COLUMBUS URBAN FORESTRY MASTER PLAN

THE CITY OF
COLUMBUS
RECREATION AND PARKS

SPRING 2021

THE CITY OF
COLUMBUS
ANDREW J. GINTHER, MAYOR

A MESSAGE FROM THE MAYOR

Columbus residents deserve cleaner and more prosperous neighborhoods with plenty of green space, air that's easier to breathe and safe drinking water. This is why the City of Columbus has worked with community partners to build a robust strategic plan for our urban forest as part of the city's equity agenda.

Our city's trees significantly affect our neighbors and neighborhoods. In Columbus, we experience 90-plus degree days every summer, worsening air quality concerns for children fighting asthma across the city. In general, cities are hotter than rural areas, and our opportunity neighborhoods are even hotter due to historic disinvestment and the legacy of redlining. Extreme heat also increases the potential for heatstroke and other health concerns.

Columbus' trees benefit our residents by shading homes and streets, improving air quality and public health. Trees filter and absorb water to reduce flooding, and research shows that more trees in neighborhoods are linked to less crime. The Urban Forestry Master Plan is a blueprint for revitalizing our urban forest and strategically investing in those neighborhoods where trees will do the most good.

As a city, we are committed to working together to implement key action steps that will make the Urban Forestry Master Plan a success. Collaboration across all departments will continue to be essential to stop tree canopy loss, ensure an equitable tree canopy across the city and reach our goal of a 40% tree canopy citywide.

The Urban Forestry Master Plan is for the entire community — both public and private landowners. It will take every resident and business owner's involvement to move the needle on this transformational plan. I want to thank the hundreds of community leaders and residents who helped create the Urban Forestry Master Plan. More important, I ask for your continued support, as we cannot meet our ambitious goals without you.

Together, let us create an equitable, sustainable and resilient urban forest that will benefit Columbus residents for generations to come.

Thank you,

Andrew J. Ginther

Mayor, City of Columbus

Paul Rakosky

Interim Director, Columbus
Recreation and Parks Department

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Cover Image: Randall Schieber

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Capital Crossroads

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Central Ohio Transit Authority

Central Ohio Watershed Council

Clintonville Area Commission

City of Bexley

City of Dublin

City of Gahanna

City of New Albany

City of Westerville

City of Worthington

COCIC Franklin County Land Bank

Columbia Gas

Columbus and Franklin County Metro Parks

Columbus Apartment Association

Columbus City Council

Columbus City Schools

Columbus Chamber of Commerce

Columbus Department of Building and Zoning Services

Columbus Department of Development

Columbus Department of Finance

Columbus Department of Public Safety

Columbus Department of Public Service

Columbus Department of Public Utilities

Columbus Land Bank

Columbus Mayor's Office

Columbus Metropolitan Housing Authority

Columbus Nature Preserve Advisory Council

Columbus Public Health

Columbus Realtist Association

Columbus Realtors

Columbus Regional Airport Authority

Columbus State Community College

Dawes Arboretum

Defense Supply Center of Columbus

Edwards Communities

EMH&T

Far East Area Commission

Far South Area Commission

Far West Side Area Commission

Fifth by Northwest Area Commission

Franklin County Engineer

Franklin Park Conservatory

Franklin Soil and Water Conservation District

Franklinton Area Commission

Friends of the Lower Olentangy Watershed

Greater Hilltop Area Commission

Greater South East Area Commission

Greenlawn Cemetery

Livingston Avenue Area Commission

Mideast Area Commission

Midwest Biodiversity Institute

Milo-Grogan Area Commission

Near East Area Commission

North Central Area Commission

North Linden Area Commission

Northeast Area Commission

Ohio Department of Agriculture

Ohio Department of Natural Resources

Ohio Department of Transportation

Ohio Environmental Council

Ohio Environmental Protection Agency

Ohio Railroad Association

OSU Extension

South Linden Area Commission

South Side Area Commission

Southwest Area Commission

The Columbus Foundation

The Ohio State University

University Area Commission

U.S. Department of Agriculture Forest Service

U.S. Green Building Council

West Scioto Area Commission

Westland Area Commission

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COLUMBUS URBAN FORESTRY MASTER PLAN

EXECUTIVE SUMMARY

Image: Randall Schieber

OVERVIEW

The **Columbus Urban Forestry Master Plan (UFMP)** is the first citywide, strategic plan to invest long-term in Columbus' trees. Columbus faces many challenges today and over the coming decades. Our tree canopy is vulnerable to threats from disease, pests, the changing climate and increased development.

Trees help reduce urban stressors — cleaning our air, providing shade, intercepting stormwater and more. The benefits urban trees provide is valued up to five times what it costs to maintain them.

Through the input of community members, industry experts and urban forestry stakeholders, Columbus has a path forward. To achieve our vision, we must coordinate and collaborate, follow best practices, dedicate resources and enact strong policies. With the UFMP, we will prioritize, preserve and grow the tree canopy in Columbus, equitably across neighborhoods, to improve health and quality of life for all residents.

What is an Urban Forest?

An urban forest is simply a term that refers to all trees within a city, across all lands (both public and private).

Current Challenges

Challenge 1: Exponential Growth Expected

The population of Columbus recently exceeded 900,000 residents and is projected to surpass 1 million in the near future. The central Ohio region as a whole is forecasted to grow to 3 million by 2050. Population growth often comes with canopy loss due to increased development. Systems must be established now to preserve and grow canopy.

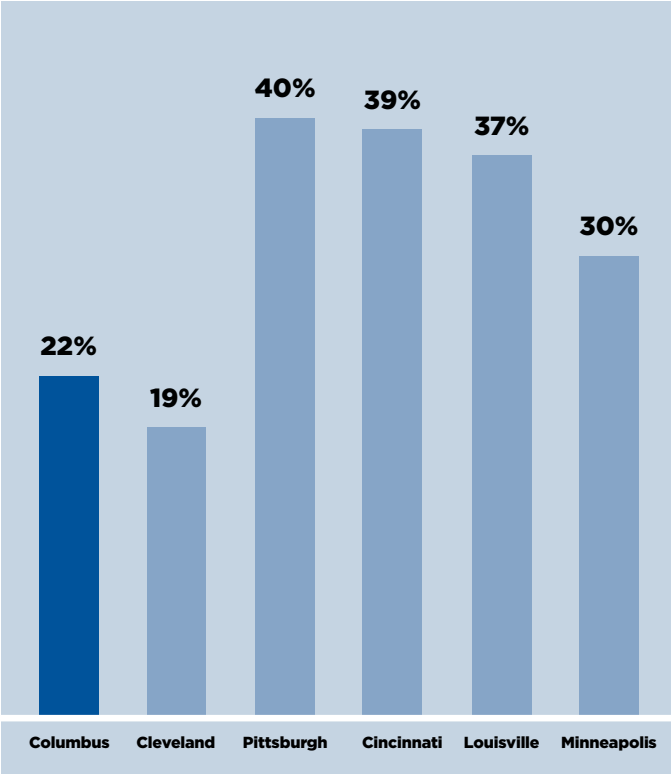
Challenge 2: High Heat Levels

Columbus' climate is becoming hotter, putting the health and well-being of residents at risk. Columbus has the fastest-growing and eighth most intense heat island of 60 major cities studied (Climate Central). Trees lower temperatures in cities and can help offset the impacts of climate change.

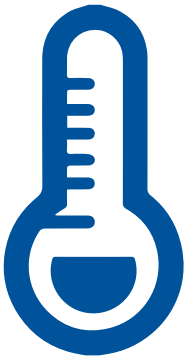
Challenge 3: Comparatively Low Tree Canopy

As of 2013, 22% of Columbus is covered by tree canopy when viewed from above. This is significantly less than other cities of similar composition and size as Columbus.

COLUMBUS COMPARED TO PEER CITIES



Columbus is the fastest-growing heat island of the 60 largest U.S. cities



Challenge 4: Public Health Issues

Columbus has experienced air quality issues, high infant mortality rates, and high rates of chronic conditions including obesity, diabetes and asthma, all of which impact overall community health. Trees improve public health by cleaning our air, shading our streets and homes and creating welcoming community spaces.

Challenge 5: Future Stresses as Climate Continues to Warm

Climate change will result in more frequent and severe storms, flooding and increased heat, creating a more stressful urban environment. Trees will maintain a comfortable quality of life for residents.

Challenge 6: Inequitable Tree Canopy

Every neighborhood and resident deserves access to the many benefits that tree canopy provides, but Columbus current canopy cover is inequitable. Tree canopy ranges between neighborhoods from as low as 9% to as high as 41%. This means that some neighborhoods experience more benefits from trees that affect health and well-being than others. The City of Columbus' vision of a socially equitable city includes ensuring trees benefit all residents, no matter where they live.

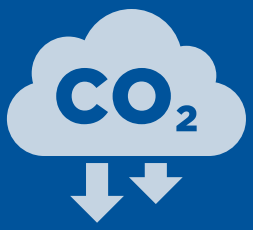
Tree Benefits

Tree canopy has never been more important to Columbus than it is today. Preserving and growing tree canopy creates a more vibrant, resilient Columbus.

Because of the significant value trees provide, cities across the country now recognize trees as critical infrastructure. Trees are the only type of infrastructure that increases in value over time. Urban trees even pay for themselves. Urban trees in the Midwest consistently provide benefits valued three times more than the cost to maintain them (Peper et al. 2009).

Columbus' 22% tree canopy cover (as of 2013) provides approximately $38 million in benefits every year, and these are only the benefits we can currently measure.

TREE CANOPY BENEFITS POVIDED BY 22% CANOPY IN COLUMBUS



Annual carbon captured

168,000 tons

SERVICE VALUE: $3.9 Million

Using trees to 'sequester' this CO_2 is a key part of the Columbus Climate Adaption Plan's goal to make the city more climate resilient.

Annual air pollution removed

2.5 million pounds

SERVICE VALUE: $4.6 Million

Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term chronic health problems (American Lung Association 2015).

Annual rainwater intercepted

331 million gallons

SERVICE VALUE: $29.5 Million

Contaminated stormwater flows into overloaded engineered sewers, ultimately reaching the local lakes and streams. Polluted water is a major cause of human health issues and degrades the local ecology.

Columbus' urban forest provides approximately $38 million in benefits every year.

Benefit 1: Clean the Air and Improve Health

New York City saw a significant decrease of asthma in young children (-29%) after increasing its tree canopy.

Benefit 2: Alleviate Heat Stress

Mature tree canopy can lower overall ambient temperatures by 20° to 45°F. Heat stress is a primary cause of death in the U.S. Each year, more Americans die from extreme heat than all other natural disasters combined.

Benefit 3: More Successful Business Districts

Consumers are willing to pay 11% more and shop longer in business districts with tree canopy versus those without.

Benefit 4: Reduce Water Pollution and Flooding

Stormwater management is a growing concern and issue in Columbus. One mature deciduous tree can intercept over 500 gallons of rainwater a year. Trees filter rainwater, removing contaminants like oil, pesticides and waste.

Benefit 5: Remove Carbon Dioxide from the Air and Provide Buffers for Noise

Trees are constantly removing and storing carbon dioxide from the atmosphere. In fact, one single large tree can absorb as much as 48 pounds of carbon dioxide per year, while one acre of trees stores the same amount of carbon dioxide released by driving 26,000 miles. Pollution and noise from busy roads and rail lines can create unhealthy and undesirable conditions for those living nearby. Buffers of trees can significantly reduce both noise and pollution. A 100-foot-wide, 45-foot-high densely-planted tree buffer can reduce highway noise by 50%.

Benefit 6: Contribute to a Decrease in Crime

A study in Baltimore found that a 10% increase in tree canopy was associated with a roughly 12% decrease in crime. Outdoor areas with trees also tend to suffer from less graffiti, vandalism and littering than areas without trees (PHS 2015).

Benefit 7: Build Stronger, More Vibrant Communities

Tree-lined streets can create stronger communities and attract new residents. One study showed that residents in areas with tree canopy reported knowing their neighbors better, socializing with them more often, having a stronger community, and feeling safer and better adjusted than residents of identical areas without trees.

In an age where walkability and pedestrian-friendly areas tend to draw the most people, tree cover is a powerful tool to revitalize business districts and neighborhoods. According to the Federal Highway Administration, urban tree canopy along streets have been shown to slow traffic, helping ensure safe, walkable streets in communities.

Benefit 8: Boost Property Values

Trees have been shown to increase residential property and commercial rental values by an average of 7%.

Benefit 9: Reduce Energy Usage and Costs

Trees reduce energy bills. Properly placed around buildings, trees can reduce air conditioning needs by 30% and can save 20% to 50% in heating. This can be a life or death issue for those prone to heat-related illnesses and/or those in lower income areas.

Benefit 10: Provide Essential Wildlife Habitat

Trees are an essential component to habitat and conservation in urban areas. They intercept and clean large quantities of polluted stormwater, protecting the water quality of our streams. Trees also provide habitat to a range of birds, pollinators, and other wildlife.

Note: Citations for all benefits are in the appendix of the plan document.

Community Engagement

How robust and sustainable is Columbus' urban forest? As part of the development of this plan, we assessed: What does the community want? How trees are currently being managed? How engaged is the community and many players in this effort?

We engaged residents across Columbus through five avenues:

- **an online survey**
- **an open house**
- **small-group presentations**
- **interviews**
- **multiple meetings of two stakeholder groups comprised of over 100 community leaders and city staff.**

Nine themes emerged showing what the community values in terms of Columbus' urban forest.

Theme 1: We are not where we should be

> Many commented on how far behind the City is in tree canopy cover and that we should have started this work decades ago.

Theme 2: Education is needed

> According to public comments, there is a lack of knowledge and awareness about the value of tree canopy to a healthy community.

Theme 3: Better management is needed for existing public trees

> All parties agree that the status quo regarding management of the existing public tree canopy is not working.

Theme 4: There are not enough tree protection measures in place currently

> The general consensus was that there are not enough tree protection measures in place now.

Theme 5: Focus on equity in the next steps to improve Columbus tree canopy

> Many cited the need to correct this inequity in canopy by engaging areas that can benefit the most.

Theme 6: Address the lack of resources and funding for something so important

> Many cited the lack of resources currently dedicated to tree canopy efforts across the city.

Theme 7: Make sure to obtain and maintain updated data

> Tree canopy data and tree inventory is out-of-date. The question was raised multiple times, "How can we manage what we don't know about?"

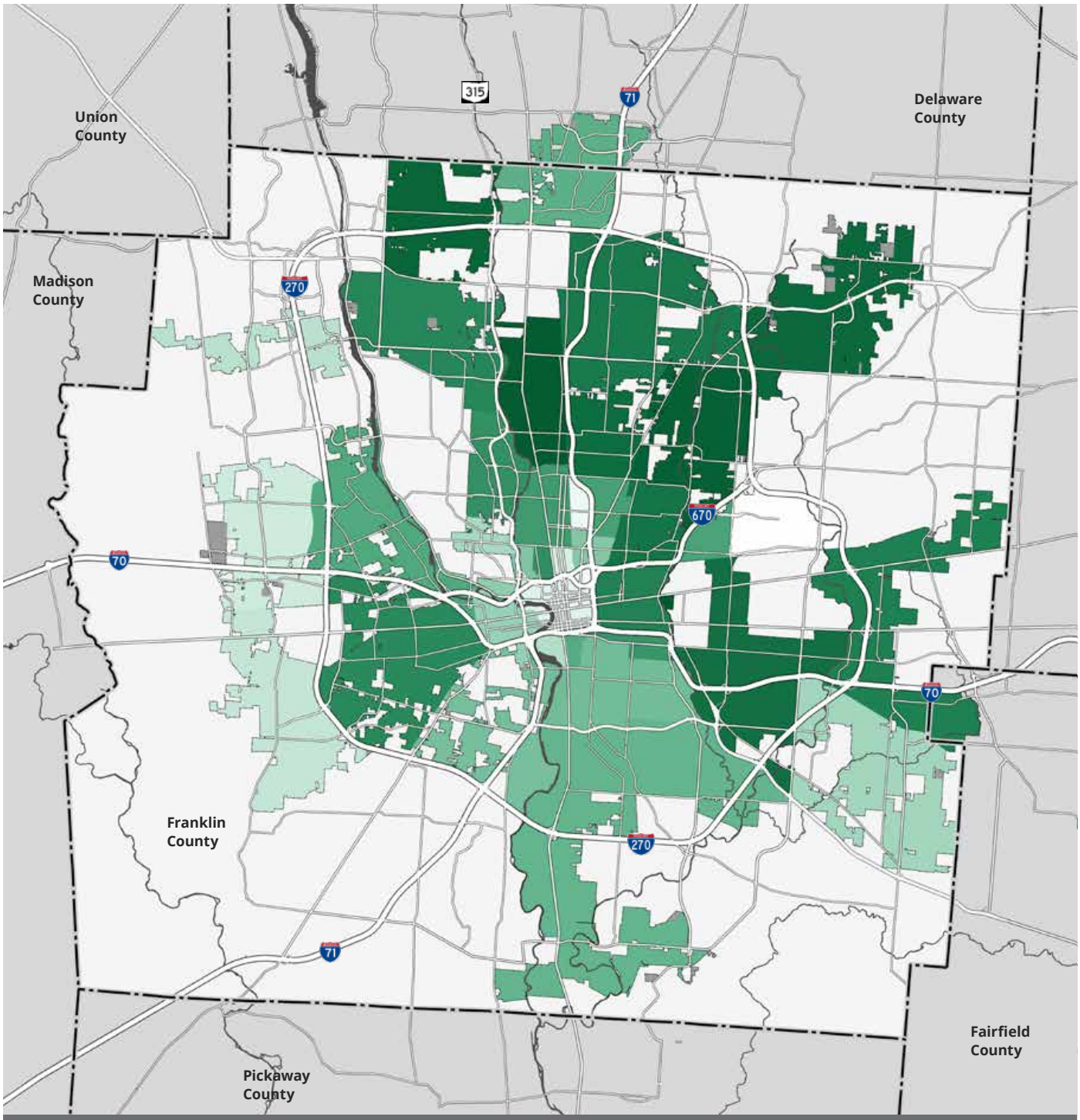
Theme 8: Encourage tree planting and preservation on private property

> Revitalizing the canopy will require private property owners to support tree preservation, maintenance and expansion.

Theme 9: Address rental properties

> The high number of rental properties in Columbus emerged repeatedly as a hurdle to growing tree canopy.

Tree Canopy in Columbus



Canopy Coverage for Columbus Communities

Lowest Canopy Rate (<10%) — Highest Canopy Rate (>40%)

Tree canopy varies from 9% to 41% across Columbus neighborhoods.

Note: Canopy coverage is based on 2013 Data.

The State of the Urban Forest

Prior to determining a way forward, Columbus' urban forest was comprehensively assessed. Industry experts and stakeholders examined all aspects of the city's tree canopy and its management. The following major findings emerged:

Finding 1: Tree Data is Out-of-Date

Columbus' last tree canopy assessment is based on 2013 data, and the public tree inventory is significantly out-of-date. Management efforts are ineffective without accurate knowledge of tree assets.

Finding 2: Columbus Has Less Tree Canopy Than Peer Cities

The City of Columbus is covered by 22% tree canopy when viewed from above. This is significantly less than some regional peer cities. Pittsburgh, Cincinnati and Louisville have nearly twice as much tree canopy cover as Columbus.

Finding 3: Canopy is Not Equitable Across Neighborhoods

Neighborhoods vary greatly in canopy coverage, from 9% in some to as high as 41% in others.

Finding 4: Majority of Tree Canopy is on Private Property

With an estimated 70% of the city's tree canopy located on private property, efforts by the entire community will be needed to grow and expand Columbus' urban forest.

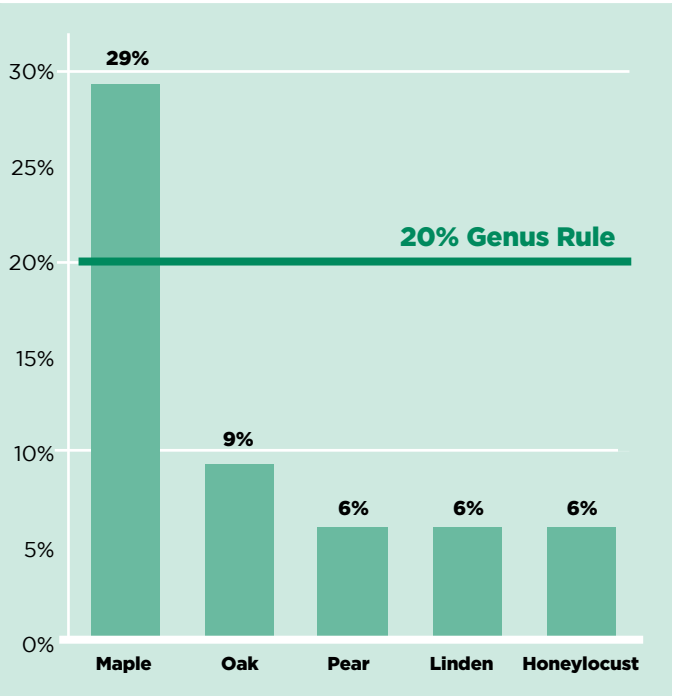
Finding 5: Significantly Higher Canopy is Possible

The 2013 tree canopy study determined that while 22% of the city was covered with tree canopy at that point, Columbus has the potential to reach canopy as high as 63% coverage.

Finding 6: Issues with Species Diversity and Quality

Species diversity safeguards the urban forest from pests, diseases and extreme weather events. Currently, maples dominate the public tree population. Invasives also impact the quality of the urban forest, and make up 6% of public trees (primarily pears).

COLUMBUS URBAN FOREST COMPOSITION



URBAN FORESTRY'S 10-20-30 RULE

No species should be more than 10%, no genus more than 20% and no family should be more than 30% of the urban forest.

70% of the Columbus' tree canopy is located on private property

Finding 7: Climate Change will Alter the Successful Tree Species

> By 2095, Columbus summers could be similar to Arkansas today (hotter and more humid). Columbus may see a loss in suitable habitat for several common native tree species (red and sugar maples, northern red oak), while other species are expected to thrive (honeylocust, river birch, sycamore, sweetgum and hackberry).

Finding 8: Trees Compete for Limited Space

> Trees in Columbus have to compete for space underground, aboveground and overhead.

Finding 9: Currently Insufficient Resources for Tree Management

> Public tree care funding in Columbus is not sufficient to institute proactive tree maintenance and ensure a sustainable, healthy and safe tree canopy. Columbus' "per tree" spending level was 38% lower than the average of cities nationwide.

Finding 10: No Formal Management Programs in Place

> Columbus does not currently have standard proactive plans in place to effectively manage this important asset. This includes nationally-accepted best practices like an urban forest management plan (for daily operations), a risk management plan and a disaster management plan.

Finding 11: Tree Planting Efforts are Happening without a Unified Goal

> Tree planting is happening through city efforts, as well as community organizations. However, these efforts are not often short term and project-based. Tree planting does not currently occur to address city priorities, such as reducing inequity, absorbing stormwater or cooling the air.

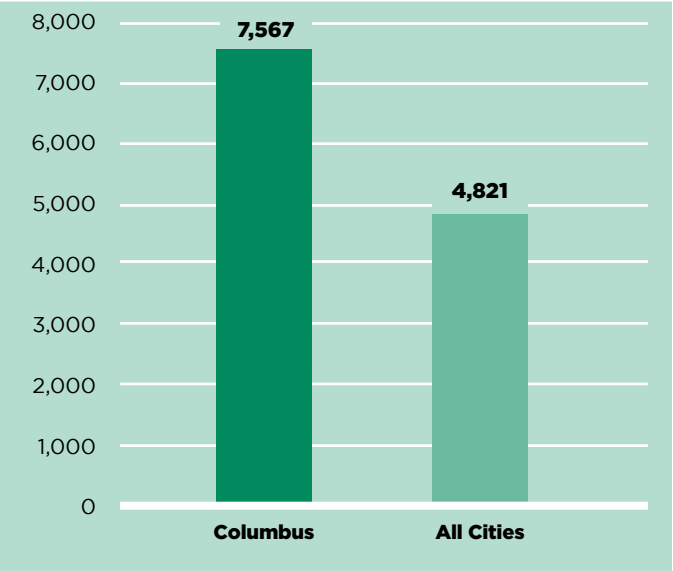
ANTICIPATED CHANGES TO SPECIES IN COLUMBUS AS CLIMATE WARMS

Predicted Habitat Change	Current Proportion of Inventoried Public Street and Park Trees	Tree Species - Common Name
Species Habitat Predicted to INCREASE	0.03%	Bitternut Hickory
	1.34%	Hackberry
	0.20%	Flowering Dogwood
	6.00%	Honeylocust
	0.10%	Osage Orange
	0.30%	Sycamore
	0.40%	White Oak
	0.43%	Bur Oak
	1.82%	Northern Red Oak
	0.21%	American Elm
Species Habitat NOT Predicted to Change	6.04%	Red Maple
	0.26%	Tuliptree
	0.15%	Blackgum
	0.81%	Pin Oak
Species Habitat Predicted to DECREASE	0.33%	Boxelder
	2.08%	Silver Maple
	4.95%	Sugar Maple
	0.09%	Ohio Buckeye
	0.04%	American Beech
	0.57%	Black Walnut
	0.19%	Eastern Hophornbeam
	0.70%	Eastern White Pine
	1.50%	Swamp White Oak
	0.07%	Scarlet Oak
	0.03%	Black Willow
	1.60%	American Basswood

Finding 12: Staffing Levels are Insufficient

City forestry staff manage 36% more trees per employee than the national average. As with per tree spending, with the tree inventory being outdated and incomplete, the number of street trees per Forestry employee in Columbus is likely even higher.

STREET TREES PER STAFF PERSON



Finding 13: Forestry Leadership is Unable to Plan and Coordinate at the Necessary Level

The responsibilities of management positions within the city's Urban Forestry program do not include planning, implementation, policy development or coordination at a high level necessary to institute city-wide change.

Finding 14: Volunteer Tree Planting and Care Activities are Limited

Current volunteer opportunities are limited in Columbus to get involved in urban forestry. Cities across the country are empowering volunteers to plant and care for trees in their communities, which can lead to volunteers planting and caring for trees on their own properties.

Finding 15: Progress Made Despite Limited Budgets

Despite restrictions on budgets and resources, Columbus' Forestry staff has made strides in tree canopy efforts, including upgrading inventory technology, young tree training and a strong program to manage the loss of ash trees to the Emerald Ash Borer (EAB).

Finding 16: No Well-Defined Preservation and Protection Policies in Place

The City does not have adequate tree protection and preservation regulations on private property, which is unusual for a large city. With exponential growth expected, this is a major concern for Columbus' tree canopy.

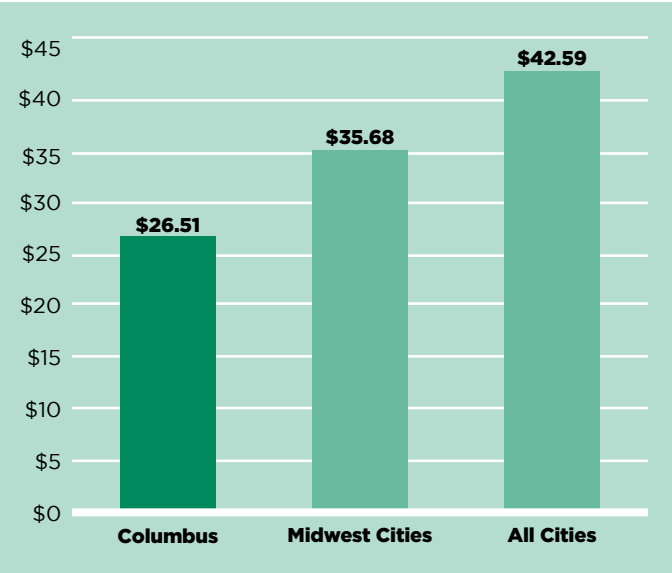
Finding 17: Lack of a Unified Vision Affects Engagement

Columbus lacks unified urban forestry goals, meaning the city and the community do not have shared goals to work toward.

Finding 18: Communication and Collaboration is Inconsistent

Communication and collaboration builds support for Columbus' urban forest. The need for improved communication, both internally among city departments and externally between the City, residents, and developers emerged as a common theme.

ANNUAL BUDGET SPENT PER TREE



The Indicators of a Sustainable Urban Forest

The Indicators of a Sustainable Urban Forest, a comprehensive resource and program assessment tool, was used to establish Columbus' baseline performance on managing, caring, and engaging with the city's urban forest. Columbus was assessed on 32 sustainable urban forest indicators, broadly categorized into three groups: The Trees, The Players, and The Management Approach.

32 INDICATORS OF A SUSTAINABLE URBAN FOREST

Columbus, Ohio		Assessed Performance Level		
		Low	*Moderate*	*Good*
The Trees	Tree Canopy Cover	●		
	Equitable Distribution	●		
	Age Distribution	●		
	Condition of Publicly-Owned Trees	●		
	Condition of Publicly-Owned Nature Areas	●		
	Trees on Private Property		●	
	Diversity / Pest Vulnerability		●	
	Suitability - Overhead	●		
	Suitability - Ground Level	●		
	Suitability - Soil Conditions	●		
	Suitability - Invasives		●	
	Suitability - Climate Change Adaptiblity		●	
The Management	Tree Inventory		●	
	Canopy Assessment		●	
	Plans and Programs: Management Plan	●		
	Plans and Programs: Risk Management	●		
	Plans and Programs: Planting		●	
	Plans and Programs: Disaster Management	●		
	Maintenance of Publicly-Owned Trees (Rights-of-Ways)	●		
	City Staffing and Equipment		●	
	Funding	●		
	Tree Protection Policy	●		
	Communication		●	
The Players	Neighborhood Action		●	
	Large Landholder Involvement	●		
	Green Industry Involvement		●	
	City Department/Agency Coordination	●		
	Funder Engagement	●		
	Utility Engagement	●		
	Developer Engagement	●		
	Public Awareness	●		
	Regional Collaboration		●	
Totals		*20*	*12*	*0*
		63%	**37%**	**0%**

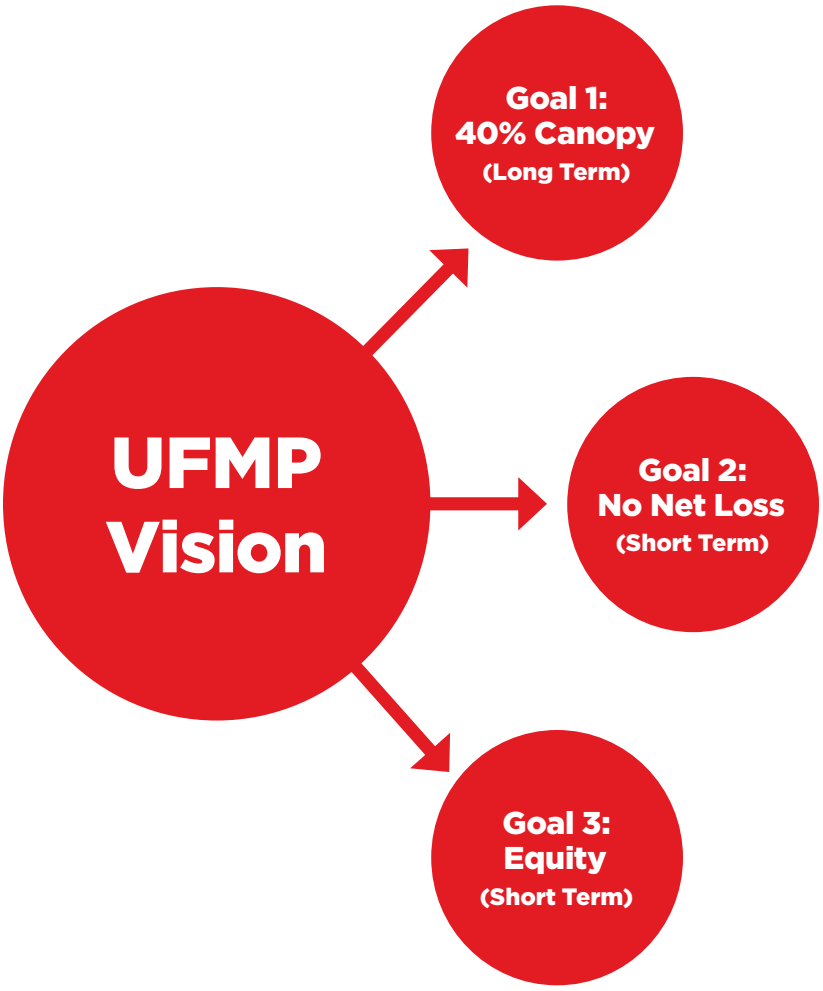
The Way Forward

Based on the analysis of the existing urban forest in Columbus and the public's priorities, the following vision and goals will guide the future urban forest in Columbus.

VISION

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

GOALS



Goal 1: Reach Citywide Tree Canopy Cover of 40% by 2050

> The community expressed a clear desire for Columbus to aim for an ultimate canopy cover of 40% or higher in order to achieve the highest quality of life for residents in the long term.

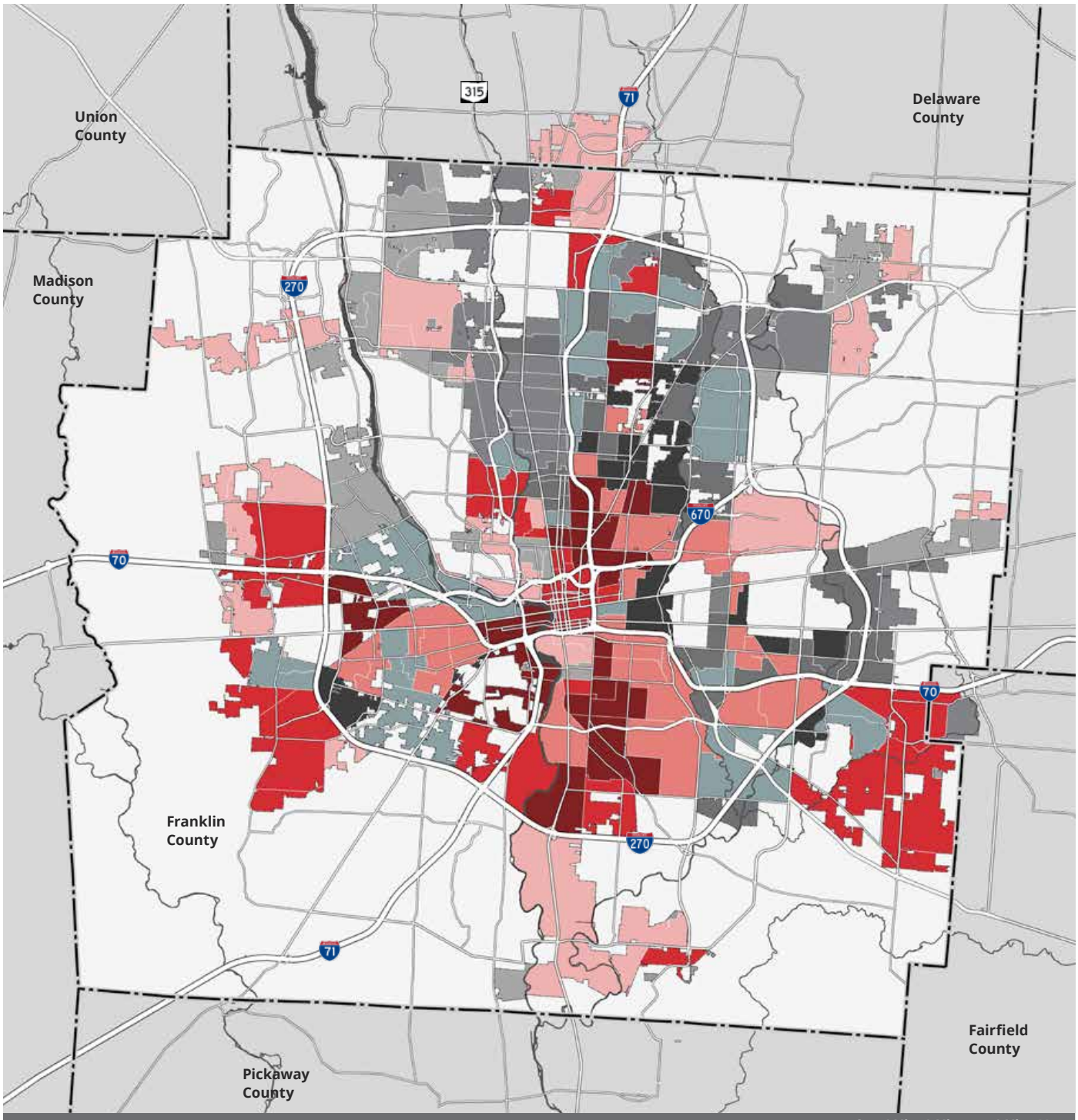
Goal 2: Stop the Net Canopy Losses by 2030

> Real gain in canopy cover will not occur until the reasons for losses are addressed.

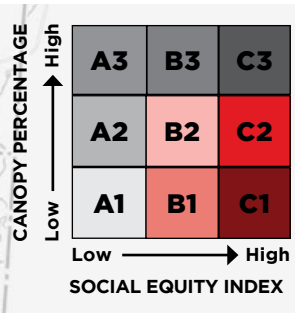
Goal 3: Invest in Equitable Canopy Across All Neighborhoods by 2030

> Over the next 10 years, Columbus will invest in tree canopy equitably, focusing on neighborhoods with low tree canopy and high social equity needs.

Prioritizing Social Equity Factors



Social Equity and Canopy Comparison



Tree planting and maintenance efforts can be focused to make Columbus a more equitable city.

The Action Steps | Moving Forward Together

COMMUNITY COORDINATION AND COLLABORATION

Action 1: Form a Team for Implementation: The Columbus Tree Coalition

A community-led "Columbus Tree Coalition" is needed to serve as a forum to unify tree-related projects and plan work beyond the City's efforts. This group of community partners is key to maintaining momentum.

Action 2: Create Messaging and Education Campaign for Use by All Partners

The community cited that the broader political, business and citizen culture in Columbus do not appear to put a high value on trees, and in some cases, resist tree canopy efforts altogether. A messaging and education campaign is needed for all partners to grow the tree canopy in Columbus.

Action 3: Improve Communications and Collaboration

Better communication and collaboration on urban forestry issues requires transparency and simplified communication avenues, both between the city and the public, as well as between city departments and other agencies.

Action 4: Share Tree Data with the Community

Many sectors of the community are not significantly engaged: neighborhoods, large landholders, developers, green industry, utilities, funders, regional groups and the public in general. One issue that could be affecting engagement is limited access to information on Columbus trees. Sharing tree data — both tree canopy cover and tree inventory — with the community helps illustrate the value of the urban forest, improves communication and builds support for its management.

Action 5: Support Active Participation by Volunteers and Partner Organizations

Community organizations and residents consistently expressed an interest in tree planting efforts. Expanded volunteer options could include: tree giveaways for private property, young tree care training, volunteering at the city nursery and tree data collection.

BEST PRACTICES

Action 6: Tree Planting: Prioritize Efforts Based on Equity

Purposeful planting and tree care efforts should be focused to correct inequitable canopy. A plan should be developed using the priority planting analysis, as well as outreach and assistance to encourage planting and tree care in these areas.

Action 7: Ensure Space for Trees

Columbus' built environment often lacks space for trees. Identify opportunities to construct new sites, or retrofit existing sites, to provide adequate space for trees early in the design process. This includes retrofitting small tree lawns, revising planting strategies and exploring alternative planting areas.

Action 8: Transition to a Proactive Care on Public Trees

The city's current management of street and park trees can best be described as reactive. Transition to a proactive approach is critical. This includes ensuring adequate resources, filling staff positions, getting updated data and implementing an operations management plan.

Action 9: Create an Urban Forestry Best Practices Manual

The policies, regulations and practices around trees and urban forestry in Columbus are not all formally documented and adopted. Stakeholders expressed interest in having all tree policies and practices in one place. A manual of best practices should be developed and incorporated into other city processes.

Action 10: Institute a Plan to Regularly Measure Progress and Reassess Next Steps

Regularly assess the UFMP's progress over time, including an annual report and brief reassessment every five years.

DEDICATION OF RESOURCES

Action 11: Identify Supplemental Funding Sources

Significant additional funding will be required to adequately care for the urban forest. Alternative funding sources to be explored including a street tree assessment, review fees, grants and fundraising through the Columbus Recreation and Parks Foundation.

Action 12: Expand the Size and Scope of Urban Forestry Leadership

Currently, city staff focused on urban forestry are tasked with daily internal operations only. Forestry's leadership should be restructured to build capacity for citywide planning and coordination.

Action 13: Obtain and Maintain Updated Essential Tree Data

In order to effectively manage urban forestry assets, quality data are essential. There are two datasets commonly used to effectively manage urban forests: tree canopy assessments and tree inventory data. Both should be updated in the short term and regularly afterwards.

STRONGER POLICIES

Action 14: Strengthen Private Tree Protection Policies on Private Property in Columbus

There are essentially no protections for trees on private property during development in Columbus. Protecting trees during development is essential to achieve Goal 2: Stop Canopy Losses.

Action 15: Improve Public Tree Protection Ordinance

All public trees are protected within the specifications included in City Code Chapter 912. However, updates and improvements are needed to be effective and reflect national standards.

CHAPTER 1

DORRIAN GREEN

Image: Randall Schieber

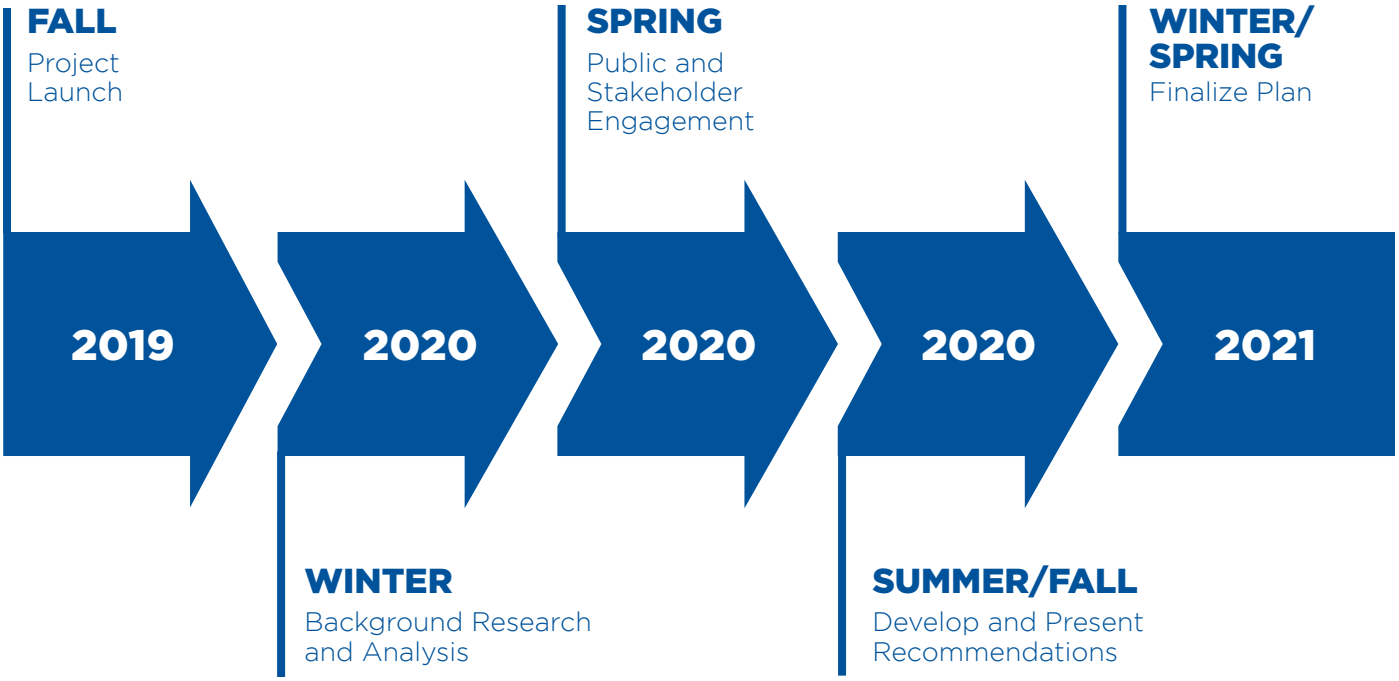
INTRODUCTION

The Columbus Urban Forestry Master Plan (UFMP) is a strategic, long-term investment in Columbus' tree canopy. Trees are critical city infrastructure that is key to every resident's health and quality of life.

Tree canopy has never been more important to Columbus than it is today. Trees reduce urban heat island effects, improve air quality and public health, reduce water pollution, moderate climate change stressors and more. Preserving and growing tree canopy creates a more vibrant, resilient Columbus.

Consider **six challenges** Columbus is facing now and over the coming decades.

PLAN DEVELOPMENT PROCESS



Background

Columbus' urban forest grows on both public and private land. While the City has taken the lead in initiating this effort to preserve and grow tree canopy in Columbus, it is important to recognize that 70% of the city's tree canopy cover is on private land. An effective master plan must, therefore, be implemented for and by the entire community, on both public and private property.

Project Organization

This is a community plan, not just a plan for city staff. For this reason, the UFMP was developed through an extensive discovery process. We examined existing conditions and conducted data analysis. Stakeholders provided input through two stakeholder groups: a 100-member Advisory Group made up of community organizations and leaders, city departments and individual Columbus residents; and a Project Team made up of more than 25 people serving throughout the plan's creation. These groups, with guidance from leading urban forest industry experts from Urban Canopy Works, Davey Resource Group, Inc. and Designing Local, developed a long-term strategic plan for growing and prioritizing tree canopy.

Figure 1.1 | Plan Development Timeline
The Urban Forestry Master Plan development began in late 2019 and was completed in early 2021.▲

Figure 1.2 | Public Engagement Activities
The Urban Forestry Master Plan was developed with the input of the public and other stakeholders. Some events in spring 2020: three stakeholder workshops (one pictured at Westgate Park) and a public open house at Wyandot Lodge. ▲

> **Columbus is expected to grow in population over the next 20 years, and commercial construction owners and developers search for every advantage to make the city attractive. Because trees create a healthy, vibrant community, commercial owners and developers are eager for a blueprint that helps to make Columbus a top choice. The master plan is a long-term investment to improve the city, and the well-being of residents, by providing a tree canopy that is equal to – or greater than – cities of comparable sizes.**
>
> -Mary Tebeau
> Executive Director, Builders Exchange of Central Ohio

EXISTING AND FUTURE COMMUNITY CHALLENGES

Challenge 1 Exponential Growth is Expected

NATIONAL VETERANS MEMORIAL AND MUSEUM

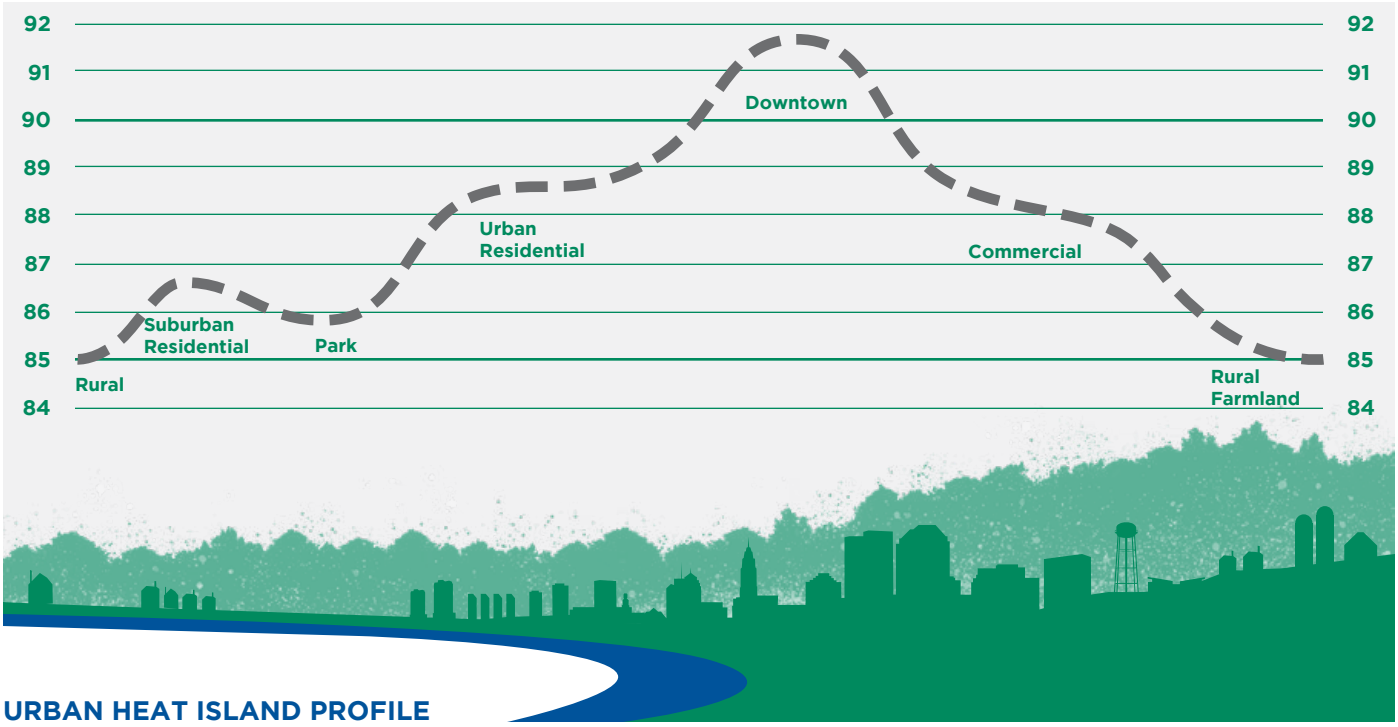
Image: Shellee Fisher

> **As central Ohio expects to be a region of 3 million people by 2050, our challenge is to balance that growth with natural resource preservation and restoration to support a high quality of life for all residents. Regardless of where you live, trees provide the same benefits to our communities in the form of clean air, clean water and shade. The Columbus Urban Forestry Master Plan provides a long-term vision that neighboring communities can come together around for a healthy and vibrant region.**
>
> -Brandi Whetstone
> Sustainability Officer, Mid-Ohio Regional Planning Commission

With a population of more than 900,000 people, Columbus is the 14th largest city in the nation. The Mid-Ohio Regional Planning Commission (MORPC) has forecasted strong growth for the City of Columbus and the central Ohio region as a whole. The region is forecasted to grow to three million by 2050.

This growth will likely impact tree canopy and increase heat stress due to the increased development. Columbus currently lacks effective tree protection measures, meaning tree losses will continue as the community grows and becomes denser. Protecting trees and planning for growing tree canopy during this time will ensure Columbus' livability.

Challenge 2 High Heat Levels



URBAN HEAT ISLAND PROFILE

Columbus' climate is changing, and hotter summers are jeopardizing our residents' health and well-being. As temperatures rise, heat is absorbed by buildings and roads and the area becomes warmer. This "urban heat island effect" means that cities are hotter than surrounding rural areas. Climate Central found Columbus to be the fastest-growing heat island and 8th most intense of 60 major cities studied (Climate Central 2014). By 2095, Columbus summers (average high temperature 85 degrees) could be similar to those in Arkansas today (average high temperature 93 degrees and humid) (GLISA).

This heat stress can significantly impact the health of Columbus residents. Cities with high heat stress have higher death rates, more childhood asthma, aggravated respiratory and cardiovascular diseases in adults, and higher energy costs (EPA 2015). All of these can be especially significant for low-income households. The most vulnerable age groups (over 65 or under 5) make up nearly 20% of Columbus' population (US Census 2019).

Trees cool the air, and canopy cover of 40% or higher has been shown to substantially reduce daytime air temperatures (Ziter et al. 2019). Columbus' urban forest is critical to protect our most vulnerable residents from heat stress. With the high influx of people expected, we need to improve our tree canopy to combat increasing temperatures.

Figure 1.3 | Urban Heat Island Profile
Temperatures in the center of the City are higher than those in suburban and rural areas. Source: Urban Land Institute. ▲

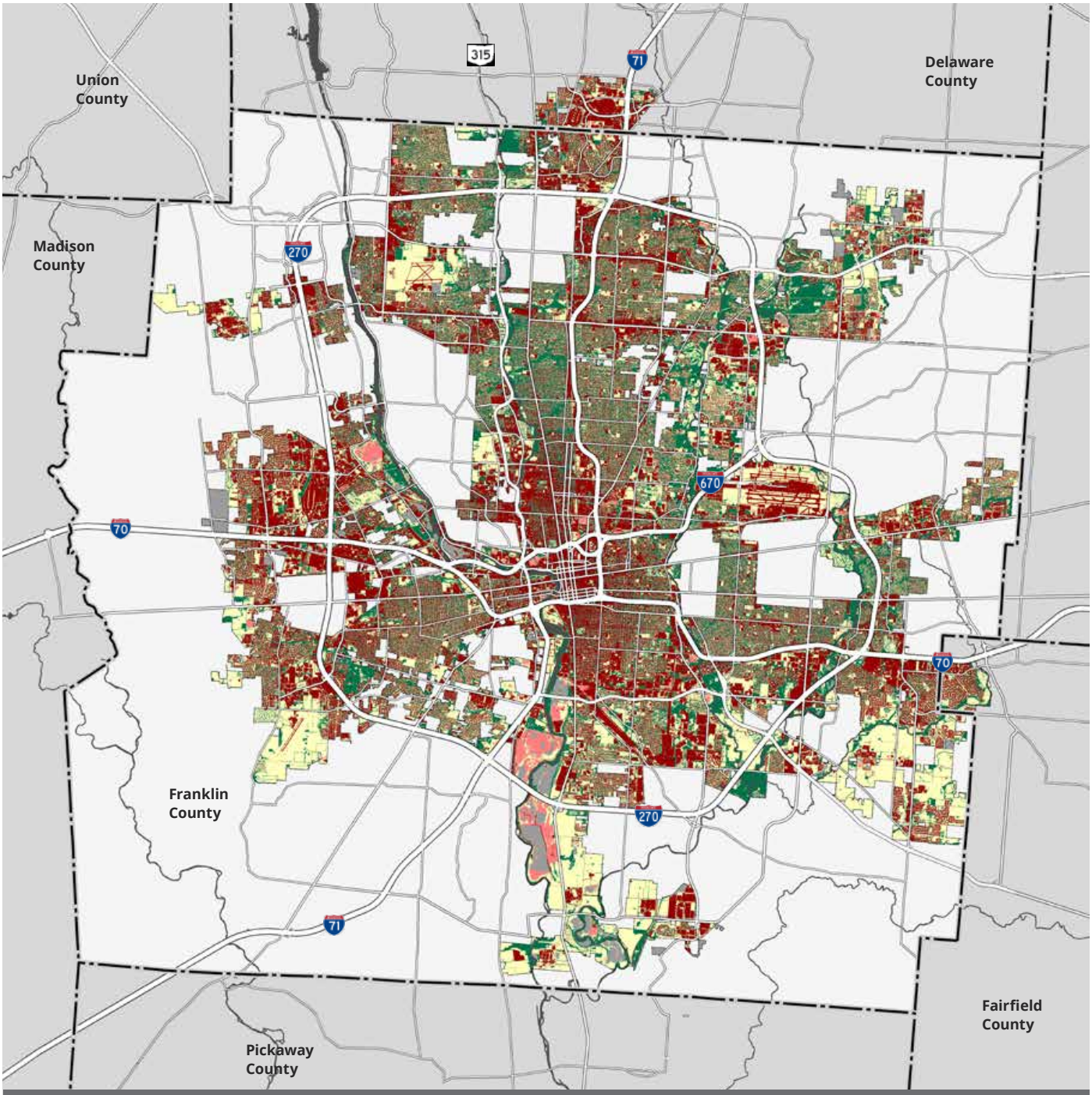
EXISTING AND FUTURE COMMUNITY CHALLENGES

Challenge 3 Comparatively Low Existing Tree Canopy

Figure 1.4 | Sullivant Avenue Corridor
The Sullivant Avenue corridor is in the Greater Hilltop neighborhood. This neighborhood has 23% average canopy coverage and is slightly above the City average of 22%. While many private properties have large trees, the rights-of-way lack street trees. ▲

Based on 2013 data, 22% of the City of Columbus is covered by trees when viewed from above. This is significantly less than comparable cities such as Cincinnati (38%), Pittsburgh (42%) and Charlotte (45%). Because of the significant growth experienced in Columbus since 2013, this coverage number is likely to be even lower. When these findings were revealed in 2015, community and city leaders launched an effort to boost tree canopy citywide. This occurred first through the tree planting and education campaign Branch Out. Leaders realized soon after that a more comprehensive, long-term strategic master plan (the UFMP) was needed.

Without growth and preservation efforts starting now, Columbus is likely to lose a significant amount of additional tree canopy in the future. The less trees, the fewer services that residents receive in terms of improved livability and health benefits, and all the other ecological, economic and social benefits they provide (detailed in Chapter 2).



Map 1.1 | Existing Land Cover in Columbus

Tree canopy covers 22% of the city of Columbus.

EXISTING AND FUTURE COMMUNITY CHALLENGES

Challenge 4 Existing Public Health Issues

WOLFE PARK SUSPENSION BRIDGE

Trees beautify our world and provide many important health benefits, including improved air quality, cardiovascular health, birth outcomes and mental health. We are pleased that UFMP strategies will provide more trees throughout the city and ensure that all residents and neighborhoods have equitable access to the many benefits they will provide for generations to come.

-Dr. Mysheika Roberts
Health Commissioner, Columbus Public Health

Columbus residents experience public health challenges related to living in an urban environment. The city has air quality issues, high infant mortality rates and elevated rates of chronic conditions including obesity, diabetes and asthma. All of these public health issues impact overall community health.

Trees remove pollutants from the air, cool the air, and reduce water pollution and much more (detailed in the Chapter 2). Higher tree canopy cover plays a significant role in improving community health in urban areas.

Challenge 5 Future Stresses as the Climate Changes

BLACKLICK CREEK

Columbus can be expected to see increased heat, severe storms and flooding over the coming decades.

Trees help lessen the impacts of climate change by keeping temperatures cooler and the air cleaner. Trees also use carbon to grow, thereby reducing the amount of carbon in the atmosphere. The recently published Columbus Climate Action Plan cited trees as a critical solution to making Columbus a more resilient city.

Climate change not only creates a more stressful urban environment for residents, but for the trees themselves. Trees are affected in three major ways: severe weather events causing tree damage and loss; higher stress on tree species that can lead to more pests and disease infestations; and greater pressures from invasive plant species outcompeting natives.

> **Planting and maintaining trees provide many benefits that increase climate resilience. Trees reduce the urban heat island, absorb stormwater, provide native habitats and improve quality of life. This plan identifies threats that climate change poses to trees in Columbus, provides recommendations underpinned by data from the city and benchmarking with other communities, and connects with actions in the Columbus Climate Adaptation Plan released in 2018.**
>
> -Jason Cervenec
> Eduction and Outreach Director of the Byrd Polar and Climate Research Center

Challenge 6 Existing Inequitable Canopy

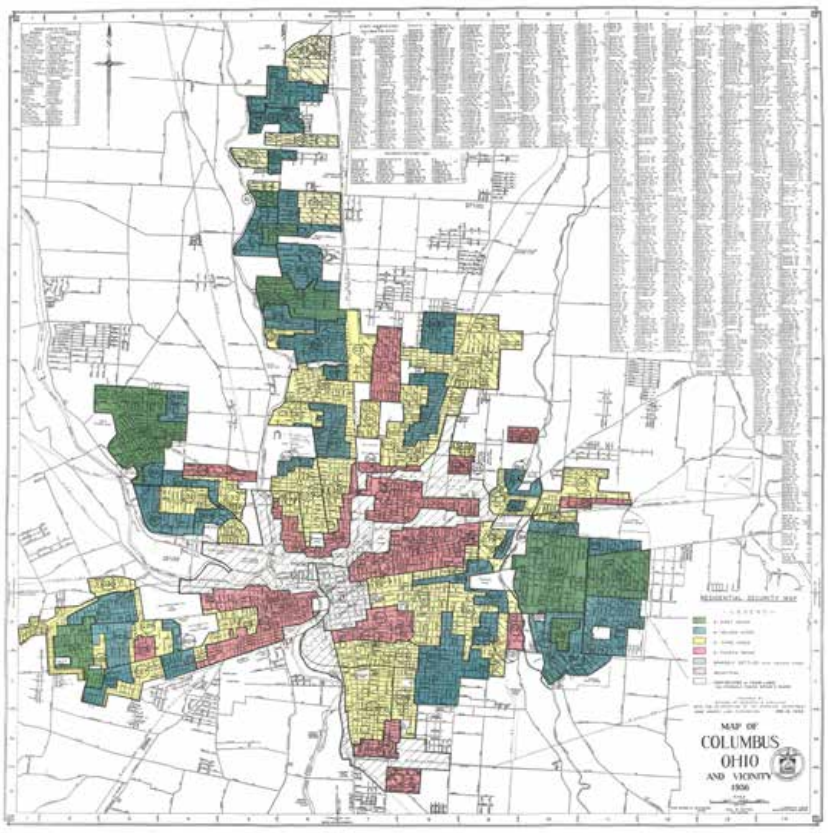


Figure 1.5 | Redlining in Columbus
The US Congress created the Home Owner's Loan Corporation (HOLC) in 1933 with the intention of refinancing mortgages to prevent foreclosures, and to expand home ownership opportunities. The HOLC created "Residential Security Maps" to determine potential risks associated with real estate investments. Green and blue areas were considered low-risk and were often newer or recently developed areas of the City. Yellow areas were considered 'Definitely Declining' and were often older areas of the City. Red areas were considered 'Hazardous' and were generally populated by minorities and lower-income residents. These 'redlined' neighborhoods were often denied mortgages and business loans, creating disparities in economic opportunities between higher income residents and minorities. The long-term impacts of redlining practices can be seen in many American cities including Columbus. Source: The Ohio State University Libraries, National Community Reinvestment Coalition. ▲

Everyone in Columbus deserves to live in a healthy, vibrant, safe community

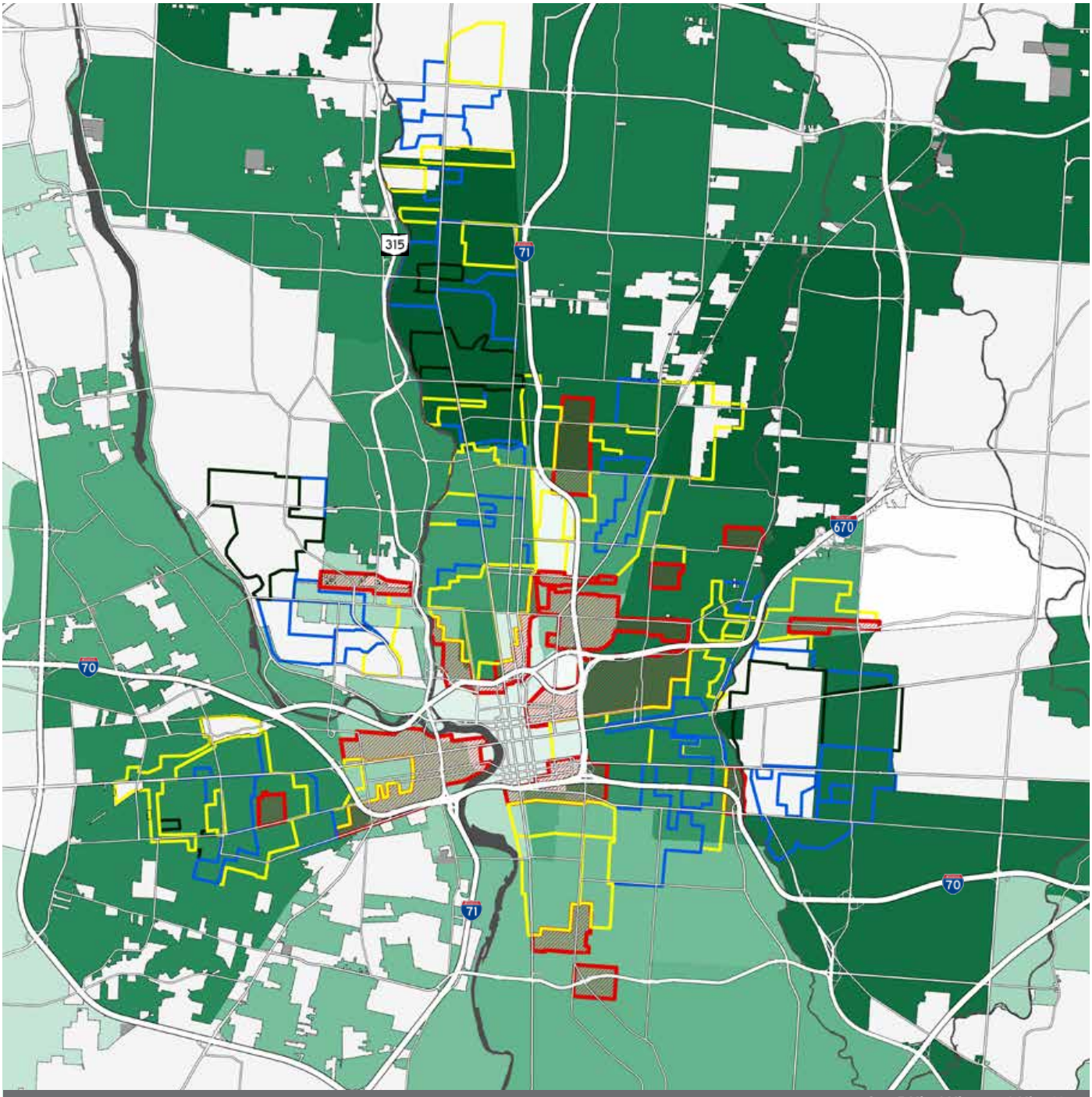
Every resident deserves access to the many benefits that tree canopy provides, but current canopy cover varies widely and inequitably between neighborhoods in Columbus. Tree canopy ranges between neighborhoods from as low as 9% to as high as 41%. This means that some neighborhoods are receiving more benefits from trees that positively affect health and well-being than others.

Equity is a community priority in Columbus, and this master plan seeks to prioritize neighborhoods with high need and low canopy. Historic disinvestment and redlining of low-income communities, immigrant communities and communities of color contributed to lower canopy in some parts of Columbus.

Trees play a critical role in making the City a better place for people to live. Our urban forest is key to create a resilient Columbus, today and into the future. The way forward starts with an understanding of what the community members in Columbus want for their city (Chapter 3), what exists today (Chapter 4) and the future direction to move forward (Chapter 5).

The Long-Term Impacts of Redlining in Columbus

Many redlined Columbus neighborhoods are still suffering from disinvestment. Significant portions of redlined neighborhoods are among the lowest in urban canopy coverage, such as Franklinton, Milo-Grogan and South Linden. Conversely, most areas that were designated green or blue are now among the highest in urban canopy rates.



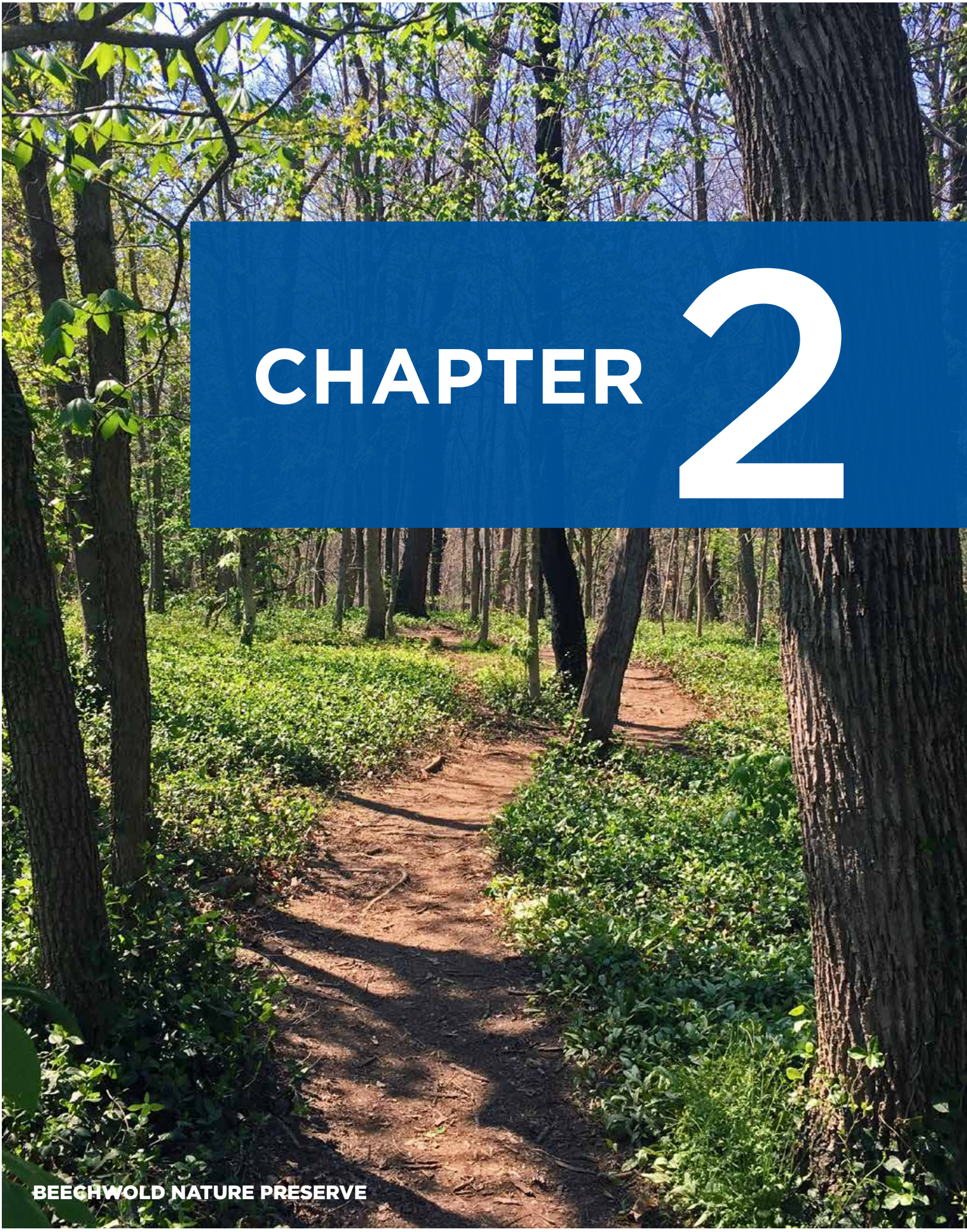
Map 1.2 | A Comparison of Redlining and Tree Canopy

Lowest Canopy Rate (<10%)

Highest Canopy Rate (>40%)

- **Area A - First Grade Area** 'Best' areas for lending
- **Area B - Second Grade Area** 'Still Desirable' areas for lending
- **Area C - Third Grade Area** 'Definitely Declining' areas for lending
- **Area D - Fourth Grade Area** 'Hazardous' areas for lending

Redlined neighborhoods generally have lower canopy rates than those that were not redlined.



CHAPTER 2

BEECHWOLD NATURE PRESERVE

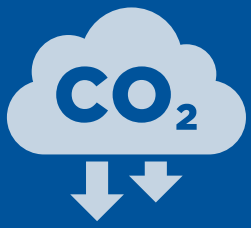
TREES AS A SOLUTION

Trees contribute significantly to the quality of life for every Columbus resident. Trees are critical to public health — they improve air quality, water quality and heat stress — as well as provide significant social benefits such as reducing mental stress, encouraging greater neighborhood-level involvement, and fulfilling spiritual and aesthetic needs, as detailed in the following page.

Because of the significant value of these benefits, cities across the country now recognize trees as critical infrastructure. They are, in fact, the only type of infrastructure that increases in value over time. And best of all, they have been proven to pay for themselves. Urban trees in the Midwest consistently provide benefits valued three times more than the cost to maintain them (Peper et al. 2009).

OVERALL TREE CANOPY BENEFITS IN COLUMBUS

TREE CANOPY BENEFITS POVIDED BY 22% CANOPY IN COLUMBUS



Annual carbon captured

168,000 tons

SERVICE VALUE: $3.9 Million

Using trees to 'sequester' this CO2 is a key part of the Columbus Climate Adaption Plan's goal to make the city more climate resilient.

Annual air pollution removed

2.5 million pounds

SERVICE VALUE: $4.6 Million

Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term chronic health problems (American Lung Association 2015).

Annual rainwater intercepted

331 million gallons

SERVICE VALUE: $29.5 Million

Contaminated stormwater flows into overloaded engineered sewers, ultimately reaching the local lakes and streams. Polluted water is a major cause of human health issues and degrades the local ecology.

Figure 2.1 | Tree Canopy Benefits Table
The tree canopy in Columbus provides many benefits, including reduction of pollutants in stormwater, removal of airborn particulate matter and sequestration of carbon. ▲

Trees as Infrastructure

Because of the significant value of these benefits, cities across the country now recognize trees as critical infrastructure. They are, in fact, the only type of infrastructure that increases in value over time. And best of all, they have been proven to pay for themselves. Urban trees in the Midwest consistently provide benefits valued three times more than the cost to maintain them (Peper et al. 2009).

Everyone in Columbus deserves to live in a healthy, vibrant, safe community

Every resident deserves access to the many benefits that tree canopy provides, but current canopy cover varies widely and inequitably between neighborhoods in Columbus. Tree canopy ranges between neighborhoods from as low as 9% to as high as 41%. This means that some neighborhoods are receiving more benefits from trees that positively affect health and well-being than others.

Equity is a community priority in Columbus, and this master plan seeks to prioritize neighborhoods with high need and low canopy. Historic disinvestment and redlining of low-income communities, immigrant communities and communities of color contributed to lower canopy in some parts of Columbus.

The Columbus urban forest provides over $38 Million in benefits every year.

> **A robust tree canopy improves health, quality of life and even utility bills for families and neighborhoods in Columbus. We know that some neighborhoods lack canopy, which is why ensuring that all families enjoy these benefits, with a focus on our neighborhoods most in need of more trees, is such an important part of this plan.**
>
> -President Pro Tempore Elizabeth Brown
> Columbus City Council

THE NUMEROUS BENEFITS OF A STRONG URBAN TREE CANOPY

Benefit 1 Urban Trees Clean the Air and Improve Health


MAYME MOORE PARK

Trees reduce or can completely remove many components of street-level air pollution, including carbon dioxide, ozone, nitrogen dioxide, sulfur dioxide (a component of smog) and small particulate matter (i.e., dust, ash, dirt, pollen and smoke).

This is an important service since air pollution creates significant public health issues. Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term chronic health problems (American Lung Association 2015). In fact, a Harvard University study showed that long-term exposure to air pollution (PM2.5 specifically) increases the risk of death in those with COVID-19 (Xiao 2020).

New York City saw a significant decrease of asthma in young children (-29%) after increasing its tree canopy through the planting of only 300 trees per square kilometer (Lovasi et al. 2008).

Studies have also shown that individuals with views or access to greenspace tend to be healthier; employees experience **23% less sick time and greater job satisfaction,** and hospital patients recover faster with fewer drugs (Ulrich 1984). Trees have also been shown to have a calming and healing effect on ADHD adults and teens (Burden 2008).

Yet another study showing the power of trees to heal and save human lives was revealed by a 2020 Philadelphia study published in the journal Lancet Planetary Health. The researchers analysis and conclusions showed that a 30% tree canopy coverage (up from 20% currently) **would result in a 3% reduction of the annual resident mortality rates.**

A study from 2004 to 2015 in New York City examined the effects of urban forest on infant health. They found that an approximately **20% increase in urban forest cover decreased prematurity by 2.1% and low birth weight among mothers by .24% percentage points respectively,** in comparison to mothers outside of the study zone. This finding is equivalent to getting a mother who smokes two cigarettes a day during her pregnancy to quit (Jones 2019).

Benefit 2 Urban Trees Alleviate Heat Stress

Due to the urban heat island effect, urban areas without trees often experience temperatures 15° to 25°F hotter than nearby, less developed areas.

Urban trees are widely accepted as one of the most effective long-term solutions to reducing the effects of urban heat islands. **Properly placed mature tree canopy can lower overall ambient temperatures by 20° to 45°F** (EPA 2015). Heat stress has been proven to cause significant public health problems and even mortality. In fact, each year, more Americans die from extreme heat than all other natural disasters combined (i.e., hurricanes, floods, tornadoes, lightning). Those over 65 or under age 5 are especially vulnerable to heat-related health problems.

In Toronto, Canada, a study found that in neighborhoods with less than 5% canopy cover, there were approximately five times as many heat-related ambulance calls as those with greater than 5% canopy cover. Additionally, there were almost 15 times as many heat-related calls as compared to neighborhoods with greater than 70% canopy cover (Graham 2016).

> **Trees in the urban landscape are one of the most effective tools to controlling heat island effects. But they also provide so much more, including cleaner air, water, habitat for wildlife and more. As a landscape architect, I design knowing that trees are one of our purest ways to experience nature in our daily urban lives.**
>
> -Jerry Smith
> Owner and Principal of Smith Greenhealth Consulting

Benefit 3 Urban Trees Create More Successful Business Districts

It has been proven that tree-covered commercial shopping districts are more successful than those without canopy. **In multiple studies, consumers showed a willingness to pay 11% more for goods and shopped for a longer period of time in shaded and landscaped business districts** (Wolf 1998b, 1999, and 2003). Consumers also felt that the quality of products was better in business districts surrounded by trees and were willing to pay more (Wolf 1998a). Trees create inviting business environments, giving each area a unique character that becomes a draw as a destination.

BROAD STREET IN FRANKLINTON Image: Shellee Fisher

THE NUMEROUS BENEFITS OF A STRONG URBAN TREE CANOPY

Benefit 4 Urban Trees Reduce Water Pollution and Flooding

As cities grow, the amount of land that naturally absorbs rainwater (i.e., lawns, parks, fields, woods) tends to shrink, while hard surfaces that cause rain to runoff (i.e., roads, buildings, parking lots) tend to increase. After flowing over roads, parking lots, and lawns, rainwater accumulates pollutants (fertilizers, oil, chemicals, grass clippings, litter, pet waste, etc.). This contaminated stormwater flows into overloaded engineered sewers, ultimately reaching the local lakes and streams. Polluted water is a major cause of human health issues and degrades the local ecology.

With more hard surfaces in an urbanized area, stormwater runoff also causes flooding. Rising incidences of flash floods in cities is a grave public health and safety concern that cities now need to address.

Trees intercept, absorb and slow rainwater, all of which play a major role in reducing the amount of contaminated stormwater that enters sewer systems and reducing the threat of floods. In fact, one mature deciduous tree can intercept over 500 gallons of rainwater a year, while a tree that holds leaves all year round (e.g., pine, fir) can **intercept up to 4,000 gallons per year** (Seitz and Escobedo 2008).

Infiltration trenches that supply water to trees can capture significant volumes of stormwater. **In one study, a system retained 43.7% of runoff.** Younger trees surrounded by impervious surfaces can benefit from these stormwater runoff interventions. (Szota 2019)

Benefit 5 Urban Trees Remove Carbon Dioxide from the Air and Provide Buffers for Noise

Most of the carbon dioxide (CO_2) in the atmosphere comes from human activities that involve the burning of fossil fuels. High levels of CO_2 have resulted in climate issues, which has in turn caused more frequent and severe storms, droughts and other natural stresses across the world in recent decades.

> **Trees are one of nature's most powerful answers to climate change. Growing more trees and larger, stronger canopies will make Columbus more climate-resilient and help keep it cool. Strong urban canopies reduce and moderate temperatures, provide shade, reduce stormwater runoff and flooding, and, of course, store carbon.**
>
> -Nathan Johnson
> Director of Public Lands, Ohio Environmental Council

Trees are constantly removing and storing carbon dioxide from the atmosphere. In fact, one single large tree is able to absorb as much as 48 pounds of carbon dioxide (CO_2) per year, **while one acre of trees stores the same amount of CO_2 released by driving an average car for 26,000 miles** (Megalos 2015).

Pollution and noise from busy roadways and rail lines can create unhealthy and undesirable conditions for those living nearby (ALA 2015). Buffers of trees can significantly reduce both noise and pollution. A 100-foot-wide, 45-foot-high densely-planted tree buffer can reduce highway noise by 50% (NC State 2012).

Benefit 6 Urban Trees Can Contribute to a Decrease in Crime

Recent studies have shown that tree-lined streets have been linked to lower crime. A study in Baltimore found that a **10% increase in tree canopy was associated with a roughly 12% decrease in crime.** It has also been shown that outdoor areas populated with trees tend to suffer from less graffiti, vandalism and littering than their treeless neighbors (PHS 2015).

In New Haven, CT, a **10% increase in tree canopy was associated with a 15% decrease in violent crime and a 14% decrease in property crime** (Gilstad-Hayden 2015).

> **Trees provide a sense of community and connectedness among residents. A strong community makes safer neighborhoods for the people who call Columbus "home."**
>
> -Emerald Hernandez-Parra
> Assistant Director, Department of Neighborhoods

Benefit 7 Urban Trees Build Stronger, Safer and More Vibrant Communities

Tree-lined streets can create stronger communities and attract new residents. While less quantifiable, the tree benefits related to community building are no less important than other services. One study showed that residents of apartment buildings surrounded by trees reported knowing their neighbors better, socializing with them more often, having a stronger community, and feeling safer and better adjusted than did residents of more barren, but otherwise identical areas (Kuo and Sullivan 2001).

In an age where walkability and pedestrian-friendly areas tend to draw the most people, tree cover is a powerful tool to revitalize business districts and neighborhoods. According to the Federal Highway Administration, urban tree canopy along streets have been shown to slow traffic, helping ensure safe, walkable streets in communities (U.S. Department of Transportation 2015). Driver stress levels have also been reported to be lower on tree-lined streets, contributing to a reduction in road rage and aggressive driving (Wolf 1998a, Kuo and Sullivan 2001). And finally, the buffers between walking areas and driving lanes created by trees also make streets feel safer for pedestrians and cyclists.

Increased tree canopy coverage in Denver, Colorado, was associated with fewer car crashes. For example, if the percent of tree canopy over a street decreased from 10% to 0%, they associated it with an increase in total crashes of 24.5%. (Coppola 2018)

THE NUMEROUS BENEFITS OF A STRONG URBAN TREE CANOPY

Benefit 8 Urban Trees Boost Property Values

PARSONS AVENUE IN OLDE TOWNE EAST

Image: Shellee Hickox

Trees have been shown to increase residential property **and commercial rental values by an average of 7%** (Wolf 2007). This is beneficial to both the property owner and the city budget's bottom lines. As property values increase, city revenue from taxes also increases. Additionally, properties can sell faster since communities with trees are generally considered more desirable places to live.

In terms of residential areas, a study in Portland, Oregon, found that on average, street trees add **$8,870 to the sales price of homes, and reduce their time on the market by 1.7 days.** (Donovan 2010)

Trees have been found to boost office rental rates. **Commercial properties with quality landscapes add 7% to the average rental rate** (Winson-Geiderman 2003). Their data suggests that increasing canopy cover while reducing hard surface cover will lead to less heat-related morbidity.

Benefit 9 Urban Trees Reduce Energy Usage and Costs

Both demands and costs for energy are rising. Heating and cooling account for approximately half of residential energy bills today (Department of Energy 2015).

Trees provide energy savings by reducing cooling and heating costs, both through their shade as well as the release of moisture through transpiration. In fact, the cooling effect of one healthy tree is equivalent to 10 room-sized air conditioners operating 20 hours a day (North Carolina State University 2012). Blocking cold winds is the biggest contribution trees can make toward energy conservation in winter.

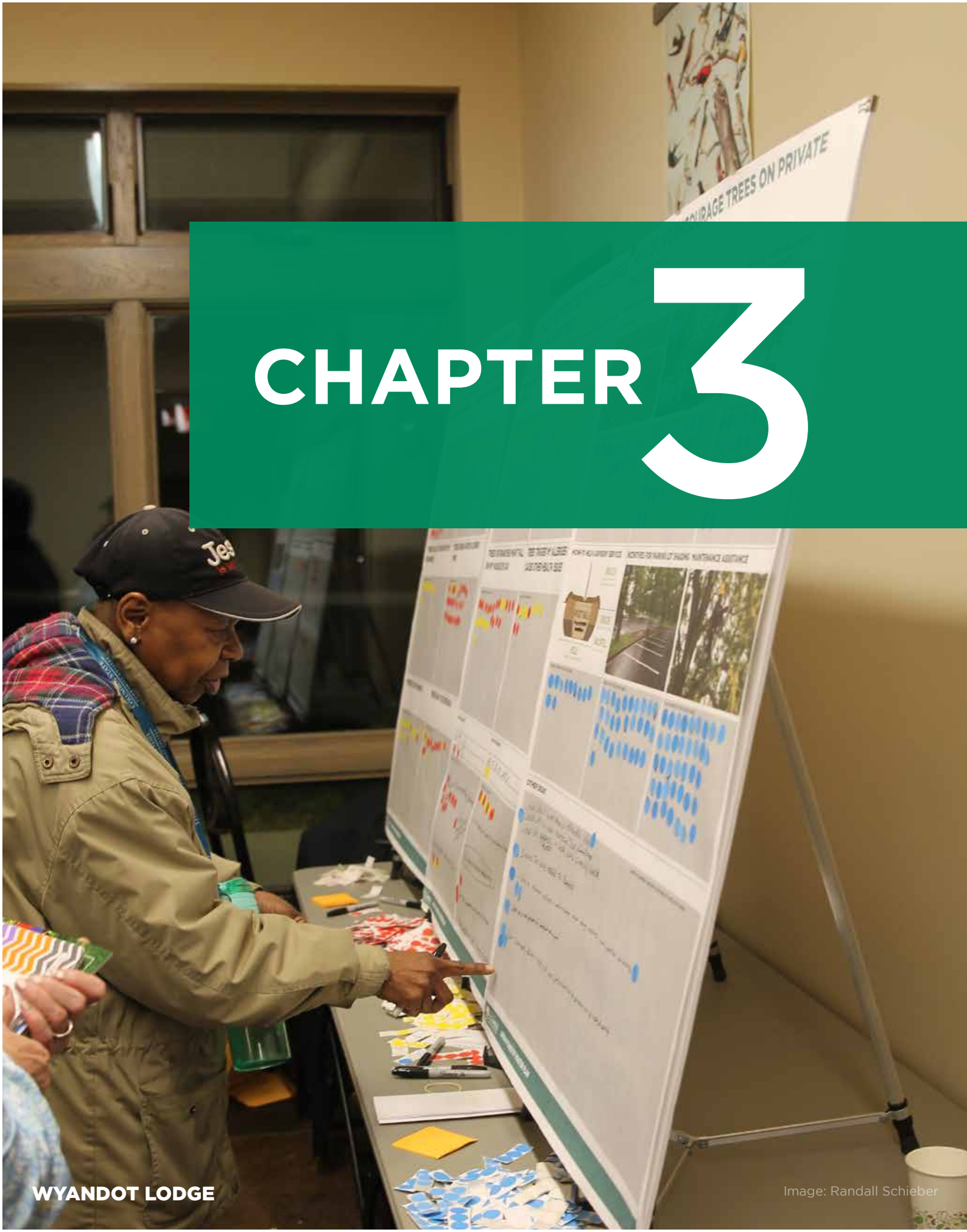
Trees properly placed around buildings can reduce air conditioning needs by 30% and can save 20% to 50% in energy used for heating. Computer models devised by the U.S. Department of Energy predict that the proper placement of only three trees can **save an average household between $100 and $250 in energy costs annually.**

Beyond monetary saving, the cooling effect provided by trees is an important benefit for any resident of Columbus, but can be a life or death issue for those prone to heat-related illnesses and/or those in lower income areas, as described in the benefit on heat stress described earlier.

Benefit 10 Urban Trees Provide Essential Wildlife Habitat

Trees are an essential component to habitat and conservation in urban areas. They intercept and clean large quantities of polluted stormwater, preventing further degradation to vital aquatic and terrestrial habitats. Additionally, as smaller forests are connected through planned or informal urban greenways, **trees provide essential habitat to a range of birds, pollinators, and other wildlife that feed on insects** (Dolan 2015). A healthy wildlife population also indicates a healthy place for people to live.

> **Protecting and maintaining a widespread, diverse population of trees is critical to biodiversity. Diverse tree cover enhances our urban environment.**
>
> -Pete Precario
> Executive Director, Midwest Biodiversity Institute


CHAPTER 3
WYANDOT LODGE
Image: Randall Schieber

THE COMMUNITY WEIGHS IN

Through a series of engagement efforts, voices from the community were heard and incorporated into the UFMP. Community opinions and input were gathered to understand what the biggest challenges are; what is being done well; what isn't working; and in general, what are the community's priorities, vision and goals for the urban forest.

The public input process also provided the City with the opportunity to share with residents and stakeholders about tree benefits and the current state of the urban forest in Columbus, as well as the systems in place that impact tree canopy.

AVENUES OF UFMP INPUT

Figure 3.1 | "Let's Talk Trees" Public Open House
Over 135 residents viewed a presentation on Columbus' urban forest and provided feedback. ▲

Figure 3.2 | Word Cloud of Public Open House Participants
One of several activities included a general request for priorities that should be the focus of the plan. This word cloud demonstrates several key items including funding, policy initiatives and ideas for implementation. ▲

The community contributed valuable insights and opinions primarily through five avenues of input:

#1 Public Open House

"Let's Talk Trees" Public Open House (March 4, 2020, 6-8 p.m. at Wyandot Lodge).

This outreach effort was a public open house with the goal of providing an educational and interactive way for the community to provide input on the challenges and solutions to increasing Columbus' tree canopy. More than 135 residents visited seven stations to provide input; these were staffed by City representatives and UFMP Project Team members. Additionally, a presentation detailed what tree canopy is and why it is important, the goals of the project and what we found so far in Columbus.

#2 Online Input

Web-Based Comment Form (www.ColumbusUFMP.org). More than 300 residents submitted comments through the online comment form between Feb. 1 - April 15, 2020.

#3 Small Group Presentations

UFMP Project Lead, Rosalie Hendon, spoke to a number of small groups throughout the city upon request, including the GreenSpot Advisory Board, Mid-Ohio Regional Planning Commission and Sustainable Columbus' external advisory board.

#4 One-on-One Interviews

Thirty people were interviewed to understand existing conditions, define challenges, and explore the future of urban tree canopy and management in Columbus. These included group interviews with city departments and elected officials, as well as one-on-one interviews with community and industry representatives.

#5 Stakeholder Groups of Community Leaders

Two stakeholder groups were formed to guide the development of this work: a Project Team (steering committee of 30 people) who met regularly to guide the project, and a larger Advisory Group (more than 100 community leaders and city staff) who participated in a series of three workshops. The full member list for both of these groups can be found in the Acknowledgments section of the document.

Emerging Community Themes

Through the hundreds of comments and conversations across the city, a number of themes emerged detailing what the community values and wants for the future. These themes are briefly described in the following pages; a more detailed report can be found at www.columbus.gov.

Figure 3.3 | Columbus Urban Forestry Master Plan Website
The Urban Forestry Master Plan website served as the web-based home for the project. ◀

Figure 3.4 | Advisory Workshop #2
The stakeholder meetings were well-attended and included representatives from community groups and urban forestry professionals. ▼

COMMUNITY THEMES

Theme 1 We Are Not Where We Should Be

Many commented on how far behind the City is in tree canopy cover compared to other cities, that this conversation and work should have started decades ago, and how important expanding tree canopy is to maintain a livable city with healthy residents. The overarching theme to these comments was that improving the quantity and quality of the tree canopy should be a high priority in the next decade.

Sample Public Comments

"There is no excuse for Columbus to have such a low percentage tree canopy; it significantly affects quality of life and attractiveness as a city."

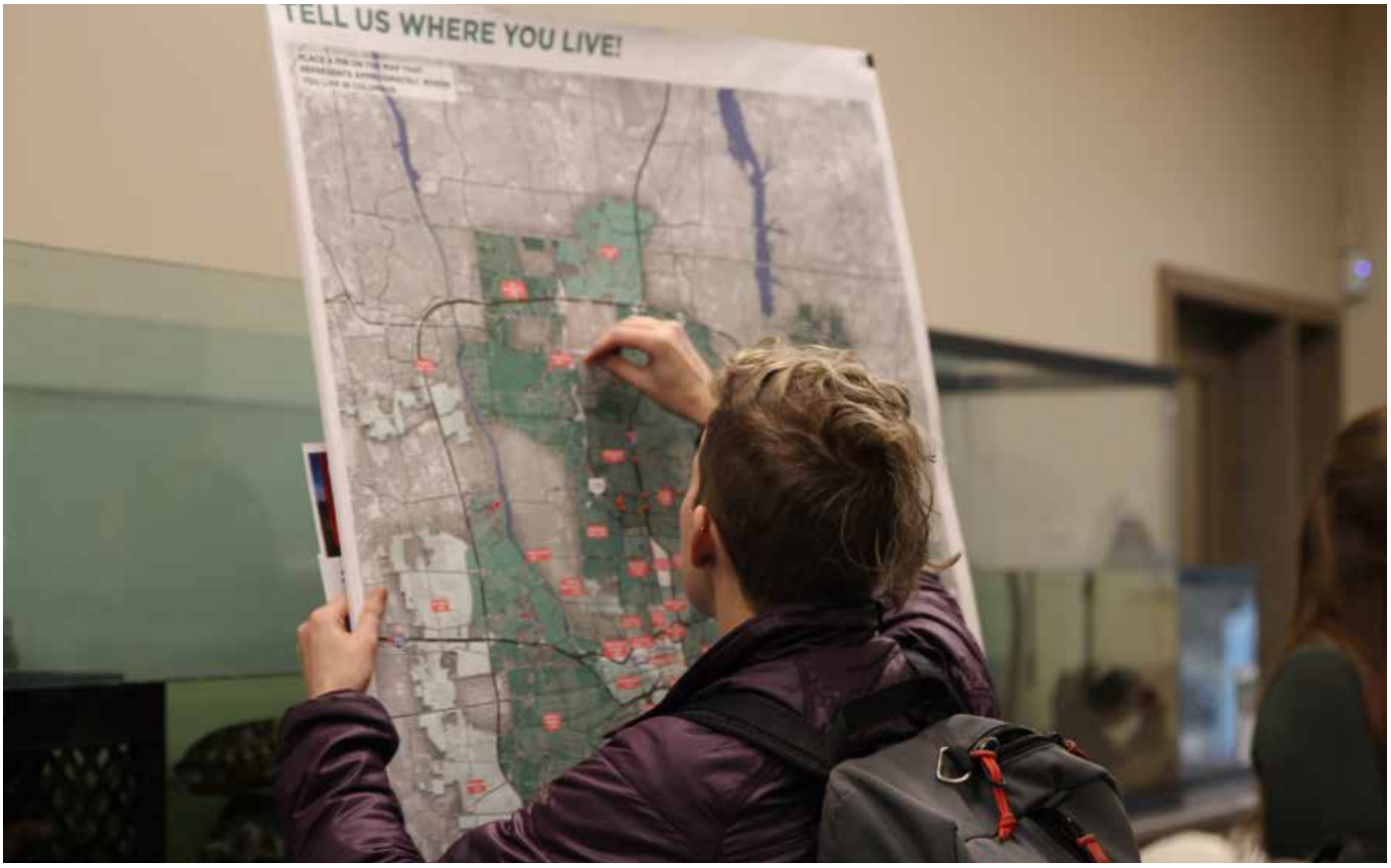
"This is one of my top concerns for the future of our city. The benefits of improved tree canopy are incredible. We just need to prioritize it."

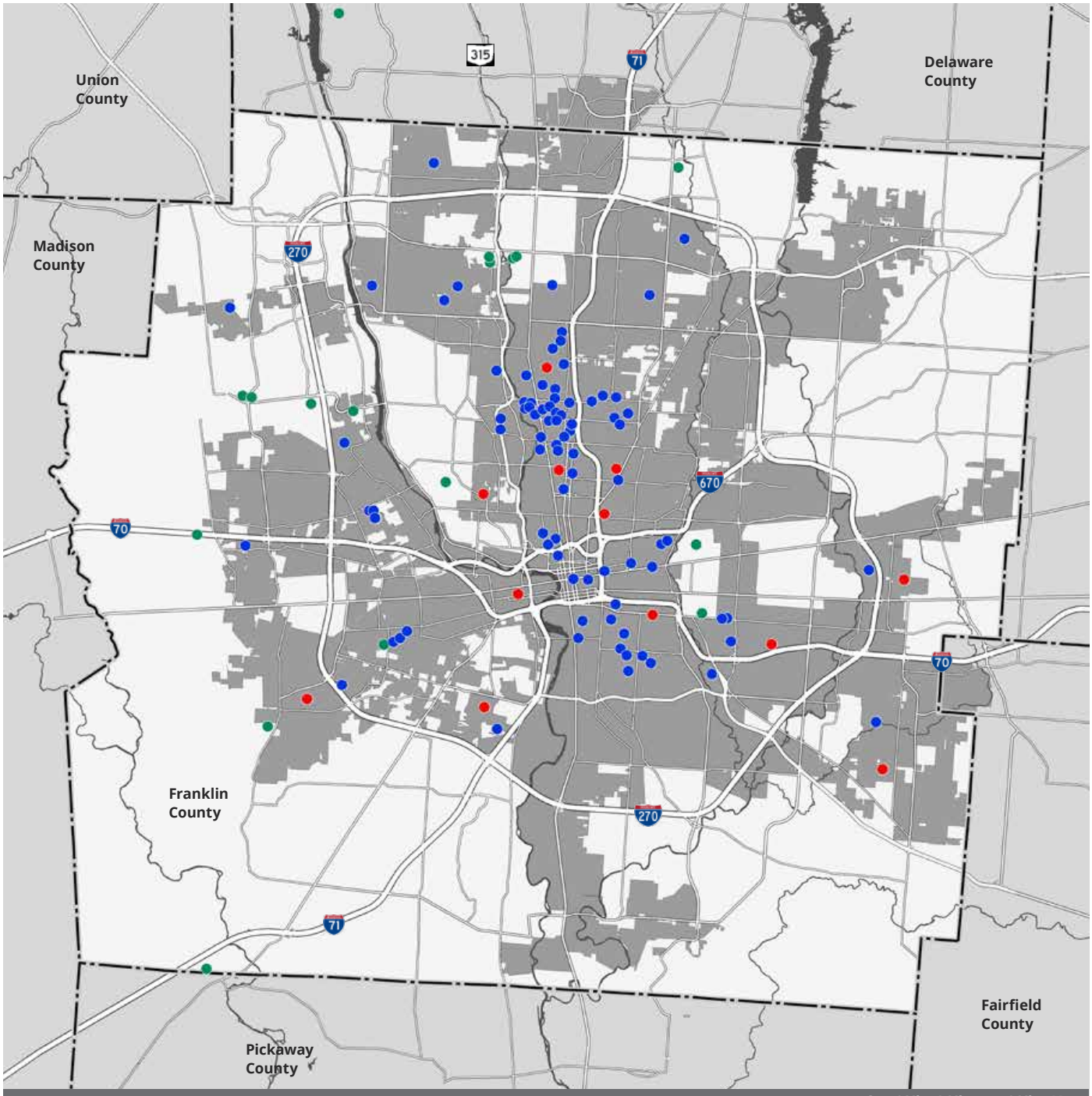
"We NEED more greenery. Columbus is turning into an apartment world, and we're losing the home-y feel of the city. We also have significantly less greenery than similar cities, and this is something that we need to work on."

"Thank you for taking on this very important issue. It's decades late."

Figure 3.5 | Household Locations Mapping Activity

Public meeting attendees placed a pin at their current residence, showing the geographic representation of those engaged for the creation of this plan. The results are illustrated on Map 3.1. ▼





Map 3.1 | Household Locations of Meeting Attendees

- **Public Meeting Attendee Who Is Not a Columbus Resident**
- **Public Meeting Attendee Who is a Columbus Resident**
- **Advisory Group Member**

The public input process engaged residents throughout Columbus and across Franklin County.

COMMUNITY THEMES

Theme 2 Education is Needed

The greatest area of consensus in the public comments was the feeling that much of the community at-large do not consider trees as critical to the community. Many expressed the opinion that there are residents who do not fully understand the economic, public health and environmental benefits of trees, and some residents may not even feel that caring for trees is their responsibility.

Stakeholders want to see education prioritized for future public engagement and marketing efforts. Educating the public was cited as the most effective solution to addressing the challenges Columbus' urban forest faces, focused not only on the benefits of tree canopy in general, but also in terms of tree species diversity, better maintenance and increased resources. Residents would like to see education and outreach occur on an individual resident level, as a larger public marketing campaign, and as a part of school curricula.

Sample Public Comments

"We need to make people aware of the threats to our trees. Especially the threats of insects (like emerald ash borer) and other things that threaten the lives of trees."

"Make the economic development case; make the climate improvement case; make the air quality/public health case; get other city departments/leaders to champion these cases and talking points."

"Trees are expensive and can take a year or two before you can see great results. However, those results will last far longer than a community garden."

"Educate developers, city officials, and the public about the economic value of trees."

Theme 3 Better Management is Needed for Existing Public Trees

Many agree that the status quo regarding management of the existing public tree canopy is not working. Maximizing the lives of existing trees is an efficient and effective way to preserve canopy. While many wanted to see an increase in trees and better protection for them, they also called for better management of the existing trees. This includes addressing communication and coordination between City departments whose actions affect the urban forest. Individual departments have their own priorities and work plans to fulfill, and the public sees this as creating conflicts between trees and other city projects.

Sample Public Comments

"More resources need to be devoted to the care and maintenance of existing trees all over Columbus. There are many trees with limbs damaged by passing cars and pedestrians, serious structural issues (girdling, roots, rubbing, limbs, etc.) and significant split limbs."

"The lack of coordination and communication across city departments is the major challenge. These master plans are developed in silos. So, both city administration, the neighborhood office, public works, economic development and the council have to figure out how to coordinate projects."

Theme 4 There are Not Enough Tree Protection Measures in Place Currently

The general consensus from the community is that there are not enough tree protection standards. Many hope the UFMP will kickstart the process to update the tree protection ordinance and make changes in multiple areas of city code to ensure new development standards prioritize tree canopy. This would include mandatory planting ratios and tree removal permit enforcement.

Sample Public Comments

"Strengthen city codes and enforce them with fewer variances."

"Pass a tree ordinance requiring tree replacement, like many other cities have done. Make trees a part of the developing process, instead of an inconvenient afterthought."

"Require new developments to not only provide a minimum tree number, but also require adequate soil volume for those trees."

"Protect wetlands and wild areas, especially preserving green corridors. Green corridors allow for communication within intact biomes. Intact healthy biomes are necessary for life on the planet."

Theme 5 Focus on Equity in the Next Steps to Improve Columbus Tree Canopy

The 2013 Urban Tree Canopy Assessment data shows that tree canopy in Columbus varies greatly by neighborhood, from 9% at the lowest to 41% at the highest. This disparity means that not all residents have access to the benefits that trees provide. Many in Columbus want to correct this inequity in canopy cover by engaging low-income areas that can benefit the most from tree canopy benefits. Neighborhood tree canopy disparity is a challenge, as there is a lack of resources in many lower-income or renter-dominated neighborhoods for tree planting and proper tree maintenance on private property. There is also a concern that many maintenance costs fall on homeowners who may not be able to afford the necessary maintenance work. Additionally, some residents are not physically able to care for trees.

Sample Public Comments

"Not everyone on the South Side understands the value trees bring. But some do. And their ignorance is not a reason to neglect trees in that area. You can track low income areas with tree cover. These old homes do not have central air and not all can afford to add it. Trees help insulate in hot summers... We need tree education in these areas and tree canopy equality!"

"Some people do not have the resources or the physical ability to plant trees on their property."

"When considering air quality — air pollution has major health impacts on our youth. Neighborhoods in close proximity to major roadways and other at risk areas should come at a priority."

"Lack of education directed towards poor folks, less advantaged individuals. I drive for a living, and I notice how trees are an important part of the charm of neighborhoods like Upper Arlington and New Albany. Why can't opportunity neighborhoods have equal charm?"

Theme 6 The Lack of Resources and Funding for Something so Important Needs to be Addressed

Many respondents felt that there are not enough resources currently dedicated to tree canopy expansion and conservation efforts across the city, indicating a citywide lack of priority for this livability and sustainability issue.

Sample Public Comments

"Investment and education from the city, similar to our approach to infant mortality through CelebrateOne. It just needs to be a deliberate focus."

"Allocate resources to make urban forestry a high priority."

"There is a need for funding commitment by the Mayor and City Council to fund in-house professional staff who can continually review plans, enforce codes, provide assistance, monitor status and facilitate city-wide progress. Obviously, at this time, there are not enough full-time Forestry personnel employed by the City of Columbus. The situation can be improved upon greatly if the Mayor of Columbus and City Council provide increased, on-going, long-term fiscal resources dedicated solely to the Parks and Forestry divisions."

Theme 7 Make Sure to Obtain and Maintain Updated Data

Tree canopy cover in Columbus was last measured from 2013 aerial photos. Concerns were raised about making decisions or taking action based on the use of old data, especially when so much development has occurred, emerald ash borer has been present, and severe storms have occurred since the aerial photos were taken. The City is using old tree inventory data as well. The question was raised multiple times "How can we manage what we don't know about?"

Sample Public Comments

"The use of 2013 canopy data for the entirety of Columbus is problematic. Some areas of the city are relatively static in terms of the effect of development on canopy. The 2013 data is acceptable for these areas. The problem comes in with more suburban areas like mine (West Scioto) that are and have been under assault by development. 2013 data doesn't come close — and presents a highly misleading picture to represent the ravaging of our tree canopy."

"Form a data working group to establish a data management plan. Link with Smart Columbus."

"Set a goal to do a tree canopy study every 5-10 years."

Theme 8 Take Steps to Encourage Tree Planting and Preservation on Private Property

Revitalizing the canopy will take more than just public sector efforts. It will require private property owners to support preservation, maintenance and expansion of the tree canopy. The community cited a number of ways to encourage tree planting and care across the community — both on private and public property. The most popular options for encouraging trees on private property included tree giveaways, assistance with maintenance, and credits for and reductions in stormwater fees. Changes in City policies and operations were also cited as a way to encourage private property owners to support trees, specifically providing leaf pick up, shifting responsibility for sidewalk damage to the City, improving general communication with the public, and providing options for planting on the private side of the sidewalk/ right-of-way.

Sample Public Comments

"City assumes responsibility for fixing sidewalks damaged by tree roots. Many simply cannot afford to replace sidewalks so they cut down trees to reduce possible damage."

"Communicate with the public. Six to seven years ago, a truck came down our street dropping trees in front of various houses. The tree planted on my property was planted close to my main water line; which is/was a concern for me. Nothing was communicated to the residents of my neighborhood that this was being done."

Theme 9 Address Rental Properties

Some stakeholders believe that rental properties in Columbus may be a hurdle to growing tree canopy. The concern is that landlords may remove trees or not plant trees to save money, and that renters are typically not invested in the property or neighborhood they are living in.

Sample Public Comments

"Encouraging more owner occupancy, or gearing messaging to renters in ways they can improve treecover without being an owner."

"Major landlord companies and other landlords in the University District don't ask for street trees or maintain their own very well."

"Landlords are disinclined to plant more trees on their own properties without incentives."

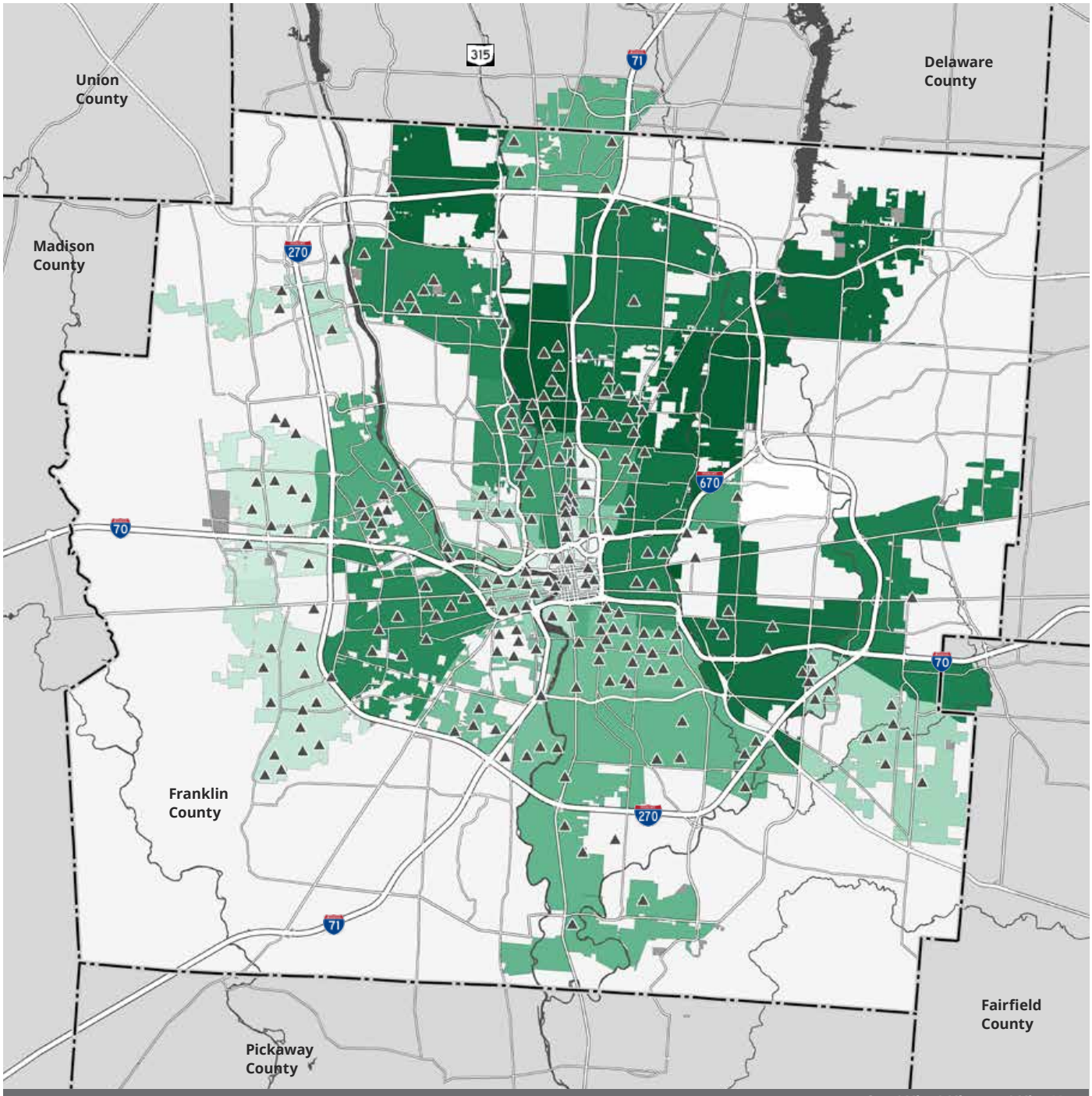
"The City has a rental registration for landlords. They should reduce the fee if the landlord can prove they planted a tree in the last year as an incentive."

"In neighborhoods with mostly rental properties, residents will not care for trees and small landlords will not invest in them due to leaves, roots, gutters and wind damage. These areas then lack trees."

Figure 3.6 | Prioritized Tree Planting Activity
Public meeting attendees were asked to determine where in Columbus they would like to see additional tree plantings. The outcomes are illustrated on Map 3.2. ▲

Community Input

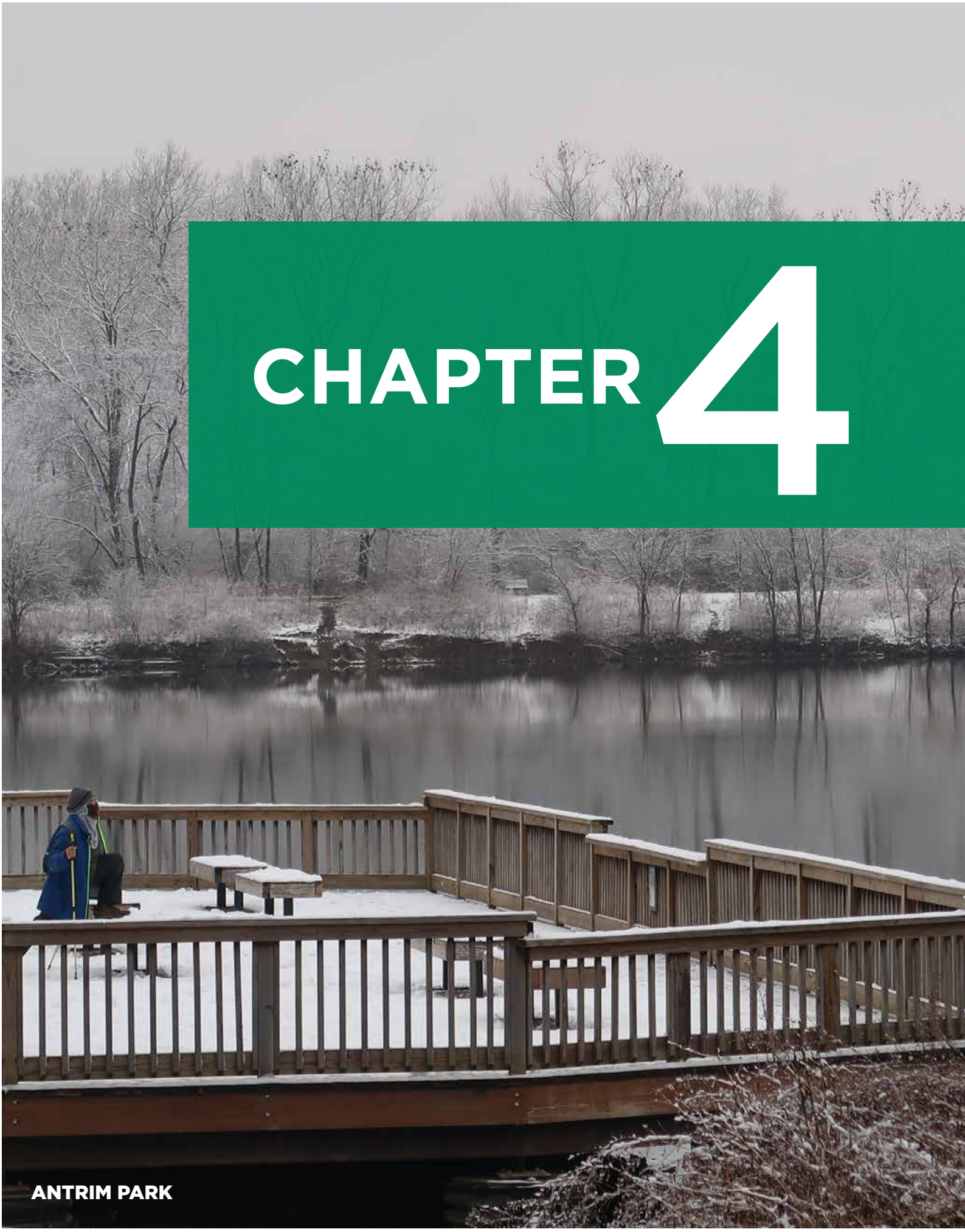
Input received from the public, the advisory group and the project team was used to develop an assessment of the urban forest (Chapter 4) and the plan's action steps to achieve Columbus' goals for the urban forest (Chapters 5-7). A full report on public input can be found on the city's website www.columbus.gov.



Map 3.2 | Desired Planting Areas from the Public

The public prioritized tree planting in areas with low canopy and along major corridors.

CHAPTER 4



ANTRIM PARK

STATE OF THE URBAN FOREST

Prior to determining a way forward, Columbus' urban forest was comprehensively assessed. Industry experts and stakeholders examined all aspects of the City's tree canopy and its management.

THE ASSESSMENT PROCESS

Figure 4.1 | Columbus City Nursery
The City of Columbus owns and operates a nursery to supply trees for planting throughout Columbus. Featured are 'White Shield' Osage orange trees. ▲

Through analysis of existing tree data, City Forestry operations, and stakeholder feedback, national urban forestry experts at Davey Resource Group and Urban Canopy Works scored Columbus on 32 indicators of a sustainable urban forest.[1]

Resource Analysis

Columbus has two main sources of tree data: 1) a public street tree inventory and 2) an urban tree canopy assessment. Both were analyzed to understand the diversity, resilience and age of the city's urban forest and determine data limitations.

Forestry Operations Review

An internal review of the City of Columbus' urban forestry operations was conducted to evaluate current practices and policies that influence the maintenance, planting and care of public trees.

1 This evaluation structure comes from a combination of James Clark's Model of Urban Forest Sustainability and Andy Kenney's Criteria and Indicators for Strategic Urban Forest Planning and Management.

A Comprehensive Evaluation

A comprehensive resource and program assessment based on the Indicators of a Sustainable Urban Forest was performed to assess the current, baseline state of Columbus' urban forest. The indicators use urban forestry industry standards and best management practices to evaluate a community's trees, how they are managed and the level of community engagement. For each indicator, Columbus' current performance level was rated as low, moderate, or good.

Performance levels were determined through analyses of existing data, and stakeholder input from the community (Chapter 3), with guidance from Davey Resource Group, Urban Canopy Works and Designing Local. The tree and management indicators were evaluated with data while the assessment of stakeholder engagement ("The Players" indicators) was based on the views of the Advisory Group members.

Summary of Major Findings

The following pages highlight the major findings from the assessment process. The "Columbus Urban Forest Assessment Technical Report: 2020," a companion document to the UFMP, provides detailed methodology, data and analyses about Columbus' urban forest. The report can be found on the City of Columbus website at www.columbus.gov.

Figure 4.2 | Walking Along Blacklick Creek Trail
The City of Columbus works to preserve forested areas as parkland for residents to enjoy. ▼

Finding 1 The City's Tree Data is Out-of-Date

While the City's tree data sources need updating — and accurate current conditions may not be known — **the following sections establish a baseline that can be updated with new inventory and tree canopy data.** This assessment, together with the Action Steps, provides tools and strategies to grow and improve Columbus' urban forest.

Canopy Cover

Industry standards recommend conducting a tree canopy assessment every five to 10 years, with more frequent assessments if development activities, insects, diseases or natural causes could have impacted tree canopy cover. Columbus' 22% tree canopy cover is based on 2013 data. Over the last seven years, the city has experienced significant growth and development, as well as the loss of thousands of ash trees on public and private property due to the emerald ash borer. These factors have led to stakeholder concerns over the accuracy of the 2013 tree canopy data.

Columbus lacks multiple years of tree canopy data to understand trends in its urban forest. A canopy change analysis measures canopy change over time. Since Columbus only has tree canopy data from 2013, an analysis could not be conducted. Measuring canopy change over time can determine where losses or gains in canopy cover are occurring and why.

Public Tree Inventory

The last full inventory of Columbus' street trees was completed in 1997. The City of Columbus manages over 127,000 public trees along streets and in mowed areas of parks, and likely even more trees that have not been inventoried. Inaccurate and incomplete information causes reactive, inefficient and insufficient care of the city's publicly managed trees.

With incomplete and out-of-date public tree inventory data, the following evaluations cannot be accurately completed:

- Age Distribution of Public Trees. To maintain a sustainable urban forest, it is important for Columbus trees to be a mix of age classes: young, establishing, maturing and mature. Age diversity prevents a significant loss in tree canopy when many mature trees die at the same time.
- Knowing the age distribution of the public tree population can also help target management activities. For example, preserving and caring for mature trees will prevent current tree canopy cover losses. Planting and caring for young trees is critical to replace old, dying and dead trees.
- Condition of Public Trees. An accurate assessment of the condition of public trees is important to direct tree care and understand the health of future tree canopy. With less than 10% of Columbus' tree inventory updated over the last five years, the data on condition and maintenance needs is outdated and not accurate.

Full Knowledge of Public Tree Risk

Columbus' current tree inventory does not include a tree risk rating. Understanding risk, condition and maintenance needs of the city's public tree population is critical in managing liability and efficiently conducting tree care operations. Information on risk is also necessary to develop plans, programs and policies to sustainably manage the urban forest.

Finding 2 Columbus Has Less Tree Canopy Than Peer Cities

The City of Columbus is covered by 22% tree canopy when viewed from above. This is significantly less than some regional peer cities (Figure 4.3). Pittsburgh, Cincinnati and Louisville having nearly twice as much tree canopy cover as Columbus.

Columbus Compared to Peer Cities

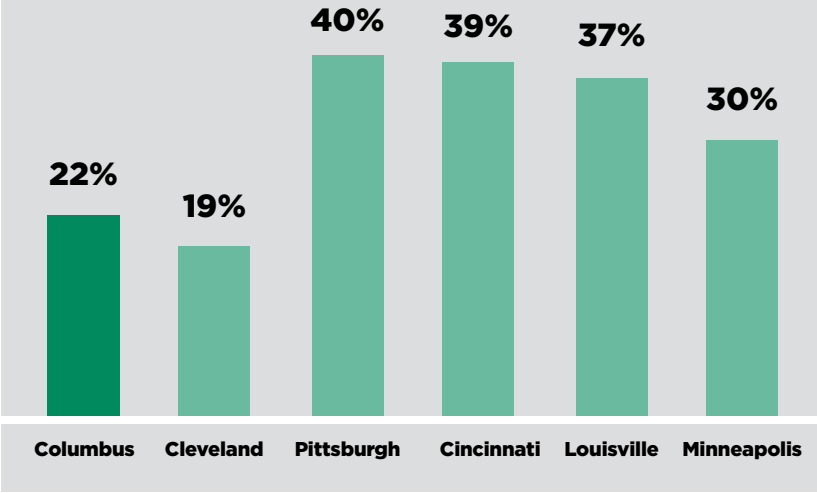


Figure 4.3 | Comparison of Tree Canopy Cover
The City of Columbus has less tree canopy than nearly all of its peer cities in the Ohio Valley and Midwest. ▶

Columbus Tree Canopy Inventory

The City of Columbus maintains a GIS-based inventory of all existing street trees. The map illustrates the existing street trees in the Cleveland Avenue corridor of Columbus.

Columbus' public tree inventory included over 127,000 street and park trees at the time of this plan. Valuable information such as the species, size and health of public trees is collected and stored in this database. City of Columbus Forestry uses this inventory to track where trees are planted, maintained or removed.

Finding 3 Tree Canopy is not Equitable Across Neighborhoods

Trees are vital infrastructure that every neighborhood deserves. However, historic disinvestment (see Map 1.2 on redlining), land use patterns, zoning and other factors mean that Columbus' tree canopy varies widely across the city. An equitable tree canopy is mature, healthy and sustainable, and it is appropriately placed to provide other environmental and social benefits in neighborhoods.

When considering equitable distribution of the urban forest, the percent of tree canopy cover is only one factor to consider. Map 4.1 and Figure 4.4 show canopy coverage across Columbus. Columbus' tree canopy ranges from 7% to 49% across the city, with an average of 22%. Neighborhoods range from a low of **9% to a high of 41% tree canopy cover** (see Appendix B for how neighborhoods were determined). It is also important to consider the trees themselves: their health, size and species. For example, a neighborhood may have an average amount of tree canopy cover, but if the area has large, aging trees on private property there is a risk of canopy loss. Additional factors that impact appropriate tree canopy cover may include average area temperatures, stormwater runoff, air pollution and land use and population information (i.e., economic, demographic and health). A neighborhood with higher temperatures and air pollution will benefit from investments in tree canopy. This means that **equity is not just about canopy cover.** In order to create an equitable tree canopy in Columbus, **both canopy cover and social equity factors will be used to prioritize neighborhoods for investment** (Map 4.2).

Investment in these neighborhoods goes beyond planting trees and will also entail collecting data on the existing urban forest, caring for and preserving mature trees, and improving public safety by removing hazardous trees. The tree canopy goals outlined in Chapter 5 and Action Step 6 provide a path forward to begin to address inequities in tree canopy cover.

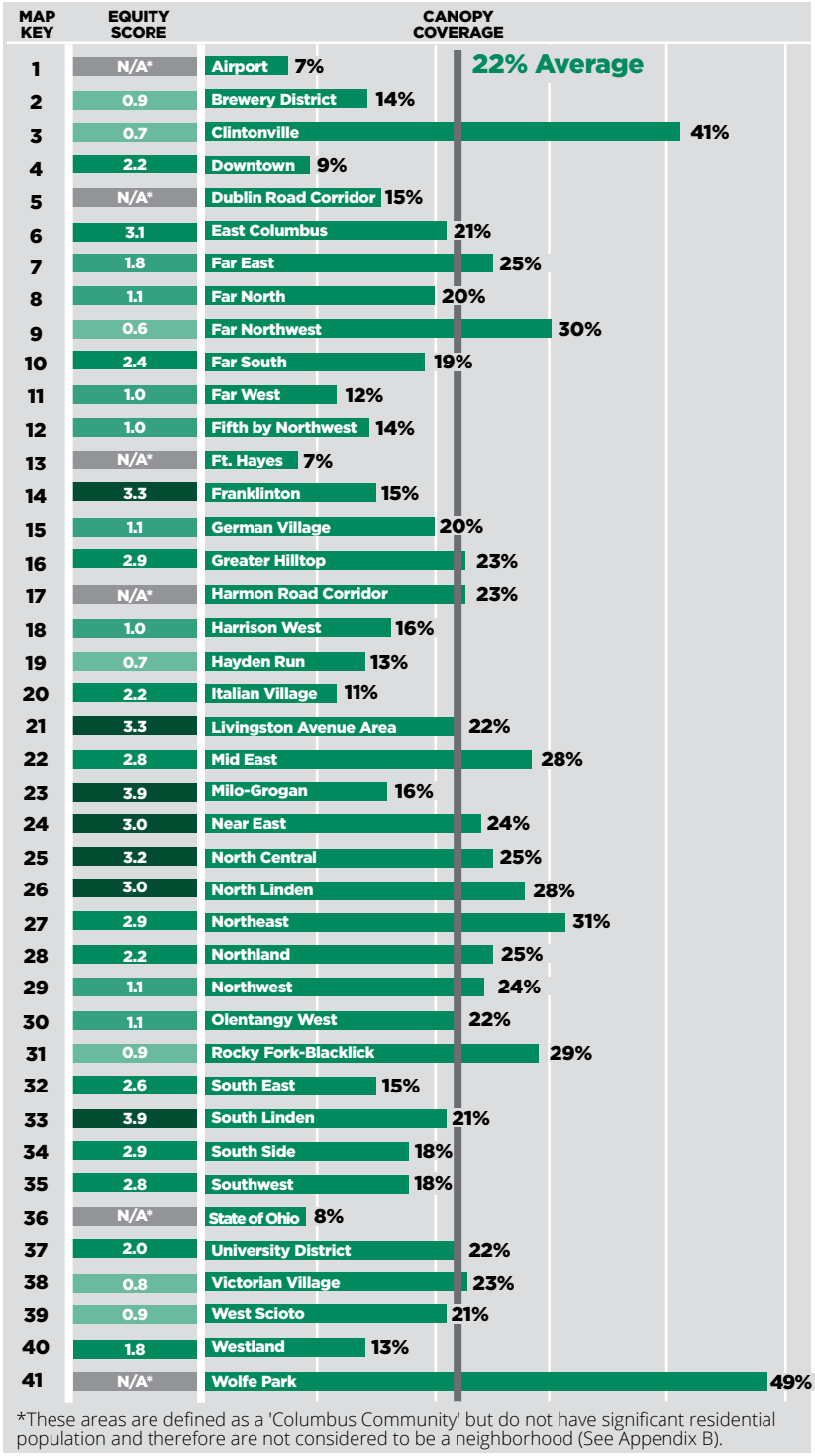
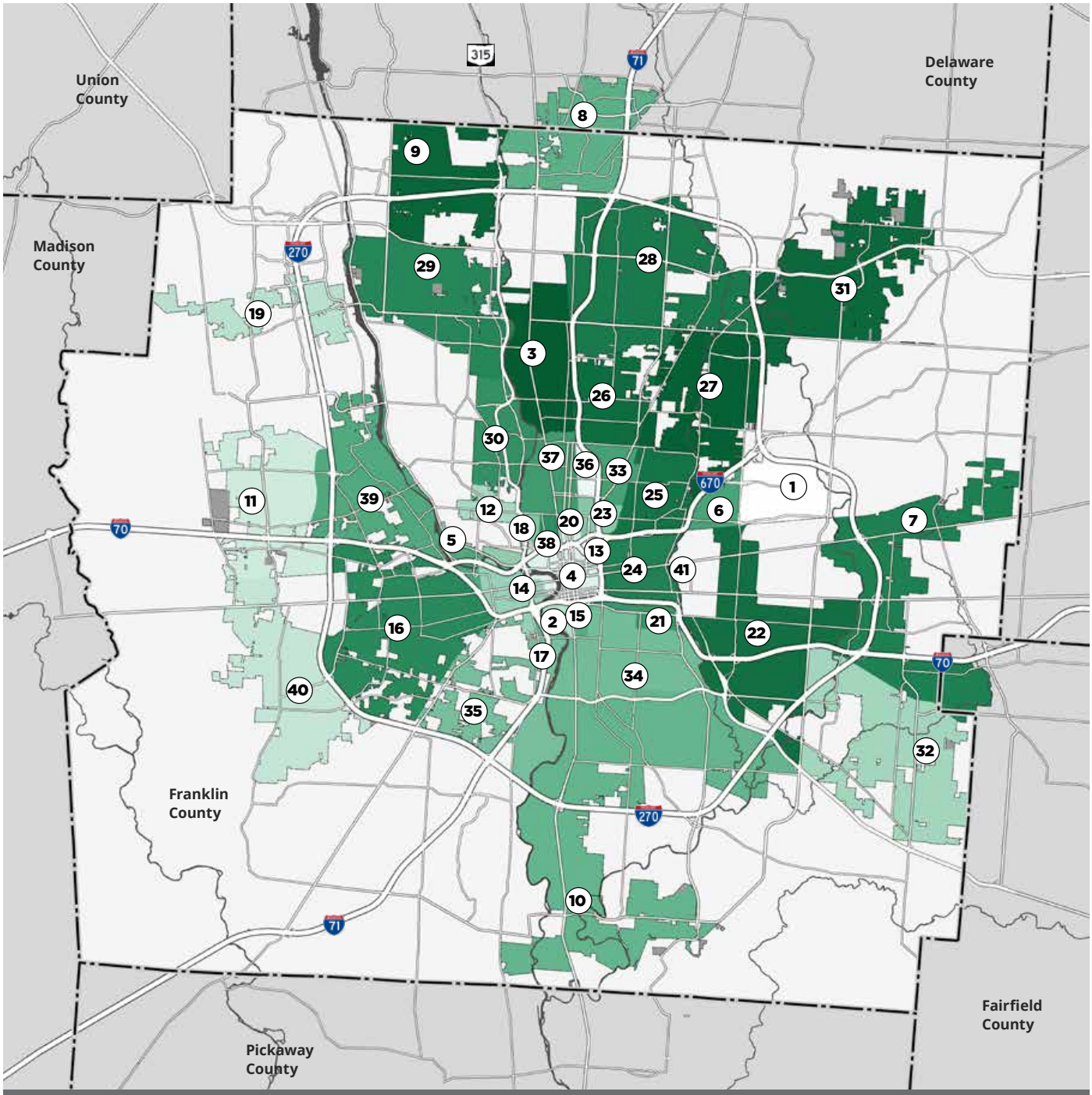


Figure 4.4 | Tree Canopy Coverage

Tree canopy varies significantly across the City of Columbus from 7% to 49%. Discounting areas with low population (industrial corridors, state land, the John Glenn Columbus International Airport, and Wolfe Park), tree canopy varies in neighborhoods from 9% to 41%. ▲

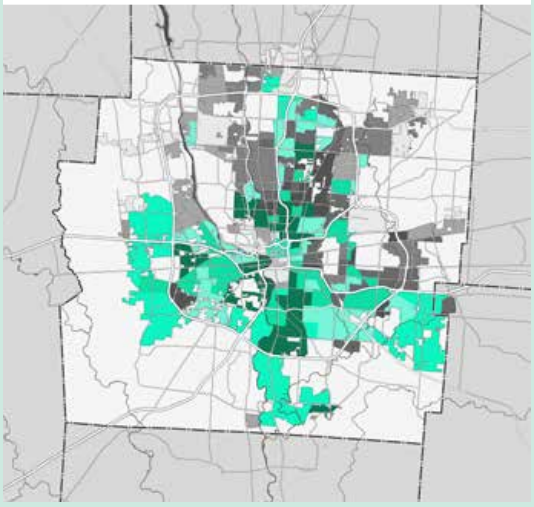


Map 4.1 | Canopy Coverage for Columbus Communities

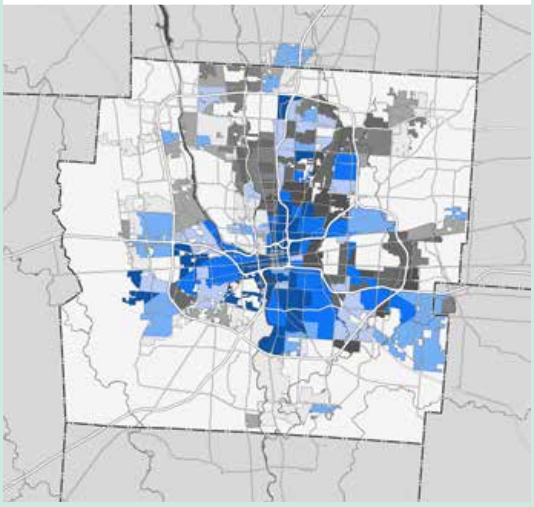
Tree canopy varies from 9% to 41% across Columbus neighborhoods.

ANALYSIS OF CANOPY COVER THROUGH AN EQUITY LENS

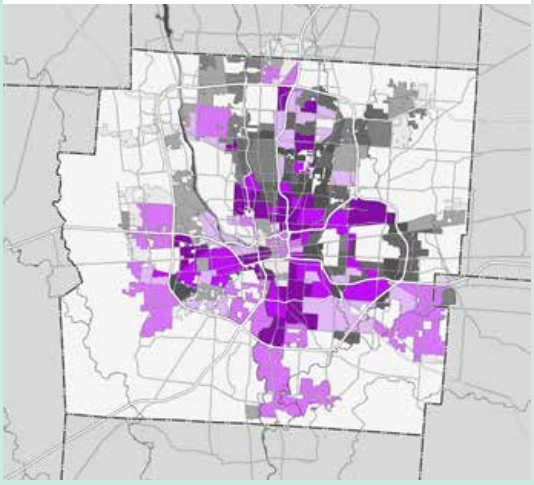
Mental Health and Canopy



Violent Crime and Canopy



Median Household Income and Canopy



Research shows that trees provide important benefits to neighborhoods, from cooling the air to improving physical health, and making communities safer. While planting and preserving trees in areas with lower canopy cover is one way to increase city tree canopy, it is also important to prioritize areas for tree planting and preservation through an equity lens.

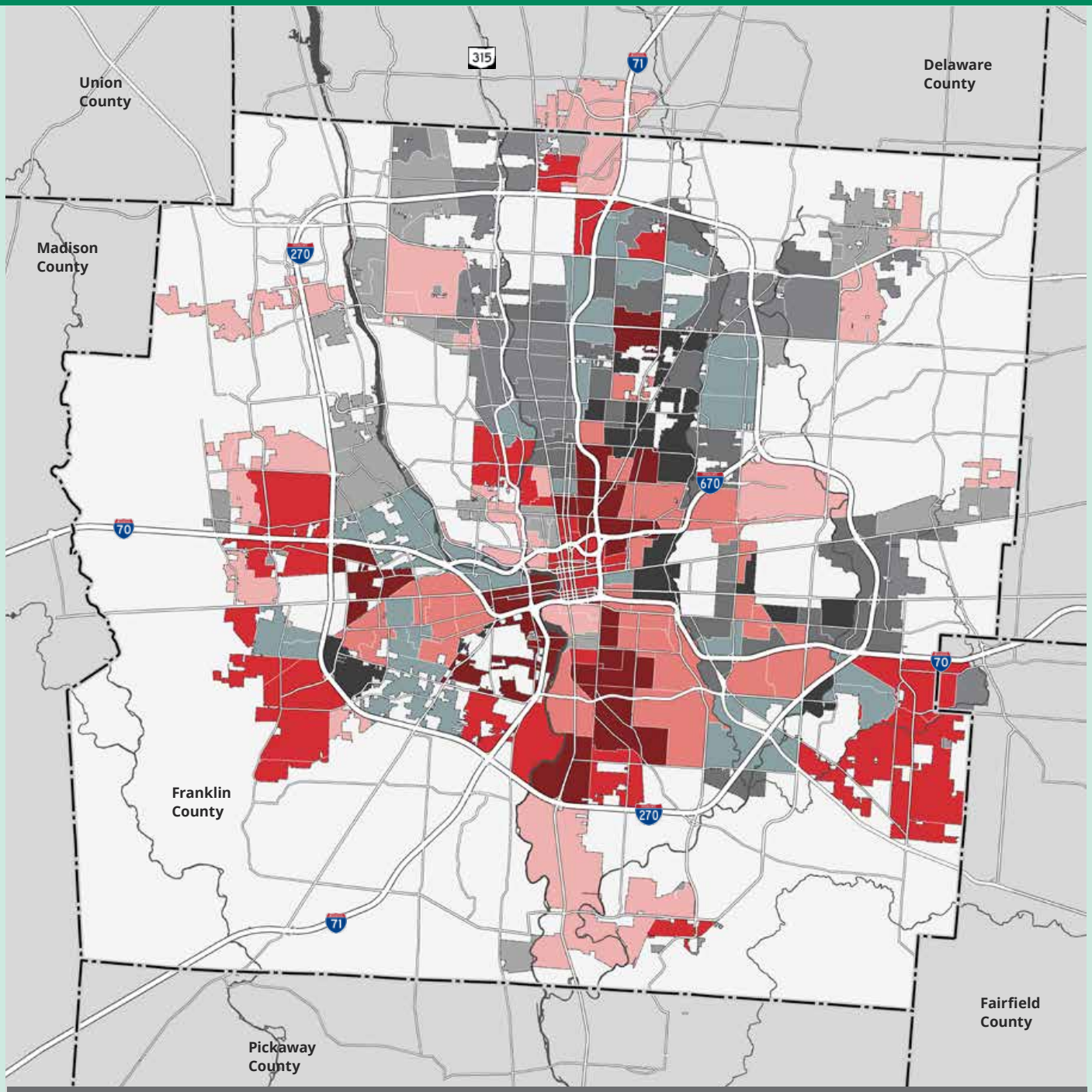
To understand the relationship in Columbus between tree canopy cover and economic, demographic, environmental and health factors, nine factors were selected by the UFMP Project Team:

1. Asthma Prevalence
2. Chronic Obstructive Pulmonary Disease (COPD)
3. Mental Health
4. Non-White Populations
5. High School Graduation Rate
6. Median Household Income
7. Family Poverty
8. Property Crime
9. Violent Crime

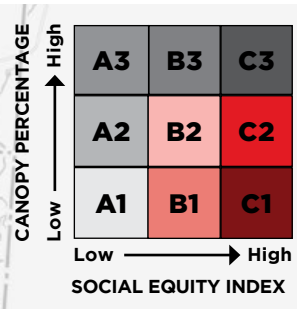
The data for each factor were combined to create a composite social equity index for each Columbus community. Scores ranged from 0 to 4, with higher scores indicating a higher social equity need (see Appendix for methodology). The social equity index was mapped against tree canopy cover to identify and rank neighborhoods in most need of tree canopy.

Map 4.2 highlights the neighborhoods that would most benefit from tree planting and care based on the social equity and tree canopy analysis. The map displays both the tree canopy cover (y-axis) and the composite social equity index score (x-axis). The priority census tracts for Columbus are the pink and red shaded areas, which have higher social equity need and lower tree canopy cover.

Figure 4.5 | Bivariate Map Analysis Layers
The social equity and canopy comparison maps were developed by layering various factors and generating a composite layer as illustrated in Map 4.2. ◄



Map 4.2 | Social Equity and Canopy Comparison



Tree planting and maintenance efforts can be focused to make Columbus a more equitable city.

Finding 4 The Majority of Tree Canopy is on Private Property

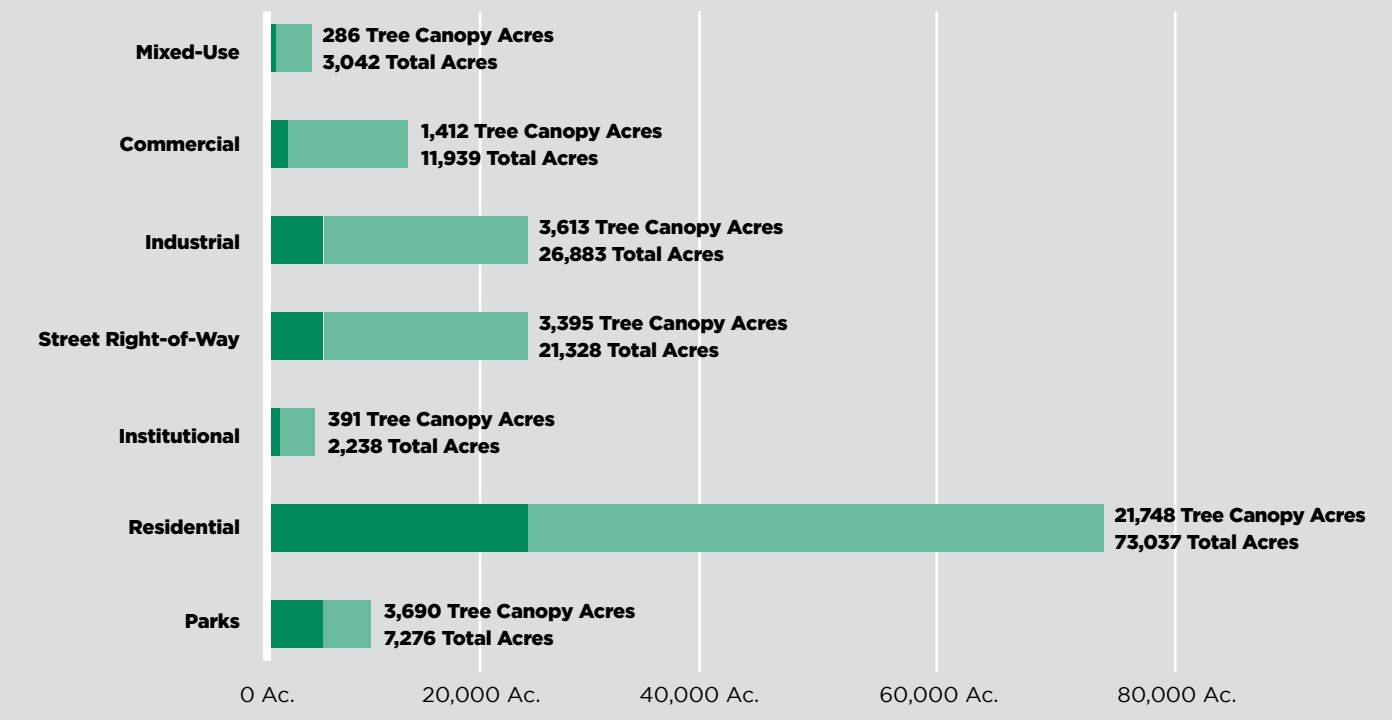


Figure 4.6 | Tree Canopy Coverage by Acre
Most land uses in Columbus have additional potential area for tree canopy growth. ▲

> **Trees are critical to urban development. Developers understand trees provide placemaking, environmental quality and beauty in our city.**
>
> -Brian Kinzelman
> Senior Principal, MKSK

Private property includes mixed use, commercial, industrial and residential land uses. Of these land uses, residential properties are approximately half of all land uses and contain the majority of the city's tree canopy cover. With an estimated 70% of the city's tree canopy located on private property, efforts by the entire community will be needed to grow and expand Columbus' urban forest (Action Step #6).

Figure 4.6 displays total land area and tree canopy acres by land use category, and Figure 4.7 shows the average tree canopy cover by land use category. Note land use categories may contain both private and public property.

Finding 5 Significantly Higher Canopy is Possible in Columbus

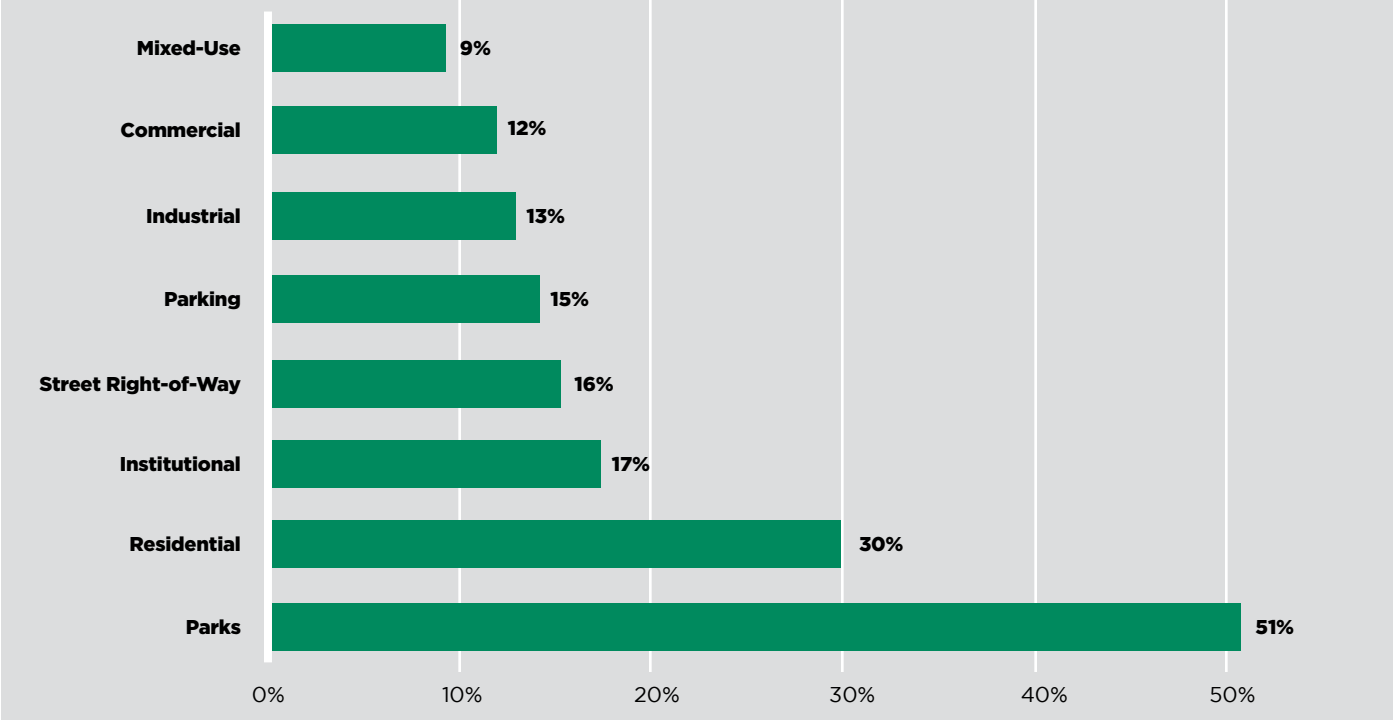


Figure 4.7 | Canopy Coverage by Land Use
Mixed-use properties have the lowest percentage of tree canopy coverage while parks have the highest average tree canopy coverage. ▲

Analysis of the 2013 urban tree canopy data found that if all of the available planting sites on both public and private property were planted, Columbus' maximum potential tree canopy cover is 63% (Plan-It-Geo, 2015). Based on the city's current tree canopy cover of 22% and this theoretical maximum potential tree canopy of 63%, Columbus has currently achieved 35% of what is possible. While the 2013 canopy assessment data is older and understanding that not all potential planting sites are suitable for planting, the data nevertheless shows that Columbus has the potential to reach higher community canopy goals (see Chapter 5).

> **Trees within development projects are the only type of infrastructure that increases in value as it ages. They are a living infrastructure which provide many benefits like higher carbon sequestration, increased property values and more walkable communities as they mature.**
>
> -Nick Gilliland
> Principal and Co-Founder of Realm Collaborative

Finding 6 Species Diversity and Canopy Quality Require Attention

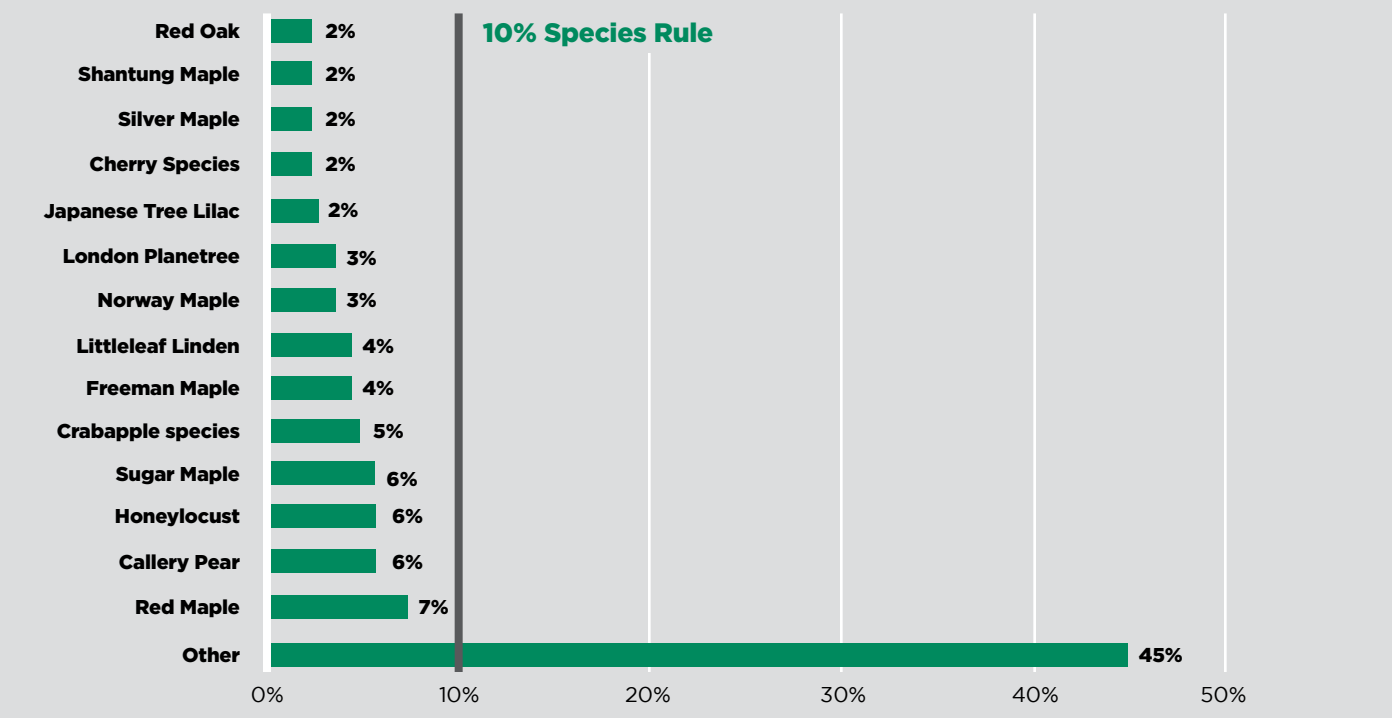


Figure 4.8 | Species of Major Public Trees in Columbus
Red maples are the most prevalent tree species in Columbus, though no tree species exceeds the 10% rule. ▲

Species diversity is the variety of tree species in the urban forest. Having more tree species (higher diversity) safeguards the urban forest from pests, diseases and extreme weather events, like ice storms and drought.

> **We expect more pest and pathogen outbreaks in the future from global trade and climate change. Increasing and diversifying Columbus' tree canopy will make our community more resilient.**
>
> -Charles Flower
> Research Ecologist, USDA Forest Service

Tree Diversity on Public Land

There are 222 different species and cultivars in Columbus' street and park tree population. However, they are not evenly distributed across the population. In fact, 14 species represent 55% of the population. Red maple (Acer rubrum) is the most abundant tree species in Columbus at 7% of population (Figure 4.8).

Maples (Acer) are also the most common tree genus in Columbus. Maples make up more than 29% of all public trees. To maintain a resilient urban forest, no genus should exceed 20% of the public tree population, and no species should exceed 10%.

Tree Diversity on Private Land

The 2013 urban tree canopy assessment data provides general information on the location of trees on private property. However, data on tree species is not known.

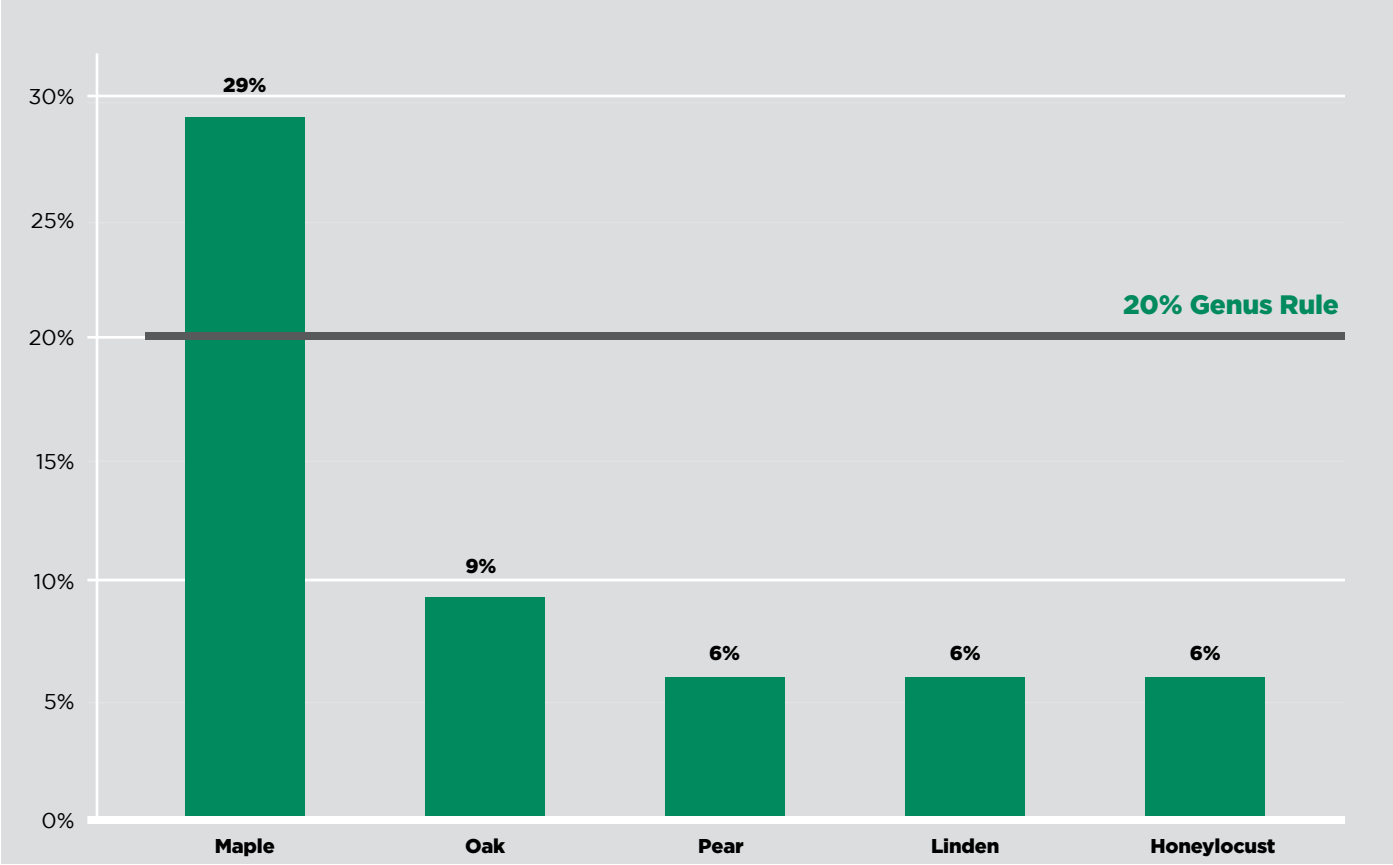


Figure 4.9 | Genus of Major Public Trees in Columbus
Maples are the most prevalent genus in Columbus. To maintain a resilient forest, no genus should exceed 20%. ▲

With the majority of Columbus' canopy cover on private property, understanding the most common tree species can help manage pest and disease outbreaks and improve diversity city-wide (see Action Step #13).

Natives, Exotics, and Exotic Invasives

Columbus has a variety of native and non-native species. This is common in cities, as only certain species can thrive in the harsh conditions of the urban environment. To achieve sufficient diversity and canopy objectives, a mix of native and non-native trees is essential.

Non-native species that spread prolifically are termed "invasives" and negatively impact native forests. Of Columbus' inventoried public trees, 6% are callery pear (Pyrus calleryana), recently listed as an invasive species by the Ohio Department of Agriculture (ODA 2018).

Urban forestry's 10-20-30 rule means no species should be more than 10%, no genus more than 20%, and no family should be more than 30% of the urban forest.

Finding 7 Climate Change will Alter the Type of Tree Species Growing in Columbus


BLACKLICK CREEK GREENWAY TRAIL

Changes in the Columbus Environment

Columbus' urban forest is facing a warmer and wetter environment, due to climate change. According to Great Lakes Integrated Sciences and Assessments (GLISA), between 1951 and 2012, Columbus experienced:

- An increase in annual average temperature of 2.3°F
- An increase in total precipitation of 19.8%
- An increase in the number of "very heavy precipitation days" by nearly 32% (GLISA 2015)

Summers in 2095

Based on GLISA's future climate projections, by 2095, Columbus summers could be similar to Arkansas today (hotter and more humid). Columbus may see a loss in suitable habitat for several common native tree species (silver and sugar maples, swamp white oak), while other species are expected to thrive (honeylocust, sycamore, white oak and American elm).

As Table 4.10 highlights, over the coming decades current USDA Forest Service models are predicting that Columbus may see a loss in suitable habitat of several common native tree species, including sugar maple, Ohio buckeye, swamp white oak, and American basswood. While the habitat of other native tree species are expected to increase including, hackberry, honeylocust, sycamore and white oak.

Action Step #6 provides recommendations on selecting tree species to address expected changes in Columbus' climate.

Anticipated Changes to Species in Columbus as Climate Warms

Predicted Habitat Change	Current Proportion of Inventoried Public Street and Park Trees	Tree Species - Common Name	Tree Species - Scientific Name
Species Habitat Predicted to INCREASE	0.03%	Bitternut Hickory	*Carya cordiformis*
	1.34%	Hackberry	*Celtis occidentalis*
	0.20%	Flowering Dogwood	*Cornus florida*
	6.00%	Honeylocust	*Gleditsia triacanthos*
	0.10%	Osage Orange	*Maclura pomifera*
	0.30%	Sycamore	*Platanus occidentalis*
	0.40%	White Oak	*Quercus alba*
	0.43%	Bur Oak	*Quercus macrocarpa*
	1.82%	Northern Red Oak	*Quercus rubra*
	0.21%	American Elm	*Ulmus americana*
Species Habitat NOT Predicted to Change	6.04%	Red Maple	*Acer rubrum*
	0.26%	Tuliptree	*Liriodendron tulipifera*
	0.15%	Blackgum	*Nyssa sylvatica*
	0.81%	Pin Oak	*Quercus palustris*
Species Habitat Predicted to DECREASE	0.33%	Boxelder	*Acer negundo*
	2.08%	Silver Maple	*Acer sacharrinum*
	4.95%	Sugar Maple	*Acer sacharrum*
	0.09%	Ohio Buckeye	*Aesculus glabra*
	0.04%	American Beech	*Fagus grandifolia*
	0.57%	Black Walnut	*Juglans nigra*
	0.19%	Eastern Hophornbeam/Ironwood	*Ostrya virginiana*
	0.70%	Eastern White Pine	*Pinus strobus*
	1.50%	Swamp White Oak	*Quercus bicolor*
	0.07%	Scarlet Oak	*Quercus coccinea*
	0.03%	Black Willow	*Salix nigra*
	1.60%	American Basswood	*Tilia americana*

Figure 4.10 | Species Habitat Changes Due to Climate Change (USDA Forest Service Climate Change Atlas)
The USDA Forest Service Climate Change Tree Atlas modeled potential habitat change in Columbus for 63 urban tree species. According to current models (high emissions scenario) the habitat of several tree species in Columbus are predicted to change due to climate change (USDA Forest Service, n.d.; Iverson, et al., 2019). ▲

Finding 8 Trees Compete for Limited Space in Columbus

Figure 4.11 | Cleveland Avenue Streetscape
Cleveland Avenue's streetscape design was not planned with space for large trees. ▲

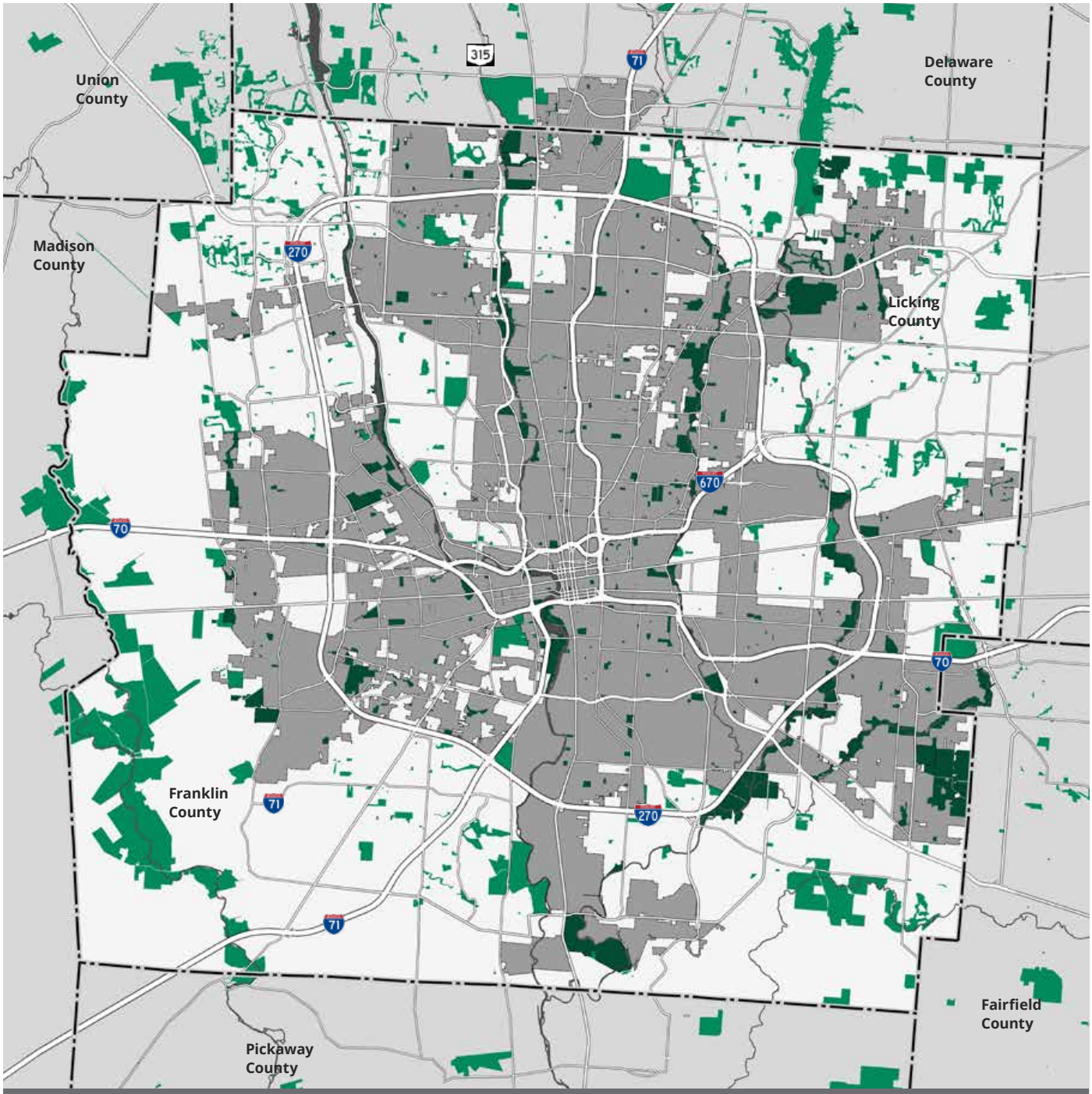
Competing for Space

Trees in Columbus have to compete for space underground, aboveground and overhead. Underground utilities like water, sewer and fiber optic internet lines can impact where a tree can be planted. Aboveground infrastructure like roads, sidewalks and buildings can limit the space to plant trees and affect how their roots and canopy can grow. Overhead utilities affect which types of trees can be planted to ensure they do not interfere with or block electric utility lines, traffic lights and new wireless technology. Competing infrastructure means there is often not adequate space to plant and grow trees, especially large shade trees, across Columbus. The priority planting analysis found that **only 19% of potential planting sites in the right-of-way can accommodate a large mature tree species, while 65% can accommodate a small mature tree species.** While this is an obstacle to growing overall city canopy, it has a significant impact on areas with low canopy cover, high density and narrow tree lawns.

Impacts to Diversity

The lack of adequate space also impacts species diversity. There are a limited number of small, mature tree species that can thrive in urban environments. If sites in Columbus are only suitable for small trees, species diversity in Columbus will decline.

Action Step #7 provides recommendations on ensuring there is adequate space for trees to grow and thrive in Columbus.



Map 4.3 | Existing Parks and Open Spaces in Columbus

Finding 9 There are Not Sufficient Resources for Proactive and Innovative Tree Management in Columbus

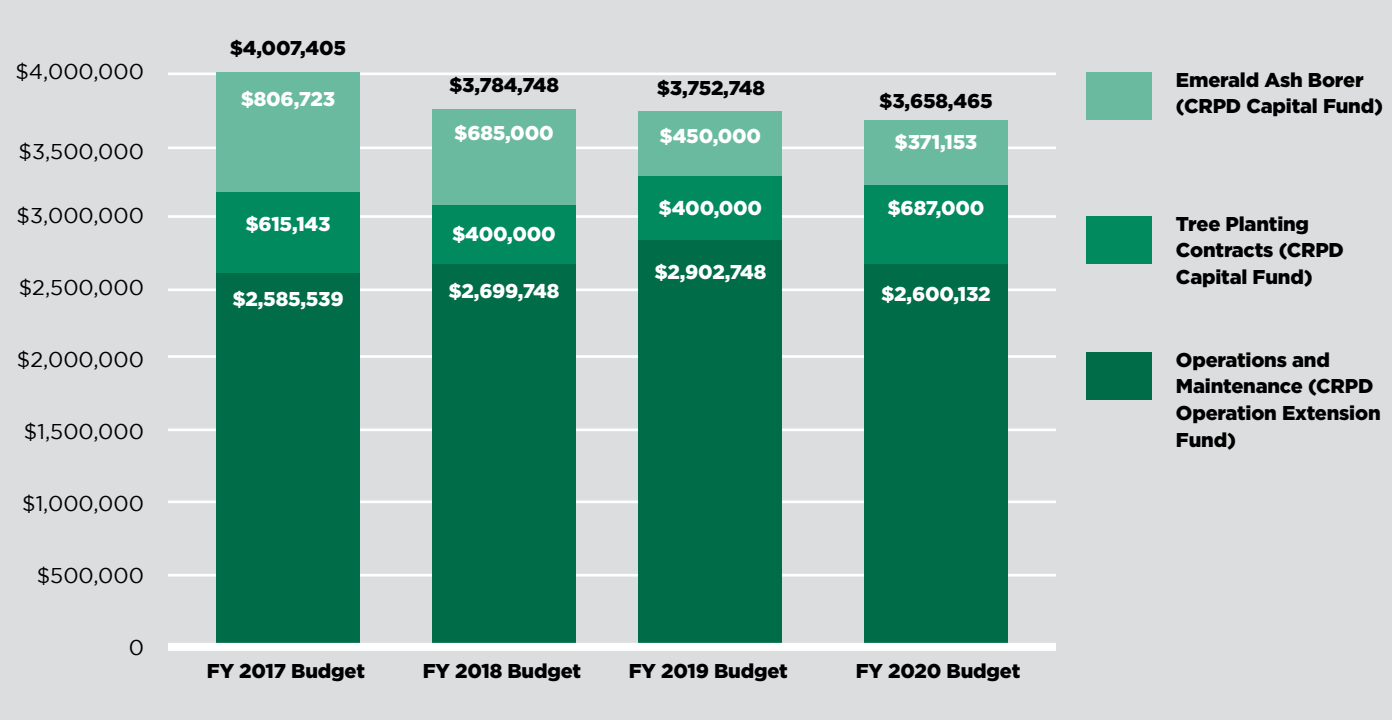


Figure 4.12 | Columbus Urban Forestry Budget 2017-2020
The Columbus Urban Forestry budget has remained stable but is not sufficient to proactively care for public trees. ▲

Stable, predictable funding is critical to effectively manage Columbus' urban forest. Current public tree care funding in Columbus is not sufficient to institute proactive tree maintenance and ensure a sustainable, healthy and safe tree canopy.

The tree care program is currently reactive due to budget levels.

An analysis of Columbus' urban forestry budget that is used to care for street and park trees, compared to other U.S. cities, found that Columbus' "per tree" spending level was 38% lower than the average of all cities surveyed and 20% lower than Midwest cities (Figure 4.14) (Hauer 2016). However, Columbus' outdated and incomplete inventory means that there are likely thousands more public trees than have not been inventoried, and the annual per tree spending level is likely even lower.

The City's limited Forestry budget resources have led it to operate a reactive program with maintenance activities primarily driven by resident requests, storm damage and emergencies. Columbus receives an average of 4,800 tree-related service requests per year, the majority requesting tree care. A reactive management approach can result in a shorter life span for City trees, inefficient service delivery, increased tree risk, lower resident satisfaction and even inequity of care across neighborhoods (as resident requests tend to come from more affluent neighborhoods). Reactive management also leads to a reduction in urban forestry benefits.

Figure 4.12 displays Forestry's operations and maintenance, tree planting and emerald ash borer program budgets from 2017-2020. During that time, Forestry's budget has remained relatively stable, however, the amount of work Forestry has to perform did not — resulting in a six to 12 month backlog of tree removal and pruning work orders.

Action Item #11 explores opportunities for identifying supplemental funding sources.

Annual Budget Spent Per Tree

Figure 4.13 | Tree Maintenance Procedures
Columbus Urban Forestry performs mainenance on street trees and other public trees. ▲

Figure 4.14 | Annual Budget Spent Per Tree
The annual budget per tree in Columbus is 20% lower than other cities in the Midwest and 38% lower than the national average (Hauer 2016). ◀

Finding 10 There is No Formal Management Plan and Program to Care for Public Trees

Proactive cities typically have one or more plans that guide their urban forest management (described below). Columbus currently has none of these plans in place.

Urban Forest Management Plan

An urban forest management plan is a 3-5 year work plan for a city's publicly-managed tree population based on updated tree inventory data. The plan determines the proactive work activities for each year and the budget needed to complete them.

Risk Management Plan

A risk management program ensures the urban forest is proactively managed to reduce risks to public safety. This type of program is outlined in an urban forest management plan. Columbus' current tree inventory data lacks risk rating, and therefore its program does not proactively address risk. Columbus addresses tree risk reactively by responding to tree concerns reported by the community.

Disaster Management Plan

A disaster management plan addresses and responds to disasters in the community. The plan includes staff, roles, contracts, response priorities, debris management and a communication plan. A disaster management plan has not been developed for Columbus' urban forest.

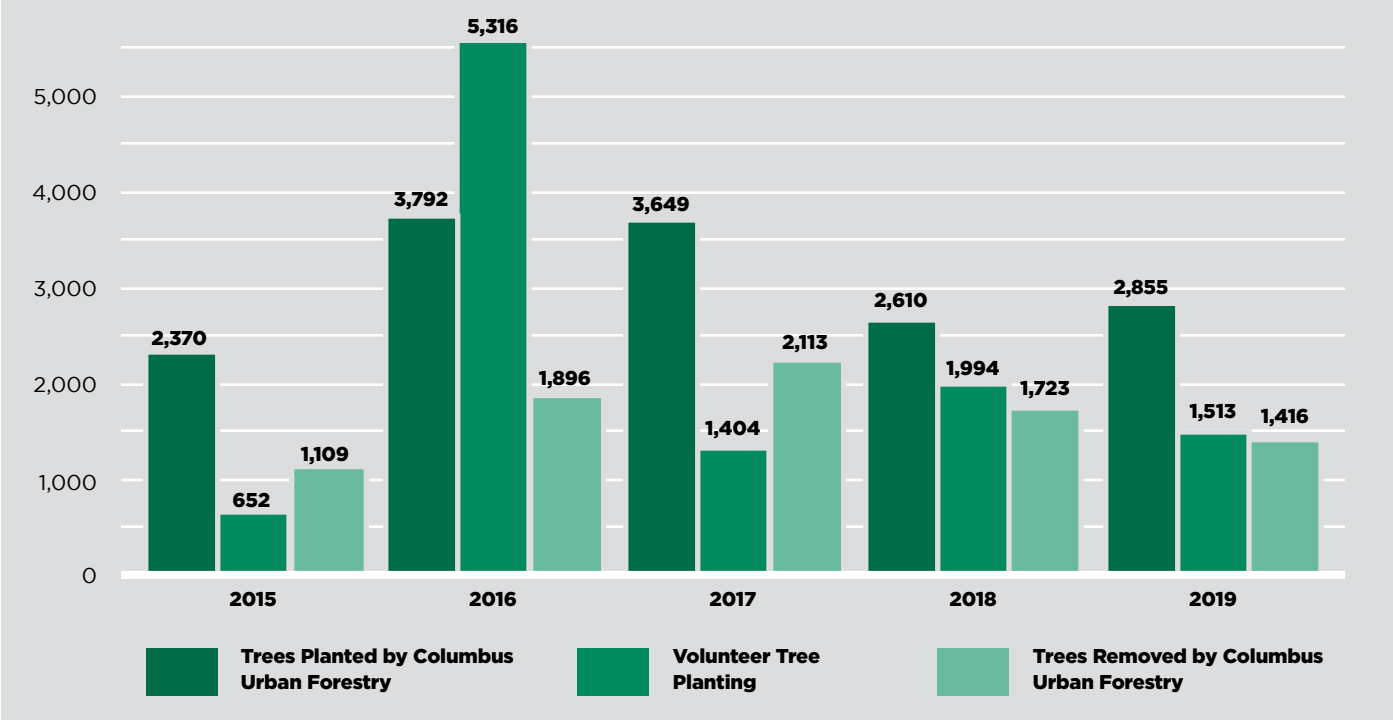
Action Step #8 focuses on developing a proactive program - including plan development.

Routine Pruning is Essential

For Columbus to proactively manage the city's public trees, a routine pruning cycle is essential. This will require an Urban Forest Management Plan, additional staff and resources. Trees require routine maintenance in the form of tree pruning just like roads require resurfacing to maintain optimal conditions. Trees pruned regularly develop proper form and are healthier, leading to:

- Lower Pruning Costs: Lower per tree pruning costs compared to reactive pruning done in response to storm damage, sight clearance or immediate hazards.
- Frequent inspections: Early identification and correction of insect/disease problems.
- Less Damage: Reduction in storm-related tree damage.
- Lower future maintenance costs.
- Satisfied Residents: Reduction of tree-related service requests and improved customer service.
- Development of a healthy and sustainable urban and community forest (Stutz et al 2004).

Finding 11 Tree Planting Efforts are Not Planned



From 2015 to 2019, Columbus Forestry and its contractors planted more than 15,200 trees — nearly twice as many trees as were removed by Forestry — representing a net gain. Volunteers also contributed to this gain by planting nearly 11,000 trees and seedlings in City parks and other City properties (Figure 4.15). Tree planting and removals conducted by other organizations and City departments are not reflected in these numbers.

Columbus street tree planting activities have occurred, however, without an annual goal-focused planting plan that utilizes data from the tree inventory and urban tree canopy assessment - see Action Step #6.

Figure 4.15 | Tree Plantings and Removals, 2015-2019

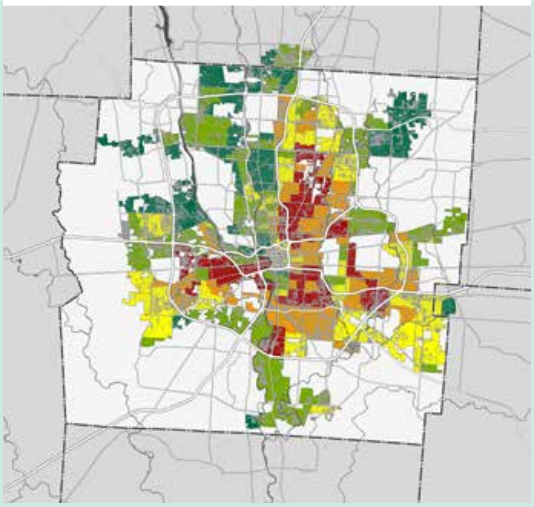
Columbus Urban Forestry and volunteers consistently plant more trees than are removed along streets and in parks. Trees vary in size depending on who planted them. Volunteer plantings could be seedlings or container trees, while trees planted by city staff or contractors are larger (2" caliper, ball and burlap). ▲

City Nursery Meets Planting and Diversity Needs

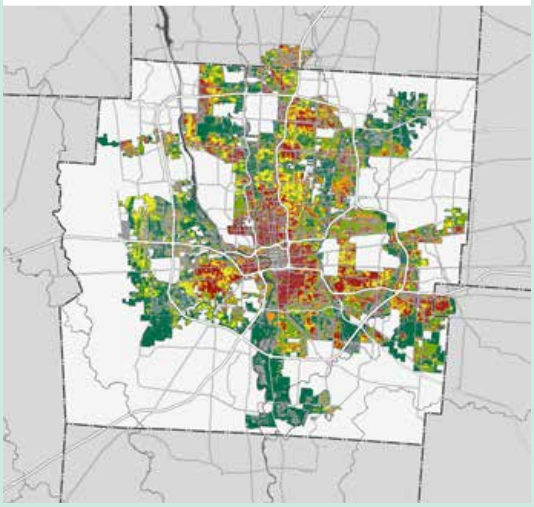
Columbus Recreation and Parks Department operates a 45-acre bare root tree nursery. The nursery meets the needs of the City's street tree planting program by providing diverse bare root tree species that are not available at local commercial nurseries for Forestry to plant along city streets. The nursery provides 2,000 bare root trees per year toward City street tree planting efforts.

PRIORITIZED PLANTING ANALYSIS

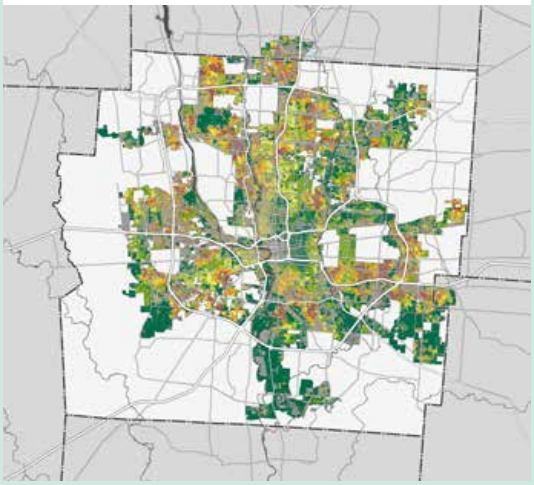
Social Equity Factors

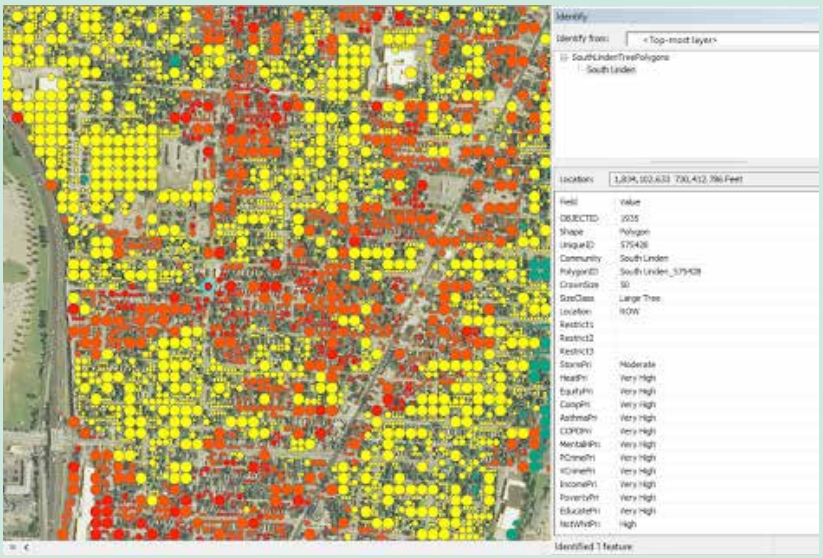


Urban Heat Island Reduction



Stormwater Benefits





Prioritized Planting Map Now Available

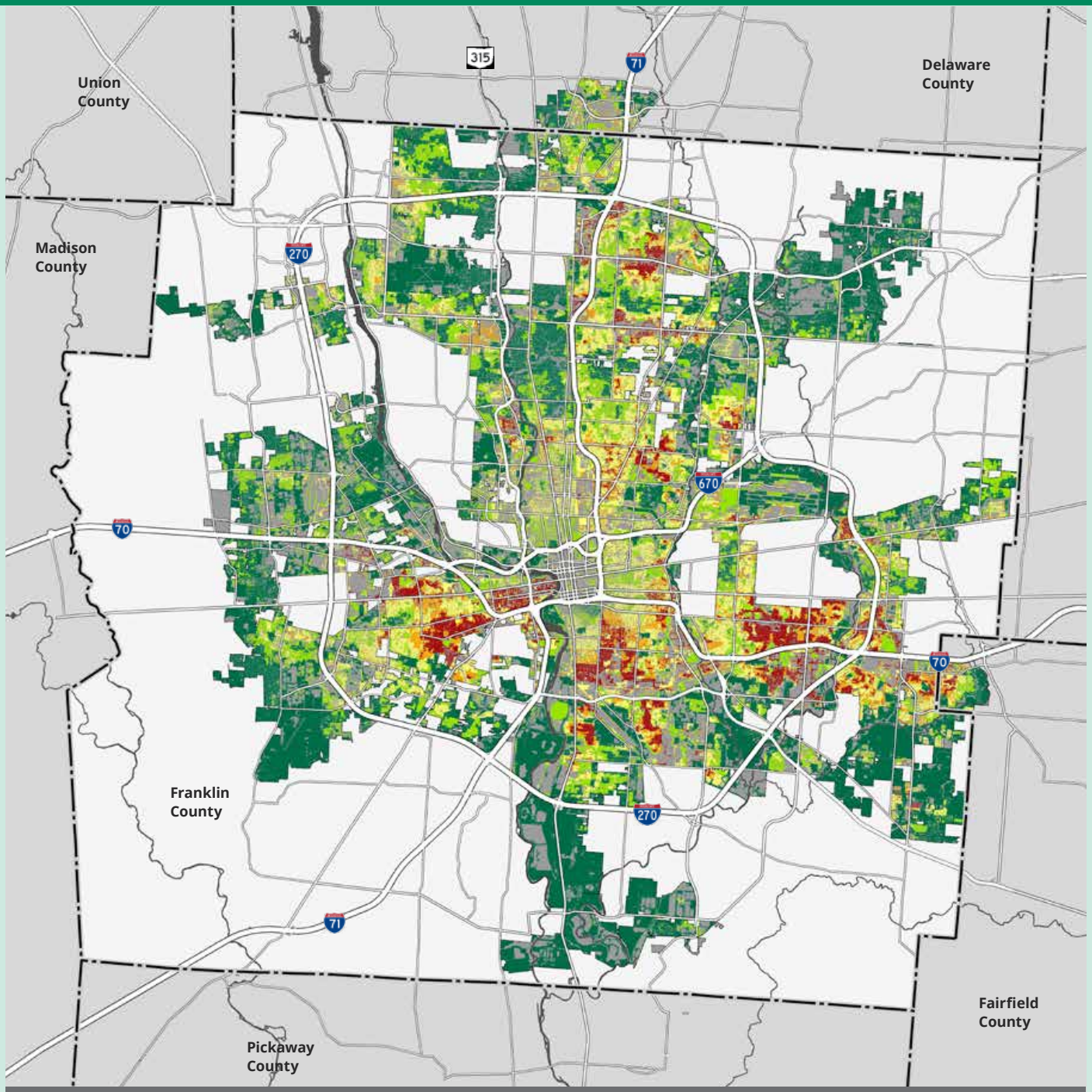
A prioritized planting analysis was conducted to identify areas of the city most in need of canopy cover based on city and community priorities. The analysis used a social equity analysis (see page 17), along with urban heat island and stormwater factors, to determine priority areas to plant trees. From this analysis, more than 600,000 potential tree planting sites were identified in Columbus. Over 65% of potential planting sites are located on private property and 35% on City-owned property. The City and its partners can use this data set as a starting point to identify areas for tree planting. However, it is necessary to field verify for tree planting suitability as these sites were determined using a model.

Notes on Planting Map

1. Sites were identified using 2015 Urban Tree Canopy land cover data and aerial imagery
2. Tree spacing was based on planting in a landscape setting.
3. Sites are potential planting locations, however, not all sites identified will be suitable for tree planting. Field verification of potential planting sites will be required.
4. This analysis can be rerun once an updated canopy assessment is completed.

Figure 4.16 | Priority Planting Map in ArcGIS
The data for the priority planting map is accessed and edited in ArcGIS. ▲

Figure 4.17 | Prioritized Planting Components
The priority planting map is composed of three factors: a social equity index, urban heat island temperatures and stormwater needs. The composite of these three factors is shown in Map 4.3. ◄



Map 4.4 | Columbus Priority Planting Map

- Very Low
- Low
- Moderate
- High
- Very High

Planting trees in high priority spaces provide the most social equity, heat island and stormwater benefits.

MAJOR FINDINGS

Finding 12 Staffing Levels are Not Sufficient to Support Columbus' Public Tree Care Management and Planning Program Needs

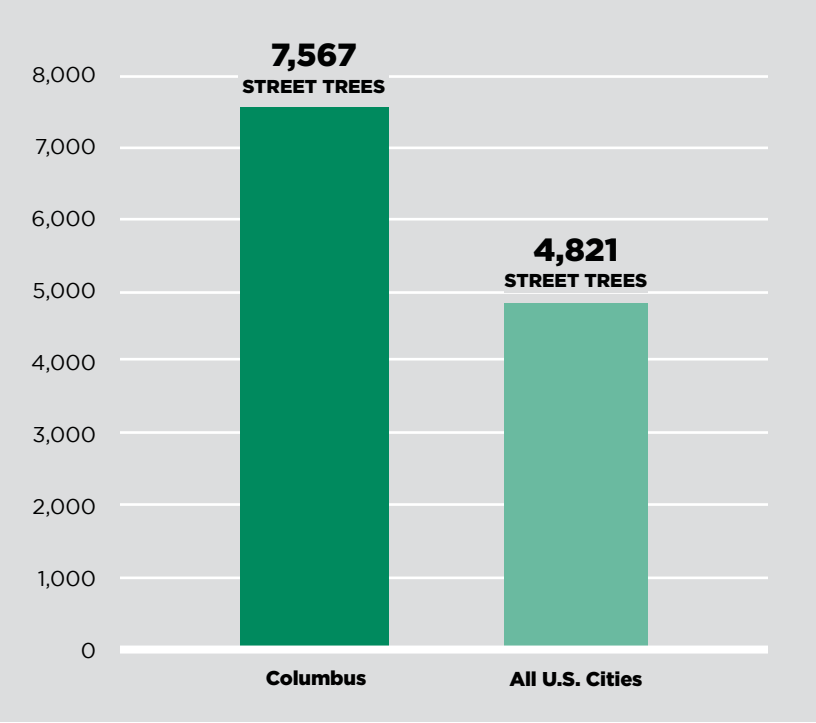


Figure 4.18 | Street Trees Per Employee
Columbus Forestry staff manage more trees per staff person than the average of all U.S. cities combined. ▲

The Columbus Forestry section is solely and legally responsible for managing and maintaining the public trees, and they must provide prompt, efficient and safe delivery of arboricultural services to residents. To do this, they must set goals and plan work by balancing the ever-changing needs and conditions of the urban forest with the demands of the residents, and do so with limited staff, equipment and funding.

The City Forester and a team of 26 staff in the Forestry section of the Columbus Recreation and Parks Department are responsible for managing over 127,000 inventoried public trees (~106,000 street tree and ~22,000 parks trees in mowed areas), including:

- tree pruning
- tree removal
- tree planting
- managing the City tree nursery
- performing tree inspections in response to resident requests and utility/ infrastructure projects
- interdepartmental cooperation, including pruning for public safety
- plan review
- tree grate maintenance
- storm response
- tree data management
- customer service support
- education and outreach

The Forestry Section has knowledgeable and skilled staff with industry-recognized qualifications and certifications, including 10 International Society of Arboriculture (ISA) Certified Arborists, four staff who are Tree Risk Assessment Qualified and four ISA Certified Tree Workers. However, there are not enough staff to address Columbus' public tree care, planning and management program needs. Current resources only allow Forestry to be reactive. There is a backlog of to-be-completed work orders and, at times during the year, uninspected service requests and in-progress work orders.

Columbus Forestry staff manage more trees per Forestry employee than the national average. As seen in Figure 4.18, The 2014 Municipal Forestry Census of Tree Activities (Hauer et al, 2016) found for all cities surveyed, the average number of street trees cared for per forestry employee was 4,821. The 14 tree trimmers and supervisors in Columbus care for 7,567 street trees per employee; that is **36% more trees to care for per Columbus employee than the national average** (Hauer 2016). As with per tree spending, with the tree inventory being outdated and incomplete, the number of street trees per Forestry employee in Columbus is likely even higher.

Action Steps #11 and #12 focus on adding additional resources to support forestry staff.

Finding 13 Forestry Leadership is Unable to Plan and Coordinate at the Necessary Level

The responsibilities of management positions within Columbus Recreation and Parks Department's Urban Forestry program do not include planning, implementation, policy development or coordination at a high level. Currently, Forestry managers administer the internal operations to plant and maintain public trees, consuming their full attention and capacity. In addition to internal administration, program leadership should coordinate closely with other entities to advocate for the urban forest in comprehensive citywide planning.

> **"As one of the 15 largest cities in the nation, Columbus must work towards a more sustainable future that includes a robust urban forestry program that will provide more shade, reduce peak temperatures, enhance pedestrian safety, increase property values, improve air quality and manage stormwater effectively. These things take time, so let's get started!"**
>
> -Steve Cothrel
> Vice-Chair of the Columbus Tree Subcommission

Finding 14 Volunteer Tree Planting and Care Activities are Currently Under-Resourced

Many cities engage volunteers to plant and care for trees in their communities. This tends to have a ripple effect, leading volunteers to plant and care for trees on their own properties. Columbus currently engages volunteers to plant trees in parks. Expanding volunteer activities on City property will require additional staff time and attention.

Action Step #5 focuses on engaging and supporting volunteer activities.

Finding 15 City Forestry Staff Have Made Strides, Despite Limited Budgets

Figure 4.19 | Columbus Nursery
Columbus Recreation and Parks Department arborists grow trees from local seed sources. Approximately 2,000 trees a year are planted from the city nursery along streets and in parks. After planting, Columbus Forestry maintains young trees with pruning, three years after planting. ▲

Despite restrictions on budgets and resources, Columbus' Forestry staff, through hard work and creative use of resources, have shown enthusiasm and dedication for improving Columbus' urban forest. They actively seek and maintain industry certifications and accreditations, demonstrating their commitment to keeping up-to-date on the latest urban forestry science, research and best management practices.

Tree Inventory Technology Upgraded

Based on the technology at the time, the city's 1997 street tree inventory did not include geospatial location information (tree locations that can be plotted on a map). Forestry staff spent years geo-locating more than 100,000 trees to migrate the 1997 inventory data into the city's geographic information system (GIS). This significant effort allows staff to visually and dynamically track tree work across the city and use computer tablets instead of paper work assignments in the field. This has improved efficiency, as Forestry crews can identify other tree work in the areas they are working in. While efficiency has been improved, data in the city's 1997 tree inventory needs to be updated.

Young Tree Training

All trees planted by Forestry and their contractors are pruned three years after planting. Pruning trees when they are young helps establish proper form and structure. For this proactive activity to have the most impact, young trees should continue on a 3-year training pruning cycle until they have been planted for 10-15 years and can be added to the City's routine pruning cycle.

Effective EAB Management

In 2011, Columbus Recreation and Parks Department's Forestry section proactively developed the Emerald Ash Borer (EAB) Strategic Plan to address the EAB crisis in the city. The plan identified City Forestry staff re-alignments needed to address the EAB infestation; reduction in services caused by re-alignment; equipment needs and costs; temporary staffing needs; contracting staff needs; and budget. The plan was supported by City leadership, leading to:

- An additional $9 million allocated to implement the plan from 2011-2019.
- More than 18,000 ash trees and stumps removed.
- Completion of planned EAB activities in 2019, two years earlier than planned.

For staff to fully support the sustainable growth, care and management of Columbus' urban forest - additional resources are needed - see Action Steps #8, #9, #11 & #12.

Figure 4.20 | Emerald Ash Borer Management Practices
Columbus Recreation and Parks Department has allocated significant resources to manage the infestation of the Emerald Ash Borer. This often involves the removal of mature ash trees. ▼

Finding 16 There are Not Well-defined Policies in Place to Preserve and Protect Trees in Columbus

Figure 4.21 | Tree Protection Measures During Construction
Tree protection fencing was critical to prevent damage to tree roots and subsequent tree loss during construction of Linden Park. ▲

> **The purpose for plan review is to try to create as much of a sustainable urban forest as possible and get the right tree in the right place. My definition of a sustainable urban forest is one that reduces the amount of tree conflicts with the urban environment that require corrective maintenance, and increases the trees' longevity, thus the benefits a tree provides. So many future problems can easily be corrected in the planning stage if the appropriate people are involved in the design process, and their comments and suggestions are addressed.**
>
> -Jack Low
> Former Columbus City Forester

Private Property

The most significant finding of the comprehensive review of Columbus' ordinances and policies is that the City does not have adequate tree protection and preservation regulations on private property - which is unusual for a midwestern city. With exponential growth expected, this is a major concern for Columbus' tree canopy.

A comparative review of ordinances in two of Columbus' neighboring communities and a peer city, Charlotte, North Carolina, highlights the tree protection and preservation deficiencies in Columbus' ordinances (Figure 4.22). With the majority of the city's tree canopy on private land, private tree protection, preservation and planting will have the most significant impact on tree canopy cover. Action Step #14 provides recommendations on improving and strengthening city code.

Public Property

Chapter 912 of Columbus city code protects trees on public property, including parks and the right-of-way. Executive Order 2015-01 provides public tree protection specific only to City of Columbus capital improvement projects (CIP).The executive order is an important first step in protecting public trees, however, it is limited in scope and is not an enforceable city code.

Action Step #15 provides recommendations to improve Chapter 912 and strengthen and expand Executive Order 2015-01.

Figure 4.22 | Tree Protection and Preservation Policies
Columbus lacks any citywide tree protection policies. Compared to peer city Charlotte, NC, and neighboring municipalities, Columbus tree codes fall short. ▶

Tree Protection and Preservation

	Columbus, OH	Gahanna, OH	Dublin, OH	Charlotte, NC
Land Use Regulated				
Single/two-family Residential		●	●	●
Multi-family Residential	X	●	●	●
Commercial/industrial		●	●	●
Public Land	●	●	●	●
Public Tree Damage and Removal				
Restricts tree removal on public property	●	●	●	●
City permit or approval required for tree removal, pruning or excavating	●	●	●	●
Prohibits damage to public trees (e.g. ropes, signs, wires, and excavation)	●	●	●	●
Private Tree Damage and Removal				
Restricts tree removal on private property		●	●	●
City permit or approval required for tree removal on private property		●	●	●
Requires preservation of trees during development on private property		●	●	●
Prohibits damage to preserved/protected trees		●	●	●
Regulated Features on Private Property				
Forests/wetlands		●	●	●
Specific species and/or size tree (e.g., heritage/significant trees)	X	●	●	●
Tree critical root zone/dripline			●	●
Amount of canopy cover (minumum amount set)				●
Riparian buffers, natural areas, preservation zones		●		●
Tree Protection Measures				
Tree protection/preservation preservation plan required		●	●	●
Identification of prohibited activities in dripline/critical root zone		●	●	●
Tree protection fencing or other protection measures required		●	●	●
Credits/incentives for tree preservation		●		●
Site Plan/Development Requirements				
Inventory and location of trees/forests/woodlands on site		●	●	●
Tree protection/preservation plan		●	●	●
Tree protection measures (e.g., fencing, soil protection, trunk protection)		●	●	●
Landscape plan with mitigation plantings		●	●	●
Grading and utility plans with trees		●	●	●
Mitigation/Penalties				
Tree planting requirements for removal of regulated trees	●	●	●	●
Fee in lieu of planting mitigation trees	●		●	●
Tree planting establishment, maintenance and survival requirements		●	●	
Penalties established for damage and removal of preserved/saved trees		●	●	●
Tree fund	●	●		●

Note: 'X' Only applies to University District zoning overlay.

Finding 17 Lack of a Unified Vision for Columbus' Urban Forest Affects Engagement

Figure 4.23 | Columbus Symphony Grove at Franklin Park
Tree planting projects are often project-based in Columbus. A unified vision will help coordinate urban forestry projects citywide. ▲

One of the elements identified during the assessment process was that Columbus lacked unified urban forestry goals. For example, there are no individual neighborhood-level goals for residents to rally behind. There is not clearly-defined reasoning for tree preservation in development projects for developers to support and potentially do more than required. Additionally, City departments may have responsibilities that require the removal of existing trees.

Action Steps #1 and # 2 provide recommendations to develop the unified vision and develop community support around trees and urban forestry.

Finding 18 Communication and Collaboration is Not Consistent

Communication and collaboration builds trust and support for growing and caring for Columbus' urban forest. The need for improved communication, both internally among City departments and externally between the City, residents and developers emerged as a common theme during the Discovery Phase of this plan.

Communications within the City

Columbus is a large city — both geographically and in staffing (8,000 employees), which can make communication between departments a challenge. Each City department has different responsibilities, including the creation or maintenance of critical infrastructure. This can lead to conflicts between preserving tree canopy and meeting the needs of other City programs and policies.

The City needs to ensure processes exist and are in use to coordinate all entities — City departments and outside entities (ex: utility companies, nonprofit organizations, developers) — whose activities impact trees. While these impacts may be positive or negative, a lack of coordination, collaboration and communication has led to other City assets like public utilities, streets and sidewalks to be prioritized over trees.

Action Step #3 focuses on ways to improve communication and collaboration across City departments.

Communications between city and residents

Communication between residents and City staff is limited to responses to service requests and notifications in advance of tree planting. Residents are generally not notified when requested tree work will occur. This lack of communication leads to low customer satisfaction as residents are required to contact 311 for status updates and keep track of their 311 reference numbers.

Action Steps #2, #3 and #5 identify ways to improve communication with residents.

BARNETT PARK

PERFORMANCE LEVELS OF COLUMBUS' URBAN FOREST

The Indicators of a Sustainable Urban Forest, a comprehensive resource and program assessment tool, was used to establish Columbus' baseline performance on managing, caring and engaging with the city's urban forest. Columbus was assessed on 32 sustainable urban forest indicators, broadly categorized into three groups: The Trees, The Players and The Management Approach. The performance levels for each indicator was determined based on data, information and input from the community and City stakeholders with guidance from industry experts at Davey Resource Group, Urban Canopy Works and Designing Local.

Columbus' overall performance level for each category:

The Trees: LOW

Determined based on analysis of existing data and information.

Management: LOW-MODERATE

Determined based on the Forestry operations review, policy review and analysis of existing data.

The Players: LOW

Determined by Advisory Group consensus.

The overall results of Columbus' assessment found:

20 of the 32 indicators (63%) scored Low.

12 of the 32 Indicators (37%) scored Moderate.

No indicators scored Good.

These results reveal the many opportunities Columbus has to improve the resiliency, engagement and management of its urban forest. The high community involvement during the discovery process, as well as participation by City leadership, shows that there is tremendous interest and support in improving these performance levels and making the urban forest a priority in Columbus.

The following tables provide a summary of the assessment for each Indicator.

32 Indicators of a Sustainable Urban Forest

COLUMBUS, OHIO		Assessed Performance Level		
		Low	Moderate	Good
The Trees	Tree Canopy Cover	●		
	Equitable Distribution	●		
	Age Distribution	●		
	Condition of Publicly-Owned Trees	●		
	Condition of Publicly-Owned Natural Areas	●		
	Trees on Private Property		●	
	Diversity / Pest Vulnerability		●	
	Suitability - Overhead	●		
	Suitability - Ground Level	●		
	Suitability - Soil Conditions	●		
	Suitability - Invasives		●	
	Suitability - Climate Change Adaptiblity		●	
The Management	Tree Inventory		●	
	Canopy Assessment		●	
	Plans and Programs: Management Plan	●		
	Plans and Programs: Risk Management	●		
	Plans and Programs: Planting		●	
	Plans and Programs: Disaster Management	●		
	Maintenance of Publicly-Owned Trees (Right-of-way)	●		
	City Staffing and Equipment		●	
	Funding	●		
	Tree Protection Policy	●		
	Communication		●	
The Players	Neighborhood Action		●	
	Large Landholder Involvement	●		
	Green Industry Involvement		●	
	City Department/Agency Coordination	●		
	Funder Engagement	●		
	Utility Engagement	●		
	Developer Engagement	●		
	Public Awareness	●		
	Regional Collaboration		●	
Totals		20	12	0
		63%	37%	0%

Figure 4.24 | Columbus' Urban Forest Assessment Table
Columbus' urban forest was assessed across three categories and 32 indicators. All performance levels were assessed as low or moderate. ▲

INDICATORS OF A SUSTAINABLE URBAN FOREST

Indicator Group 1 The Trees

Tree Canopy Cover	
Tree canopy goal has not been established: historical canopy data is not available to determine canopy trend.	**Low**
Equitable Distribution of Tree Canopy	
Tree canopy cover not equitably distributed across city. Urban tree canopy levels at the neighborhood level range from 9 to 41%.	**Low**
Size (Age) Distribution	
Public tree population trends heavily toward young (0-8" diameter).	**Low**
Condition of Publicly-Owned Trees	
Tree canopy goal has not been established: historical canopy data is not available to determine canopy trend.	**Low**
Trees on Private Property	
2015 urban tree canopy assessment provides basic information on location of tree canopy cover.	**Moderate**
Diversity / Pest Vulnerability	
No species makes up more than 10% of the city managed tree population.	**Moderate**
Suitability - Overhead	
Data on overhead utility or other conflicts is not available.	**Low**
Suitability - Ground Level	
Data on below ground utilities or other conflicts is not available.	**Low**
Suitability - Soil Conditions	
Data on soil conditions is not available.	**Low**
Suitability - Invasives	
Callery pear (Pyrus calleryana) is invasive and makes up 6% of population of inventoried population.	**Moderate**
Suitability - Climate Change Adaptability	
USFS Tree Atlas finds 20% of existing city inventoried tree population is expected to experience decline due to warming climate.	**Moderate**

Indicator Group 2 The Management

Tree Inventory	
GIS-based street & park tree inventory completed in 1996; data is outdated and incomplete.	**Moderate**
Canopy Assessment	
Urban tree canopy assessment completed in 2015 using 2013 aerial imagery. Assessment becoming outdated.	**Moderate**
Plans & Programs: Management Plan	
A comprehensive urban forest management plan has not been developed.	**Low**
Plans & Programs: Risk Management	
Tree inventory data lacks risk rating: maintenance activities are not based on risk.	**Low**
Plans & Programs: Planting	
Tree planting and establishment program consistently funded.	**Moderate**
Plans & Programs: Disaster Management	
Disaster management plan has not been developed.	**Low**
Maintenace of Publicly-Owned Trees	
Request-based, reactive system; a systemic maintenance program not in place.	**Low**
City Staffing and Equipment	
Staff with industry certifications and accreditations; not sufficient number of staff to address all the needs of the urban forest.	**Moderate**
Funding	
City urban forestry activities funded solely by the City. Budget is not adequate to address all urban forestry needs.	**Low**
Tree Protection Policy	
Tree protection and preservation not required in city code.	**Low**
Communication	
Avenues for communication in place but used sporadically and without coordination or only on a one-way basis.	**Moderate**

INDICATORS OF A SUSTAINABLE URBAN FOREST

Indicator Group 3 The Players

Neighborhood Action	
Some active groups engaged in advancing urban forestry but no unified set of goals or priorities.	**Moderate**
Large Landholder Involvement	
Large private landholders are unaware of issues and potential influence in the urban forest.	**Low**
Green Industry Involvement	
Some partnerships are in place to advance local urban forestry goals, but more often for the short-term.	**Moderate**
City Department/Agency Cooperation	
Conflicting goals and/or actions among city departments and agencies.	**Low**
Funder Engagement	
Few or no funders are engaged in urban forestry initiatives.	**Low**
Utility Engagement	
Utilities and city agencies act independently of urban forestry efforts; limited coordination exists.	**Low**
Developer Engagement	
Little or no involvement from developers in (or awareness of) municipality-wide urban forest goals and objectives.	**Low**
Public Awareness	
General lack of awareness of trees and the benefits they provide. For some, trees seen as a nuisance, and a drain on homeowner budgets and city finances.	**Low**
Regional Collaboration	
Neighboring communities and regional groups share similar goals and policy vehicles related to trees and the urban forest.	**Moderate**

HAYDEN RUN FALLS PARK

The assessment of the current state of Columbus' urban forest — highlighted in this Chapter — provides the foundation for the UFMP's vision, goals and action steps outlined in the following chapters. For additional information, details and analysis on Columbus' urban forest, see the "Columbus Urban Forest Assessment Technical Report" a companion document of the UFMP. Visit the City of Columbus website for more information.

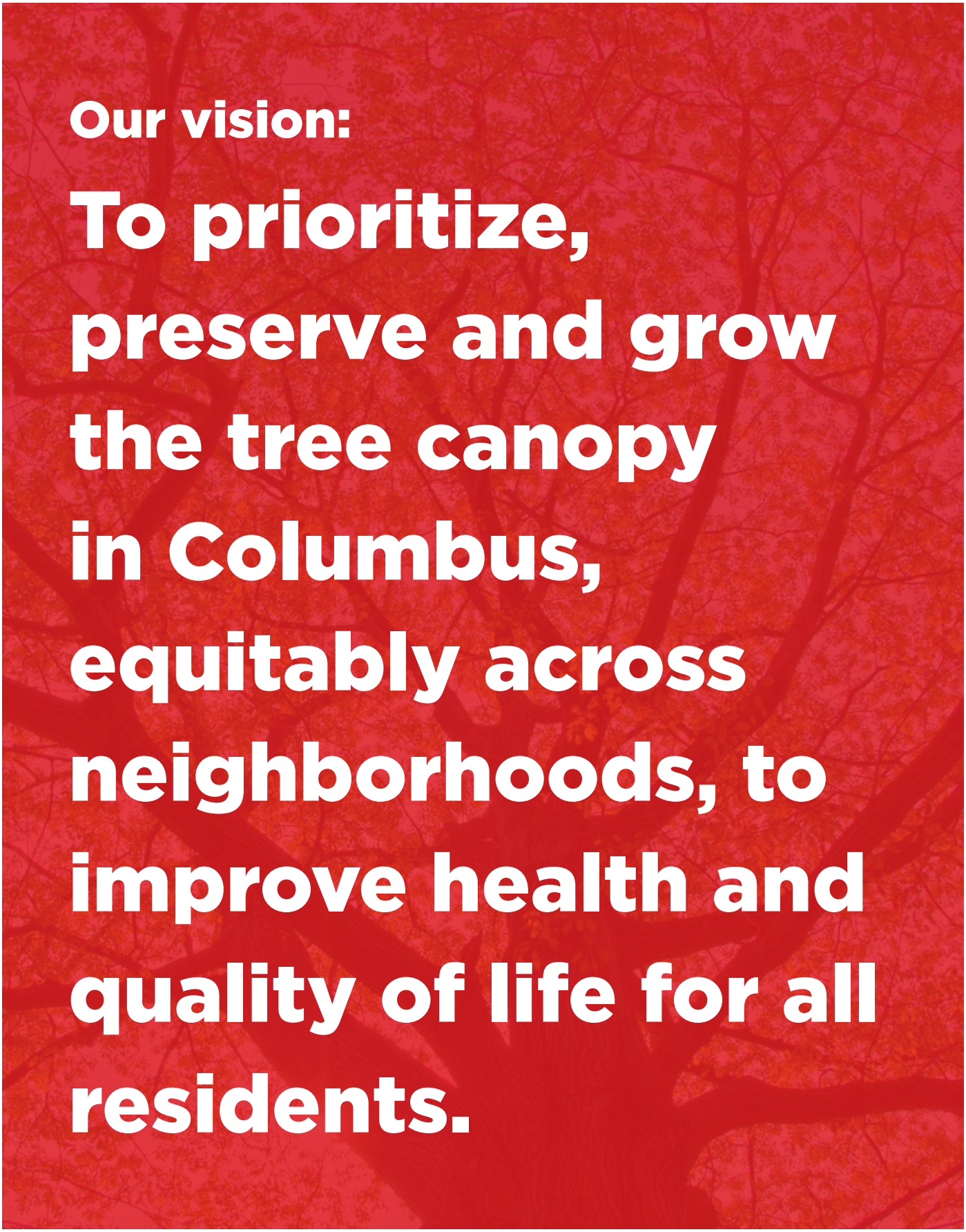
CHAPTER 5

BLACKLICK CREEK GREENWAY TRAIL

VISION AND GOALS FOR COLUMBUS' TREE CANOPY

Before creating an effective and fair plan of action for improving and protecting the urban forest, Columbus must first clearly determine what success looks like, what the values of the community are, and what the community wants the future of the City and the urban forest to be.

THE VISION


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

We will reach this vision together as a community by working toward three goals; one is a long-term goal; two are goals to achieve in the short-term.

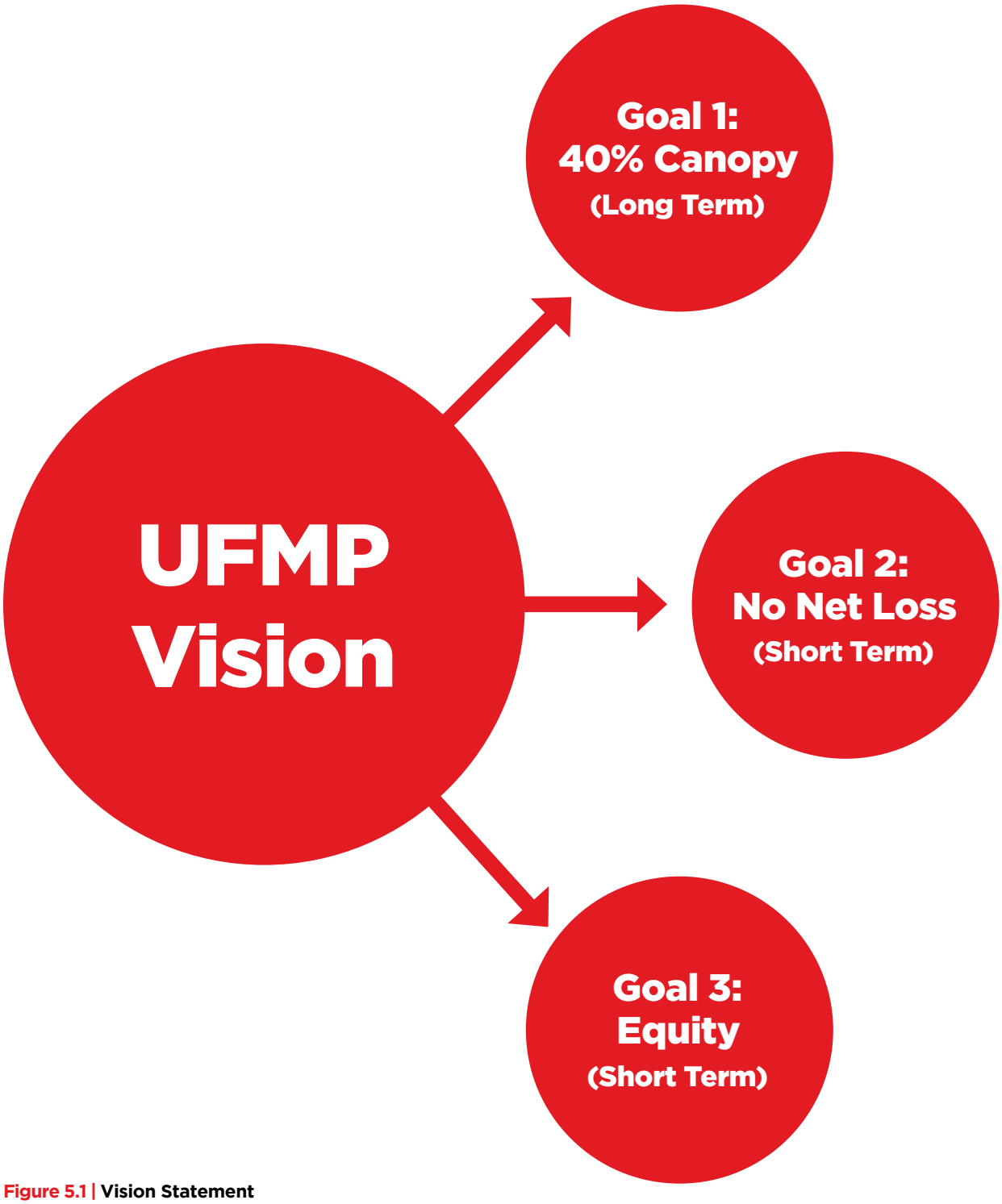


Figure 5.1 | Vision Statement
The vision for Columbus' urban forest. ◄

Figure 5.2 | Vision and Goal Diagram
The vision will be achieved through three primary goals. ▲

GOALS

Goal 1 Reach Citywide Tree Canopy Cover of 40% by 2050

High levels of health, quality tree canopy is critical for Columbus to remain a livable city. It is especially important as stressors increase as the climate warms and high population growth is expected. Tree canopy significantly reduces heat stress and air pollution, which has significant impacts on public health. It also reduces water pollution (by managing stormwater runoff), enhances property values, provides wildlife habitat, aesthetic benefits and even improves social ties among neighbors. Business districts are also more successful in areas with robust tree canopy.

Columbus must strive for a much higher canopy cover of 40% in order to remain livable and resilient in the years to come.

This will be a challenge, but follows an industry standard and was clearly called for from the community (see sidebar). It is important to recognize that Columbus' canopy level was measured at 22% in 2013 and may be currently be lower than 22% considering population growth and the impact to ash trees from emerald ash borer. While this goal will take many decades to reach, it is critical for a livable community in the decades to come.

Consider that to increase citywide canopy by 1% (to raise canopy to 23% citywide), an additional 1,800 acres of tree canopy is required. That is approximately the same amount of land on the OSU main campus (1,726 acres).

Where Did the 40% Canopy Goal Come From?

There is an suggested industry standard that communities should consider striving for 75% tree canopy of what was determined as possible in that community (Kenney et al, 2011). In Columbus, the most recent tree canopy assessment stated that if all non-concrete surfaces in the city were planted with trees (excluding inappropriate areas like agricultural fields, sports fields, etc), that Columbus could potentially reach a 59% tree canopy cover (Plan-It Geo, 2015). Using the industry suggested standard of achieving 75% of what is possible (59%), that equates to 44% canopy coverage. 40% was used as a rounded number for ease of communication and measurement. A canopy goal of 40% was widely supported, by 70% of the Advisory Group members and the majority of the community input in order to achieve the highest quality of life for residents in the long term.

Goal 2 Stop the Net Canopy Losses by 2030

In order to make real gains in canopy cover called for in Goal #1, the sources of tree loss must be addressed.

Only one tree canopy study has been conducted to date (Columbus, Ohio Urban Tree Canopy Assessment, published in 2015 based on 2013 imagery), so exact numbers on the amount of tree loss in Columbus is unavailable. However, population growth and the effects of emerald ash borer have been significant in Columbus since 2013. With Columbus forecasted to continue to grow, canopy cover will be lost unless measures are put in place to preserve canopy and consistently plant trees.

Over the next 10 years, Columbus will stabilize existing tree canopy cover by slowing the ongoing losses in tree canopy city-wide. This is a challenging goal. One priority will be to develop, enact, and enforce citywide private tree protections in the short term, along with other key action steps to preserve, maintain, and grow canopy in Columbus. Consider that to counter natural tree mortality alone — estimated at an average of 2.6% of trees per year — over 800 acres of new trees must be added each year (Hilbert et. al. 2019). This figure doesn't account for other sources of tree canopy loss, such as storms, invasive insects and development.

Stopping canopy losses is a key goal to reach if Columbus is to grow its canopy in the future.

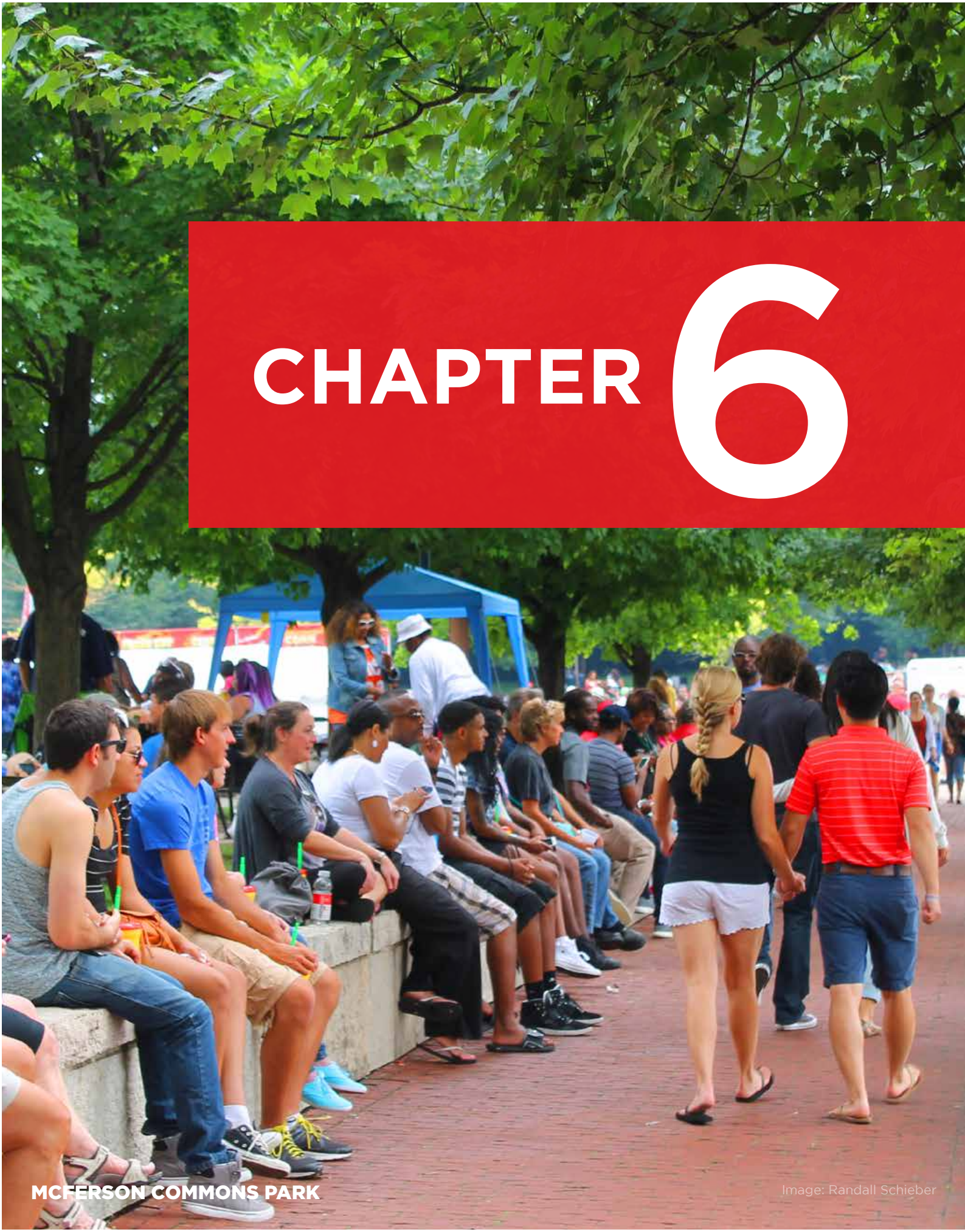
Goal 3 Invest in Equitable Canopy Across All Neighborhoods by 2030

All Columbus residents deserve to live in a community with large, mature trees. However, historic disinvestment, land use and other factors have resulted in neighborhoods with vastly different tree canopy levels — ranging between 9% to 41% canopy cover. As discussed in Finding 3, Columbus' urban forest is inequitable across Columbus due to historic disinvestment, land use and other factors. Every neighborhood deserves access to the benefits trees provide: clean air, shade, energy savings, higher property values, reduced flooding and countless other benefits.

Over the next 10 years, Columbus will invest in tree canopy equitably. Using the priority planting analysis conducted as part of this plan, the City and the community can target investment in the Columbus neighborhoods that need trees the most. A priority list of communities was created based on tree canopy levels and a social equity index, which factored in health, poverty levels and crime (see page 42 for details on the index). All neighborhoods in Columbus deserve a quality urban forest, and some neighborhoods need to be lifted up.

Remedying inequitable tree canopy can mean different efforts for different neighborhoods. Investing in equitable canopy does not just entail raising overall tree canopy cover, 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.

CHAPTER 6



MCFERSON COMMONS PARK

Image: Randall Schieber

THE ACTION PLAN

Achieving the three goals can be done by working in four focus areas, each with specific action steps that are detailed on the following pages. They were developed to reach the three goals described previously and are based on key issues and themes heard during interviews, meetings, data analysis and public input. The following actions are grouped by strategy and are not listed in order of priority.

HOW WE WILL REACH OUR THREE GOALS

Community Coordination and Collaboration

1. Form a Team for Implementation: The Columbus Tree Coalition
2. Create Messaging and Education Campaign for Use by All Partners
3. Improve Communications and Collaboration
4. Share Tree Data with the Community
5. Engage, Encourage and Support Active Participation by Volunteers and Partner Organizations in Public Tree Planting and Care

Best Practices

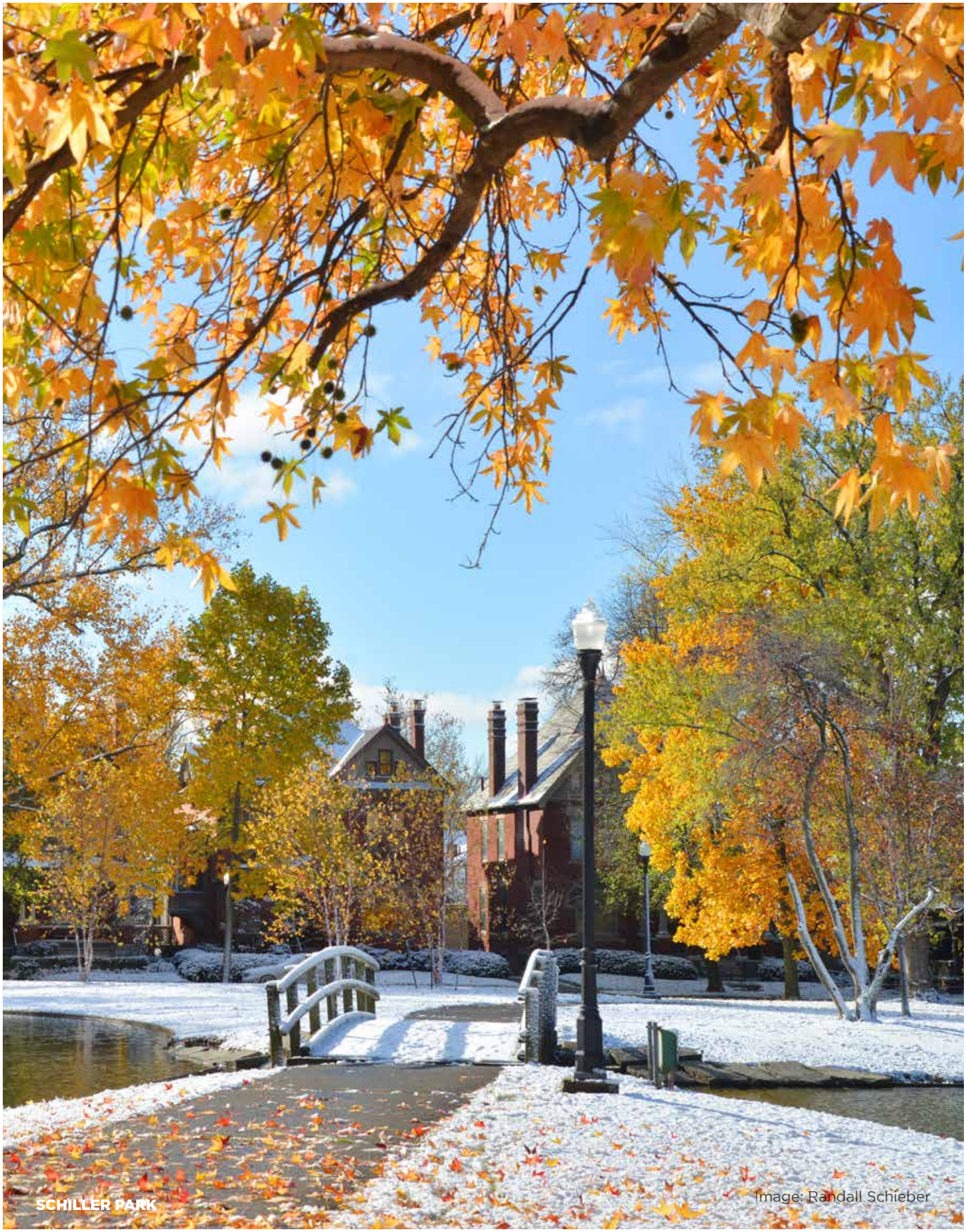
6. Tree Planting: Prioritize Efforts Based on Equity
7. Ensure Space for Trees
8. Transition to a Proactive Care on Public Trees
9. Create an Urban Forestry Best Practices Manual
10. Institute a Plan to Regularly Measure Progress and Reassess Next Steps

Dedication of Resources

11. Identify Supplemental Funding Sources
12. Expand the Size and Scope of Urban Forestry Leadership
13. Obtain and Maintain Updated Essential Tree Data

Stronger Policies

14. Strengthen Private Tree Protection Policies
15. Improve Public Tree Protection Ordinance



SCHILLER PARK

Image: Randall Schieber

ACTION ITEMS

Action 1 Form a Team for Implementation: The Columbus Tree Coalition

Challenge

This is a master plan for the urban forest in Columbus, meaning that it is not just a plan for the city staff and leadership to implement. As the majority of the urban forest is located on private land, there are many actions in this plan that must be spearheaded by the community.

Action Needed

Coordination and organization among the larger community can occur in one of three ways:

1. A working group is housed under an existing organization's umbrella, with City representatives as participants, or
2. A coalition of organizations and residents form to take on the implementation of this plan with the City as a coalition member, or
3. A new nonprofit forms to work with the City as a plan implementation partner.

Regardless of form, the Columbus Tree Coalition should be community-led and serve as a forum to unify tree-related projects, and it should ultimately plan work beyond the City's efforts. This can evolve organically over time to a structure that will work for Columbus. This group of community partners is key to maintaining momentum.

Action Item 1.1: Convene a First Gathering

LEAD: City - Columbus Recreation and Parks Department

Many community stakeholders were involved in formulation of this plan. They could serve as an initial group to meet, talk about next steps and how best to organize and engage over the coming months. During this meeting, plans for next steps are ultimately up to the group, but could include:

- Formation of Working Groups. Topic-focused work groups could tackle certain action steps and provide a way for the public to get involved as a team volunteer.
- Consider a Pledge of Commitment. A "Pledge of Commitment" can be created as part of membership into the coalition, detailing each member's commitment to the UFMP's vision, goals and action steps. This will provide partner organizations and agencies with the opportunity to officially and publicly pledge their commitment to improving and growing Columbus' tree canopy.
- Start Implementation Efforts. Plan for Implementation of Action Step #2, which is focused on developing a messaging and outreach plan, and Action Step #3, which includes building an online information hub.

Figure 6.1 | Volunteer Planting Activities
This plan will be implemented through a coalition of various partners and community stakeholders, including private residents and volunteers. ▲

Implementation Notes

How these actions will help meet our goals:
As the majority of tree canopy is privately owned, getting the community organized and started on implementing certain parts of this plan is critical for long-term success in all three goals the first year.

Resources Needed:
Meeting logistics only.

Timeline:
This group is an important player in plan implementation so the initial gathering should take place within the first year or two.

> **The Green Funds of The Columbus Foundation are pleased to support the master plan as a way to ensure, that as Columbus and central Ohio continues to change, leaders are prioritizing our environmental health and forestry assets for years to come.**
>
> -Dan Sharpe
> Vice President for Community Research and Grants Management, The Columbus Foundation

Action 2 Create Messaging and Education for Use by All Partners

Challenge

According to the UFMP Advisory Group and the majority of public open house attendees, the broader general public is not aware of the value of tree canopy in cities. The community cited that, outside of those engaged in this plan development, the broader political, business and citizen culture in Columbus does not appear to put a high value on trees, and in some cases, it resists tree canopy efforts altogether. This comes in part from a lack of understanding of trees' value in urban communities.

Action Needed

A simple messaging campaign must be created for all partners to grow the tree canopy in Columbus. This is especially critical since the majority of the urban forest (and potential tree planting space) is privately-owned. Encouraging preservation and planting of trees on private property will require education and outreach for different stakeholder groups, such as landlords, large landholders, developers, residents and others.

Action Item 2.1: Create Messaging Around Trees in Columbus

LEAD: Columbus Tree Coalition

An education and outreach campaign is needed that conveys 1) the value of trees, and 2) what each person can do right now to increase the tree canopy in Columbus. Messaging should be presented in lay terms and tailor messaging to the priorities of the community (improved health, energy savings, etc.), not just provide a long list of the services trees provide. Messages on improved safety, health, relief from heat stress and cost savings ranked highest in the initial messaging ideas from the community.

It would be up to the coalition to determine what course of action to take in regards to messaging. However, it is recommended to create branding, messaging and graphics that all partners can use with their own audiences. As the foundation for outreach in the coming years, professional communications and branding services are worth the investment at this initial stage.

Action Item 2.2: Target the Message

LEAD: Columbus Tree Coalition

Identify key sectors and groups of private property owners (i.e. developers, universities, health care companies, large landholders, schools, landlords, neighborhoods) and develop specific ways to reach them. Consider creating toolkits for these group types including persuasive information on the importance of tree canopy, preservation and planting that specifically resonates with them. For example, hospitals might be encouraged to start their own planting programs on the basis that trees reduce childhood asthma rates. Landlords may plant trees because trees improve tenant retention and business profitability. Include for each group brief information on the community's new vision and goals.

Action Item 2.3: Get the Message Out

LEAD: Columbus Tree Coalition

Once messages are created and targeted, the next step is dissemination to the entire community.

- Partner Networks. Once the messages are created and targeted, dissemination can be most cost-effectively done through the vast networks of the many organizations that were involved in the development of this plan.
- Existing Programs. There are a number of existing programs that advance tree canopy on various types of properties—Arbor Day Foundation's Tree Healthcare Campus USA, Tree Campus USA, and others. Partnering with or promoting existing programs should also be considered in any outreach work.
- Paid Outreach. If additional promotions are required, paid options like billboards, social media and other avenues can be explored as funding becomes available.

Action Item 2.4: Provide the Public with Access to Tree Expertise

LEAD: Columbus Tree Coalition

Once messaging is out, residents may have questions about landscape tree planting and care. It is important to provide the community with access to technical expertise regarding how and what to plant, proper pruning, etc., as well as a direct contact to explain how neighborhood groups can get more involved in urban forestry projects.

Related Action Steps

This direct contact for expert information could be the new urban forestry leadership position created in Action Step #12, the Tree Coalition (Action Step #1), the Tree Subcommission as discussed in Action Step #3, or simply connections made on the urban forest information hub described in Action Step #3.

Implementation Notes

How these actions will help meet our goals:
Lack of education and awareness of the value of trees was cited as one of the key reasons for low tree canopy levels, as well as impediments to future tree preservation and growth. So this Action Step is critical to all three goals.

Resources Needed:
Potential marketing and communications expertise and funds for any printing/advertising/online outreach efforts.

Timeline:
As this will be used as the foundation for all outreach work, this should be started within the first year and complete by end of Year 2.

Action 3 Improve Communication and Collaboration

Challenge

According to the UFMP Advisory Group and many who attended the public open house, there has been a broader communication challenge and lack of trust between the residents and City. Additionally, instances of uncoordinated work amongst City departments was also cited as a source of tree canopy loss in the past.

The need for improved communication and collaboration around tree issues, both internally between City departments and externally between the City, residents and other organizations was a common theme throughout the UFMP development process. Improved collaboration is critical to protect the urban forest and to empower residents to improve their own neighborhoods.

Action Needed

Better communication and collaboration on urban forestry issues requires transparency and simplified communication avenues. Suggested improvements follow.

Improve communication between the City and the public:

Action Item 3.1: Establish an Urban Forestry Information Hub Online

LEAD: Columbus Tree Coalition

Develop a one-stop online information hub for the community to get information about all aspects of Columbus' urban forest—no matter if the forest is on public or private property.

Content should include findings and next steps from this plan; answers to the most common urban forestry questions from the public; an interactive tree canopy tool (see Acton Step #4 on Sharing Tree Data for details); how-to resources related to tree planting and care; access to tree expertise for those needing help, and a place to share stories from all tree partners, programs and activities supporting the Columbus urban forest.

Action Item 3.2: Consider an Annual Tree Summit

LEAD: Columbus Tree Coalition

An annual meeting should be hosted by the tree coalition (see Action Step #1) to update the community on the city's urban forestry program along with community-led projects over the last year. This could be a simple review of the year's planting activities, group discussions of the challenges faced, a progress update on the UFMP and planning for next year's goals.

Action Item 3.3: Better utilize the Tree Subcommission

LEAD: City - Columbus Recreation and Parks Department

The Columbus Recreation and Parks Tree Subcommission's current role is very limited and focuses on providing guidance and recommendations around tree planting. However, the role of this group could be expanded to also serve as a conduit for increased communication between the public and the City. The Subcommission could serve as an ombudsman for residents who need assistance and aren't sure where to start within the City organization. Additionally, this group can work with Forestry staff to reduce street tree planting refusal rates by taking steps to identify reasons residents refuse new street tree plantings, and start to explore ways to address this issue.

Figure 6.2 | Arbor Day Activities
Columbus Recreation and Parks Department Forestry staff educate the community through events like Arbor Day. ▲

Improve coordination between City departments:

Action Item 3.4: Revise Internal Systems and Procedures for Better Coordination Between Departments.

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Potential revisions of city systems and procedures can improve coordination between departments. These could include:

- Develop a process for Urban Forestry to share and coordinate tree planting and maintenance activities to ensure activities do not conflict with future plans of other City departments.
- Invite Urban Forestry's participation in project working groups for large City projects, to ensure that trees are adequately planned for and opportunities for collaboration are identified.

Note that the new leadership role described in Action Step #12 is key to better coordination and communication between departments. Other departments will also need to incorporate Urban Forestry into their business processes.

Action Item 3.5: Incorporate Urban Forestry Messaging into Existing Initiatives

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Columbus' urban forestry vision, goals and messaging created in Action Step #2 should be incorporated into existing City programs wherever possible. City divisions and departments are actively working to improve and enhance the services provided to the Columbus community. However, they can be strengthened to support the UFMP and grow canopy cover in the city. Plans and programs to consider:

ACTION ITEMS

- **Sustaining Scioto - Investing Today, Preserving Tomorrow (2015).** The climate change adaptation strategies recommended in this plan decrease the amount of hardscape and encourage green infrastructure. However, they do not explicitly consider street trees as an adaptive strategy for stormwater management. Street trees should be considered as a stormwater management strategy next time this plan is updated.
- **Columbus Climate Adaptation Plan (2018).** The Columbus Climate Adaptation Plan (CCAP) was developed by the Byrd Polar Climate Research Center at The Ohio State University in collaboration with the City of Columbus and the Mid-Ohio Regional Planning Commission. The CCAP details Columbus' climate vulnerabilities and provides climate adaptation strategies to enhance the community's preparedness and resilience.

  The plan recognizes trees as a strategy to mitigate the effects of climate change. However, there are sections of the plan where trees can play an important role in improving the impacts of climate change. For instance, trees can improve air quality and reduce energy demand during summer months; trees can reduce flooding by capturing and slowing down stormwater runoff; and planting trees along sidewalks and bike paths to improve the experiences of pedestrians and cyclists and ultimately encourage their use. The UFMP should be used as a resource when updating the CCAP to identify additional ways that trees and tree canopy cover can be used to mitigate the effects of climate change.
- **Neighborhood Pride and Celebrate One.** Neighborhood Pride is a partnership initiative between the City of Columbus, neighborhoods, residents, businesses, schools and organizations to beautify neighborhoods and improve safety. CelebrateOne is a city-led initiative to reduce the infant mortality rate in Columbus. The Priority Tree Planting analysis, conducted as part of the development of the UFMP, can be coupled with data and information from these programs to identify areas where increases in tree canopy cover can help meet program goals and objectives.
- **Sustainable Columbus.** Sustainable Columbus is a city initiative to encourage sustainability and policies that improve the environment and preserve the city's natural resources. The initiative includes a variety of programs, including: **GreenSpot, Smart Columbus and Columbus Blueprint.** The UFMP should continue to be promoted within the Sustainable Columbus platform and programs.
- **Mid-Ohio Regional Planning Commission Sustainability Agenda.** Incorporating tree canopy and urban forests into the Regional Sustainability Agenda can help elevate the urban forest in the region. Sharing the UFMP with regional partners can help develop regional goals to improve and grow canopy cover, and seeking partnerships around urban forestry initiatives can improve regional collaboration.

Other possibilities include any neighborhood improvement efforts underway by Area Commissions and the Department of Neighborhoods, additional public health and safety initiatives within the City like Vision Zero, business organizations like the Columbus Partnership, and other initiatives centered on affordable housing, safety strategies and more, as deemed appropriate to coordinate efforts across the city.

Figure 6.3 | The Scioto Greenways Project
The Scioto Greenways project was completed in 2015 and created 33 acres of new greenspace through the removal of an existing lowhead dam. Hundreds of new trees were planted as part of the project. ▲

Implementation Notes

How these actions will help meet our goals:
Lack of coordination of efforts and priorities have been the cause of the "one step forward, two steps back" sense of tree canopy efforts within Columbus to date. This Action Step is important to all three goals, but critical to stopping net canopy loss (Goal 2).

Resources Needed:
Direct costs for this step would likely include annual website domain and hosting costs and potentially costs to host an annual summit.

Timeline:
The information hub is a priority and should be initiated the first year of implementation. The remaining steps will be a matter of slowly implementing over the course of the next one to two years.

Action 4 Share Tree Data with the Community

Challenge

As part of the UFMP discovery process, the Advisory Group assessed many sectors as not significantly engaged: neighborhoods, large landholders, developers, green industry, utilities, funders, regional groups and the public in general. One issue that could be affecting engagement is limited access to information on Columbus trees.

Sharing tree data with the community helps illustrate the value of the urban forest, improves communication (Action Step #3) and builds support for its management.

Action Needed

As inventory data and canopy assessments are updated (see Action Step #13), as much information as possible should be available to the entire community, much like the interactive tree canopy map created during the development of this plan (see link below).

Once avenues are available for data sharing, both partner organizations and all City departments should have access to the newest information on Columbus' trees.

Action Item 4.1: Provide Access to Canopy Data to the Public

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

During the development of this plan, the City of Columbus made tree canopy data available in an online interactive map for residents. This can be updated with newer data once a new canopy assessment is completed (see Action Step #12).

Action Item 4.2: Provide Access to Public Tree Inventory Data to the Public

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Explore ways to publish the City's tree inventory on a public, interactive web-based platform. Options for this can be explored while the inventory is updated.

Implementation Notes

How these actions will help meet our goals:
Providing data on existing canopy is a critical starting point to the community improving their own neighborhoods so this is most important for equity goals (Goal 3), but also for 40% overall canopy (Goal 1).

Resources Needed:
An online platform for data sharing that is accessible to the community.

Timeline:
Canopy data from the 2015 Urban Tree Canopy Assessment has been shared through an interactive canopy map and should be updated once a new urban tree canopy assessment is complete. The public tree inventory should be available in a more accessible format within the next one to two years, as the inventory is updated.

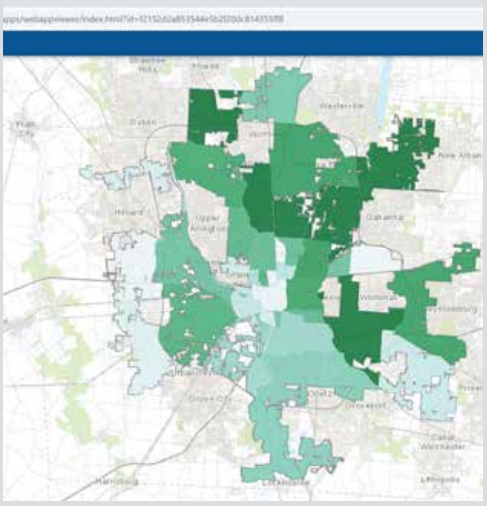
Case Study: Interactive Tree Maps

New York City Parks has placed their street tree data on an online interactive map for residents to explore on their own, as well as log the care each tree receives by volunteers.

"For the first time, you have access to information about every street tree in New York City. Learn about the trees that make up our city's urban forest, mark trees as favorites and share them with your friends, and record and share all of your caretaking and tree stewardship activities." Additional information is available on all the benefits those trees provide, as well as where additional trees are needed and the ability to report an issue with a tree on the application directly.

Washington D.C. has an extensive data sharing platform for its residents to keep up with current activities by the city in urban forestry, as well as engage in care for street trees. Residents can view a tree and register an issue, water it and record care activity on the systems, see where removals are happening and what planting plans are in place.

The City of Columbus has created an interactive tool for residents to determine the tree canopy coverage for their community. This tool will be updated with new data as it becomes available.



Action 5 Engage, Encourage and Support Active Participation by Volunteers and Partner Organizations in Tree Planting and Care

Challenge

The discovery phase of the UFMP planning process uncovered the need to support volunteers and partner organization in tree planting and care activities. Community organizations and residents consistently expressed an interest in planting street trees in the right-of-way in their own neighborhoods. However, a lack of City staff and resources to oversee a volunteer planting program for neighborhood streets, as well as safety and liability concerns, have restricted these efforts in recent years.

Across the country, neighborhood residents are typically highly motivated to improve their own "common areas" like in business districts, in parks and other semi-public areas like schools or homeowner's association properties. Residents often then apply their new knowledge, appreciation for the impact trees make and overall enthusiasm in urban forestry to other projects on private land—their own homes, businesses and elsewhere.

Action Needed

There are many partnership opportunities to be explored between the City and partner organizations to grow and improve tree canopy cover in Columbus. By creating opportunities for volunteers and partner organizations to participate in tree planting and care, the City develops urban forest stewards and advocates. These efforts create substantial momentum in growing Columbus' urban forest.

Partnership opportunities can include:

Private Property Planting

To reach all three goals, significant tree planting on private property will need to occur. Encouraging urban forestry stewardship on private property requires education and outreach, as well as easy access to trees to plant.

Action Item 5.1: Explore Tree Giveaways for Private Property Planting

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

The public cited free tree giveaway programs as the No. 1 choice for encouraging private tree planting. This would be especially effective in those areas in most need to achieve Goal #2 on Equity. The Columbus Tree Coalition can explore options for giveaways, including a program using trees grown in the city nursery. Conversely, if funding is available, the City of Columbus could consider giving away trees for planting on private property.

Volunteer Plantings

Action Item 5.2: Continue Park Tree Planting Volunteer Program

LEAD: City - Columbus Recreation and Parks Department

Continue to coordinate and partner with local community groups to plant trees in City parks.

Figure 6.4 | Volunteers Plant Trees at Walnut Hill Park
Participation by children and young adults fosters environmental and community stewardship. ▲

Action Item 5.3: Continue Partnerships with Environmental Nonprofits

LEAD: City - Columbus Recreation and Parks Department

Friends of the Lower Olentangy Watershed (FLOW) and Green Columbus both have satellite tree nurseries that offer opportunities for volunteers to assist in tree propagation and giveaways.

Volunteer Tree Care

Action Item 5.4: Provide Training and Education on Tree Care

LEAD: Columbus Tree Coalition

A young tree care program for residents and volunteers can benefit the City by creating a corps of volunteers for young tree care, while educating the public on tree care for their own properties. Green Columbus initiated a Tree Stewards program and held multiple trainings in partnership with Forestry. This could be revisited as an area of opportunity to build on. The City nursery and public parks could also serve as outdoor classrooms to practice.

Action Item 5.5: Create Opportunities to Volunteer at the City Nursery

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Explore opportunities for residents to learn about nursery operations by volunteering. The city nursery offers partnership opportunities between the City and partner organizations, including utilizing the nursery to: grow trees for community tree giveaways; as an outdoor classroom for young tree training education program; and providing volunteer opportunities to learn about nursery operations.

ACTION ITEMS

Action Item 5.6: Explore Citizen Tree Data Collection

LEAD: City - Columbus Recreation and Parks Department

Create opportunities to engage volunteers in collecting tree data. For example, volunteers could inventory newly planted trees and help monitor their growth for three to five years after planting.

Note that all volunteer programs will benefit from quality data to ensure planting and tree care is occurring in areas of highest need. Action Step #4 calls to share tree data.

Implementation Notes

How these actions will help meet our goals:
This work is key to engagement of the community, which has significant implications and potential impacts on adding tree canopy to private property, which is critical in correcting inequity in tree cover (Goal 3) and reaching 40% canopy (Goal 1).

Resources Needed:
Additional resources would be essential at the nursery and to ensure staff is available to manage any volunteer programs.

Timeline:
Expansion of volunteer forestry activities is recommended to occur within the short term (two to three years).

Figure 6.5 | Earth Day Volunteers Distribute Trees at Whetstone Park
Volunteers are able to fill multiple roles including data collection and tree distribution. Volunteers with our department and with partner organizations have been crucial in helping plant trees throughout the years. ▼

Case Study: Volunteer Tree Programs Across the Country

Examples of volunteer tree programs exist across the country. A similar program should be explored in Columbus, taking into consideration current obstacles such as resources and liability issues.

In Dallas, the Texas Trees Foundation has a Cool Schools program that "connects students and teachers to nature by planting trees and creating fun and engaging outdoor experiential learning areas." This is in response to the data that showed Dallas school campuses are in dire need of improved tree canopies. A recent report showed that 70% of Dallas area elementary schools have less than 7% tree canopy, while a minimum of 27% tree canopy is recommended to reduce exposure to harmful ultraviolet rays and air pollution. https://www.texastrees.org/projects/cool-schools/

In Philadelphia, TreePhilly works with community groups across the city each spring (April and May) and fall (October and November) to host yard tree giveaway events, complete with staff support and a small grant. TreePhilly is a program of Philadelphia Parks and Recreation and Fairmount Park Conservancy, sponsored by TD Bank, with the goal of helping Philadelphia residents plant and care for trees. Another Philadelphia nonprofit, Pennsylvania Horticulture Society, trains volunteers as Tree Tenders, who then can assist in planting, care and data collection of public trees. treephilly.org/ https://phsonline.org/programs/tree-programs

Washington, D.C. partners with a nonprofit to collect information on public trees and plant on private property. Funds received from the removal of protected "special" and "heritage" trees (trees over a certain size) on private property are used to fund free tree planting back on private property across the entire city. Funds are collected by the city, and the program is administered by Casey Trees, the nonprofit organization for trees in the District. Once an application is made for a tree, Casey Trees will come out to the property, speak with a homeowner on species and placement, then return later with a crew to plant the tree. Casey Trees also organizes park inventories, teaching volunteers how to survey trees. The information is then used for mapping and management.

Action 6 Prioritize Tree Planting and Care Based on Equity

Challenge

The percentage of tree canopy cover by neighborhoods varies greatly in Columbus, from 9% to 41%. This is due to a number of factors, including varying levels of past investment, socioeconomics, development patterns, land use and others. This variability has led to an inequitable distribution of tree canopy cover. Neighborhoods with lower tree canopy receive fewer benefits, impacting health, property values and overall quality of life.

Correcting this inequity is the sole focus of Goal 3 and will require a data-driven planting effort city-wide.

The first step toward more equitable canopy cover was a priority planting analysis to determine planting sites and tree care needs in neighborhoods with low canopy and high social equity needs. A re-analysis of the 2013 Columbus tree canopy data was conducted during UFMP development. Potential tree planting sites were modeled onto open green space on both private and public land. These potential sites were prioritized in three ways: urban heat island, stormwater and social equity. A social equity index was created from nine social equity factors selected by the Project Team, spanning health, crime, demographic and economic data.

Action Needed

Purposeful planting and tree care efforts should be focused to correct inequity in tree canopy cover. A plan should be developed using the priority planting analysis, as well as outreach and assistance to encourage planting and tree care in these areas.

Determine Areas of Inequity

Action Item 6.1: Determine Areas in Need

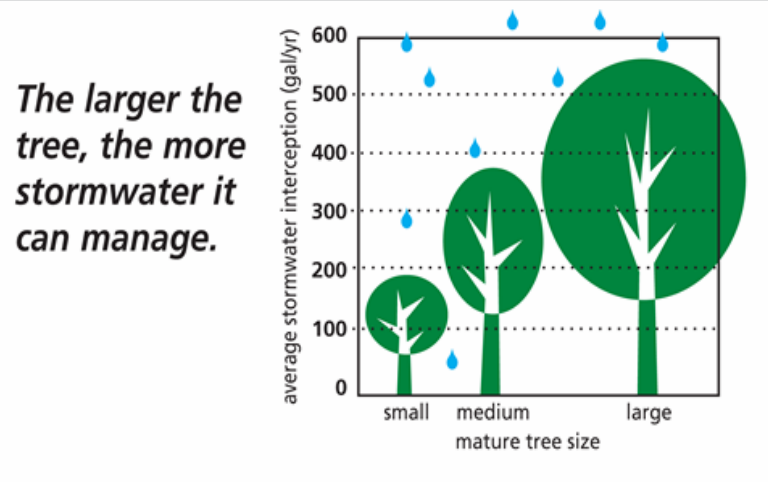
LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

A GIS-based map of priority planting sites throughout the city has already been developed (as described above). This priority planting analysis will be made available to the community to focus tree planting in areas of highest need. The City has already begun to use the priority neighborhoods from this analysis to update street tree inventories, putting those communities with the lowest canopy and highest need first. This data should also be used to determine priority areas needed to reach Goal 3: Equity in Canopy.

Once a more updated tree canopy assessment is in place (Action Step #13), this analysis should be updated with the latest canopy data and adjusted for any changes in priorities.

> **94% of COTA's customers reach our service by walking, and shade along public ROWs will be increasingly important. Transit customers in Columbus are disproportionately low income compared to the population at-large, and may also be disproportionately impacted by an inequitable distribution of tree canopy. People who walk and use transit are disproportionately impacted by a lack of shade on public streets.**
>
> -Andrew Neutzling
> Service Planner, Central Ohio Transit Authority

Case Study: Portland, Oregon, Treebate Program



The City of Portland, Oregon, has a Treebate program that provides a one-time credit on the city sewer/stormwater/water utility bill for planting a tree in a residential yard. Larger species trees receive larger credits as they will intercept a greater amount of rain when at mature size.

Two examples of tree stormwater credit programs include Impervious Surface Reduction Credits and Volume Reduction Credits.

Surface Reduction Credits reduce the area of impervious surface that has to be treated on a development site if trees are planted or preserved. Cities that have adopted this approach include Austin, Texas; Portland, Oregon; Sacramento, San Jose and Santa Clara Valley, California; Indianapolis, Indiana; Seattle, Washington; Philadelphia, Pennsylvania; and Minneapolis, Minnesota (Stone Environmental, 2014).

Volume Reduction Credits provide volume credits for existing trees. Washington, D.C., for example, provides a volume credit of 20 cubic feet for each preserved tree, and 10 cubic feet for each planted tree. Pine Lake, Georgia, provides 10 gallons of credit per inch of trunk diameter at breast height (DBH) for preserving existing trees under 12" DBH, and 20 gallons per inch for preserving existing trees over 12" DBH (Stone Environmental, 2014).

Plant for the Long Term

Once areas in need are identified, a plan must be developed. For the best chances at long-term success, consider species diversity, invasives and climate change into consideration.

Action Item 6.2: Prioritize City Planting Efforts to Correct Inequity

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Incorporate into the City tree management program (see Action Step #8) a focus and priority on planting in areas of highest need first.

Related Action Steps:

- Using Volunteers. The work in Action Step #5 will make tree canopy improvements in the priority areas, as residents will often show up in great numbers to improve their own parks and other common areas.
- When Street Trees Won't Fit. In areas with narrow tree lawns where street tree planting may not be feasible, a program to plant in front yards could increase street tree canopy cover, while providing a benefit to the property. See more in Action Step #7.

Action Item 6.3: Take Tree Species Diversity, Invasive Plants and Future Climate Changes into Consideration in Planting Plans

LEAD: City – Columbus Tree Subcommission

Increasing diversity, anticipating climate change and managing invasive species will be critical to an equitable, long-lived urban forest.

- Increase Biodiversity. There are 222 different species/cultivars in Columbus' public tree population. However, they are not evenly distributed across the population—in fact, 14 species represent 55% of the population. To be more resilient to insects, diseases, pests and climate changes, the City and its partners should evaluate site conditions and existing tree species diversity in the area, prioritizing the planting of underrepresented tree species. The largest size class possible for the space should be planted to maximize benefits to residents..
- Plan for Climate Change. Based on current models from the USDA Forest Service's Climate Change Atlas, the habitat of some of Columbus' inventoried street and park trees are predicted to change due to climate change (USDA Forest Service, n.d.; Iverson, et al., 2019). Current models show that the City may want to increase planting of hackberry (Celtis occcidentalis) and bur oak (Quercus macrocarpa) due to predicted increases in suitable habitat. While reducing the planting of sugar maple (Acer saccharum) and swamp white oak (Quercus bicolor) due to predicted decreases in suitable habitat. It is recommended that the City of Columbus and the Tree Sub-commission reference the Tree Atlas and tree selection resources when revising the City's approved street tree list.
- Avoid Invasive Trees. It is recommended that the City, with the Tree Subcommission, periodically review its approved street tree list against the latest invasive tree species research by accepted entities, including the Ohio Department of Agriculture and the Ohio Invasive Plant Council, to avoid invasive species.

Encourage Private Planting Activity

Once priority areas are identified and best practices are considered, there are a number of ways to encourage planting beyond what the City will be doing already on public land.

Case Study: Marylanders Plant Trees Program

The City of Columbus' GreenSpot program currently offers $50 rebates to residents who purchase a native tree. Since 2016, GreenSpot has provided more than 1,200 rebates for native trees and plants to Columbus residents citywide through the Community Backyards program. This program could be expanded in areas of need in Columbus.

Maryland started the Marylanders Plant Trees program in 2009 "to encourage citizens and organizations to partner with the State to plant new trees." Any resident or landowner could get a coupon for a $25 discount off the purchase of one tree valued at $50 or more at participating nurseries and garden centers. The coupon is valid only for trees listed on the programs recommended tree list. Over 109,000 trees were planted through this program over the next 5 years, exceeding the state's goal of 100,000 trees planted by the end of 2013 (Stone Environmental 2014).

Action Item 6.4: Explore Incentivizing Planting Through a One-Time Stormwater Credit Program

LEAD: City - Department of Public Utilities

Incentivize planting on private property by adding tree planting as a one-time Stormwater Utility credit, potentially on residential and commercial properties that plant trees beyond what is required. Consider adding tree planting as an eligible Stormwater Credit in development. A 'credit' in development in this case is referring to the amount of stormwater that a developer would otherwise be required to treat in exchange for the alternate practices (in this case, trees) that reduce the runoff volume generated. There are many communities with these types of programs in place (see sidebar).

Action Item 6.5: Explore Offers of Discounts or Cost Share Programs in Priority Areas

LEAD: Columbus Tree Coalition

Discounts on trees to be planted on private property in Columbus could be expanded in areas of high need, as part of the new messaging and education campaign and to promote equity. See the case study of GreenSpot Columbus, which currently offers rebates for native trees citywide, as a potential program to expand.

Implementation Notes

How these actions will help meet our goals:
This Action Step is entirely focused on achieving Goal 3: Equity.

Resources Needed:
Buy-in from City departments to make these areas a priority. Education and outreach efforts to promote selected programs for planting in priority areas.

Timeline:
These action items should be instituted in the short term as canopy growth is a slow process and must be started soon to achieve equity sooner.

Action 7 Ensure Space for Trees

Challenge

There is a lack of adequate space to plant and grow trees, especially large shade trees, across Columbus. While this is an obstacle to growing overall city canopy, it has a significant impact on areas with low canopy cover, high density and narrow tree lawns.

Action Needed

Identify opportunities to construct new, or retrofit existing sites, to provide adequate space for trees early in the design process. This action step will require early input from City departments, including Urban Forestry, and the willingness to consider using existing or new technologies to increase soil volume for trees (e.g., structural soil, silva cells). Site-specific alternatives to achieve canopy cover (e.g., street bump-outs, green roofs, planting beyond the right-of-way) will also be needed.

The following strategies can help ensure there is adequate space for trees in Columbus:

Existing Tree Lawns

Action Item 7.1: Design Options to Retrofit Small Tree Lawns

LEAD: City – Columbus Recreation and Parks Department, Columbus Department of Public Service

Design options to retrofit existing tree lawns less than 4-feet-wide to provide adequate space for trees to grow and thrive. In areas where expansion in the size of the tree lawn is not feasible - evaluate using green infrastructure technologies (e.g., silva cells, structural soils) to add additional rooting area for trees. The use of green infrastructure technologies should be considered during the planning and design of utility and development projects or when large-scale excavation in the right-of-way will occur.

Action Item 7.2: Revise Narrow Tree Lawn Planting Strategies

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Determine strategies for streets with tree lawns less than 4-feet-wide to allow the planting of street trees (e.g. allowing specific small-class trees; adding tree bump outs along street). Assess current City policy requiring a tree lawn be a minimum of 4-feet-wide to plant a street tree, and instead allow tree planting where there is a minimum of 3 feet of tree lawn. In some areas of the city, an entire street may only have 3-foot-wide tree lawns. While the palette of tree species that can be planted in a narrow tree lawn is limited, the benefits these trees will provide outweigh the risk of having low species diversity on the street, or not having any trees at all.

Explore Alternative Areas

Action Item 7.3: Explore Tree Plantings in Street Medians

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section, in partnership with Columbus Department of Public Service

Consider planting more trees in medians. Grassy medians provide adequate space for trees to grow without retrofitting the site. Within the City, this will have significant maintenance impacts and will require interdepartmental coordination, decisions and resources.

Action Item 7.4: Explore Planting Beyond the Right-of-Way

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Explore options to allow street trees to be planted in the front yard setback (private

Case Study: Concord, Massachusetts Setback Program

Concord, Massachusetts, has a setback tree planting program where the property owner gives the town permission to plant a tree in the 20-foot setback adjacent to the right-of-way. The town plants the tree at no cost to the property owner. In return, the property owner is responsible for tree care and watering. The tree cannot be removed without permission from the town.

Visit: https://concordma.gov/2257/Setback-Tree-Planting-Program

property) or in street tree easements in areas of the city where the tree lawn is too narrow to accommodate a tree.

Related Action Steps:

Space for trees must be designed and incorporated during new construction as well. This includes the following two major categories of projects - development and capital improvement projects (CIP). These are included in Action Steps #14 and #15.

Implementation Notes

How these actions will help meet our goals:
This work will aid Goals 2 and 3. Many areas of Columbus with low canopy lack places to plant, such as commercial areas like Downtown with high amounts of hard surfaces. Ensuring canopy equity (Goal 3) requires space for trees. This work also ultimately impacts the long-term canopy goal from Goal 1.

Resources Needed:
Working group, design expertise, regulation changes.

Timeline:
Within the first five years.

> **The Ohio Environmental Protection Agency recognizes both the value urban trees provide and the many threats they face. Columbus' use of green infrastructure practices for stormwater management shows a commitment to incorporating trees into the urban landscape. This master plan represents another major step forward for urban forestry in Columbus, and the greening of central Ohio.**
>
> -Steve Malone
> Technical Review Section Manager, Ohio Environmental Protection Agency

Action 8 Transition to Proactive Care on Public Trees

Challenge

As with any city infrastructure (roads, bridges and utilities), public trees need proactive care and routine maintenance.

The City of Columbus' current management of street and park trees can best be described as reactive. Due largely to limited resources, tree maintenance is driven by resident requests and emergency work after storm events. In most cities, affluent residents make more requests for tree care so reactive care can also result in inequitable investment in the public tree canopy over time.

Reactive urban forestry care also negatively impacts the overall condition, value and sustainability of Columbus' trees. It leads to inefficient and more costly service delivery by the City and low customer satisfaction (see sidebar).

> **Trees are vital infrastructure in cities, and they appreciate in value as they grow. Like any valuable asset, urban trees should be professionally and systematically maintained to enhance benefits, extend tree service life, and maximize return on investment.**
>
> -Steve Cothrel
> Vice-Chair, Columbus Tree Subcommission

Proactive care, on the other hand, increases tree longevity (health) and safety (fewer risks), and therefore allows trees to provide the maximum potential benefit to the community. Additionally, this program of care can improve relationships between the City and communities, as residents will have assurances that their street trees will be maintained. The fear from residents that trees are dangerous and/or a nuisance was cited during the public input process as a key reason some residents don't want trees - street trees OR private trees.

While initial costs to start this type of program can be high, overall costs over time decrease substantially as more substantial defects are addressed and resources are used more efficiently. Instances of storm damage also decrease when trees are well maintained.

Action Needed

The 2016 Municipal Tree Survey (Hauer 2016) found that Columbus has almost twice as many street trees per Forestry employee (7,567 street trees) than the communities that completed the survey (4,821).

Transitioning to proactive care of public trees by city staff will require a number of things:

Action Item 8.1: Fill Existing Vacant Staff Positions

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Moving to a proactive program will require additional labor, which could consist of contractors, more City staff and equipment or a combination of both. Regardless, a first step should be to fill existing vacant positions in Urban Forestry.

Action Item 8.2: Obtain Updated Tree Inventory

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

The exact amount of funding needed for a proactive management program like this cannot be estimated without an updated tree inventory. Inventories provide critical information on the size, condition and risk of each tree, which dictates the level of maintenance work needed in each zone each year. This is detailed in Action Step #13.

Action Item 8.3: Develop a Formal Public Tree Management Plan

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

Once tree inventory data is up-to-date and accurate, a management plan can be developed to detail resources needed for proactive care of city-owned trees over the next five to 10 years. A predictable, ongoing pruning cycle is ideal. Cycles in other Cities often range from six to 10 years. However, it is common to extend to 20 or more years during the first full cycle as there is typically so much remedial work needed in the beginning. Costs drop off in the second round because the costly tree maintenance tasks have been addressed already. Phasing this work is common and often a reality due to funding challenges. The important thing is to get started.

Action Item 8.4: Secure Additional Funding to Implement a City Tree Management Plan

LEAD: City - Columbus Recreation and Parks Department

Transitioning Columbus' program from reactive to proactive will require an increase in funding. Forestry's current budget is not adequate to manage even the existing reactive program, as evidenced by the backlog in work orders to address resident tree pruning and removal requests. Supplemental funding sources will likely be needed - see Action Step #10 for more.

Implementation Notes

How these actions will help meet our goals:
Proactive management of public trees will ensure the City is preserving and expanding canopy on public land, working toward all three canopy goals.

Resources Needed:
Accurate tree inventory data, additional funding for annual tree work, permission to fill vacant positions.

Timeline:
Implement over the next five years to fill vacancies, update data and build operational capacity.

Why Prune Trees on a Cycle?

Pruning trees on a systematic and consistent cycle has been shown to significantly improve the condition of the tree population city-wide. One study (Miller and Sylvester 1981) examined the frequency of pruning for 40,000 street trees in Milwaukee, Wisconsin. A decline in tree health correlated directly with increases to the length of the pruning cycle. When pruning was not completed for more than 10 years, the average tree condition was rated 10% lower than when trees had been pruned within the last several years.

Action 9 Create an Urban Forestry Best Practices Manual

Challenge

The policies, regulations and practices around trees and urban forestry in Columbus are not all formally documented and adopted. Currently, Columbus lacks a single document for City staff, contractors, residents and developers to access information about trees.

Action Needed

Develop an urban forestry best management practices manual to provide guidance on tree protection, preservation and planting within Columbus. The manual can serve as a companion to city code and also document and formalize Forestry's policies and practices.

Action Item 9.1: Form Working Group and Develop Urban Forest Best Practices Manual

LEAD: City - Columbus Recreation and Parks Department

A working group of relevant city departments can provide input on the best practices for tree-related work within Columbus. Potential information to include:

- Standard details to support;
  - Tree planting spacing;
  - Soil information, such as appropriate soil volume and surface treatment;
  - Specifications on tree pits and tree lawn widths;
  - Coordination with utilities;
  - Care for street trees upon planting.
- Menu of design options that support trees (e.g., silva cells, suspended pavement systems, structural soil) and standard City details for these options;
- Policy and specifications on sidewalks, including options to deal with tree/ sidewalk conflicts;
- Tree Risk Evaluation (e.g., Tree Risk Assessment Qualifications)
- Process for plan review and construction inspections;
- Tree replacement process and invoicing for the removal of public trees;
- Details for property owner sidewalk design, installation or replacement should include alternatives that can help preserve trees in locations where trees have damaged sidewalks (e.g., alternate sidewalk material, reduce sidewalk thickness, easements) and to ensure adequate planting spaces for future trees.

The result of this work can be put together in a printed manual or housed in an online format, potentially housed or linked to by the online information hub detailed in Action Step #3. A working group of key stakeholders will be ideal when creating this manual. .

Action Item 9.2: Incorporate Best Management Practices into Other City Policies

LEAD: City - Columbus Recreation and Parks Department

Monitor development of new and updates to existing city codes, regulations and policies in order to incorporate urban forestry best management practices where appropriate. For example:

Columbus City Wide Planning Policies. Columbus City Wide Planning Policies (C2P2) establishes a framework for future neighborhood planning and development review. It is based on best practices and

policies developed by the City of Columbus over more than 20 years of area and neighborhood planning, and it is the city's most up-to-date policies for land use and design. Incorporating urban forestry best practices into updates to these policies can support the UFMP and increase canopy cover across Columbus neighborhoods. Additions could include adding street trees as an element in parking lot screening; incorporating trees in median landscapes; and encouraging tree planting to improve pedestrian experience.

Implementation Notes

How these actions will help meet our goals:
Losses are occurring in Columbus in part from lack of adherence to nationally accepted urban forestry best practices. A manual clarifying expected practices will aid in achieving Goal 2 (no net loss) and Goal 1 (40% canopy) especially.

Resources Needed:
Multi-departmental working group to create the standards and incorporate them into existing directives and plans.

Timeline:
Within the first two years.

Figure 6.6 | High Street Silva Cell Installation
Silva cells were used in the recent High Street Streetscape project. The cells provide structural support for sidewalks and create space for root growth below the sidewalk. ▲

> **Developers recognize how important trees and green spaces are in projects. We are more likely to sell or rent when trees and green spaces are on our properties.**
>
> -Joseph Reidy
> Vice President – Development and Director of Environmental Services, Thrive Companies

Action 10 Institute a Plan to Regularly Measure Progress and Reassess Next Steps

Challenge

This plan included an extensive assessment of the Columbus urban forest as it stands today and as the community today would like to see it. However, as we know, Columbus today will not be the Columbus of five, 10, or 20 years from now. Long-term success requires a level of flexibility and adaptive management.

Action Needed

An adaptive management approach was used as a model to develop the UFMP precisely because it is an approach that factors in changes over time. Adaptive management is based on a learning process (make a plan, implement, reassess, repeat), so it improves the outcomes of long-term strategic planning.

The "reassess" phase must be embedded into the implementation of this plan. This requires regular and scheduled check-ins and reassessments over time. The following regiment of assessing progress in plan implementation is suggested:

> **Strategic planning coupled with disciplined and prioritized budgeting are critical to the success and credibility of local urban forestry programs.**
>
> -Tyler Stevenson
> Urban Forestry Manager, Ohio Department of Natural Resources

Action Item 10.1: Create Annual UFMP Progress Reports

LEAD: City - Columbus Recreation and Parks Department

Each year, consider documenting all activity and progress made to-date and providing this update to the community as a whole. This could be as simple as posting a list of activities completed that year to a website.

Progress Metrics to Utilize.

There are three goals defined in this plan, and success or progress can be shown by progress made toward reaching those goals. Metrics to use could include:

Goal #1: 40% Tree Canopy Citywide

- Changes in citywide canopy coverage from regular assessments

Goal #2: Stopping the Net Losses of Canopy

- Measurement of net growth or loss in canopy over time.
- Progress made in implementing tree protection measures in UFMP (Action Steps 14, 15).

Goal #3: Equitable Canopy Across All Neighborhoods

- Changes in neighborhood level canopy coverage
- Quantity of neighborhoods with a rising canopy cover
- Quantity of higher-need neighborhoods engaged in projects with an urban forestry component.

Action Item 10.2: Reassess Sustainability of Urban Forest Regularly

LEAD: City - Columbus Recreation and Parks Department

Every five years (following the latest canopy assessment update), it is recommended to assess the position and sustainability of the Columbus urban forest using the assessment matrix utilized in this UFMP.

Progress Metrics to Utilize.

There are metrics in tree canopy that require improvement and progress tracking beyond the three goal metrics described in Action Item 10.1 above. The quality of the canopy matters as well (age, species, condition, etc.) as it is a significant determinant in the longevity of the tree canopy, but also in the value to the natural ecosystem as well. How effectively the tree canopy is being cared for is critical, as well as the amount of engagement and involvement of all the players that impact tree canopy over time.

The framework used to evaluate the indicators of a sustainable urban forest in Columbus not only provided a high level picture of current performance, but can also serve as a primary benchmark for measuring broader progress every five years.

For these reasons, progress should also be measured by changes in performance levels of the 28 indicators of an urban forest used in the existing conditions assessment.

It is recommended that both the city and community gather and update this assessment matrix at this time to determine any changes in performance levels.

Action Item 10.3: Update the Full UFMP at Year 20

LEAD: City - Columbus Recreation and Parks Department

At year 20, a full update of the UFMP is recommended, including gatherings and input collection from a community advisory team as well as the broader public to undertake a full assessment and examination of challenges and progress made to date.

Implementation Notes

How these actions will help meet our goals:
Monitoring progress annually and a more in-depth check-in every five years is critical for all three goals. Plans that are constantly reassessed and flexible are more likely to be successful in reaching all goals.

Resources Needed:
Staff time to create annual progress reports. This can be as simple as a two to three page update that is posted to a website each year.

Timeline:
Start the first annual report one year after the plan is adopted and implementation begins.

Action 11 Identify Supplemental Funding Sources

Challenge

The current operating budget of Columbus' Urban Forestry has been based on the city's available resources, but is not sufficient to proactively care for the public tree population while continuing to address resident requests and respond to storm events. This has resulted in a backlog of tree removal and pruning work orders.

An analysis of Columbus' urban forestry budget compared to communities that completed the 2016 Municipal Tree Census found Columbus' per tree spending was 38% lower than the national average (Hauer 2016). Millions in additional funding would be required just to reach the national average.

However, this national funding level may not even be adequate. The Municipal Tree Census found 36% of communities surveyed stated their current budget was inadequate to meet the needs of their urban forestry program—on average 45% below their identified needs. This information further highlights the degree to which Columbus' urban forestry program is underfunded.

> **All Ohio municipalities can collect special assessments for planting, maintaining and removing shade trees in their communities. A number of communities do this, including Cincinnati and Toledo. This would be a great opportunity for Columbus to care for their Urban Forestry program citywide.**
>
> -Lisa Bowers
> Regional Urban Forester, Ohio Department of Natural Resources

Action Needed

Columbus' urban forestry program is financed through two funds: the Recreation and Parks Operations Extension Fund (General Fund) for street tree maintenance, and the Recreation and Parks Capital Improvement budget for street tree planting. Significant additional funding will be required to reach even the average urban forestry spending of US cities. To adequately care for Columbus' urban forest, alternative funding sources should be identified and explored. Options include:

Action Item 11.1 Pursue Passing a Street Tree Assessment

LEAD: City - Columbus Recreation and Parks Department

Authorized through Ohio Revised Code Chapter 727.011 Control (ORC), planting, care and maintenance of shade trees, this assessment is utilized by many Ohio cities. This funding mechanism is not a tax, and does not need to be voted on by the general public. As an assessment, it only needs the approval of a city's elected leadership, and it must be approved each year. The most common method of assessment is charging a fee based on the amount of right-of-way frontage. Amounts in use today in Ohio cities range from $0.19 to $1.16 per foot of right-of-way frontage. Another method allowed by the ORC is to assess for a percentage of property value. It is highly recommended that Columbus begin exploring and evaluating this funding option immediately.

Both Cincinnati and Toledo's urban forestry programs are funded by the special assessment, raising millions for maintenance and care of public trees.

Action Item 11.2: Review Fees and Billing Internally within City

LEAD: City - Columbus Recreation and Parks Department's Urban Forestry Section

Improvement of internal processes within the city also has the potential to generate some revenue that can be used for tree care. This includes instituting review fees and exploring billing between departments.

- Review Fees. Consider fee-based Forestry plan review and inspections for both private and public activities.
- Internal Billing Between Departments. Determine if internal billing is feasible for inspections conducted by Forestry, if costs are not already covered through project coordination.

Action Item 11.3: Pursue Grants Related to Tree Benefits

LEAD: City - Columbus Recreation and Parks Department, in partnership with the Columbus Tree Coalition

The City should continue to explore grant opportunities to fund urban forestry projects. Specifically, begin to explore applying for grants connected to the benefits trees provide, not just to trees themselves — for example, public health and equity. This is potentially an untapped source of funds for the City.

Action Item 11.4: Create a Columbus Tree Fund to Accept Donations and Grants

LEAD: City - Columbus Recreation and Parks Department

A nonprofit fund does not currently receive tree donations for the City. The Columbus Recreation and Parks Foundation can accept donations and grants for urban forestry activities, including but not limited to: planting trees on public land; providing trees to residents and businesses to plant on private land; maintenance of current tree canopy in the City of Columbus; research, planning, or marketing activities determined to be needed in partnership with Columbus Recreation and Parks Department or the Columbus Tree Coalition.

Implementation Notes

How these actions will help meet our goals:
Funding is essential to all three goals. Implementation will depend largely on increased funding and resources.

Resources Needed:
Establishing a street tree assessment would require a significant outreach, potentially a working group. The remaining sub-action items require internal coordination efforts only.

Timeline:
Ability to institute an annual street tree assessment is available to Ohio municipalities. Pursuing this funding should be a priority in implementation as it has the potential to fund a significant portion of the city's operations needs. This work should be started as soon as possible, as it can take multiple years.

Action 12 Expand the Size and Scope of Urban Forestry Leadership

Challenge

Columbus Recreation and Parks Department's Urban Forestry leadership is primarily focused on administering internal operations to plant and maintain public trees, with minimal planning and coordination. Other departments were uncertain who to contact about Forestry matters, leading to breakdowns in communication. This is a significant challenge to maintain and grow a healthy urban forest.

With current capacity devoted to managing internal operations, leadership is unable to coordinate with other departments and guide the City's planning process as a whole, from an urban forestry perspective. Creating capacity for citywide planning and coordination is critical to the implementation of the UFMP and future plans.

Action Needed

Columbus Urban Forestry leadership needs a broader role in planning and implementation citywide. Forestry management positions must be available to coordinate with other organizations and City departments in order to successfully implement long-term plans such as the UFMP. Additional managers are needed to perform these assignments while operational administration continues.

Action Item 12.1: Restructure Forestry Leadership to Ensure UFMP Implementation and Coordination

LEAD: City – Columbus Recreation and Parks Department

Restructuring Forestry leadership is critical to the city's efforts in growing canopy. This would complement the operational work of Urban Forestry by:

- Leading implementation of the UFMP, especially elements involving other entities;
- Providing capacity to complete recommended action steps;
- Developing and improving policies applied beyond internal operations;
- Maintaining clear communication with other entities;
- Partnering more extensively with community groups;
- Facilitating a functional working relationship with all of Columbus Forestry's partners.

Implementation Notes

How these actions will help meet our goals:
This is critical to all three goals and is a potential catalyst to spearhead many Action Steps.

Resources Needed:
Funding for a new staff position.

Timeline:
Restructuring Forestry's leadership will be a significant factor for the effectiveness of plan implementation. Suggested to be put into place within the first two years.

Case Study: Urban Forest Leadership in Other Cities

Similarly, the city of Tallahassee, Florida, also has a city arborist who manages all the operations from the city's Community Beautification Division, as well as an urban forester who works on city-wide initiatives and advocates for canopy from the Planning Department. Having a leadership urban forester role in Planning is essential to ensure the three goals of the UFMP — canopy quality improvement, canopy level improvement and better engagement — are met. While cities have a great deal of control over tree management on their own property, this enables Tallahassee to incorporate policies and programs that achieve goals in private development, too. The urban forester was hired when the city acknowledged that population growth was driving development and tree loss, and they needed a long-term plan and leader to spearhead urban forest preservation.

Charlotte, North Carolina, has two key urban forestry positions. The city arborist manages all the daily operations from the City's Landscape Management Division. A chief urban forester plans city-wide initiatives, partners with the local nonprofit TreesCharlotte, advocates for canopy from the Planning Division, and leads the application/enforcement of development requirements for tree canopy policy. Both are ISA Certified Arborists. The city cited that "having the Chief Urban Forester in the Planning Division is critical for ensuring our urban forestry efforts span across all initiatives and plans within the City."

Many other cities have this type of position, including: Ann Arbor, Michigan; Cincinnati, Ohio; Mountain View, California; and Philadelphia, Pennsylvania, to list a few.

Action 13 Obtain and Maintain Updated Essential Tree Data

Challenge

In order to effectively manage any asset, quality data are essential. There are two data sets that are commonly used to effectively manage urban forests:

Canopy

First, there is the extent of tree canopy in a city, expressed as a percentage of total land covered by trees. This is a broad measurement of tree canopy and is a key benchmark used in all three goals. Measuring progress in stopping losses (Goal 2), canopy equity across neighborhoods (Goal 3) and ultimate canopy goal of 40% (Goal 1) all require quality canopy data. Ongoing assessments of canopy also help identify trends — not just amounts of gains or losses, but where and why those changes are occurring. Industry standard recommends conducting a canopy assessment every five to 10 years, with more frequent assessments recommended if development activities, insect/disease pests or natural causes may have impacted tree canopy cover.

Status of Data: The City of Columbus completed its first-ever urban tree canopy assessment using 2013 aerial imagery. Many stakeholders reported low confidence in this canopy assessment, due to its age and the amount of growth and development since 2013. It is within the age range to be updated, per the industry standard of five to 10 years.

Action Needed: Data must be updated as soon as practicable and budgeted for regular updates every five to 10 years.

Action Item 13.1: Update Canopy Data, Analyze Change

LEAD: City – Columbus Recreation and Parks Department

Planning for an updated canopy assessment should begin now, as it will be used as one of the primary benchmarks for measuring progress of the work that comes out of this plan - both city-wide (Goals 1 and 2) and by neighborhoods - to measure equity (Goal 3) . Not only will a new canopy assessment provide updated canopy cover information, but it will also identify areas and reasons for change in canopy over time, which will be critical in development of policy and code related to trees in Columbus.

Action Item 13.2: Budget and Plan for Regular Canopy Updates

LEAD: City – Columbus Recreation and Parks Department

Additionally, regular updates every five to 10 years should also be budgeted for on an ongoing basis. Consider potential partnerships for regional canopy updates with Franklin County or Mid-Ohio Regional Planning Commission.

City Tree Inventory

Second, there are data on the trees managed by the City — primarily street and park trees. This consists of data on each individual tree, including species, size, condition, etc., which is essential information used to create a plan of work to manage this city asset and a critical foundation for a proactive care program (details in Action Step #8). An inventory also serves as the basis for prioritizing tree care activities and delivering care services efficiently and cost-effectively. The amount of staff, equipment and other resources needed for proactive care can only be determined by an accurate inventory. It is not possible to effectively manage and budget for asset management without this information. Urban forestry best practices call for an updated municipal tree inventory every 10 years, or an inventory that is updated on an ongoing basis (as with a pruning cycle).

Status of Data: Columbus' tree inventory consists of more than 127,000 trees and was completed in 1997. Since then, the entire inventory (every tree) has been converted to a GIS-based system (points on a map instead from records in a table). On an ongoing basis, records are updated to reflect trees planted and removed, but this only accounts for approximately 10% of all the trees on record. Size, condition and maintenance of public trees is critical for planning, but has not been updated en masse.

Action Needed: The public tree inventory should be updated as soon as possible, especially as it has safety implications. This work can be done all at once or in a phased process.

Action Item 13.3: Launch a Pilot Inventory Project

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

As a first step, it is recommended that Columbus conduct a pilot tree inventory in a neighborhood identified as having low canopy cover and high need based on the priority planting analysis.

Action Item 13.4: Update the Existing City Tree Inventory

LEAD: City – Columbus Recreation and Parks Department's Urban Forestry Section

For safety reasons and to manage risk, it may be most prudent to update the entire inventory at one time, as the data for most trees has not been updated in more than 15 years. Future updates could be conducted on a routine basis by re-inventorying specific management zones each year to spread out costs.

Private Trees

While tree canopy assessments provide an indication of where the urban forest covers private property, it does not provide information on individual trees, such as their size, species or health. With most of Columbus' urban forest on private property, understanding the private tree population can help manage pest and disease outbreaks across the entire city.

Status of Data. There are currently no detailed data available for the urban forest located on private property.

Action Needed: This is an opportunity to increase knowledge of the entire urban forest. With this information, Columbus can improve the resiliency and health of the entire urban forest.

Action Item 13.5: Explore Collecting Data on Private Property Trees

LEAD: Columbus Tree Coalition

Explore an i-Tree Eco assessment, where trees on both public and private property are assessed using a sampling method. The methodology, developed by the USDA Forest Service, is an efficient and statistically accurate way to glean important forestry data on both public and private property. It can reveal information on species diversity, tree condition, amount and types of tree benefits, insect and disease threats to the forest, and other valuable information. This information can then be shared with the community and stakeholders to determine plans of action and educational messaging for private property owners.

Implementation Notes

How these actions will help meet our goals:
Working toward all three goals depends heavily on having accurate data on existing conditions.

Resources Needed:
Professional inventories can range from $5 to $8 per tree, and funding for canopy updates are $60,000 to 125,000.

Timeline:
Updating this information should happen within the short term (one to five years).

Action 14 Strengthen Private Tree Protection Policies

Challenge

Columbus has various city ordinances and policies protecting public trees. However, there are virtually no protections for trees on private property, which many peer cities do to maintain a healthy, extensive urban forest. Protecting trees during development of residential and commercial properties is essential to achieve Goal 2: No Net Loss. By updating existing policy, Columbus can reflect the value residents place on trees and preserve both public and private trees for future generations.

Action Needed

The following areas should be explored by the City and working groups, with research done on best practices from other communities. Outreach and public education around these challenges will likely also be needed.

> **It was truly eye opening to see such a strong correlation between denser tree canopy, increased household incomes and positive mental health outcomes. CMHA provides affordable housing options to nearly 33,000 residents in Franklin County, the vast majority of whom live in areas with little canopy coverage. Everyone should be able to enjoy and benefit from trees, regardless of their income. Canopy coverage is truly a social justice issue.**
>
> -Alex Romstedt
> Director of Resident Services, Columbus Metropolitan Housing Authority

Action Item 14.1: Form Working Group; Revise Columbus Tree Regulations

LEAD: City – Columbus Recreation and Parks Department, along with Columbus Department of Building and Zoning Services and Columbus City Attorney's Office

There are multiple areas within Columbus' regulations that should be revised, updated or reworked completely. An ordinance revision process should be undertaken that includes extensive public engagement, which will help determine the type and level of private property tree regulations in Columbus based on the values and needs of the urban forest and the community. Form a working group with representatives from both the city departments and community leaders to revise current tree regulations, including the following:

- Protect Trees During Development. Columbus has virtually no protections for trees during development, meaning new developments are not required to preserve existing trees or replant trees that are removed. A working group should be formed to determine what is feasible for Columbus' community to promote tree canopy in new developments. Tree protection ordinances vary. Some elements to be considered include: requiring a tree protection plan is implemented during development; requiring construction fencing to protect trees; identifying prohibited activities that can damage the tree's roots; incentivizing private tree protection; and determining which areas should be prioritized for preservation, such as forests, trees of a significant size, or an amount of canopy cover across the property.

- Provide Alternatives for Tree Canopy in High Density Projects. The City is experiencing strong development demand in high density areas such as Downtown, pre-1950 neighborhoods and major transit corridors. Many new developments do not have any ground-level open space that is appropriate for tree planting. Alternatives should be provided for adding canopy in these areas while still encouraging the dense development that is being championed through other planning initiatives. These can include options like allowing off-site tree planting in street rights-of-way or in nearby parks to meet on-site tree planting requirements.
- Provide Alternatives for Tree Canopy in Affordable Housing Projects. Housing affordability is a key initiative in the City. To achieve cost efficiencies, affordable housing projects often maximize density on urban sites. Requiring dedicated ground-level open space for trees on these sites may decrease development yield and therefore increase unit cost, having an adverse effect on affordability. Exploration of new policies and options for incorporating both canopy improvement and affordability in these areas is critical.

  Note: An updated tree canopy assessment (see Action Item 12.1) and change analysis can provide a helpful basis for revisions.

- Incentivize Protection on Private Land Beyond Development. Tree protection on privately-held land that is not being developed does not currently exist, and it is very difficult to institute. The following two action items are recommended as a way to incentivize protection without creating a burden or infringement on private property rights.

Action Item 14.2: Develop a Heritage Tree Program

LEAD: Columbus Tree Coalition

Develop a list of heritage/landmark tree species throughout Columbus and provide signage or other marking options that will demonstrate the value in large trees. Landowners with heritage trees often do not recognize the value. With this program in place, this often instills pride and stewardship of these trees, lessening the chance of removals later on.

Action Item 14.3: Explore Options for Tree Maintenance Assistance in Low Income Areas

LEAD: Columbus Tree Coalition

Explore a maintenance assistance program for low-income areas to encourage tree care versus tree removal on private property. Charlotte, North Carolina, launched a Large Tree Assistance pilot program upon the completion of their UFMP to address this need. A promotional video of the pilot program was produced and can be found here: https://youtu.be/Qmd-152uzws.

Implementation Notes

How these actions will help meet our goals:
This work is essential to Goal 2: No Net Loss of tree canopy.

Resources Needed:
Working group, outreach efforts, political will to update policy and code.

Timeline:
This process is lengthy, so it should be at least started in Year 1 if Columbus is to reach a no-net-loss of canopy in 10 years. Stormwater credit program (from Action Step #6) could also be developed in the same working group.

Action 15 Improve Public Tree Ordinance

Challenge

All the trees managed by the City are referenced and protected in City Code, Chapter 912: *Trees and Shrubs; Columbus Tree Subcommission.*

Action Needed

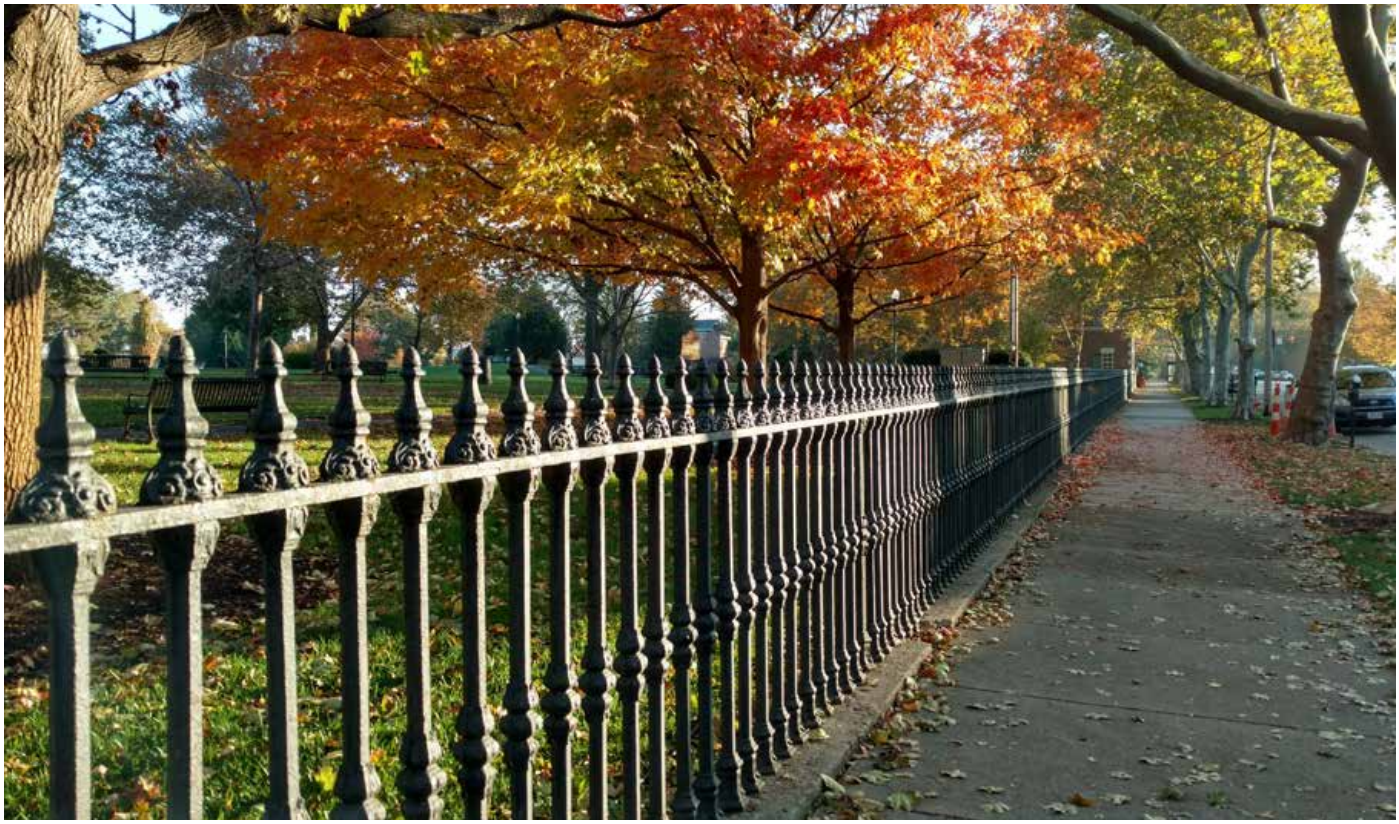
While this code exists, it should be updated and strengthened. The needs of other City assets (e.g. public utilities, streets, sidewalks) are typically prioritized over trees. The code must protect all public trees regardless of the entity which has jurisdiction.

Item 15.1: Form a Working Group to Revise City Code Chapter 912

LEAD: City – Columbus Recreation and Parks Department, in partnership with Building and Zoning Services, Public Utilities, and Public Service

A number of recommendations are listed below to strengthen the protection systems in place for public trees through edits to City Code Chapter 912: Trees and Shrubs; Columbus Tree Subcommission. A working group of city departments can be gathered to rework the existing code, explore the following recommendations:

- Public tree protections should be captured in city code, building on the Executive Order 2015-01 Tree Protection and Mitigation Policy. These should include (but are not limited to):
  1. Require all projects impacting public trees to replace or mitigate those trees
  2. Share data on public tree removals and plantings, for the city's public tree inventory
  3. Increase the mitigation planting requirements
  4. Revise how the fee for tree replacement is calculated
  5. Require ISA certified arborists for public tree work
  6. Require adherence to American National Standards (ANSI) A300 standards and best practices
  7. Prohibit tree topping
- Expand protection of public trees to include all construction, building and digging operations in the right-of-way. Additionally, establish tree protection standards for public trees, including penalties for encroachment into a tree's critical root zone.
- Change the eligibility for use of the "Plant Material Fund" (and change name to "Tree Fund") to allow for funds to be used for all urban forestry planting activities, not just the purchase of plant material. Additionally, streamline the process of assessing, collecting and depositing these funds.



- Make the tree species lists more adaptable by removing them from the code itself (section 912.16 - Prohibited Species) and instead referencing a list on file with the city. For example, the code language could be revised to state "The Recreational and Parks Forestry Section shall maintain a list of prohibited plant species that shall not be planted along public streets and other public property."
- Examine the role the Columbus Tree Subcommission plays, which is currently limited to managing the tree planting list. Consider expanding their role to better communicate and collaborate with the community. This is discussed in Action Step #3. Note that any update to the role of this group will require updates to the Subcommision by-laws as well.

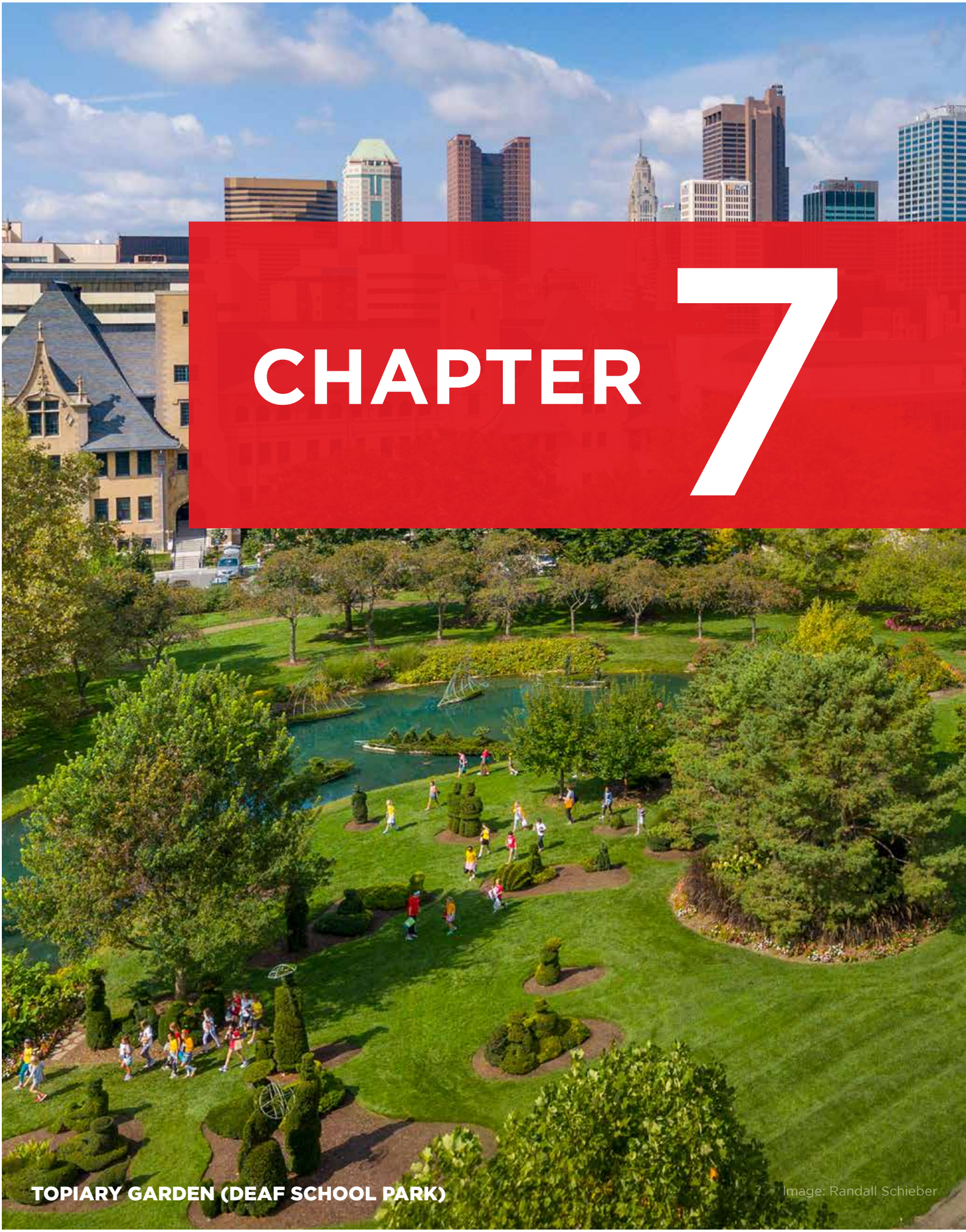
Implementation Notes

How these actions will help meet our goals:
This work is essential to Goal 2: No net loss of tree canopy.

Resources Needed:
Management of a working group to determine what changes should be made to existing public tree protection code.

Timeline:
This should be initiated sooner than later as it has implications for tree preservation, and the process for code amendments is typically lengthy. This action item is suggested for Years 2 or 3.

Figure 6.7 | Town Street and Deaf School Park
This area of Downtown showcases mature public trees along the street and in a public park, creating a beautiful and comfortable environment. ▲



CHAPTER 7

TOPIARY GARDEN (DEAF SCHOOL PARK)

Image: Randall Schieber

IMPLEMENTATION STRATEGY

Through the public engagement process, a clear vision and goals have been defined. Through data analysis and stakeholder input, strategies for action have been recommended.

Now what? Now it's time to make things happen.

Implementation of the 15 Action Steps will require involvement of various city departments and community partners. The following chart suggests responsibility and a timeline for implementing all 15 Action Steps.

COMMUNITY COORDINATION AND COLLABORATION

ACTION ITEMS	LEAD	PARTNERS	TIMELINE
ACTION 1: FORM A TEAM FOR IMPLEMENTATION: THE COLUMBUS TREE COALITION			
Action Item 1.1: Convene a First Gathering	*CRPD*	*UFMP Advisory Group, General Public, CRPD-Urban Forestry*	**Immediate (0-2 Years)**
ACTION 2: CREATE MESSAGING AND EDUCATION FOR USE BY ALL PARTNERS			
Action Item 2.1: Create Messaging Around Trees in Columbus	*Columbus Tree Coalition*	*CRPD*	**Immediate (0-2 Years)**
Action Item 2.2: Target the Message	*Columbus Tree Coalition*	*CRPD*	**Immediate (0-2 Years)**
Action Item 2.3: Get the Message Out	*Columbus Tree Coalition*	*All City Departments*	**Ongoing**
Action Item 2.4: Provide the Public with Access to Tree Expertise	*CRPD-Urban Forestry*	*Columbus Tree Coalition, All City Departments*	**Immediate (0-2 Years)**
ACTION 3: IMPROVE COMMUNICATION AND COLLABORATION			
Action Item 3.1: Establish an Urban Forestry Information Hub Online	*Columbus Tree Coalition*	*CRPD-Urban Forestry*	**Immediate (0-2 Years)**
Action Item 3.2: Consider an Annual Tree Summit	*Columbus Tree Coalition*	*CRPD-Urban Forestry*	**Immediate (0-2 Years)**
Action Item 3.3: Better utilize the Tree Subcommission	*CRPD*	*Columbus Tree Subcommission, CRPD-Urban Forestry, Columbus Tree Coalition*	**Short Term (0-5 Years)**
Action Item 3.4: Revise Internal Systems and Procedures for Better Coordination Between Departments.	*CRPD-Urban Forestry*	*All City Departments*	**Near Term (0-2 Years), Then Revise Every Five Years**
Action Item 3.5: Incorporate Urban Forestry Messaging into Existing Initiatives	*Columbus Tree Coalition*	*CRPD, CRPD-Urban Forestry, All City Departments*	**Immediate (0-2 Years)**

ACTION ITEMS	LEAD	PARTNERS	TIMELINE
ACTION 4: SHARE TREE DATA WITH THE COMMUNITY			
Action Item 4.1: Provide Access to Canopy Data to the Public	*CRPD-Urban Forestry*	*Columbus Tree Coalition*	**Immediate (0-2 Years)**
Action Item 4.2: Provide Access to Public Tree Inventory Data to the Public	*CRPD-Urban Forestry*	*Columbus Tree Coalition*	**Short Term (0-5 Years)**
ACTION 5: ENGAGE, ENCOURAGE AND SUPPORT ACTIVE PARTICIPATION BY VOLUNTEERS AND PARTNER ORGANIZATIONS IN TREE PLANTING AND CARE			
Action Item 5.1: Explore Tree Giveaways for Private Property Planting	*CRPD-Urban Forestry*	*General Public, Columbus Tree Coalition*	**Immediate (0-2 Years)**
Action Item 5.2: Continue Park Tree Planting Volunteer Program	*CRPD-Urban Forestry*	*CRPD, Columbus Tree Coalition*	**Immediate (0-2 Years)**
Action Item 5.3: Continue Partnerships with Environmental Nonprofits	*CRPD*	*CRPD, Columbus Tree Coalition*	**Immediate (0-2 Years)**
Action Item 5.4: Provide Training and Education on Tree Care	*Columbus Tree Coalition*		**Short Term (0-5 Years)**
Action Item 5.5: Create Opportunities to Volunteer at the City Nursery	*Columbus Tree Coalition*	*CRPD-Urban Forestry*	**Short Term (0-5 Years)**
Action Item 5.6: Explore Citizen Tree Data Collection	*CRPD-Urban Forestry*	*CRPD, Columbus Tree Coalition*	**Short Term (0-5 Years)**

Abbreviations and Notations:

CRPD:	Columbus Recreation and Parks Department
MORPC:	Mid-Ohio Regional Planning Commission
All City Departments:	Includes the Mayor's Office, City Council, and all administrative departments
Area Commissions:	Includes all Area Commissions which represent various communities and neighborhoods.
Design Community:	Includes design professionals in private consulting firms and nonprofit entities

BEST PRACTICES

ACTION ITEMS	LEAD	PARTNERS	TIMELINE
ACTION 6: PRIORITIZE TREE PLANTING EFFORTS BASED ON EQUITY			
Action Item 6.1: Determine Areas in Need	*CRPD-Urban Forestry*	*Columbus Tree Coalition*	Immediate (0-2 Years)
Action Item 6.2: Prioritize City Planting Efforts to Correct Inequity	*CRPD-Urban Forestry*		Immediate (0-2 Years)
Action Item 6.3: Take Tree Species Diversity, Invasive Plants, and Future Climate Changes into Consideration in Planting Plans	*Columbus Tree Subcommission*	*CRPD-Urban Forestry*	Short Term (0-5 Years)
Action Item 6.4: Explore Incentivizing Planting Through Residential Stormwater Credit Program	*Dept. of Public Utilities*	*CRPD, CRPD-Urban Forestry*	Short Term (0-5 Years)
Action Item 6.5: Explore Offers of Discounts or Cost Share Programs in Priority Areas	*Columbus Tree Coalition*		Short Term (0-5 Years)
ACTION 7: ENSURING SPACE FOR TREES			
Action Item 7.1: Design Options to Retrofit Small Tree Lawns	*CRPD*	*Design Community Partners*	Immediate (0-2 Years) / Revisit in Long Term (11-20 Years)
Action Item 7.2: Revise Narrow Tree Lawn Planting Strategies	*CRPD-Urban Forestry*		Immediate (0-2 Years)
Action Item 7.3: Explore Tree Plantings in Street Medians	*CRPD*	*Department of Public Service*	Immediate (0-2 Years)
Action Item 7.4: Explore Planting Beyond the Right-of-Way	*CRPD-Urban Forestry*	*Dept. of Public Utilities*	Immediate (0-2 Years)
ACTION 8: TRANSITION TO A PROACTIVE CARE ON PUBLIC TREES			
Action Item 8.1: Fill Existing Vacant Staff Positions	*CRPD-Urban Forestry*		Immediate (0-2 Years)
Action Item 8.2: Obtain Updated Tree Inventory	*CRPD-Urban Forestry*		Short Term (0-5 Years)
Action Item 8.3: Develop a Formal Public Tree Management Plan	*CRPD-Urban Forestry*		Short Term (0-5 Years)
Action Item 8.4: Secure Additional Funding to Implement a City Tree Management Plan	*CRPD*	*CRPD-Urban Forestry*	Short Term (0-5 Years)

ACTION ITEMS	LEAD	PARTNERS	TIMELINE
ACTION 9: CREATE AN URBAN FORESTRY BEST PRACTICES MANUAL			
Action Item 9.1: Form Working Group and Develop Urban Forest Best Practices Manual	*CRPD-Urban Forestry*	*Department of Public Utilities, Dept. of Public Service, Dept. of Development (Planning), Building and Zoning Services, Design Community*	**Immediate (0-2 Years)**
Action Item 9.2: Incorporate Best Management Practices into Other City Plans and Manuals	*Department of Development (Planning)*	*Department of Public Utilities, Department of Public Service, Design Community*	**Immediate (0-2 Years)**
ACTION 10: INSTITUTE PLAN TO REGULARLY MEASURE PROGRESS AND REASSESS NEXT STEPS			
Action Item 10.1: Create Annual UFMP Progress Reports	*CRPD-Urban Forestry*	*Columbus Tree Coalition, General Public*	**Annually**
Action Item 10.2: Reassess Sustainability of Urban Forest Regularly	*CRPD*	*Columbus Tree Coalition, General Public*	**Every 5 Years**
Action Item 10.3: Update the Full UFMP	*CRPD*	*Columbus Tree Coalition, General Public*	**At Year 20**

Abbreviations and Notations:

CRPD:	Columbus Recreation and Parks Department
MORPC:	Mid-Ohio Regional Planning Commission
All City Departments:	Includes the Mayor's Office, City Council, and all administrative departments
Area Commissions:	Includes all Area Commissions which represent various communities and neighborhoods.
Design Community:	Includes design professionals in private consulting firms and nonprofit entities

DEDICATION OF RESOURCES AND STRONGER POLICIES

ACTION ITEMS	LEAD	PARTNERS	TIMELINE
ACTION 11: IDENTIFY SUPPLEMENTAL FUNDING SOURCES			
Action Item 11.1: Pursue Passing a Street Tree Assessment (collected from the Property Tax Bill)	*CRPD*		**Immediate (0-2 Years)**
Action Item 11.2: Review Fees and Billing Internally within City	*CRPD-Urban Forestry*	*All City Departments*	**Immediate (0-2 Years)**
Action Item 11.3: Pursue Grants Related to Tree Benefits	*CRPD*	*Department of Public Health, Columbus Tree Coalition, CRPD-Urban Forestry*	**Immediate (0-2 Years)**
Action Item 11.4: Create a Columbus Tree Fund	*CRPD*	*CRPD-Urban Forestry*	**Immediate (0-2 Years)**
ACTION 12: EXPAND THE SIZE AND SCOPE OF URBAN FORESTRY LEADERSHIP			
Action Item 12.1: Restructure Forestry Leadership to Ensure UFMP Implementation and Coordination	*CRPD*		**Immediate (0-2 Years)**
ACTION 13: OBTAIN AND MAINTAIN UPDATED ESSENTIAL TREE DATA			
Action Item 13.1: Update Canopy Data, Analyze Change	*CRPD*	*CRPD-Urban Forestry*	**Immediate (0-2 Years), then Every 5 Years**
Action Item 13.2: Budget and Plan for Regular Canopy Updates	*CRPD*	*Franklin County, CRPD-Urban Forestry, MORPC*	**Immediate (0-2 Years)**
Action Item 13.3: Launch a Pilot Inventory Project	*CRPD-Urban Forestry*	*Columbus Area Commissions*	**Immediate (0-2 Years)**
Action Item 13.4: Update the Existing City Tree Inventory	*CRPD-Urban Forestry*	*CRPD*	**Short Term (0-5 Years)**
Action Item 13.5: Explore Collecting Data on Private Property Trees	*Columbus Tree Coalition*	*CRPD-Urban Forestry*	**Short Term (0-5 Years)**

ACTION ITEMS	LEAD	PARTNERS	TIMELINE
ACTION 14: STRENGTHEN PRIVATE TREE PROTECTION POLICIES ON PRIVATE PROPERTY IN COLUMBUS			
Action Item 14.1: Form Working Group; Revise Columbus Tree Regulations	*Department of Development (Planning)*	*Department of Public Utilities, CRPD, CRPD-Urban Forestry, Building and Zoning Services, Design Community*	**Immediate (0-2 Years)**
Action Item 14.2: Develop a Heritage Tree Program	*Columbus Tree Coalition*	*CRPD-Urban Forestry*	**Immediate (0-2 Years)**
Action Item 14.3: Explore Options for Tree Maintenance Assistance in Low Income Areas	*Columbus Tree Coalition*		**Short Term (0-5 Years)**
ACTION 15: IMPROVE PUBLIC TREE PROTECTION ORDINANCE			
Action Item 15.1: Form a Working Group to Revise City Code Chapter 912	*Department of Development (Planning)*	*Department of Public Utilities, CRPD, CRPD-Urban Forestry, Building and Zoning Services*	**Immediate (0-2 Years)**

Abbreviations and Notations:

CRPD:	Columbus Recreation and Parks Department
MORPC:	Mid-Ohio Regional Planning Commission
All City Departments:	Includes the Mayor's Office, City Council, and all administrative departments
Area Commissions:	Includes all Area Commissions which represent various communities and neighborhoods.
Design Community:	Includes design professionals in private consulting firms and nonprofit entities

APPENDICES

GOODALE PARK

Image: Randall Schieber

SUPPLEMENTAL INFORMATION

SOCIAL EQUITY ANALYSIS METHODOLOGY

Analysis Methodology

An analysis of the 2013 Columbus tree canopy cover data was conducted to see how it related to a variety of economic, demographic, health and crime factors in Columbus. The factors were selected by the Urban Forestry Master Plan Project Team, made up of representatives from City departments, outside agencies and local nonprofit and environmental groups, based on research that correlated tree canopy with improvements in the factors. While some of these factors are correlated with tree canopy cover, correlation does not necessarily equal causation.

- Asthma prevalence
- Chronic Obstructive Pulmonary Disease (COPD)
- Mental Health
- Non-White Populations
- High School Graduation Rate
- Median Household Income
- Family Poverty
- Property Crime
- Violent Crime

The data from these factors were combined to create a composite social equity index (0=low need, 4 high need) for each Columbus community. The community equity index scores were mapped along with tree canopy cover data to identify the communities with the highest need for tree canopy cover and the benefits it provides based on the social equity index. The results of the analysis helps Columbus understand how the inequitable distribution in tree canopy cover impacts neighborhoods and provides a tool to help address it.

Map 4.3 highlights the neighborhoods that would most benefit from tree planting and care based on the social equity analysis. The map displays both the tree canopy cover (y-axis) and the composite social equity index (x-axis). The areas of interest for Columbus are the pink and purple shaded areas which have medium to high need on the composite social equity index and low to medium tree canopy cover.

Just as canopy cover varies across the city, it also varies within Columbus communities. There may be high priority and low priority areas within the same neighborhood, as seen on the map in the HIlltop, Franklinton and Northland neighborhoods. Focusing on increasing canopy cover on the high priority areas of a neighborhood, instead of the entire neighborhood, can maximize resources and allow more high priority neighborhood areas across the city to be addressed.

The social equity analysis was part of a larger prioritized planting analysis (see sidebar Prioritized Planting and Tree Placement Analysis) that also included urban heat island and stormwater factors.

Priority		Columbus Community (Neighborhood)	Tree Canopy Cover	Social Equity Index
Social Equity Score > 3.0 (Sorted by Social Equity Score - highest to lowest)	**Highest Priority**	Milo-Grogan	16%	3.9
		South Linden	21%	3.9
		Franklinton	15%	3.3
		Livingston Avenue Area	22%	3.3
		North Central	25%	3.2
		East Columbus	21%	3.1
		Near East	24%	3.0
		North Linden	28%	3.0
Social Equity Score 2.0 - 2.9 (Sorted by Social Equity Score - highest to lowest)	**High Priority**	South Side	18%	2.9
		Greater Hilltop	23%	2.9
		Northeast	31%	2.9
		Southwest	18%	2.8
		Mid East	28%	2.8
		South East	15%	2.6
		Far South	19%	2.4
		Downtown	9%	2.2
		Italian Village	11%	2.2
		Northland	25%	2.2
		University District	22%	2.0
Social Equity Score 1.0-1.9 (Sorted by Social Equity Score - highest to lowest)	**Moderate Priority**	Westland	13%	1.8
		Far East	25%	1.8
		Fifth by Northwest	14%	1.0
		Harrison West	16%	1.0
		Far West	12%	1.0
		Far North	20%	1.1
		German Village	20%	1.1
		Olentangy West	22%	1.1
		Northwest	24%	1.1
Social Equity Score 0.0 - 0.9 (Sorted by Social Equity Score - highest to lowest)	**Lower Priority**	Brewery District	14%	0.9
		West Scioto	21%	0.9
		Rocky Fork-Blacklick	29%	0.9
		Victorian Village	23%	0.8
		Hayden Run	13%	0.7
		Clintonville	41%	0.7
		Far Northwest	30%	0.6

Notes:

1. Some areas of Columbus have been defined as a 'Columbus Community', but do not have significant residential population and are not considered to be a 'neighborhood'. For that reason, this table excludes John Glenn Columbus International Airport, Dublin Road Corridor, Fort Hayes, Harmon Road Corridor, State of Ohio and Wolfe Park. See Appendix B for more information.
2. The neighborhoods are listed by their social equity score. This is one tool for prioritizing investments.

Appendix B

COLUMBUS COMMUNITIES' POPULATION ANALYSIS

A population density analysis was conducted on the 41 Columbus Communities boundaries. The 2019 population was apportioned by block groups to the communities, and then populations were calculated by square mile. Six communities had population density one or more standard deviation less than the mean population density:

1. Airport
2. Dublin Road Corridor
3. Fort Hayes
4. Harmon Road Corridor
5. State of Ohio
6. Wolfe Park

These "communities" are land used for largely non-residential purposes, such as the John Glenn International Airport, industrial corridors, educational land, state land, and City of Columbus Wolfe Park. While canopy coverage varies 7 to 49% when including all community boundaries in Columbus, for the purposes of this master plan we focused on the 35 communities with more normal population densities. Those communities, which we refer to as neighborhoods for clarity, varied 9 to 41% in tree canopy cover.

PRIORITIZED PLANTING METHODOLOGY

Planting Tree Tool

A prioritized tree planting and tree placement tool was developed as part of this master planning project to assist Columbus in planting trees where they are needed most. The layer provides a robust, dynamic tool for the City and community partners to develop planting plans based on specific community priorities.

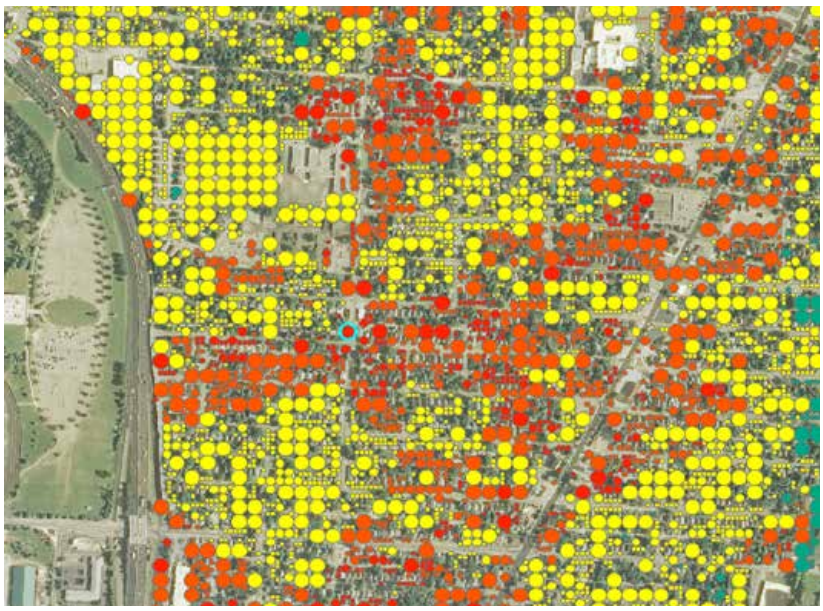
To develop the prioritized planting and tree placement, layer information from the social equity analysis along with urban heat island and stormwater data was used (Map 4.4). Potential planting sites were created in GIS (geographic information system) and assigned the following attributes:

- Tree Size Class (small, medium or large) based on available growing space
- Location (Private or Right-of-Way)
- Restriction (non-feasible planting locations)
- Stormwater Priority (Very Low, Low, Moderate, High, Very High)
- Heat Island Priority (Very Low, Low, Moderate, High, Very High)
- Equity Index Priority (Very Low, Low, Moderate, High, Very High)
- Priority for each social equity, health, demographic factor (Very Low, Low, Moderate, High, Very High)
- Composite Priority Ranking of all factors (Very Low, Low, Moderate, High, Very High)

Potential Tree Planting Sites

Over 600,000 potential tree planting sites were identified in Columbus - with over 65% of those sites on private property. Sites were identified using aerial imagery and the spacing between trees was based on planting in a landscape setting. Not all sites identified will be suitable for tree planting; the City and its partners can use this data as a starting point to identify areas for tree planting and field check the sites for tree planting suitability.

Columbus Prioritized Planting and Tree Placement GIS Layer



Very High Priority Planting Site

High Priority Planting Site

Moderate Priority Planting Site

Low Priority Planting Site

Very Low Priority Planting Site

Note: The size of the circle corresponds to the size of the tree that is appropriate for that specific site.

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