15	1.1
TNT 2		
Norway maple	681	20.9
Sugar maple	287	8.8
Silver maple	267	8.2
Honeylocust	242	7.4
Crabapple, spp.	195	6.0
Green ash	141	4.3
Littleleaf linden	129	4.0
Arborvitae	127	3.9
American sycamore	65	2.0
Austrian pine	63	1.9
TNT 3		
Norway maple	1450	26.5
Silver maple	484	8.9
Honeylocust	475	8.7
Sugar maple	391	7.2
Crabapple, spp.	326	6.0
Littleleaf linden	240	4.4
Green ash	204	3.7
Arborvitae	198	3.6
London planetree	132	2.4
Blue spruce	118	2.2
TNT 4		
Norway maple	617	21.6
Sugar maple	271	9.5
Silver maple	227	7.9
Honeylocust	195	6.8
Arborvitae	147	5.1
Crabapple, spp.	145	5.1
Norway spruce	134	4.7
Green ash	116	4.1
Boxelder	83	2.9
Littleleaf linden	77	2.7
TNT 5		
Norway maple	2538	25.0
Honeylocust	808	8.0
Silver maple	699	6.9
Crabapple, spp.	671	6.6

continued

Ten Most Common Street Trees by TNT Area—continued

Tree species	Number of trees	Percent of TNT population
Green ash	581	5.7
Littleleaf linden	543	5.3
Sugar maple	445	4.4
Arborvitae	357	3.5
London planetree	304	3.0
Norway spruce	234	2.3
TNT 6		
Norway maple	1148	30.2
Silver maple	631	16.6
Crabapple, spp.	234	6.2
Honeylocust	188	4.9
Littleleaf linden	178	4.7
Green ash	173	4.6
Red maple	144	3.8
Sugar maple	128	3.4
Hedge maple	78	2.1
Callery pear	70	1.8
TNT 7		
Norway maple	1858	26.9
Silver maple	744	10.8
Honeylocust	551	8.0
Crabapple, spp.	479	6.9
Littleleaf linden	441	6.4
Green ash	382	5.5
Sugar maple	311	4.5
Callery pear	225	3.3
Red maple	182	2.6
London planetree	145	2.1
TNT 8		
Littleleaf linden	89	24.8
Callery pear	49	13.6
Eastern cottonwood	31	8.6
Honeylocust	31	8.6
Blue spruce	29	8.1
Balsam fir	16	4.5
Crabapple, spp.	14	3.9
Tree-of-heaven	13	3.6
Norway maple	12	3.3
London planetree	12	3.3

Street-Tree Condition[a] by Land-Use Type (in percent)

	Land-use type									
Condition	Comm.	Park	Inst.	Res.	M.F	Street ROW	Trans.	Vacant	Unknown	Total
Good	44.7	26.1	39.5	40.2	40.9	25.3	55.8	30.4	46.7	39.4
Fair	43.0	50.7	41.5	41.5	41.1	58.0	11.5	44.9	38.4	42.3
Poor	11.3	21.0	18.1	18.0	17.4	13.4	24.0	22.5	12.5	17.6
Dead	1.0	2.2	0.9	0.4	0.7	3.4	8.7	2.2	2.4	0.7

[a]Tree evaluation process includes assessments of tree roots, trunk, scaffold branches, smaller branches and twigs, and foliage.
Comm. = commercial/industrial; Park = park and greenspace; Inst. = institutional; M.F. = multifamily residential; Res. = residential; Street ROW = street right of way (trees are farther than 500 feet from any land use classified on GIS land use map. Most of these trees are on medians) Trans. = transportation/utility.

Street-Tree Condition[a] by TNT Area (in percent)

	TNT area								
Condition	1	2	3	4	5	6	7	8	Total
Good	42.7	39.0	30.1	39.9	39.6	39.8	44.2	66.3	39.4
Fair	49.1	37.9	46.0	44.7	42.4	43.3	39.1	29.0	42.3
Poor	7.9	21.8	23.1	14.3	17.2	16.5	16.2	4.7	17.6
Dead	0.3	1.2	0.9	1.1	0.8	0.3	0.5	0.0	0.7

[a]Tree evaluation process includes assessments of tree roots, trunk, scaffold branches, smaller branches and twigs, and foliage.

Agency Reference List

City of Syracuse
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Commissioner Anthony Ilacqua
Don Robbins, Superintendent of Forestry
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Syracuse, NY 13210
448-8515

City of Syracuse
Division of Neighborhood Planning Tomorrow's Neighborhoods Today
201 E. Washington Street, Room 412
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City of Syracuse
Parks, Recreation & Youth Programs
Commissioner Otis Jennings
Lyle Halbert, Director of Planning & Developing
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Syracuse, NY 13204
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New York State Department of Environmental Conservation
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428-5985

SUNY College of Environmental Science and Forestry
Dr. Doug Morrison
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725 Harrison St.
Syracuse, NY 13210
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Syracuse-Onondaga County Planning Agency
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435-2611

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David Nowak, Project Leader
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1 Forestry Dr.
Syracuse, NY 13210
448-3200

Specifications for Individual Trees

SITE AND SPECIES SELECTION:

1. Open planting sites in areas with little or no shade shall be given priority over shaded streets.

2. Large trees maturing at a height more than 30 feet tall should be planted in all sites unless there are overhead constraints, such as primary electric lines. Where there are concerns for overhead obstructions, trees maturing at a height of 30 feet or less should be planted.

3. All property owners should be given notification of planned planting so there is ample time for reaction.

4. If a property owner does not want a tree in front of their property, an effort should be made to change his or her mind if the site is a high-priority spot. However, if this fails, the tree should not be planted and the site revisited at a later date.

5. Planting sites should be evaluated for restricted rooting space, soil texture, soil pH, drainage, road salt, exposure, building setback/overhead wires/ surrounding building surfaces.

6. Entrances and main thoroughfares should be planted in such a way as to create visual compatibility among trees.

7. Species should not be overplanted. No one species should make up more than 10 percent of the total population.

8. Species should be used that:
   - Are tolerant of site conditions.
   - Have few management problems.
   - Meet functional and esthetic needs.

TREE SELECTION:

The following characteristics shall be considered when selecting nursery stock:

1. Trunk and Branch Characteristics:
   - Buy plants that have a form typical of the species.
   - Shoots should show good vigor and growth.
   - Branches should be well spaced and have good branch attachment. Avoid narrow branch attachments that may have included bark.
   - Crowns should be reasonably free of wounds and/ or evidence of insect damage and/or disease.
   - Avoid topheavy trees that have been severely headed back.
   - Trunks should be straight, free from wounds or diseases, and show trunk flare and proper trunk taper.

2. Foliage Characteristics:
   - Foliage should have good color, with no sign of insect pests and/ or diseases.
   - There should be an adequate number and size of leaves.
   - Avoid trees with leaf margins that are scorched.

3. Rootball Characteristics:
   - All trees should have an adequate-size rootball as specified by the *American Standard for Nursery Stock*.
   - Roots should have a good connection with the shoots.
   - Ball and burlap rootballs should be covered with natural burlap.
   - Container plants should not be potbound.
   - Avoid plants with kinked root systems.
   - Avoid plants with weedy rootballs.

PLANTING/ INSTALLATION:

1. Dig the planting hole 2 to 3 times the diameter (width) of the rootball and no deeper than the depth of the rootball.

2. Remove rootball coverings that will impede root growth.

3. The rootball should be set so that the trunk flare is exactly at the existing grade in loamy or sandy soils, and above the existing grade in clayey or poorly drained soils.

4. Backfill firmly but without overly compacting the soil.

5. Do not cover the trunk with soil.

6. Form a 2-to 3-inch soil rim at the edge of the planting hole.

7. There is no need to fertilize trees at planting.

8. Create a mulch ring using a layer of 2 to 3 inches of mulch. Do not overapply mulch, and keep it away from the trunk.

9. Water the tree in well.

10. Prune to remove only dead, diseased, damaged, crossing branches, and competing leaders at planting time.

11. Stake only if necessary. Remove staking after 1 year to prevent girdling.

MAINTENANCE IN THE FIRST GROWING SEASON:

1. Water the plants as frequently as is necessary to keep rootball moist (but not too wet). As a rule of thumb, water 15 gallons once a week in the absence of rain and to a depth of 6 to 12 inches (best if applied using drip irrigation bags).

2. Maintain the 2- to 3-inch mulch layer.

3. Use fertilizer only if determined, by visual inspection of growth and/or by a nutrient analysis test, that the plant requires additional nutrients.

4. After the first growing season, evaluate the structure of the plant and do any necessary structural pruning.

ANNUAL MAINTENANCE:

1. All maintenance activities shall be in accordance with the ANSI Z133.1-1994 standard.

2. Mulch:
   • Mulch should be maintained at a depth of 2 to 3 inches.
   • Mulch as much of the area underneath the crown canopy as possible.
   • Do not allow mulch to touch the tree trunk.

3. Pruning:
   • The main goal of pruning shall be to encourage the growth of several large permanent branches called scaffold branches. Secondary goals will include removing dead wood and pruning for public safety, such as sidewalks and buildings.[16]
   • Pruning shall take place in accordance with the priorities identified by the tree inventory or through observation by the City Forester and crew. Every attempt shall be made to correct hazardous conditions first.
   • Tree trimmers shall maintain line clearance tree-trimmer certification. This will enhance safety in daily operations, provide for compliance with national standards, and allow for mutually beneficial municipal-utility operations.
   • Older trees of weak-wooded species should be inspected at least once a year.
   • Volunteers and citizen pruners should train young trees to develop sound branching structure and good overall form.
   • Wounds created by pruning shall not be treated.

TREE REMOVAL:

1. Trees shall be removed on the basis of safety first and foremost. Hazardous trees shall have the highest priority.

2. Dead trees: If a tree has a target and is dead or more than 50 percent of its major limbs are dead and the tree has a history of decline, it should be removed.

3. Trunk decay: Trees that have lost more than one-third of their strength should be removed. Removal of trees with less than 33-percent strength loss should be considered when other structural defects are present.

4. If the tree is not an imminent hazard, notice of its removal should be given at least 2 weeks before removal.

5. Every effort shall be made to explain the need for a tree's removal when questioned by the property owner or neighbors.

[16]For more information on timelines for pruning see Argent. M. 2000. Pruning. In: Kuser, J., ed. Handbook of urban and community forestry in the Northeast. New York: Kluwer Academic/Plenum Publishers: 205-213.

City of Syracuse Municipal Tree Ordinance

NOTE: The following ordinance information contains excerpts from the Syracuse-Chapter Ordinance and local law pertaining to the management of municipal trees. For a complete listing of City ordinances, contact the City of Syracuse Bureau of Research.

CHAPTER 15. DEPARTMENT OF PUBLIC WORKS

Section 5-1501. Functions.
The department of public works, headed by the commissioner of public works, shall:

(36) Perform for the department of parks, recreation and youth programs maintenance of recreational facilities, equipment, and other recreational property of the City, including, but not limited to, the City parks and care for the shade trees of the City.

LOCAL LAW No. 7, 1995. City of Syracuse

A LOCAL LAW OF THE CITY OF SYRACUSE AMENDING THE CHARTER OF THE CITY OF SYRACUSE-1960, AS AMENDED, TO … AND TO TRANSFER CERTAIN DEPARTMENT OF PARKS, RECREATION AND YOUTH PROGRAMS MAINTENANCE FUNCTIONS TO THE DEPARTMENT OF PUBLIC WORKS.

Section 3. Article V, Chapter 12, Section 5-1201, of the Charter of the City of Syracuse- 1960, as amended, entitled Department of Parks, Recreation and Youth Programs, is amended to read as follows:

Section 5-1201. Functions.
The Department of Parks, Recreation and Youth Programs, headed by a Commissioner of Parks, Recreation and Youth Programs, shall:
(4) Care for the shade trees of the City, which shall be accomplished through the Department of Public Works in accordance with Section 5-1501 of this Charter.

CHAPTER 22. MUNICIPAL TREES

Sec. 22-1. Definitions
As used in this chapter:

Street tree shall be defined as any tree in or on a City street right-of-way including those trees on public right-of-way land between a sidewalk and the adjacent property line.

Tree shall be defined as any perennial woody plant having a potential mature height in excess on 10 feet.

Vegetation shall be defined as any perennial woody plant.

Sec. 22-4. Planting of trees; permit.
(A) No person shall plant in a City street right-of-way or public place without a written permit from the commissioner of public works, and the conditions contained in said permit must not be violated. Trees other than those specified in said permit must not be planted.

(B) Any tree planted in or on a City street right-of-way or public place will be considered a permanent fixture and will become the property of the City of Syracuse.

(C) The department of public works is authorized to plant trees on City street rights-of-way and public places.

Sec. 22-5. Maintenance and removal of trees; permit.
(A) No person shall cut down any tree in or on a City street right-of-way or public place, or cut any branch or limb therefrom, or otherwise disrupt of degrade tree form or health, without a written permit from the commissioner of public works.

(B) The department of parks and recreation is responsible for maintaining street trees so as to not obstruct or interfere with normal pedestrian or vehicular traffic.

(C) The department of parks and recreation is authorized to remove, trim, or maintain any tree in or on a City street right-of-way or public place.

Sec. 22-6. Trimming for overhead utility line clearance permit.
(A) No public service corporation or agent thereof shall trim trees in or on City street right-or-way or public places for overhead utility line clearance without a written permit from the commissioner of parks and recreation. All conditions contained in said permit must not be violated.

(B) All employees or agents of any public service corporation operating under a permit to trim trees for overhead utility line clearance must, upon the request of any resident, give their full name, by whom they are employed and for which public service corporation such work is being done.

Sec. 22-7. Cutting of tree roots, permit.
(A) No person shall cut, sever, remove or otherwise injure any tree root larger than five (5) inches in diameter under the canopy or crown of any tree in or on any street right-of-way or other public place without a written permit from the commissioner of parks and recreation. A permit shall be applied for in advance of

any construction work involving probable damage to tree roots.

(B) Tree roots larger than five (5) inches in diameter may be removed without a permit only during work done when necessary to alleviate an emergency situation. The commissioner of parks and recreation must be notified within two (2) weeks following an emergency work where tree roots larger than five (5) inches were cut.

(C) Any person who cuts tree roots larger than five (5) inches in diameter without a permit, or any person who fails to notify the commissioner of parks and recreation following root cutting during work done when necessary to alleviate an emergency situation shall be liable for any damage that results from a tree uprooting due to structural instability as a result of the tree root being cut.

Sec. 22-8. Damage to trees.
(A) No person shall injure, mutilate, deface or intentionally vandalize any tree in a City street right-of-way or public place.

(B) Suitable guards shall be placed around all nearby trees in or on any street right-of-way or public place so as to prevent breaking, debarking, or injury to any part of the tree or its root system during any above or below ground construction for paving, grading, building construction, or curbing, sidewalk and utility line installation.

(C) No person shall allow any toxic chemical to seep, drain, or be emptied on or around any tree.

(D) No person shall affix, attach, post or hang any sign, poster, banner or advertisement in any form to any tree in or on a City street right-of-way or public place.

(E) In the event of any damage to a tree growing in or on any City street right-of-way or public place, a report of such damage shall be made to the commissioner of parks and recreation. Repair, removal or replanting necessitated by such damage shall be done by the department of parks and recreation, and the City of Syracuse may collect the expense of such repair, removal or replanting from the person or persons responsible for the damage.

Sec. 22-9. Paving around trees restricted.
No person shall place concrete, asphalt, blacktop or any substance impervious to air or water, excluding paving for driveways and sidewalks, over the root system of any street tree.

Sec. 22-10. Tree removal or tree trimming on private property.
(A) The commissioner of parks and recreation shall have the authority to notify in writing the owner of any property containing any hazardous or diseased trees which require trimming or removal when such trees constitute a hazard to life, property or public safety or when such trees are host to insect pests or disease which constitute a threat to other trees within the City of Syracuse.

(B) In the event of failure of any property owner to trim or remove a hazardous or diseased tree after such time as designated in the notification, the commissioner of parks and recreation shall have the authority to cause the trimming or removal of said tree and the expense incurred shall be assessed against the property owners tax notice.

Sec. 22-11. Penalties.
Any person adjudged to have violated the provisions of sections …. Herein shall be guilty of a violation which shall be punishable by imprisonment which shall not exceed fifteen (15) days or shall be liable to pay a fine not to exceed one hundred fifty dollars ($150.00) or both.

Nowak, David J.; O'Connor, Paul R., comps. 2001. **Syracuse urban forest master plan: guiding the city's forest resource into the 21st century.** Gen. Tech. Rep. NE-287. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 50 p.

The Syracuse Urban Forest Master Plan is one of the most comprehensive urban forest assessments ever developed for a city. This report combines a high-resolution digital urban cover map with field vegetation sampling data from all land uses, a 100-percent street-tree inventory, a survey of city residents regarding desirable and undesirable tree characteristics and functions, and a survey of local tree experts on the best trees for various city conditions. These data provide a wealth of information related to the urban forest resource and its management, and were used to develop 10 recommendations to help guide urban forest management in Syracuse in the 21st century.

Keywords: urban forestry, urban tree cover, street-tree inventory, public survey, urban forest planning

Headquarters of the Northeastern Research Station is in Newtown Square, Pennsylvania. Field laboratories are maintained at:

Amherst, Massachusetts, in cooperation with the University of Massachusetts

Burlington, Vermont, in cooperation with the University of Vermont

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Durham, New Hampshire, in cooperation with the University of New Hampshire

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Morgantown, West Virginia, in cooperation with West Virginia University

Parsons, West Virginia

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Syracuse, New York, in cooperation with the State University of New York, College of Environmental Sciences and Forestry at Syracuse University

Warren, Pennsylvania

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