



CITY OF COLUMBUS STREET TREE INVENTORY SUMMARY REPORT



THE CITY OF
COLUMBUS
RECREATION AND PARKS

SPRING 2023



CITY OF COLUMBUS

PROJECT OVERVIEW

In 2020, Columbus Recreation and Parks Department commissioned a pilot neighborhood street tree inventory and summary report for the South Linden community. In 2021, six more communities were inventoried and reports were created. In 2022, tree inventory data was collected for the rest of the city, with neighborhood reports complete in 2023 for a total of 41 reports. This tree inventory is a result of the citywide Urban Forestry Master Plan (UFMP).

COMMUNITY OVERVIEW

The City of Columbus has an estimated population of 907,971 residents, which makes it the nation's 14th largest city. Columbus is one of the fastest growing cities in the midwestern United States, and population growth is expected to continue. The City's Department of Public Service maintains 5,678 road miles in Columbus. The current tree canopy cover in Columbus is 22%.

COLUMBUS' URBAN FOREST GOALS



VISION FOR THE URBAN FOREST

To prioritize, preserve, and grow the tree canopy in Columbus equitably across neighborhoods, to improve health and quality of life for all residents.

URBAN FORESTRY MASTER PLAN ACTION STEPS

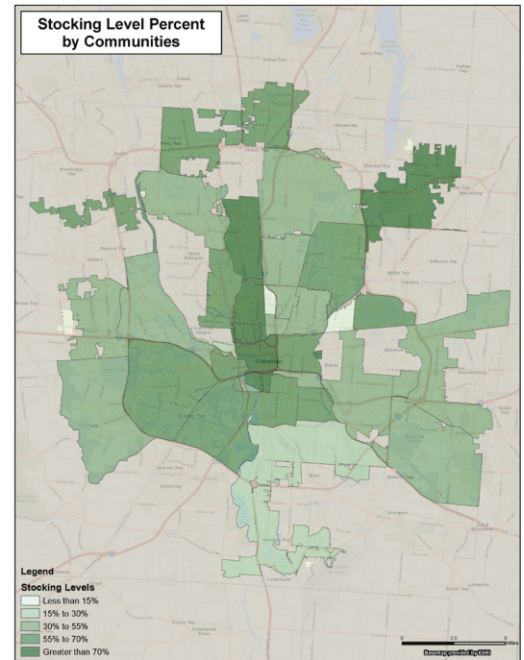
This citywide tree inventory directly addresses the following Action Steps in the City's UFMP.

- 1. Share Tree Data with the Community (Action Step 4)**
Neighborhood summary reports compile tree inventory data and suggestions for use by community members.
- 2. Tree Planting: Prioritize Efforts Based on Equity (Action Step 6)**
The tree inventory identified planting sites in each neighborhood. Using the existing Equity Score Rankings, this data will be used to prioritize equitable planting projects.
- 3. Obtain and Maintain Updated Essential Tree Data (Action Step 13)**
By inventorying every tree and planting space in the street right-of-way, CRPD now has updated data to use when making decisions regarding the management of the urban forest.

225,982

Sites Inventoried

125,796 Trees **96,498** Planting Sites **3,688** Stumps



OVERALL CONDITION OF COLUMBUS' INVENTORIED TREES: **GOOD**



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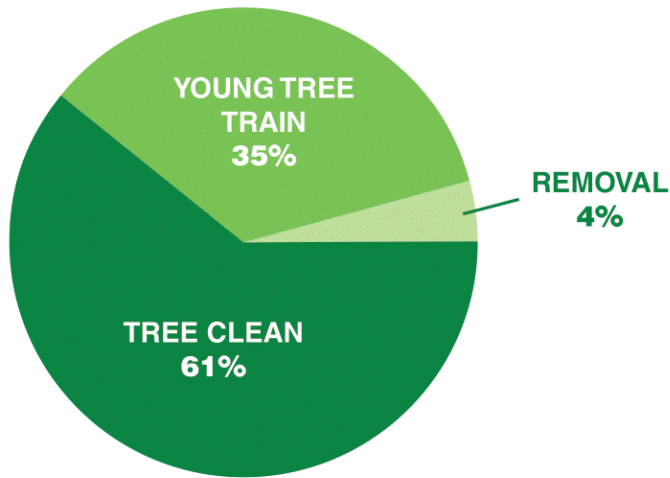


Inventory Details

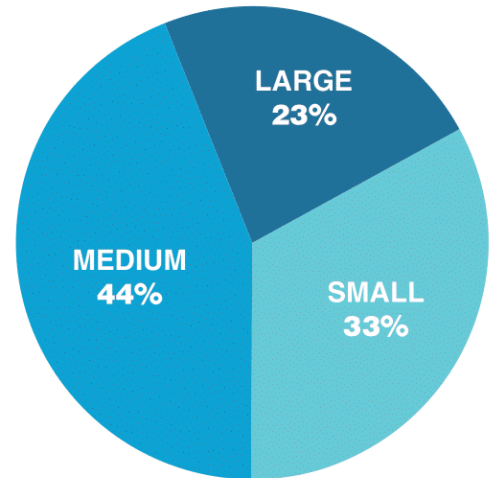
DRG's team of ISA Certified Arborists completed the tree inventory in 2022.



TREES BY MAINTENANCE RECOMMENDATION



PLANTING SITES BY TREE SIZE



\$248 million

Estimated value of Columbus' inventoried street trees.

826 metric tons

Annual CO₂ captured

31 tons

Annual air pollutants removed

19.5 million gallons

Annual stormwater runoff intercepted



CREATING EQUITABLE CANOPY COVER

Implementation of the following action steps will significantly increase canopy cover over time, provide greater value and more benefits to the city's residents, and help the city realize its vision and achieve its goals for the urban forest.

THE WAY FORWARD: ACTION STEPS

1. Preserve and maintain existing canopy.
2. Prioritize planting of large- and medium-size planting sites.
3. Develop neighborhood tree planting initiatives and community outreach focused on planting trees on private property.
4. Explore retrofitting existing street infrastructure and updating design standards to expand and improve available tree growing spaces.

Contact Info

Inventory Details

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Cover photo: courtesy of Randall Schieber



Notice of Disclaimer: Inventory data provided by Davey Resource Group, Inc. "DRG" are based on visual recording at the time of inspection. Visual records do not include individual testing or analysis, nor do they include aerial or subterranean inspection. DRG is not responsible for the discovery or identification of hidden or otherwise non-observable hazards. Records may not remain accurate after inspection due to the variable deterioration of inventoried material. DRG provides no warranty with respect to the fitness of the urban forest for any use or purpose whatsoever. Clients may choose to accept or disregard DRG's recommendations or to seek additional advice. Important: know and understand that visual inspection is confined to the designated subject tree(s) and that the inspections for this project are performed in the interest of facts of the tree(s) without prejudice to or for any other service or any interested party.

SECTION 1: STRUCTURE, COMPOSITION, AND MAINTENANCE

Columbus Recreation and Parks Department (CRPD) prioritized updating the City’s stree tree inventory and summarizing inventory results by community. Columbus is the nation’s 14th largest city and one of the fastest growing cities in the Midwest with a population of 906,971. The City’s Department of Public Service maintains 5,678 roadmiles. Columbus has a tree canopy cover of 22%. Each community in the City received an individual summary report (Map 1). The City of Columbus community street tree inventory supports the Columbus *Urban Forestry Master Plan* (UFMP). Tree inventory data represents a moment in time because trees are living organisms, which is why it is important for the city to update data routinely.

225,982 SITES INVENTORIED

From 2020-2022, Davey Resource Group (DRG) arborists performed field data collection and catalogued new data on potential viable planting sites, existing trees, and tree stumps located within the ROW of the City of Columbus (Figure 1).

Of the 225,982 total inventoried sites:

- 56% = Existing street trees
- 43% = Potential planting sites
- 2% = Existing stumps

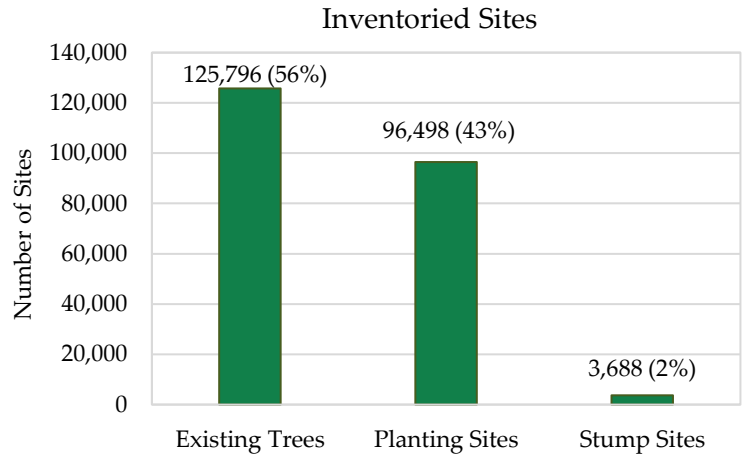


Figure 1. Quantity of inventoried sites by site type.

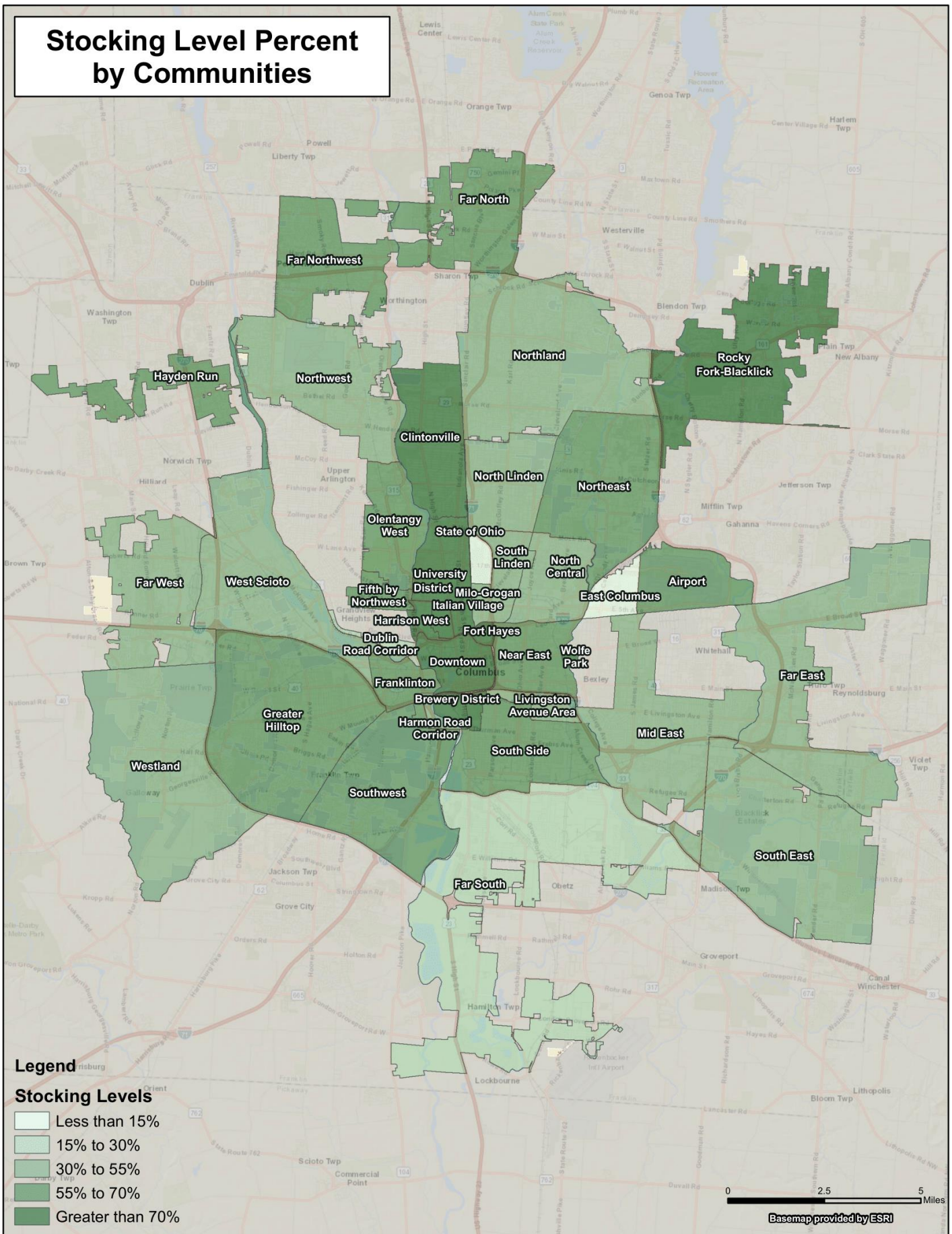
A wealth of vacant planting sites is an opportunity to increase tree canopy cover

Stocking level is a forestry term used to report the ratio of existing street trees to the total number of suitable tree locations within the street ROW, which includes trees, stumps, and vacant planting locations. Stocking level varies across the city (Map 2 and Appendix A); this figure represents a statistical average.

The stocking level of the City of Columbus right-of-way is currently 56%. This means there is ample opportunity to plant additional trees in the right-of-way that will continue to grow and add canopy while CRPD continues to plant throughout the city in future targeted efforts, which will be driven by the results of the inventory update and analysis and the equity score of each community as reported in the Urban Forestry Master Plan.



Stocking Level Percent by Communities



Map 1. Stocking level of Columbus communities. Stocking level is the ratio of existing street trees to available planting spaces and varies across the city. Stocking level by community can be found in Appendix A.

IMPROVE STREET TREE POPULATION DIVERSITY

Urban forest resiliency is positively correlated with tree population diversity; greater diversity helps reduce exposure to harmful pests and disease which can target individual tree species, groups of species, or even entire tree genera.

Species and genus diversity distributions offer a critical measure of a tree population’s resiliency to such attacks and help managers to identify and remedy potential areas of overexposure. **Action Item 6.3 in the city’s UFMP recommends that Columbus increase the species diversity of the urban forest by prioritizing the planting of underrepresented species.**

When assessing tree population diversity, it is widely accepted that **no more than 10% of an urban tree population should be composed of a single species and no greater than 20% from a single genus.**

Species Distribution is Balanced

A total of 330 unique tree species were catalogued. Of the five most abundant tree species recorded during the inventory, no species exceeded the 10% threshold (Figure 2). Red maple is the most abundant species found within the community’s street ROW, accounting for 9% of all inventoried trees.

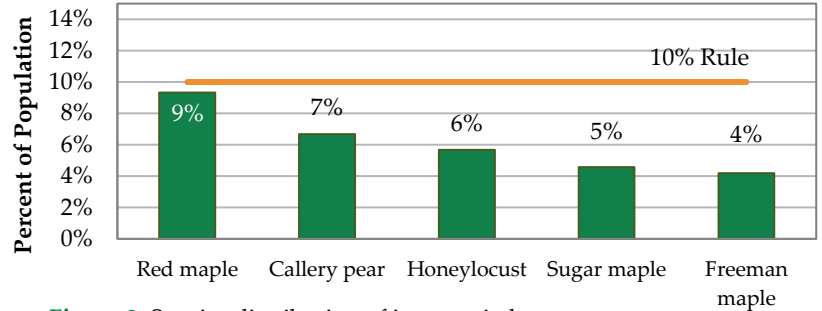


Figure 2. Species distribution of inventoried trees.

Genus Distribution is Skewed

Columbus has 97 unique tree genera, or groups of tree species, that are closely related (Figure 3).

The genus *Acer*, which is composed of maple trees, accounts for 30% of the entire inventoried population—which exceeds the suggested threshold of 20%.

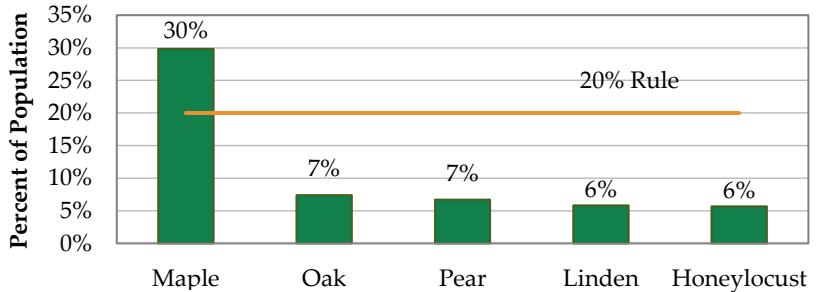


Figure 3. Genus distribution of inventoried trees.

Family Distribution is Skewed

Sapindaceae, the family that maple and buckeye belong to, are overrepresented in Columbus’ urban forest (Figure 4).

Future tree plantings across the city should consider diversity to the family level to limit disease vulnerability (see Appendix B for species recommendations).

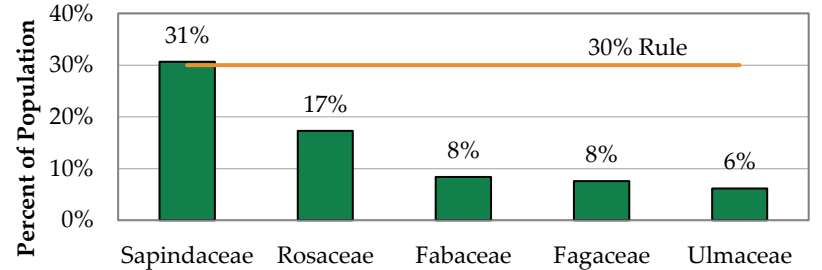


Figure 4. Family distribution of inventoried trees

Maple Trees are Overrepresented

Future planting initiatives should minimize the installation of additional maples across the city until representation of the genus *Acer* no longer exceeds the recommended 20% threshold and representation from the family *Sapindaceae* falls below the recommended 30% threshold.

Maple trees are susceptible to a variety of harmful pests and disease, including the fungal pathogen Verticillium wilt (*Verticillium* spp.) and the invasive Asian longhorned beetle (ALB, *Anoplophora glabripennis*). Improved genus and family diversity in the urban forest will reduce the potential for tree loss and help ensure long-term urban forest health and viability. Additionally, CRPD should take into account tree diversity on a community level for future tree plantings as community needs may be more specific.

OVERALL TREE CONDITION IS GOOD

The condition of each inventoried tree was evaluated and rated as good, fair, poor, or dead. Several factors affecting condition were considered for each tree, including root characteristics, branch structure, trunk, canopy, foliage condition, and the presence of pests.

The general health of the inventoried tree population is characterized by the median average condition rating. Overall, **Columbus’ street trees are in good condition** (Figure 5).

Routine Inspections Are Key

Proactive monitoring helps identify, prevent, and mitigate concerns. Routine tree inspections are necessary to monitor for changes in tree condition, the presence of pests and/or disease, or the worsening of existing defects – particularly among trees rated in poor condition.

Poor condition ratings are generally due to visible signs of decline and stress, such as decay, dead limbs, or discolored foliage. If retained, these trees will likely require corrective pruning and intensive plant health care to improve their vigor. Dead trees and trees with defects that cannot be remedied should be removed as soon as possible.

The Columbus UFMP Action Step 8 calls for more proactive care of public trees. Identifying the primary maintenance need for each tree in the right-of-way allows CRPD to prioritize street tree maintenance based on current tree inventory data.

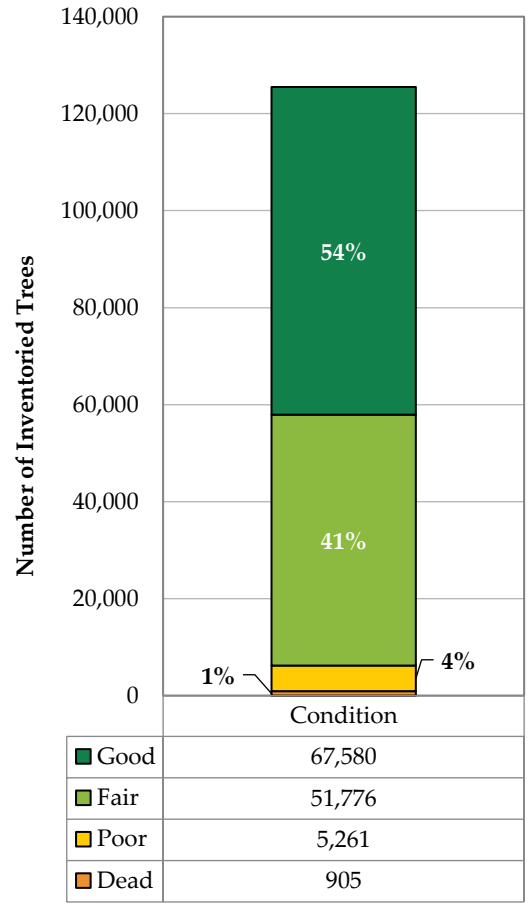
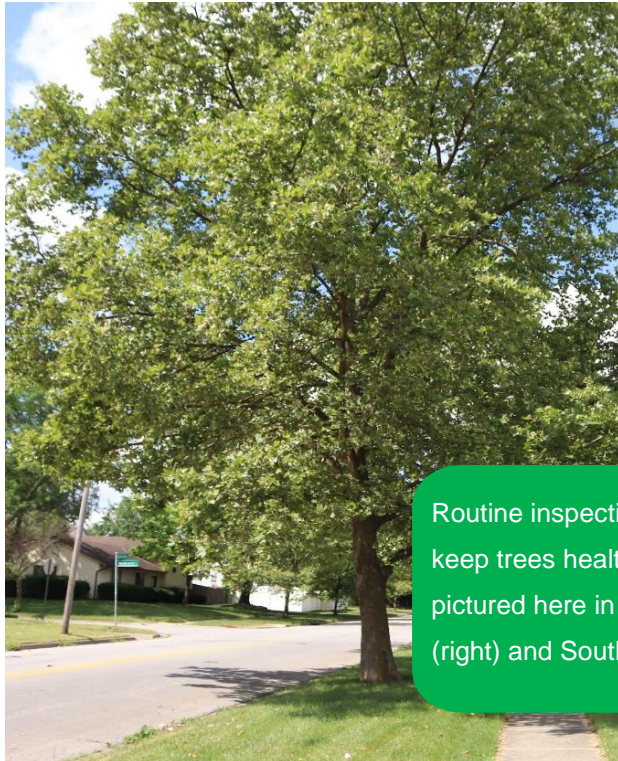


Figure 5. Condition of inventoried trees.



Routine inspection and maintenance helps to keep trees healthy, like the street trees pictured here in the Far Northwest community (right) and Southwest community (left).

TREE DIAMETER-AGE DISTRIBUTION

Understanding the relative age of a tree population allows planners to align future management strategies with current policy goals. To determine relative tree age, DRG categorized the city’s inventoried street trees by small- and large-growing trees and assigned each tree to an age grouping based on the tree’s diameter at breast height (DBH) as outlined in Table 1.¹ Small-growing trees mature to a maximum of 25 ft and have a smaller diameter at maturity than large-growing trees which mature to over 50 ft.

Table 1. Tree age by growing size at maturity and diameter at breast height (DBH).

Relative Tree Age	Large-Growing		Small-Growing		Combined	Combined
	DBH	Quantity	DBH	Quantity	Quantity	Percentage
Young	0–8"	45,141	0–4"	11,563	56,704	45%
Established	9–17"	36,642	5–8"	8,327	44,969	36%
Maturing	18–24"	10,322	9–12"	4,310	14,632	12%
Mature	> 24"	7,355	>12"	2,036	9,391	7%

The relative age distribution of Columbus’ inventoried tree population was then compared to an ideal distribution for an expanding urban forest, which states that a sustainable urban forest should have a mix of age classes equivalent to 40% young trees, 30% establishing, 20% maturing, and 10% mature trees (Figure 6). **Age diversity provides canopy resiliency and prevent a major loss of canopy when mature trees die and require removal at the same time.**

An Overabundance of Young Trees

Overall, 45% of Columbus’ inventoried trees are classified as young, which exceeds the ideal threshold of 40%, and 36% are classified as established, which exceeds the ideal threshold of 30%. A high population of younger trees can be explained by the widespread removal and replacement of mature ash trees due to emerald ash borer and the development of new residential areas happening in Columbus as the city grows. Future maintenance should prioritize activities that help establish these young trees in the urban landscape through pruning to train future tree growth, watering programs, and routine tree health inspections.

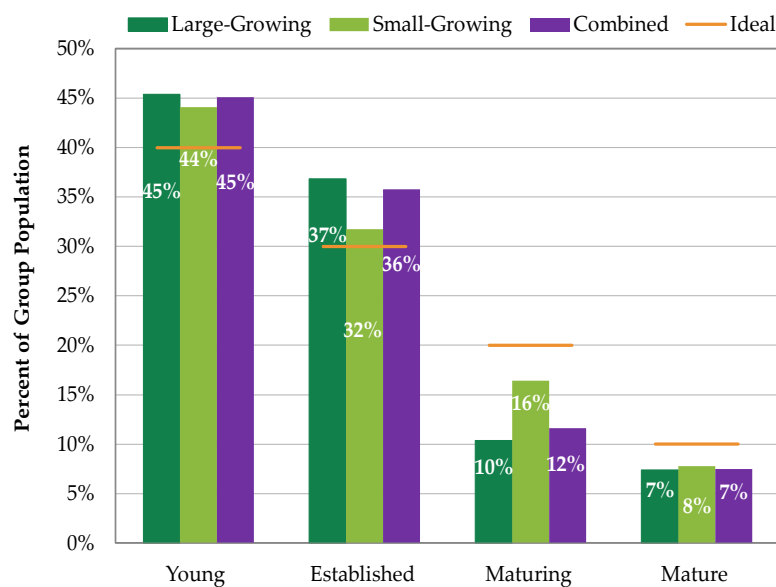


Figure 6. Distribution of relative tree age by diameter size class

A Young Urban Forest Provides Limited Benefits

There are insufficient maturing and mature trees in Columbus’ urban forest, with 12% of inventoried trees classified as maturing and 7% classified as mature, below the respective thresholds of 20% and 10%. Proactive maintenance to promote the longevity of maturing and mature trees, especially large-form trees in fair and good condition, will help ensure that the existing mature trees continue to thrive and provide canopy while young and establishing trees continue to grow.

¹ Tree size is only a rough approximation of tree age; tree size alone is not a definitive or appropriate measure of tree age. In the urban environment in particular, numerous factors play a role in determining tree size, including the availability of water, soil, and sunlight, proper tree care and planting techniques, the presence of pests and pathogens, etc.

TREE MAINTENANCE RECOMMENDATIONS

During the inventory, DRG arborists assigned a primary recommended maintenance activity to each of the 125,796 inventoried trees (Figure 7). This is in line with Action Item 8 from the UFMP: transition to proactive care of public trees.

City managers generally prioritize maintenance activities by risk. For example, a large dead tree by a busy intersection should be removed before a small dead tree at the end of a little-used secondary street. **Understanding the top maintenance need for each tree allows CRPD to proactively prioritize tree maintenance across the city in a more efficient and cost-effective manner.**

PRIMARY MAINTENANCE CATEGORIES

Tree Cleaning = 76,592 Trees

Tree cleaning describes pruning to remove dead, dying, broken, decayed, and/or crossing limbs. Trees in this category are recommended for inclusion in a regularly scheduled, routine maintenance program. Over time, routine pruning minimizes the occurrence of reactive maintenance.

Tree Removal = 5,125 Trees

Across the city, 5,125 trees are designated for removal, representing 4% of the total inventoried tree population. City Forestry only removes trees that are hazardous: either dead, dying, or dangerous to public safety.

Young Tree Training = 44,079 Trees

Younger trees can have branch structures that lead to potential problems as the tree ages. These trees should be pruned to train future growth patterns and correct or eliminate weak, interfering, or objectionable branches to minimize future maintenance requirements.

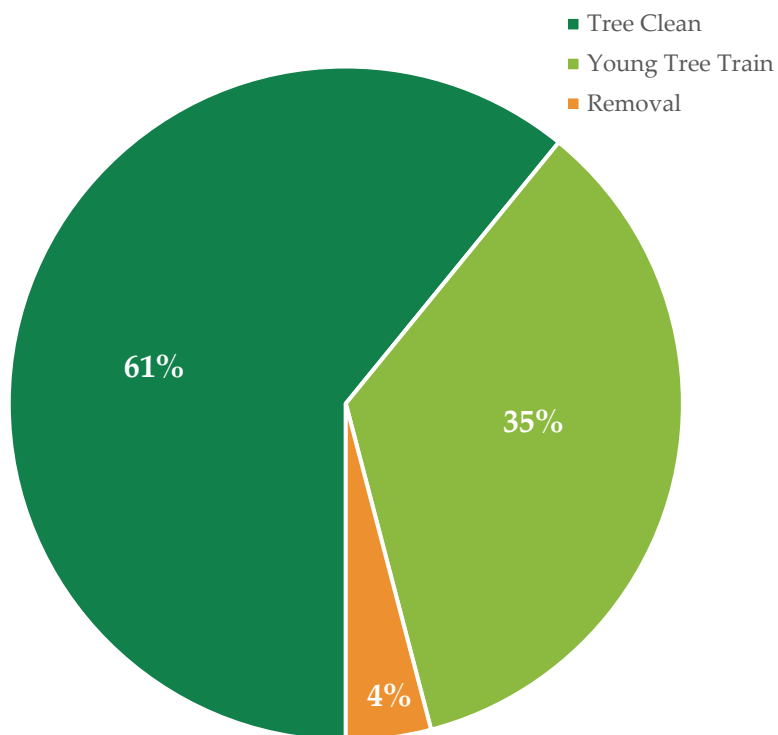


Figure 7. Primary maintenance recommendations for 125,796 trees across the city, by type.

SECTION 2: TREE BENEFITS

STRUCTURAL VALUE OF COLUMBUS' STREET TREES: \$248 MILLION

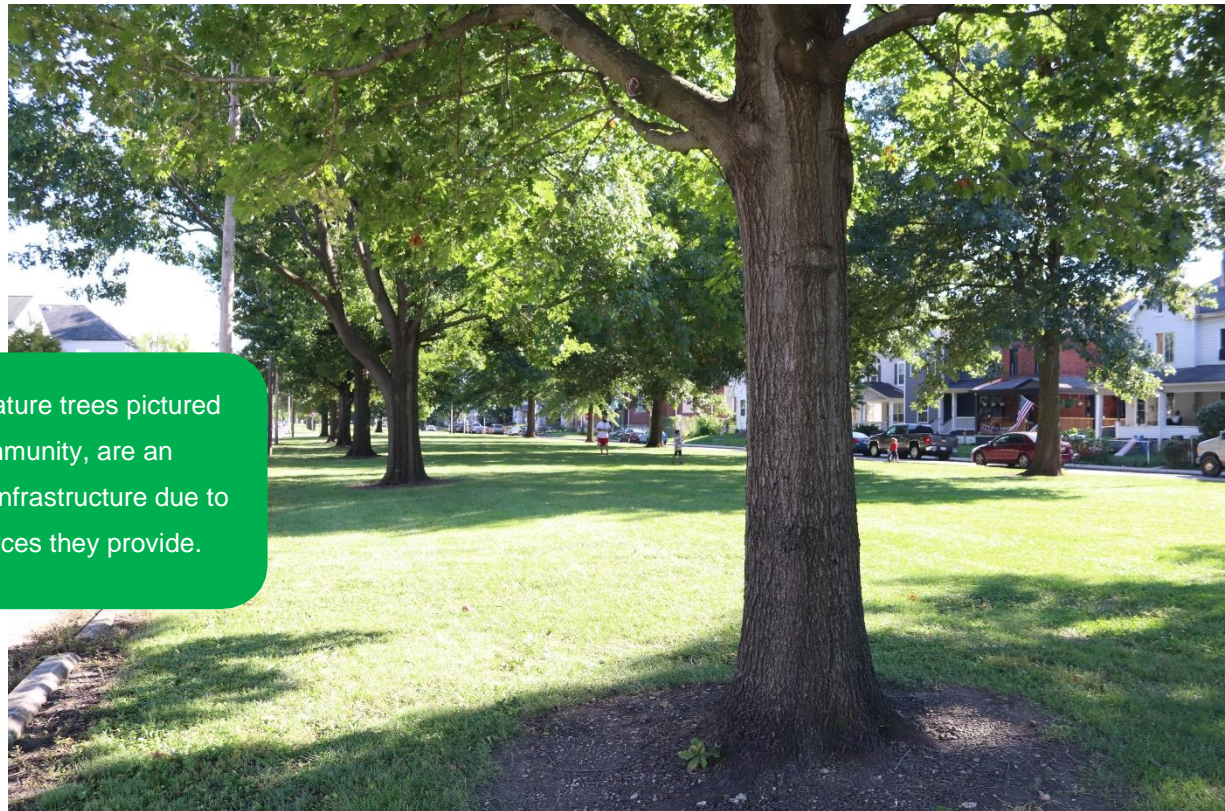
Trees are critical to public health and contribute significantly to quality of life for every community resident. In addition to improving air quality, water quality, and alleviating heat stress, trees provide significant social benefits such as reducing mental stress, encouraging greater neighborhood-level involvement, and fulfilling spiritual and aesthetic needs. **Structural value calculates the cost it would take to replace trees, meaning that all of the street trees in Columbus are estimated at \$248 million.**

Because of the significant value of these benefits, cities across the country now recognize trees are critical infrastructure. In fact, they are the only type of infrastructure that increases in value over time and have been proven to pay for themselves. Urban trees in the Midwest consistently provide benefits value three times more than the cost to maintain them.²

The 125,796 street trees inventoried across the city provide an ecosystem value of \$8.9 million through air filtration, water quality improvements, and carbon storage—and those are just the benefits quantified by this analysis (Table 2). Trees also boost property values, reduce energy costs, lower crime rates, and help create more successful business districts.³

Table 2. Estimated benefits provided by the City's street trees

Category	Value
Ecosystem Services	\$8,930,981.62
Structural Value	\$248,038,862.72
Combined Value	\$256,969,844.34
Per Tree Average	\$2,042.75
Per Capita Average	\$283.02



Street trees, like the mature trees pictured here in Franklinton community, are an important piece of city infrastructure due to the environmental services they provide.

² Peper, Paula J.; McPherson, E. Gregory; Simpson, James R.; Vargas, Kelaine E.; Xiao, Qingfu. 2009. Lower Midwest community tree guide: benefits, costs, and strategic planting. Gen. Tech. Rep. PSW-GTR-219. Albany, CA: U.S. Forest Service, Pacific Southwest Research Station. 115 p.

³ [See the Columbus Urban Forestry Master Plan for in-depth discussion on tree benefits and their impact on the city's residents.](#)

ECOSYSTEM SERVICES

Annual Carbon Captured – 1.8 million pounds

As the primary greenhouse gas driving climate change, carbon dioxide (CO₂) impacts people, property, and the environment. Trees are carbon sinks—constantly absorbing CO₂ from the atmosphere and storing it within tree tissue. Over the course of their lifetime, Columbus’ inventoried trees have captured over 43,613 metric tons of carbon. Using trees to sequester CO₂ is a key part of the Columbus *Climate Action Plan*’s goal to make the city more resilient.

Annual Air Pollution Removed – 68,630 pounds

Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term chronic health problems. Trees absorb gaseous pollutants such as ozone during respiration and trap particulate pollutants, such as PM_{2.5S}, on leaf surfaces before they can enter the atmosphere.

Annual Rainwater Intercepted – 19.5 million gallons

As cities grow, land that naturally absorbs rainwater (i.e., lawns, parks, fields) tends to be replaced by hard surfaces that cause rain to runoff (i.e., roads, buildings, parking lots). Rainwater flowing over these hard surfaces accumulates pollutants, and the contaminated stormwater flows into overloaded sewers, ultimately reaching the local lakes and streams. Polluted water is a major cause of human health issues and degrades the local ecology. Tree leaves intercept rainwater as it falls, which slows the rate at which stormwater enters sewer systems. Trees also absorb stormwater from the soil, and their roots help create more pore space in urban soils so that soils can absorb more water.

Structural Value – \$248 million

Structural value represents the cost to replace a given tree with an identical one. Structural value increases over time as more trees are planted and existing trees mature. The total value of the Columbus’ urban forest will grow considerably in future years as more trees are planted, existing trees are maintained and become healthier, and the city works toward achieving the goals of the UFMP.

Per Capita Value - \$283 Per Resident

The value of the street trees in Columbus per capita is \$283 (Table 2). By expanding the benefits of the urban forest through continued planting and maintenance efforts, the city’s urban forest will continue to add value for city residents and taxpayers.

As these trees in Deshler Park in the South Side community continue to mature, the value they provide to Columbus residents will grow accordingly.



SECTION 3: FUTURE CONSIDERATIONS

Every neighborhood deserves access to the benefits trees provide. With an estimated 22% canopy cover in Columbus, proactive and equitable tree planting and maintenance across the city is crucial for achieving citywide urban tree canopy goals. Realizing the vision and achieving the goals of the *Columbus Urban Forestry Master Plan* will take planned strategic effort guided, in part, by data analysis and application.

96,498 POTENTIAL PLANTING SITES

A key objective of the tree inventory update is to catalog and analyze growing spaces along the city's street ROW. Analysis results will inform future planting initiatives and help ensure the selection of the most appropriate tree species given the available growing spaces across the city.

DRG arborists found a total of 96,948 vacant sites suitable for planting trees. Vacant planting sites were evaluated for suitability for trees and characterized by size and type. DRG considered the presence of existing utilities, overhead lines, and distances from stop signs, fire hydrants, driveways, and other existing infrastructure in the evaluation of planting sites. About two-thirds of these sites (67%) could accommodate trees species that are large- or medium-sized at maturity (Figure 8).

Availability, size, and type of planting sites varies greatly by community. Please see Appendix A for a complete breakdown of planting sites by size and community.

31,689 Small Planting Sites

- Best suited for small-maturing trees.
- Minimum width of 3 to 5 feet.
- Located at least 20 feet from another tree.
- Includes all sites with overhead utilities, regardless of site width.

42,526 Medium Planting Sites

- Best suited for medium-maturing trees.
- Minimum width of 5 to 7 feet.
- Located at least 30 feet from another tree.

22,283 Large Planting Sites

- Best suited for large-maturing trees.
- Minimum width of greater than 7 feet.
- Located at least 40 feet from another tree.
- The highest quality potential planting site.

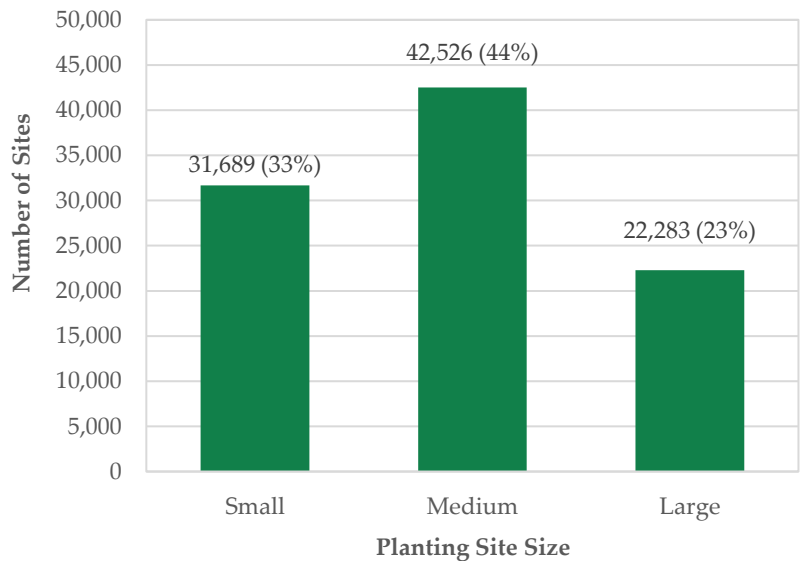


Figure 8. Vacant planting sites by size.

PLANTING CONSIDERATIONS

Site Selection: Urban environments constrain what tree species are appropriate. Existing infrastructure such as utilities and sidewalks, growing space size, and other trees all impact what tree is appropriate for a site.

Tree Selection: Tree species should be resilient to the urban environment, diverse, and the appropriate height and width for the growing space.

Blocking an unsightly view or creating shade may be a priority, but the impact of a tree on its environment – and vice versa – must be considered. Sustainable and successful planting initiatives select tree species that thrive and flourish in the chosen planting location in a way that harmonizes with the surrounding urban environment.

AN ABUNDANCE OF PLANTING SITES

The good news: With 96,948 potential planting locations, the neighborhood's street ROW is currently under its maximum capacity for trees. The quickest way to improve canopy cover is to plant more trees.

The better news: The majority of available sites, 67%, are suitable for medium and large trees (Figure 8). Larger-maturing trees provide more environmental benefits and canopy cover over the course of their lifetime than small trees. Planting medium and large trees is more impactful to improving canopy cover.

The best news: Using community equity scores, community tree canopy cover, and tree inventory data, medium and large trees in high-need neighborhoods with low tree canopy can be a top priority for CRPD planting efforts.

THE WAY FORWARD: ACTION STEPS

Investing in equitable canopy does not just entail increasing overall tree canopy cover through planting, but also addressing the quality of the trees, caring for the existing trees, planning for trees within the different land uses and infrastructure, and reaching out to residents about the importance of trees. Street tree inventory data will be used to prioritize planting and management of the street tree population. Inventory data requires regular updates since the urban forest is not a static asset; CRPD will need to include inventory updates in future management planning.

In Columbus, tree planting is needed for the neighborhood to be in line with the city's canopy goals, and the community will benefit from equitable investment to maintain and grow that canopy. With nearly three quarters of available planting locations that can accommodate a medium or large sized tree, there is ample opportunity to improve the urban forest. Given this set of facts, what can be done across the city to maximize growth of the neighborhood forest for the benefit of its residents, stakeholders, and the entire City of Columbus?

Maintain and Preserve Existing Trees (Near-Term)

It takes a long time for a young tree to become a large, stately mature shade tree. Preserving what is already there is a major component of an urban forest growth strategy.

Prioritize Planting of Large and Medium Sites (Short-Term)

Larger trees provide residents with greater benefits. Across the city, 22,283 large and 42,526 medium sites were identified. Planting in these locations will increase the amount of street trees by 33% and provide a solid foundation for maintaining and improving community canopy cover.

Explore Planting Beyond the Right-of-Way (Intermediate-Term)

Where insufficient space or overhead utilities restrict available planting options, planting on private property can allow for the selection of more desirable tree species. Urban forestry stewardship on private property will require education and outreach initiatives, as well as easy and low-cost access to trees.

Expand Right-of-Way Growing Spaces (Intermediate to Long-Term)

Future policy initiatives should consider options to improve available grow space, including retrofitting existing infrastructure and implementing design standards that provide adequate grow space for trees within street rights-of-way. Examples include the addition of bump-outs, expanding the size of tree lawns during utility or development projects, and exploring the use of green infrastructure technologies (e.g., silva cells, structural soils). Ensuring canopy equity requires sufficient growing space for trees to survive and thrive in an urban setting.

Ensure Tree Planting is Equitable (Near-Term to Long-Term)

In order for canopy expansion to benefit all Columbus residents, future planting plans must put equity at the forefront. By using the Community Equity Scores to prioritize planting in vacant spots in communities that score as highest need, CRPD can plant in neighborhoods where trees are needed most.

APPENDIX A

AVAILABLE PLANTING SITES BY COMMUNITY

This table shows the available planting sites by community and the percentage of those sites that can accommodate trees that will be large at maturity (over 50 ft. tall). Communities are sorted by equity score. Six communities do not have equity scores because they have population densities one or more standard deviation less than the mean population density.

Community	Equity Score	Canopy Cover ⁴	Available Planting Spaces	Percentage of Medium/Large Sites	Stocking Level
South Linden	3.9	21%	1,342	69%	46%
Milo-Grogan	3.9	16%	585	12%	46%
Livingston Ave. Area	3.3	22%	962	48%	55%
Franklinton	3.3	15%	930	15%	58%
North Central	3.2	25%	2,359	29%	46%
East Columbus	3.1	21%	1,437	42%	15%
North Linden	3.0	28%	3,114	54%	44%
Near East	3.0	24%	1,823	51%	70%
South Side	2.9	18%	3,789	19%	56%
Northeast	2.9	31%	2,099	70%	66%
Greater Hilltop	2.9	23%	4,162	57%	63%
Southwest	2.8	18%	2,576	47%	62%
Mid East	2.8	28%	7,588	75%	48%
South East	2.6	15%	3,409	89%	47%
Far South	2.4	19%	7,829	29%	30%
Northland	2.2	25%	11,385	86%	46%
Downtown	2.2	9%	229	31%	92%
Italian Village	2.2	11%	82	24%	90%
University District	2.0	22%	1,020	36%	79%
Far East	1.8	25%	4,250	89%	54%
Westland	1.8	13%	3,672	88%	51%
Olentangy West	1.1	22%	608	73%	60%
Northwest	1.1	24%	5,416	79%	41%
German Village	1.1	20%	153	24%	84%
Far North	1.1	20%	2,601	81%	65%
Harrison West	1.0	16%	157	49%	85%
Fifth by Northwest	1.0	14%	758	42%	60%
Far West	1.0	12%	4,556	86%	51%
West Scioto	0.9	21%	3,367	74%	50%
Rocky Fork-Blacklick	0.9	29%	2,319	81%	77%
Brewery District	0.9	14%	52	38%	81%
Victorian Village	0.8	23%	186	37%	85%
Hayden Run	0.7	13%	1,837	93%	61%
Clintonville	0.7	41%	1,730	51%	76%
Far Northwest	0.6	30%	5,519	89%	59%
Airport	N/A	7%	14	71%	59%
Dublin Road Corridor	N/A	15%	122	10%	18%
Fort Hayes	N/A	7%	4	100%	84%
Harmon Road Corridor	N/A	23%	88	31%	31%
State of Ohio	N/A	8%	57	46%	8%
Wolfe Parke	N/A	49%	4	100%	96%

⁴ Columbus Urban Forestry Management Plan, 2015.

APPENDIX B

B.1 SPECIES DIVERSITY

The table below shows the top 80 species of trees found in the Columbus right-of-way, the total number of each species inventoried, and each species' total percentage of the entire street tree population. All top species from communities are represented in this table.

Rank	Scientific Name	Common Name	Number of Street Trees	Percentage of Street Tree Population
1	<i>Acer rubrum</i>	Red Maple	11,728	9.32%
2	<i>Pyrus calleryana</i>	Callery pear	8,400	6.68%
3	<i>Gleditsia triacanthos</i>	Honeylocust	7,143	5.68%
4	<i>Acer saccharum</i>	Sugar maple	5,764	4.58%
5	<i>Acer x freemanii</i>	Freeman maple	5,273	4.19%
6	<i>Acer platanoides</i>	Norway maple	4,684	3.72%
7	<i>Tilia cordata</i>	Littleleaf linden	4,672	3.71%
8	<i>Platanus x acerifolia</i>	London planetree	4,602	3.66%
9	<i>Syringa reticulata</i>	Japanese lilac-tree	3,727	2.96%
10	<i>Ulmus x</i>	Elm, Hybrid	3,203	2.55%
11	<i>Malus x</i>	Crabapple	2,917	2.32%
12	<i>Prunus species</i>	Plum species	2,796	2.22%
13	<i>Carpinus betulus</i>	European hornbeam	2,502	1.99%
14	<i>Acer saccharinum</i>	Silver maple	2,422	1.93%
15	<i>Malus species</i>	Apple, species	2,378	1.89%
16	<i>Quercus rubra</i>	Northern red oak	2,143	1.70%
17	<i>Acer campestre</i>	Hedge maple	1,915	1.52%
18	<i>Tilia americana</i>	Basswood	1,872	1.49%
19	<i>Ulmus parvifolia</i>	Chinese elm	1,836	1.46%
20	<i>Quercus bicolor</i>	Swamp white oak	1,780	1.41%
21	<i>Quercus acutissima</i>	Sawtooth oak	1,459	1.16%
22	<i>Celtis occidentalis</i>	Common hackberry	1,438	1.14%
23	<i>Zelkova serrata</i>	Japanese zelkova	1,400	1.11%
24	<i>Cercis canadensis</i>	Eastern redbud	1,364	1.08%
25	<i>Prunus x</i>	Flowering cherry	1,343	1.07%
26	<i>Ginkgo biloba</i>	Ginkgo	1,281	1.02%
27	<i>Acer x 'Warrenred'</i>	Maple, Pacific Sunset	1,235	0.98%
28	<i>Liquidambar styraciflua</i>	Common sweetgum	1,157	0.92%
29	<i>Quercus palustris</i>	Pin oak	1,116	0.89%
30	<i>Acer miyabei</i>	Miyabe's maple	1,001	0.80%
31	<i>Acer ginnala</i>	Amur maple	988	0.79%
32	<i>Picea abies</i>	Norway spruce	973	0.77%
33	<i>Amelanchier species</i>	Serviceberry, species	960	0.76%
34	<i>Morus alba</i>	White mulberry	881	0.70%
35	<i>Eucommia ulmoides</i>	Hardy rubber tree	841	0.67%
36	<i>Picea pungens</i>	Blue spruce	812	0.65%
37	<i>Acer truncatum</i>	Shangtung maple	800	0.64%
38	<i>Cladrastis kentukea</i>	Yellowwood	796	0.63%

Rank	Scientific Name	Common Name	Number of Street Trees	Percentage of Street Tree Population
39	<i>Gymnocladus dioicus</i>	Kentucky coffeetree	750	0.60%
40	<i>Pinus strobus</i>	Eastern white pine	737	0.59%
41	<i>Tilia tomentosa</i>	Silver linden	724	0.58%
42	<i>Quercus imbricaria</i>	Single oak	635	0.50%
43	<i>Juglans nigra</i>	Black walnut	632	0.50%
44	<i>Ulmus pumila</i>	Siberian elm	624	0.50%
45	<i>Taxodium distichum</i>	Bald-cypress	562	0.45%
46	<i>Fraxinus pennsylvanica</i>	Green ash	556	0.44%
47	<i>Thuja occidentalis</i>	Arborvitae	545	0.43%
48	<i>Liriodendron tulipifera</i>	Tulip tree	522	0.41%
49	<i>Quercus macrocarpa</i>	Bur oak	486	0.39%
50	<i>Amelanchier laevis</i>	Allegheny serviceberry	485	0.39%
51	<i>Betula nigra</i>	River birch	461	0.37%
52	<i>Quercus shumardii</i>	Shumard oak	457	0.36%
53	<i>Cornus florida</i>	Flowering dogwood	456	0.36%
54	<i>Acer buergerianum</i>	Trident maple	456	0.36%
55	<i>Ulmus americana</i>	American elm	455	0.36%
56	<i>Fraxinus americana</i>	White ash	447	0.36%
57	<i>Crataegus species</i>	Hawthorn, species	437	0.35%
58	<i>Catalpa speciosa</i>	Northern catalpa	436	0.35%
59	<i>Carpinus caroliniana</i>	American hornbeam	375	0.30%
60	<i>Amelanchier arborea</i>	Downy serviceberry	360	0.29%
61	<i>Ostrya virginiana</i>	Hophornbeam	339	0.27%
62	<i>Prunus virginiana</i>	Chokecherry	337	0.27%
63	<i>Ailanthus altissima</i>	Tree-of-heaven	316	0.25%
64	<i>Cornus mas</i>	Cornelian cherry dogwood	302	0.24%
65	<i>Acer palmatum</i>	Japanese maple	301	0.24%
66	<i>Acer x 'Keithsform'</i>	Maple, Norwegian Sunset	297	0.24%
67	<i>Thuja species</i>	Cedar species	296	0.24%
68	<i>Quercus robur</i>	English oak	280	0.22%
69	<i>Koelreuteria paniculata</i>	Goldenrain tree	265	0.21%
70	<i>Alnus glutinosa</i>	Black maple	264	0.21%
71	<i>Acer tataricum</i>	Tatarian maple	257	0.20%
72	<i>Maackia amurensis</i>	Amur maackia	255	0.20%
73	<i>Quercus lyrata</i>	Overcup oak	248	0.20%
74	<i>Magnolia virginiana</i>	Sweetbay magnolia	246	0.20%
75	<i>Acer negundo</i>	Boxelder	242	0.19%
76	<i>Platanus occidentalis</i>	American sycamore	241	0.19%
77	<i>Magnolia x soulangeana</i>	Saucer magnolia	234	0.19%
78	<i>Picea glauca</i>	White spruce	226	0.18%
79	<i>Juniperus virginiana</i>	Eastern redcedar	223	0.18%
80	<i>Quercus alba</i>	White oak	220	0.17%

B.2 DIVERSITY BY COMMUNITY

The table below shows an overview of urban forest diversity by community, whether a community is within the 10% species guideline and 20% genus guidelines, and the top species and genus inventoried in the community.

Community	Over 10% Species Rule	Over 20% Genus Rule	Top Species	Top Genus
South Linden	Yes	Yes	Amur maple	Maple
Milo-Grogan	No	Yes	Sugar maple	Maple
Livingston Ave. Area	Yes	Yes	Freeman maple	Maple
Franklinton	No	Yes	Callery pear	Maple
North Central	No	Yes	Amur maple	Maple
East Columbus	Yes	Yes	Freeman maple	Maple
North Linden	Yes	Yes	Freeman maple	Maple
Near East	No	Yes	Callery pear	Maple
South Side	No	Yes	Callery pear	Maple
Northeast	No	Yes	London planetree	Oak
Greater Hilltop	No	Yes	Sugar maple	Maple
Southwest	Yes	Yes	Callery pear	Maple
Mid East	No	Yes	Sugar maple	Maple
South East	No	Yes	Freeman maple	Maple
Far South	No	Yes	Freeman maple	Maple
Northland	No	Yes	Red maple	Maple
Downtown	Yes	Yes	London planetree	Planetree
Italian Village	Yes	Yes	Red maple	Maple
University District	No	Yes	Sugar maple	Maple
Far East	Yes	Yes	Red maple	Maple
Westland	Yes	Yes	Callery pear	Maple
Olentangy West	No	Yes	Freeman maple	Maple
Northwest	Yes	Yes	Callery pear	Maple
German Village	Yes	Yes	Callery pear	Pear
Far North	Yes	Yes	Red maple	Maple
Harrison West	Yes	Yes	Callery pear	Pear
Fifth by Northwest	No	Yes	London planetree	Maple
Far West	Yes	Yes	Callery pear	Maple
West Scioto	Yes	Yes	Red maple	Maple
Rocky Fork-Blacklick	Yes	Yes	Red maple	Maple
Brewery District	Yes	Yes	Honeylocust	Honeylocust
Victorian Village	Yes	Yes	London planetree	Maple
Hayden Run	Yes	Yes	Red maple	Maple
Clintonville	No	Yes	Sugar maple	Maple
Far Northwest	Yes	Yes	Red maple	Maple
Airport	Yes	Yes	Crabapple	Apple
Dublin Road Corridor	Yes	Yes	Cherry	Pine
Fort Hayes	Yes	Yes	Hybrid elm	Elm
Harmon Road Corridor	Yes	Yes	Hackberry	Hackberry
State of Ohio	Yes	Yes	Catalpa	Catalpa
Wolfe Park	Yes	Yes	London planetree	Planetree

APPENDIX C

RECOMMENDED SPECIES FOR PLANTING IN COLUMBUS, OHIO

The below tables show trees recommended for planting in Columbus, Ohio and is intended to be a guide only. The most up-to-date guide on recommended species for street trees is housed with Columbus' Forestry department and should be consulted during planning. Trees were selected for this guide based on hardiness (hardy to USDA Zone 6), species and genus diversity of the inventoried tree resource in Columbus, and prevalence in the nursery industry. Tree selection for right-of-way planting will depend on site-specific conditions, such as light, soil characteristics, growing space, and location to utilities. Trees with an asterisk are not recommended for street tree planting (due to site or soil sensitivities, form not conducive with ROW trees, or other reasons) but could be used in lawn, park, or other greenspace settings.

C.1 Deciduous Trees

Large Trees (Greater than 50 Feet in Height When Mature)

Scientific Name	Common Name	Cultivar	Native to Ohio
<i>Betula lenta</i> *	sweet birch		Yes
<i>Betula nigra</i>	river birch	Heritage®	Yes
<i>Carpinus betulus</i>	European hornbeam	'Pyramidalis'	No
<i>Carya illinoensis</i> *	pecan		
<i>Carya lacinata</i> *	shellbark hickory		Yes
<i>Carya ovata</i> *	shagbark hickory		Yes
<i>Castanea mollissima</i> *	Chinese chestnut		No
<i>Catalpa speciosa</i>	northern catalpa		Yes
<i>Celtis laevigata</i>	sugar hackberry		No
<i>Celtis occidentalis</i>	common hackberry	'Prairie Pride'	Yes
<i>Cercidiphyllum japonicum</i>	katsuratree	'Aureum'	No
<i>Diospyros virginiana</i> *	common persimmon		Yes
<i>Ginkgo biloba</i>	ginkgo	(Choose male trees only)	No
<i>Gleditsia triacanthos inermis</i>	thornless honeylocust	'Shademaster'	Yes
<i>Gymnocladus dioica</i>	Kentucky coffeetree	Espresso	Yes
<i>Juglans nigra</i> *	black walnut		Yes
<i>Liquidambar styraciflua</i>	American sweetgum	'Rotundiloba'	Yes
<i>Liriodendron tulipifera</i> *	tuliptree		Yes
<i>Magnolia acuminata</i> *	cucumbertree magnolia	(Numerous exist)	Yes
<i>Magnolia macrophylla</i> *	bigleaf magnolia		Yes
<i>Metasequoia glyptostroboides</i>	dawn redwood	'Emerald Feathers'	No
<i>Nyssa sylvatica</i>	black tupelo	(Numerous exist)	Yes
<i>Platanus occidentalis</i> *	American sycamore		Yes
<i>Platanus × acerifolia</i>	London planetree	'Yarwood'	No
<i>Quercus alba</i>	white oak		Yes
<i>Quercus lyrata</i>	overcup oak		No
<i>Quercus macrocarpa</i>	bur oak		Yes
<i>Styphnolobium japonicum</i>	Japanese pagodatree	'Regent'	No
<i>Taxodium distichum</i>	baldcypress	'Shawnee brave'	

Scientific Name	Common Name	Cultivar	Native to Ohio
<i>Tilia americana</i>	basswood	'Redmond'	Yes
<i>Tilia cordata</i>	littleleaf linden		No
<i>Tilia tomentosa</i>	silver linden		No
<i>Ulmus parvifolia</i>	Chinese elm	'Allee'	No
<i>Zelkova serrata</i>	Japanese zelkova	'Green Vase'	No

Medium Trees (31-45 Feet in Height When Mature)

Scientific Name	Common Name	Cultivar	Native to Ohio
<i>Alnus cordata</i>	Italian alder		No
<i>Cladrastis kentukea</i>	American yellowwood	'Rosea'	Yes
<i>Corylus colurna</i>	Turkish filbert		No
<i>Eucommia ulmoides</i>	hardy rubber tree		No
<i>Halesia carolina*</i>	Carolina silverbell		Yes
<i>Koelreuteria paniculata</i>	goldenraintree		No
<i>Maclura pomifera</i>	Osage orange	'White Shield'	Yes
<i>Magnolia virginiana</i>	sweetbay magnolia	'Henry Hicks'	No
<i>Ostrya virginiana</i>	American hophornbeam		Yes
<i>Parrotia persica</i>	Persian parrotia	'Vanessa'	No
<i>Phellodendron amurense</i>	amur corktree	'Macho'	No
<i>Pistacia chinensis</i>	Chinese pistachio		No
<i>Populus tremuloides</i>	quaking aspen		No
<i>Pterocarya fraxinifolia*</i>	Caucasian wingnut		No
<i>Sassafras albidum*</i>	sassafras		Yes
<i>Ulmus propinqua</i>	Japanese elm	'Emerald Sunshine'	No
<i>Zelkova serrata</i>	Compact Japanese zelkova	'Wireless', 'City Sprite'	No

Small Trees (15-30 Feet in Height When Mature)

Scientific Name	Common Name	Cultivar	Native to Ohio
<i>Amelanchier arborea</i>	downy serviceberry	(Numerous exist)	Yes
<i>Amelanchier laevis</i>	Allegheny serviceberry		Yes
<i>Asimina triloba*</i>	pawpaw		Yes
<i>Carpinus caroliniana*</i>	American hornbeam		Yes
<i>Cercis canadensis</i>	eastern redbud	'Forest Pansy'	Yes
<i>Cornus alternifolia</i>	pagoda dogwood		Yes
<i>Cornus florida</i>	flowering dogwood	(Numerous exist)	Yes
<i>Cornus kousa</i>	Kousa dogwood	(Numerous exist)	No
<i>Cornus mas*</i>	corneliancherry dogwood	'Spring Sun'	No
<i>Corylus avellane*</i>	European filbert	'Contorta'	No
<i>Cotinus coggygria*</i>	common smoketree	'Flame'	No
<i>Cotinus obovata*</i>	American smoketree		No

Scientific Name	Common Name	Cultivar	Native to Ohio
<i>Crataegus phaenopyrum</i> *	Washington hawthorn	Princeton Sentry™	Yes
<i>Crataegus viridis</i>	green hawthorn	'Winter King'	No
<i>Franklinia alatamaha</i> *	Franklinia		No
<i>Halesia tetraptera</i> *	Mountain silverbell	'Arnold Pink'	No
<i>Maackia amurensis</i>	amur maackia		No
<i>Magnolia × soulangiana</i> *	saucer magnolia	'Alexandrina'	No
<i>Magnolia stellata</i> *	star magnolia	'Centennial'	No
<i>Magnolia tripetala</i> *	umbrella magnolia		Yes
<i>Magnolia virginiana</i> *	sweetbay magnolia	Moonglow®	No
<i>Malus</i> spp.	flowering crabapple	(Disease resistant only)	No
<i>Oxydendrum arboreum</i>	sourwood	'Mt. Charm'	Yes
<i>Prunus subhirtella</i>	Higan cherry	'Pendula'	No
<i>Prunus virginiana</i>	common chokecherry	'Schubert'	Yes
<i>Salix caprea</i> *	pussywillow		Yes
<i>Staphylea trifolia</i> *	American bladdernut		Yes
<i>Stewartia ovata</i>	mountain stewartia		No
<i>Styrax japonicus</i> *	Japanese snowbell	'Emerald Pagoda'	No
<i>Syringa reticulata</i>	Japanese tree lilac	'Ivory Silk'	No

Note: * denotes species that are **not** recommended for use as street trees

C.2 Coniferous and Evergreen Trees

Large Trees (Greater than 50 Feet in Height When Mature)

Scientific Name	Common Name	Cultivar	Native to Ohio
<i>Chamaecyparis nootkatensis</i>	Nootka falsecypress	'Pendula'	No
<i>Cryptomeria japonica</i>	Japanese redcedar	'Sekkan-sugi'	No
× <i>Cupressocyparis leylandii</i>	Leyland cypress		No
<i>Cupressus arizonica</i>	Arizona cypress		No
<i>Picea abies</i>	Norway spruce		No
<i>Picea omorika</i>	Serbian spruce		No
<i>Picea orientalis</i>	Oriental spruce		No
<i>Pinus contorta</i>	lodgepole pine		No
<i>Pinus densiflora</i>	Japanese red pine		No
<i>Pinus nigra</i>	Austrian pine		No
<i>Pinus ponderosa</i> *	ponderosa pine		No
<i>Pinus strobus</i>	eastern white pine		Yes
<i>Pinus sylvestris</i>	Scotch pine		No
<i>Pinus taeda</i>	loblolly pine		No
<i>Pinus virginiana</i>	Virginia pine		Yes
<i>Pseudotsuga menziesii</i>	Douglas-fir		No
<i>Sequoiadendron giganteum</i> *	giant sequoia		No
<i>Thuja occidentalis</i>	American arborvitae	(Numerous exist)	Yes
<i>Thuja plicata</i>	western redcedar	(Numerous exist)	No

Medium Trees (31 to 50 Feet in Height When Mature)

Scientific Name	Common Name	Cultivar	Native to Ohio
<i>Chamaecyparis thyoides</i>	atlantic whitecedar	(Numerous exist)	No
<i>Juniperus virginiana</i>	eastern redcedar		Yes
<i>Pinus bungeana</i>	lacebark pine		No
<i>Pinus flexilis</i>	limber pine	'Vanderwolf's Pyramid'	No
<i>Pinus parviflora</i>	Japanese white pine		No
<i>Thuja occidentalis</i>	eastern arborvitae	(Numerous exist)	Yes

Small Trees (15 to 30 Feet in Height When Mature)

Scientific Name	Common Name	Cultivar	Native to Ohio
<i>Ilex × attenuata</i>	Foster's holly		No
<i>Pinus aristata</i>	bristlecone pine		No
<i>Pinus mugo</i>	mugo pine		No

Dirr's Hardy Trees and Shrubs (Dirr 2013) and *Manual of Woody Landscape Plants (5th Edition)* (Dirr 1988) were consulted to compile this suggested species list. Cultivar selections are recommendations only and are based on DRG's experience. Tree availability will vary based on availability in the nursery trade.

APPENDIX D MAINTENANCE BY COMMUNITY, RANKED BY EQUITY SCORE

The table below shows the breakdown of maintenance prescriptions for trees in each neighborhood.

Community	Equity Score	Tree Removals	Tree Clean	Young Tree Training
South Linden	3.9	149	940	382
Milo-Grogan	3.9	42	336	158
Livingston Avenue Area	3.3	83	652	524
Franklinton	3.3	113	932	392
North Central	3.2	182	1,039	845
East Columbus	3.1	54	111	92
North Linden	3.0	63	1,593	1,395
Near East	3.0	220	2,724	1,786
South Side	2.9	355	3,259	1,641
Northeast	2.9	187	2,585	1,476
Greater Hilltop	2.9	339	4,727	2,405
Southwest	2.8	45	721	763
Mid East	2.8	399	5,047	1,667
South East	2.6	63	1,593	1,395
Far South	2.4	261	1,389	1,716
Northland	2.2	538	7,038	2,314
Italian Village	2.2	31	411	447
Downtown	2.2	109	2,090	1,124
University District	2.0	154	3,157	1,252
Westland	1.8	102	1,531	2,245
Far East	1.8	137	2,936	2,042
Olentangy West	1.1	13	613	290
Northwest	1.1	153	2,766	931
German Village	1.1	8	775	297
Far North	1.1	159	2,446	2,395
Harrison West	1	36	698	180
Fifth by Northwest	1.0	66	766	379
Far West	1.0	97	2,944	1,925
West Scioto	0.9	114	2,156	1,154
Rocky Fork-Blacklick	0.9	274	4,114	3,877
Brewery District	0.9	0	212	71
Victorian Village	0.8	32	711	426
Hayden Run	0.7	65	1,800	1,110
Clintonville	0.7	162	3,766	1,896
Far Northwest	0.6	183	5,366	2,601
Airport	N/A	3	18	2
Dublin Road Corridor	N/A	1	24	1
Fort Hayes	N/A	1	19	6
Harmon Road Corridor	N/A	6	27	7
State of Ohio	N/A	2	3	0
Wolfe Parke	N/A	24	445	22