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A MESSAGE FROM TEXAS TREES FOUNDATION

As the oldest and longest-running Tree City USA in Texas, the City of Fort Worth has a long history of advocacy for its urban forest. In the tradition of stewardship of this green infrastructure they have taken the next step, through a partnership with the Texas Trees Foundation, to advance their commitment with the new City of Fort Worth Urban Forest Master Plan.

The Fort Worth Urban Forest Master Plan creates a shared vision and is a roadmap for urban forest managers to preserve, manage, and grow the City's forest resources more effectively and equitably. When properly managed, urban trees provide a myriad of benefits, including stormwater mitigation, heat reduction, better air quality, and improved health, wellness, and quality of life for everyone. This comprehensive master plan is essential to ensure the tree resource is available to meet current and future needs of Fort Worth residents and visitors.

While many people appreciate the aesthetic value of trees, research has shown that the benefits trees provide make them necessities rather than niceties.

We commend the City of Fort Worth for their continued commitment to making their city greener, cleaner, healthier, and cooler by investing in their urban tree canopy, and are appreciative and grateful to those that helped support this effort.

Janette Monear

President/CEO, Texas Trees Foundation

A MESSAGE FROM
THE CITY OF FORT WORTH

Fort Worth is the fastest-growing city in America and is also currently half-developed. We have an opportunity, responsibility, and urgency right now to protect natural areas and plan for generations to come. Leaving this city better than we found it starts now, and the Urban Forest Master Plan is a vital piece of that effort.

The Urban Forest Master Plan also builds onto our history. Fort Worth has long shown its commitment to maintaining our green infrastructure, from being the oldest and longest-running Tree City USA in Texas since 1978, to the designation of a wildlife sanctuary in 1964 that later became the Fort Worth Nature Center & Refuge, to the launch of the Good Natured Fort Worth Green Space Initiative that I introduced just this year.

The creation of a Fort Worth Urban Forest Master Plan builds on this important work and will inform our next steps in implementing the protection of our natural landscape and urban canopy for residents today and far into the future.

Mayor Mattie Parker
City of Fort Worth

TABLE OF
CONTENTS

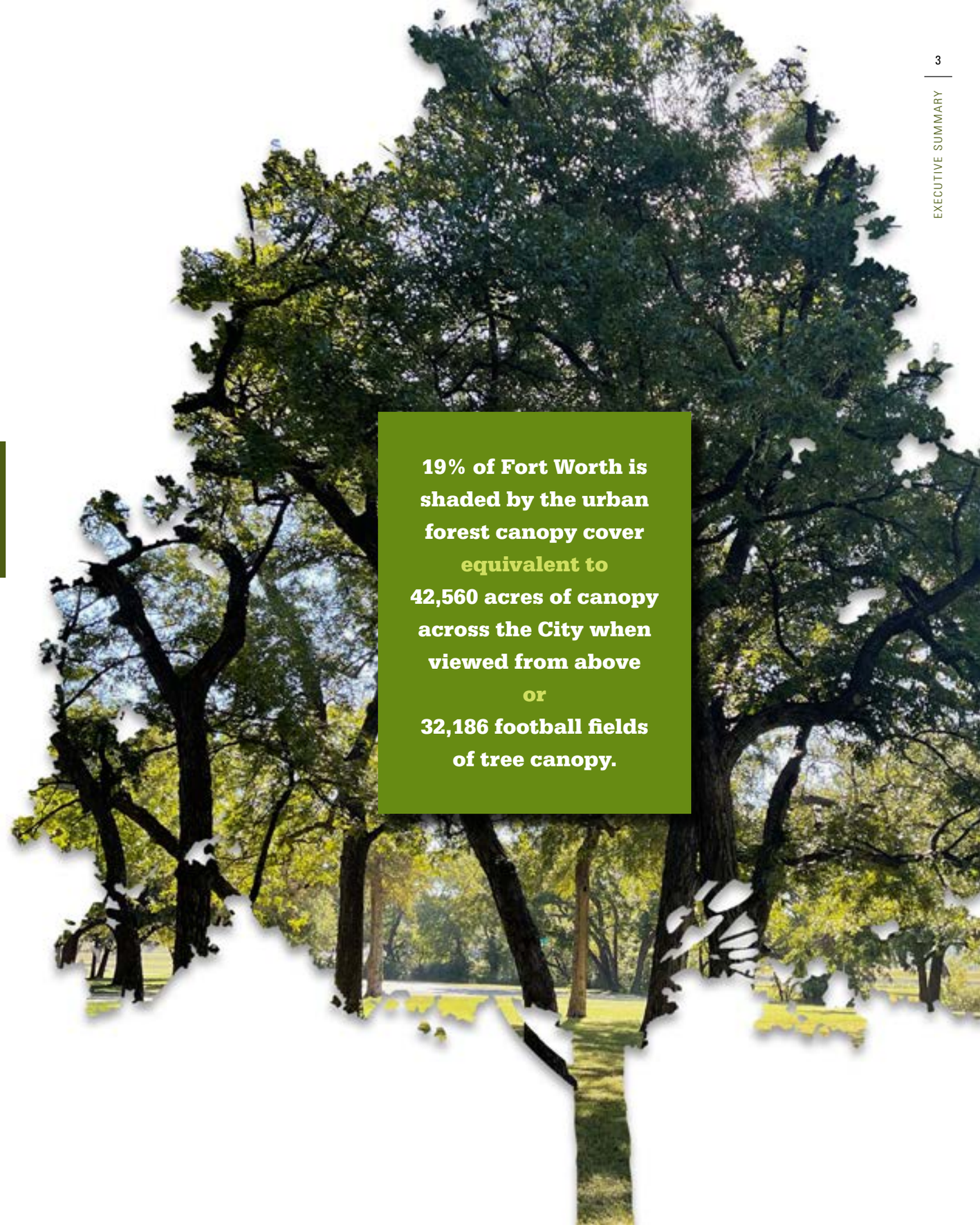
EXECUTIVE SUMMARY

Summer in North Texas can be unbearably hot, with daytime air temperatures in August frequently hovering around 105 degrees. Unshaded concrete can be 50 degrees hotter than the recorded air temperature. The air temperature combined with the radiant heat from the pavement creates an environment that is not only uncomfortable, but it also poses health risks for people and animals. Future climate predictions indicate that inhospitable summer temperatures are expected to continue, but there are ways to beat the heat and make time spent outdoors more enjoyable. A city's trees (collectively known as the urban forest) provide much-needed shade and are the most effective mechanism to cool urban areas and make them more livable.

Why Fort Worth's Urban Forest Matters

In addition to providing relief from summer heat, trees provide urban areas with multiple other essential benefits. They reduce flooding and erosion by capturing rainfall and decreasing stormwater runoff. Trees also help clean the air by removing contaminants and particulate matter. Along roadways, trees improve safety by calming traffic and providing a barrier between pedestrians and automobiles. Additionally, trees make commercial areas more attractive to shoppers, diners and other visitors and provide food and shelter for birds, pollinators, and other wildlife.

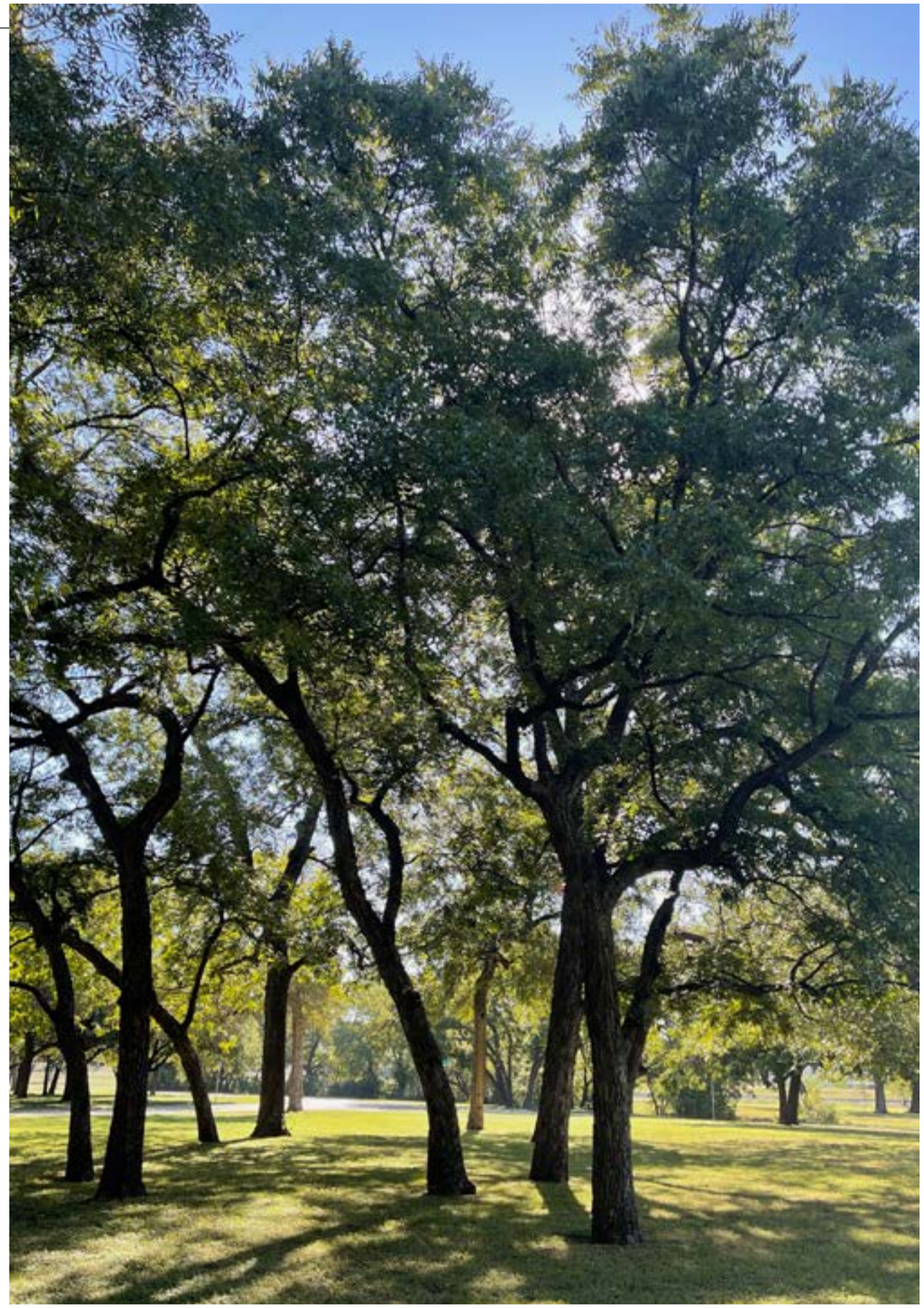
The urban forest is a key component of Fort Worth's infrastructure. However, unlike roads or utilities, which are depreciating assets, the value of a well-managed urban forest increases over time. Investing in the urban forest is one of the most cost-effective ways a city can improve the quality of life and benefit economically.



19% of Fort Worth is shaded by the urban forest canopy cover equivalent to 42,560 acres of canopy across the City when viewed from above or 32,186 football fields of tree canopy.

Fort Worth Values its Trees

Trees are important in Fort Worth. The City operates its own tree farm and has maintained Tree City USA designation since 1978. Trees are preserved and planted in approximately 300 parks and public spaces across the City, including a 3600-acre nature preserve in northwest Fort Worth. The City has established an Open Space Conservation Program, adopted a greenspace initiative, and implemented City ordinances designed to protect and grow the urban forest. However, additional measures are needed to address the challenges currently facing the city's trees.



The Fort Worth Urban Forest Master Plan (UFMP) presents an opportunity for the City to build on its history of prioritizing the urban forest. Implementing this plan supports the Tree City USA program objectives and Fort Worth's vision to become the most livable city in Texas.

Fort Worth's Legacy : Making Trees a Priority

Fort Worth is a recognized leader in urban forestry as the oldest and longest-running Tree City USA city in Texas. The City achieved this designation in 1978, just two years after the Arbor Day Foundation launched the program.

As a Tree City USA city, Fort Worth maintains:

- A municipal department overseeing community tree management
- A public tree ordinance regulating planting, maintenance and removals
- A tree program budget of at least $2 per capita
- An Arbor Day observance and proclamation

TREE CITY USA

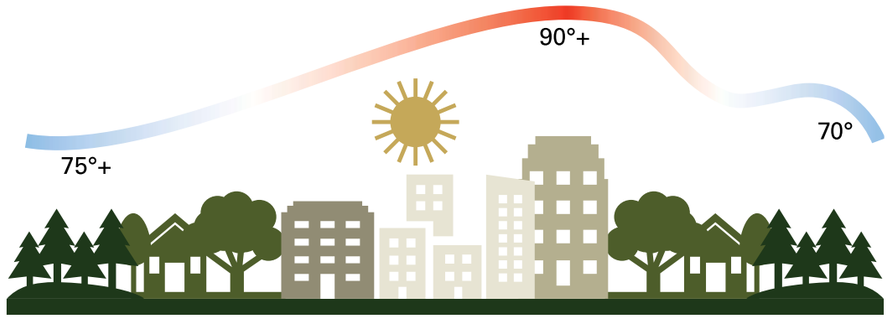


Figure 1. Illustration of the higher temperatures that occur in densely developed portions of cities.

Challenges Facing Fort Worth's Urban Forest

Urban forests across the country face common stressors including urban heat, poor air quality, soil limitations, weather extremes, pressure from development, and invasive plants, pests, and diseases. These challenges are often intensified by conflicting priorities and a shortage of resources. As the 13th largest and one of the fastest growing cities in the country, Fort Worth is feeling the impact on its trees.

Like many cities, the tree canopy cover in Fort Worth is not equitably distributed across the City. As a result, some neighborhoods experience higher surface and ambient temperatures, poorer air quality, and more frequent flooding than neighborhoods with greater tree canopy cover. Additionally, the lack of access to trees and greenspace impacts residents' physical and mental health, sense of community, and overall well-being.

In the face of rising temperatures and ongoing development, preservation and planting of healthy trees on public and private land is essential to maintaining and enhancing quality of life. A unified strategy is needed to ensure protection of mature trees and wooded areas, maintenance of existing trees, and equitable planting of new trees for the future. Additionally, Fort Worth has a unique opportunity to protect portions of native Cross Timbers Forest located on the east and west sides of the City. Protection of this critical habitat will further bolster the City's efforts to promote biodiversity and enhance the local native tree population.

A Plan For Action: An Integrated Approach

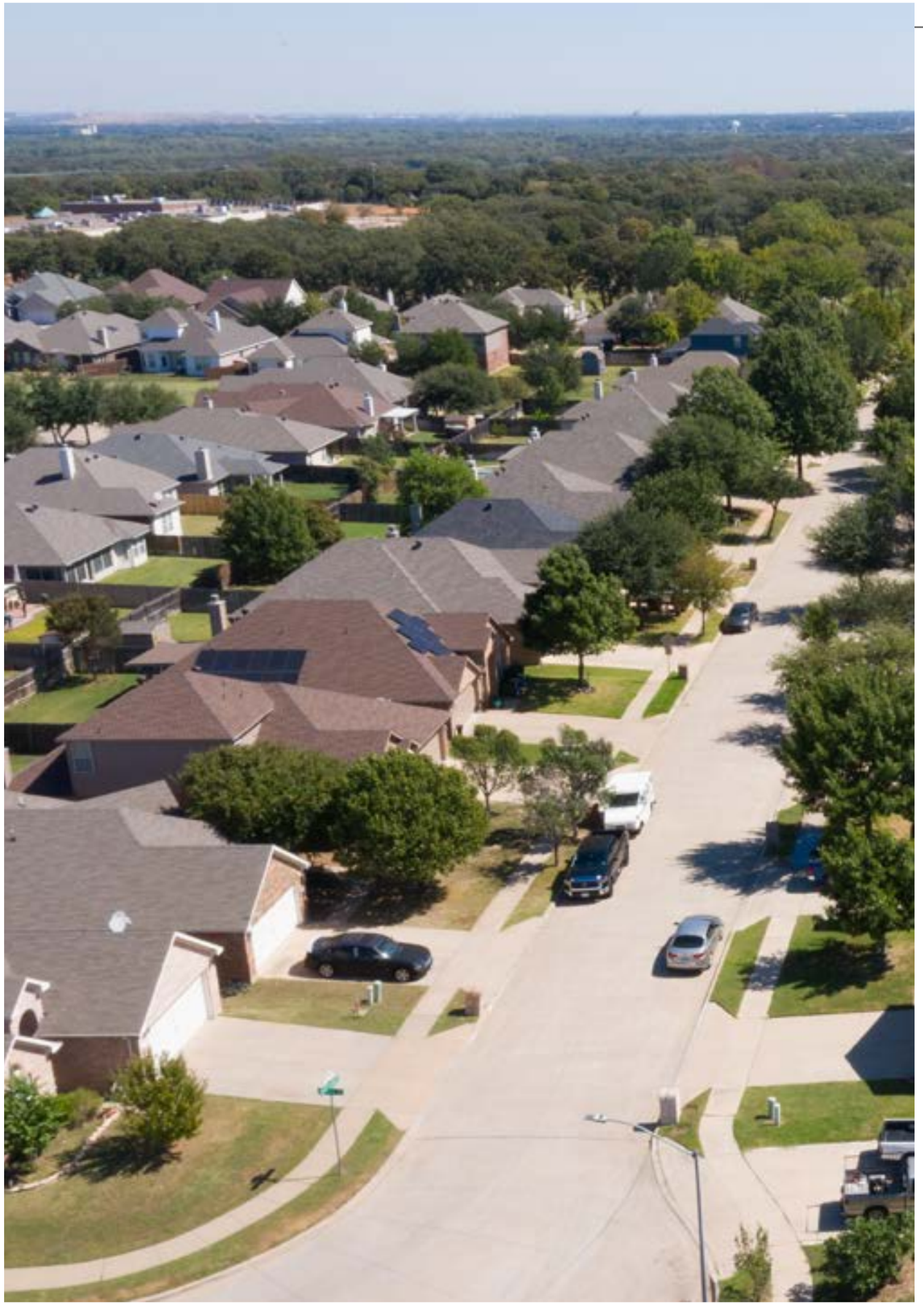
The UFMP complements existing City and regional planning efforts such as the Fort Worth Comprehensive Plan, the Trinity River Strategic Master Plan, and the Fort Worth Open Space Conservation Program. The UFMP aligns with Fort Worth's vision of becoming the most livable city in Texas and builds on the remarkable legacy of being the oldest and longest running Tree City USA community in Texas.

Community involvement has been key to development of the UFMP and establishing the Plan's priorities. A diverse group of residents, City staff, and community stakeholders provided perspectives on the most important issues faced by the urban forest. Collectively, this group prioritized preserving existing trees and incorporating healthy, drought-resistant trees into the City's built environment, particularly in underserved areas. The recommendations and strategies included in the UFMP reflect these values and priorities. The plan will coordinate roles and responsibilities to effectively manage the urban forest and provide maximum long-term benefits to the people who live and work in Fort Worth.

Fort Worth's Urban Forest Master Plan addresses important social, environmental, and economic issues. It is designed to enhance public health, reduce urban heat, improve air quality, provide economic benefits, increase public safety, conserve energy, and manage stormwater more effectively. The ten recommendations and proposed action steps were designed to guide the City in managing, growing, strengthening, and preserving its urban forest.

Greenspace is Key to the Quality of Life in Urban Areas

The Urban Forest Master Plan complements Fort Worth's Open Space Conservation Program (OSCP) in bringing the benefits of nature and greenspace to the City. The OSCP acquires land containing existing waterways, forests, woodlands, and prairies, protecting it for current and future generations. The UFMP focuses on tree preservation and planting within portions of the City that are currently developed or proposed for development. These programs work together to make Fort Worth cleaner, greener, cooler, and healthier.



Fort Worth's Urban Forest Master Plan Goals

Fort Worth's long-range, visionary plan includes an ambitious but achievable goal to increase the city's canopy coverage from 19% to 30% by 2050. This correlates to approximately 76,200 trees planted each year, in addition to replacement of trees lost to development, pests, or other causes.

Alongside tree planting, tree preservation is critical to meeting the City's canopy goal. Parks, open space, and other undeveloped lands represent approximately half of the land area of the City and and its extra-territorial jurisdiction (ETJ)* – an incredible asset in a major American city. However, Fort Worth loses 2,500 acres of open space to development each year. Thoughtful, balanced development policies are necessary to support smart growth while retaining the city's natural heritage.

Success hinges on the commitment and cooperation of City departments, private landowners and developers, and the broader community to a shared vision for a cool, green, and healthy Fort Worth.

The UFMP will help Fort Worth to manage its urban forest so that it is sustainable, resiliant, and equitably distributed across the City. Definitions of these terms and the role of the UFMP are detailed in Figure 2.

* The ETJ is an area outside the City limits where the City has some regulatory authority and the ability to annex land.

Urban Forest Objectives and Role of UFMP

Equitable
Fair and inclusive access to tree benefits that strives to eliminate racial, ethnic, and income disparities

Sustainable
A condition under which humans and nature can exist in productive harmony to support present and future generations (EPA)

Resilient
A "resilient" urban forest refers to one that can thrive in the face of change

The Urban Forest Master Plan Will Help Fort Worth to:

- **Plan** for a sustainable and resilient urban forest by developing strategies and policies that align with internationally-established best management practices.
- **Manage** tree maintenance, care, and tree planting activities more effectively by improving data, technology, communication, decision-making, and collaboration.
- **Protect** the urban forest and maximize the benefits it provides by ensuring systems are in place to support its long-term growth, preservation, and care.
- **Grow** the urban forest in an equitable and sustainable manner to ensure that Fort Worth residents have access to trees and the benefits they provide.
- **Engage** and connect with the community about the important role that they play in the growth, preservation, and care of Fort Worth's trees.

Figure 2. Urban forest objectives and role of the UFMP

Fort Worth Urban Forest Master Plan Goals

1

Continue to manage the urban forest as an asset using industry standards and best practices and adequate resources for sustainable management.

2

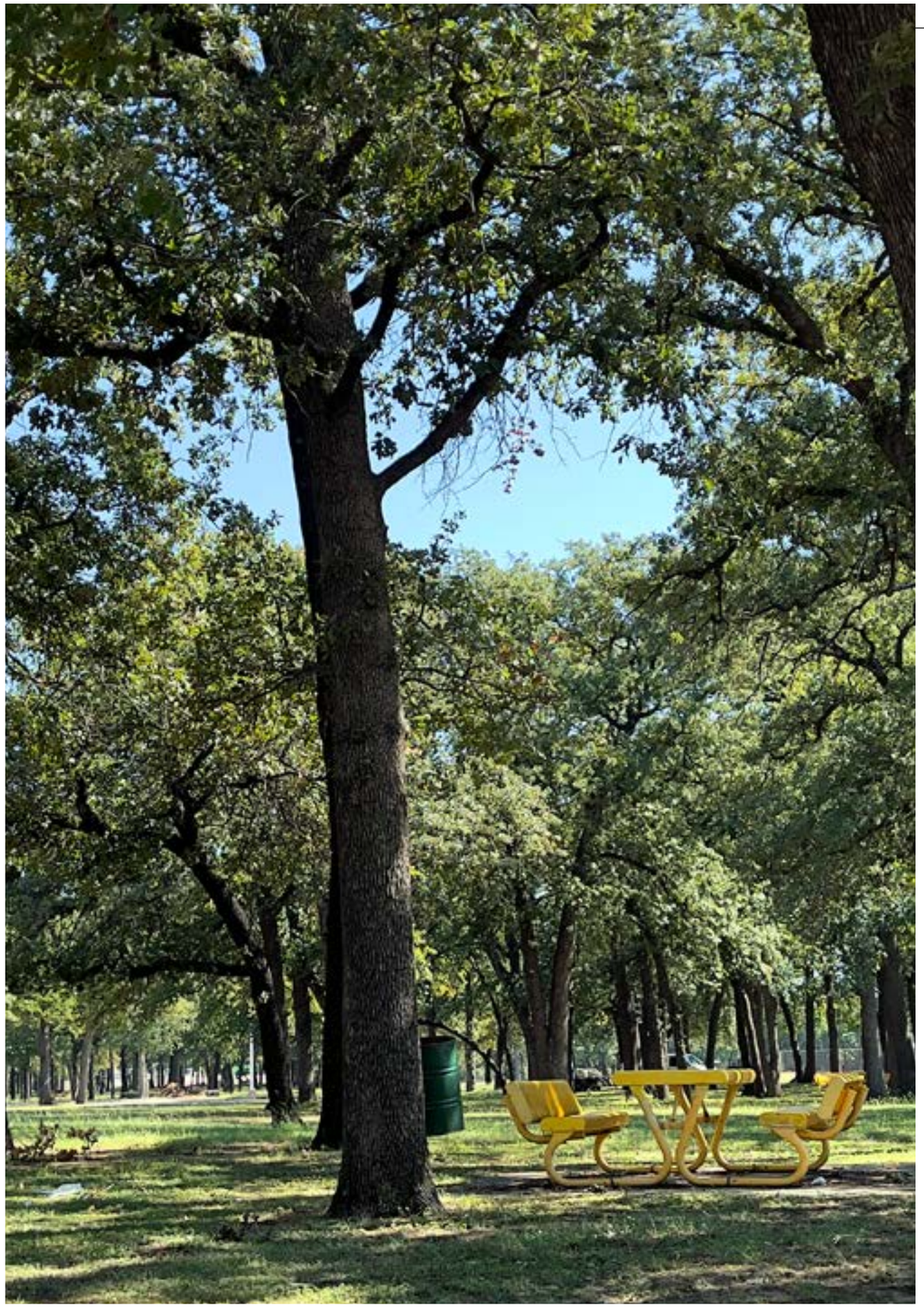
Preserve and expand the urban forest to address tree equity, resiliency, urban heat, air quality, human health, and other challenges facing Fort Worth.

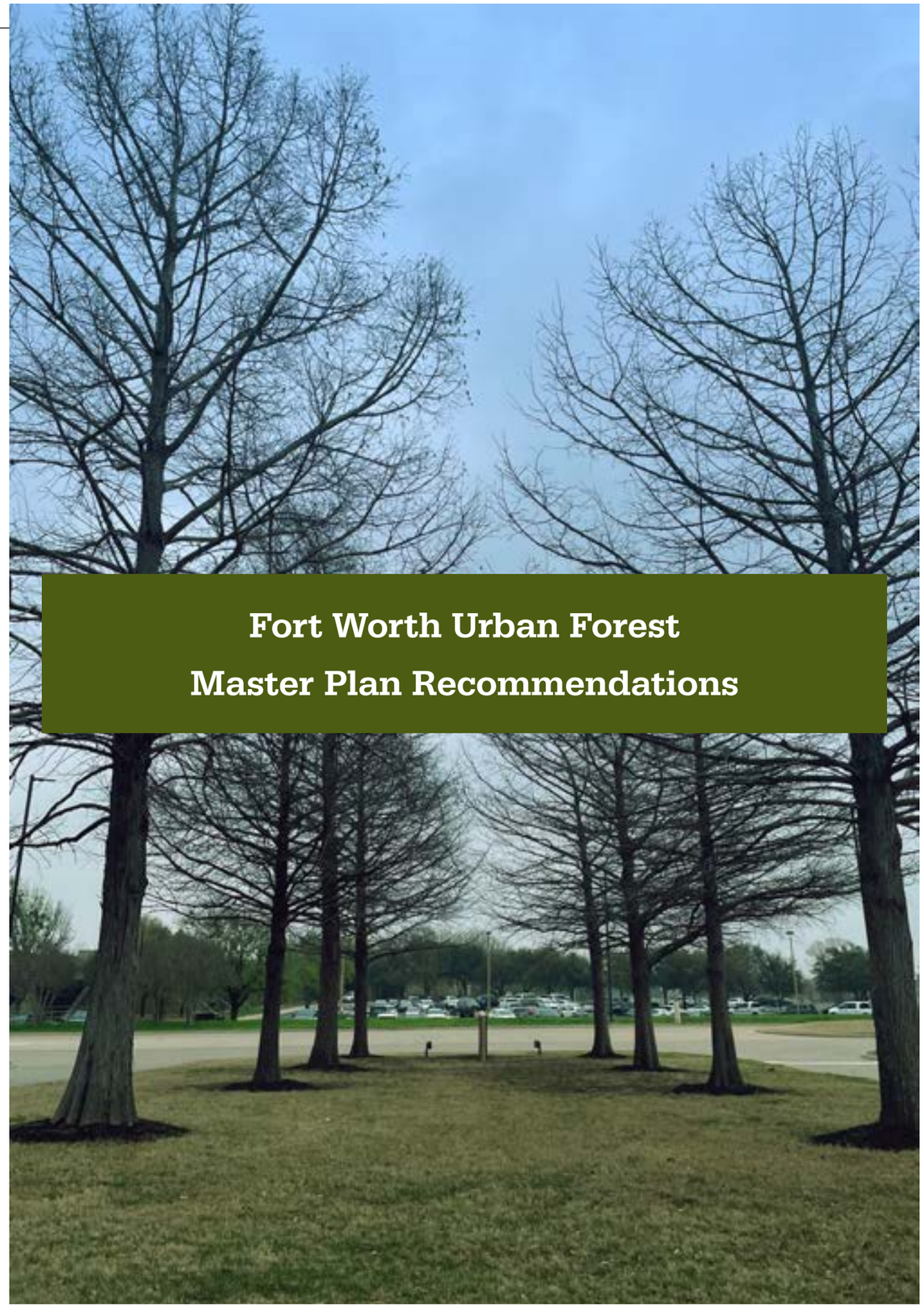
3

Strengthen urban forest programs through coordination, integration, professionalism, and funding to meet the needs of a growing city and urban forest.

4

Invigorate equitable engagement for a community-wide commitment to care for and grow Fort Worth's urban forest.





Fort Worth Urban Forest Master Plan Recommendations

1

Conduct a comprehensive inventory of public trees in rights-of-way, parks, and other public property. Understanding the composition of Fort Worth's urban forest is key to proactive management. The City needs a more current inventory, as the most recent data available is from 2011.

2

Develop and implement changes to tree regulations, standards, and best practices to support Fort Worth's tree canopy and sustainability goals. Fort Worth's Urban Forestry Ordinance has not been updated since 2009. City staff and community stakeholders have expressed the need to revise the ordinance to better meet the needs of a fast-growing city and protect mature trees in the Cross Timbers Forest.

3

Expand and strengthen cooperation among departments to ensure adequate staffing, training, and integration of urban forest considerations into City plans, programs, and policies. Improved coordination will help to address staffing deficits in the short-term and provide long-term support and buy-in for urban forest goals.

4

Strengthen existing relationships and support new partnerships with neighborhoods and community organizations throughout the City. Broadbased community support and involvement are essential to achieving equitable distribution of tree canopy to improve the quality of life in Fort Worth.

5

Coordinate, create, and implement a public communication, education, and engagement plan focused on Fort Worth's urban forest. An effective public communications program will keep the community informed and encourage Fort Worth residents and businesses to participate in reaching canopy cover goals.

6

Develop and implement a strategy to maintain sustainable funding and resources to achieve desired levels of service for urban forest programs and management. Increased funding is essential to advance each of the other recommendations and to support the City's efforts to grow its urban forest by 76,200 trees annually.

7

Support and expand plans for maintenance, risk management, and resiliency of public trees. For many people, public trees may be the only source of shade and greenspace within walking distance.

8

Create plans for tree planting, preservation, and maintenance to grow a resilient and equitable urban forest with 30% canopy cover. Fort Worth's current tree canopy coverage is approximately 19%. This plan provides a strategy to achieve 30% tree canopy by 2050.

9

Develop protocols for monitoring the urban forest to identify and address pests and other threats throughout the City. Early detection of forest challenges, such as pests and diseases, will allow Fort Worth to take action to minimize damage to the urban forest.

10

Strengthen, expand, and increase awareness of programs and strategies that utilize or repurpose urban wood waste generated from public tree operations. Wood utilization programs keep wood debris out of landfills while meeting the needs of local residents, businesses, and other organizations.

SECTION 1

INTRODUCTION

In 2022, the Texas Trees Foundation and the City of Fort Worth committed to developing the City's Urban Forest Master Plan (UFMP). The UFMP provides a shared vision and framework for growing and managing a sustainable and equitable urban forest.

While nature may seem far from the urban environment, the trees across Fort Worth contribute valuable benefits to the urban ecosystem. Research increasingly shows the significant impact trees have on the lives of City residents. Fort Worth's urban forest improves air and water quality, cools the environment, lowers energy costs, and supports biodiversity and wildlife habitat. A healthy urban forest also supports human health and well-being, offering intangible benefits like stress reduction and opportunities for active lifestyles and social connections.

Purpose of an Urban Forest Master Plan

Caring for and prioritizing the urban forest is an important part of maintaining a sustainable and vibrant city. However, urban forest management must also support other goals, including economic development, transportation, urban design, and the goals of property owners.

The Fort Worth Urban Forest Master Plan serves as a guide to proactively manage, care for, protect, and expand the City's tree canopy while navigating these competing pressures.

The Planning Process

The development of the Fort Worth Urban Forest Master Plan was based on answering four key questions:

1
What Do We Have?

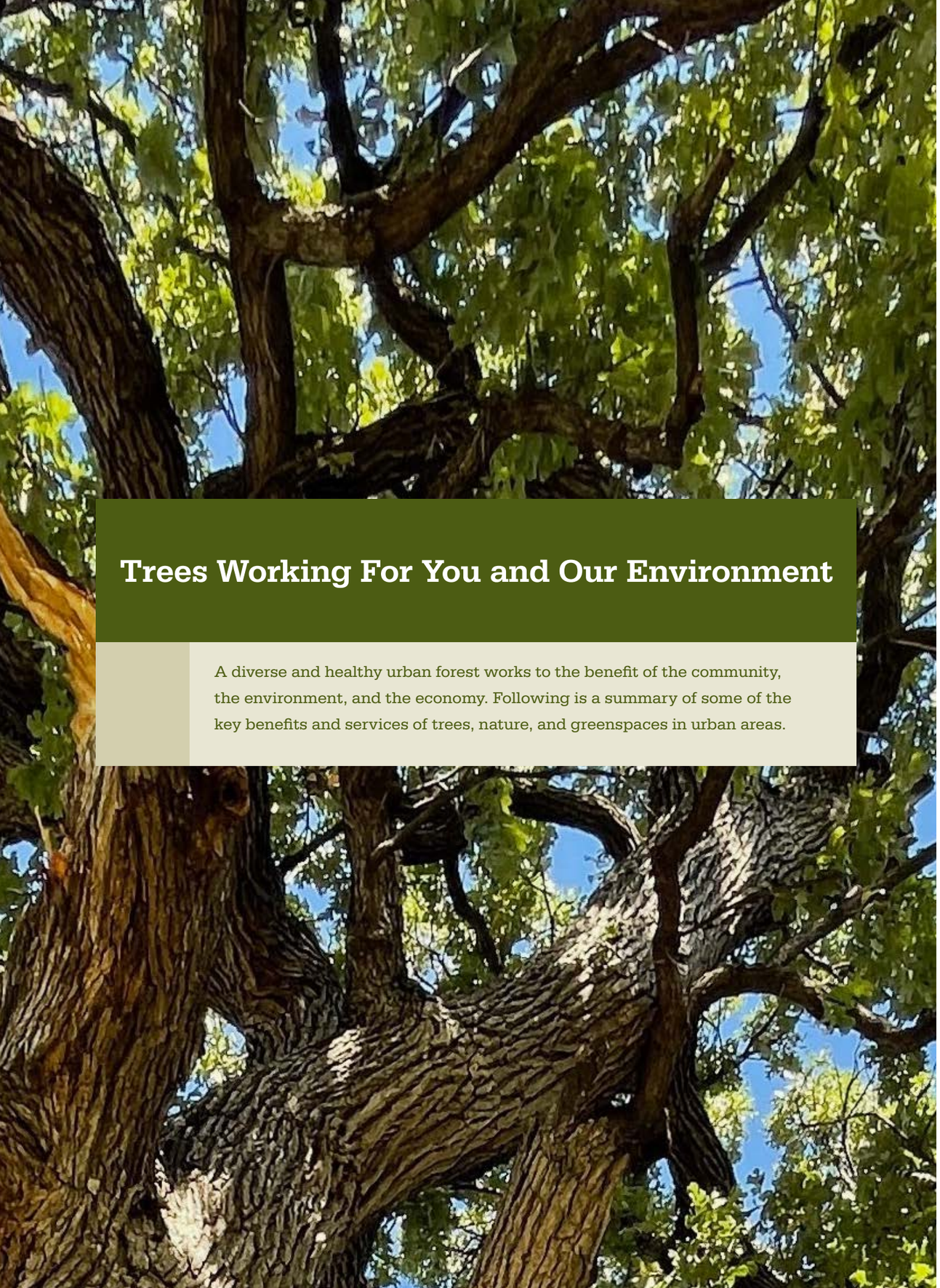
2
What Do We Want?

3
How Do We Get There?

4
How Are We Doing?

This structure, termed "adaptive management," is commonly used for resource planning and management and provides a useful conceptual framework for managing Fort Worth's urban forest resource (Miller, 1988).

Figure 3. The Urban Forest Master Plan process.



Trees Working For You and Our Environment

A diverse and healthy urban forest works to the benefit of the community, the environment, and the economy. Following is a summary of some of the key benefits and services of trees, nature, and greenspaces in urban areas.

Improve the Quality of Life

Trees make cities more livable by decreasing summer temperatures and improving well-being. Greater contact with natural environments correlates with lower levels of stress, improved performance, and fewer sick days. Residents in areas with more greenery are three times more likely to be physically active and less likely to be overweight than residents living in areas with little greenery.

Reduce Air and Surface Temperatures

Tree canopy lowers temperatures by shading buildings, asphalt, and concrete. Trees deflect radiation from the sun and release moisture into the air, reducing surface temperatures by as much as 36 degrees. Lower temperatures diminish fumes from heated asphalt and mitigate the urban heat island effect.

Improve Air Quality

Trees produce oxygen and clean the air by removing pollutants that would otherwise contribute to human health problems, such as asthma and other respiratory diseases.

Protect Wildlife and Ecosystems

Preserving and planting trees provides valuable habitat for wildlife, supports pollinator species, and provides favorable conditions for beneficial soil microorganisms.

Save Energy and Lower Energy Costs for Buildings

As natural screens, trees insulate homes and businesses from extreme weather, keeping buildings cooler and reducing air conditioning bills. Shade trees planted on a sunny exposure can provide savings of up to 50% in the summer. In winter, evergreen trees provide a protective barrier against cold winds.

Conserve Water and Soil

A tree's root system draws water into the soil, and its canopy slows rainfall, reducing runoff and erosion while removing contaminants. In contrast, impervious surfaces like roads and parking lots allow water to run off unfiltered and at high volumes, increasing the likelihood of flooding and impaired water quality.

Additional Benefits are listed in the Element 4 of the Urban Forest Master Plan Technical Report. This list includes increased property values, reduced pavement wear, traffic calming, and public safety. Sources are listed in the References section of the plan and in Element 4 of the Technical Report.

A Closer Look at Tree Benefits

Trees come in various forms—shade trees, flowering trees, trees with edible fruit and nuts, and trees with vibrant fall color. All contribute benefits and services to the urban ecosystem. Many environmental benefits of trees in urban areas are identifiable and measurable, while other benefits are experienced, such as the calming feeling of walking a quiet tree-covered trail. The following provides a summary of the social and human health benefits of trees and greenspaces.

Social and Human Health Benefits of Trees

Fort Worth's park and street trees create a sense of community, offering opportunities for people to come together and engage in various activities. Additionally, Fort Worth's urban forest provides a respite from the hustle and bustle of city life, offering peaceful retreats where individuals can relax, unwind, and enjoy nature.

Research summarized in the following paragraphs shows the presence of trees and greenery in urban areas reduces stress, improves mental well-being, and encourages physical activity, all of which contribute to healthier and happier communities. Moreover, Fort Worth's urban forest creates **opportunities for environmental education and volunteering, inspiring residents to learn about nature, participate in tree planting initiatives, and engage in environmental stewardship.**

Studies have shown that trees and vegetation in parks and other common spaces are associated with an increased sense of safety and stronger social ties among neighbors. Encounters with nature in cities also lead to **enhanced positive attitudes, decreased stress levels, improved attention spans, and better performance on cognitive memory assessments** (Wolf, et al., 2020).

Figure 4. Human health and social benefits of trees.

Research shows that community residents are three times as likely to be physically active when living in areas with more trees and greenspace. They are also more likely to report good health. This is particularly evident among vulnerable populations, such as older and low-income residents.

Opportunities to experience urban nature — whether it's a view of a tree through a window or actually being outside — **are key to the mental well-being** of city residents. People are happier, experience a greater sense of well-being, and have reduced stress levels when they live in areas with more greenspace nearby or on a tree canopied neighborhood street (White, et al., 2013).

Access to nature has been shown to positively impact human health, resulting in increased longevity, reduced rates of cancer, heart disease, anxiety, and depression, lower stress hormones, and improved immune function. A study in 2016 of 108,000 people found a **12% lower rate of nonaccidental mortality among those with the most greenery** in a 250-meter radius around their homes (James, et al., 2016). In addition, hospital patients placed in rooms with views of nature experienced **shorter stays in the hospital** compared to patients in rooms that faced other buildings (Mihandoust et al., 2021).

> **"If we can address obstacles to well-being before someone becomes ill or develops a chronic condition, we can make Fort Worth the envy of cities across the country."**
>
> **BARCLAY BERDAN**
> CEO, Texas Health Resources

Tree cover near schools connects children to nature and has **a positive effect on student performance.** Children with challenges concentrating are more focused following a 20-minute walk in an urban park or tree canopy covered sidewalk than they do after walks in other urban settings without trees and greenery (Taylor, et al., 2009).

Overall, Fort Worth's urban forests play a crucial role in enhancing social interactions, well-being, human health, and community engagement, making Fort Worth a more livable and enjoyable city.

COOL SCHOOLS

The Texas Trees Foundation's Cool Schools Program is an example of neighborhood-level efforts with regional impacts on urban heat, air quality, and greenspace. The program connects students and teachers to nature by planting trees and creating fun and engaging outdoor experiential learning areas. Participation in the Cool Schools program is an option for Fort Worth area school districts to enhance students' learning environment and play a role in achieving the City's tree canopy cover goal.

Environmental Benefits of Trees

Urban trees provide quantifiable environmental benefits in terms of stormwater management, air and surface water quality, and carbon storage. The City of Fort Worth can use this data to educate community members, develop strategies to address inequities, and incorporate trees in infrastructure design.

A tree canopy assessment conducted by PlanIT Geo in 2020 determined that 19% of the City (75,740 acres) was shaded by tree canopy. The following benefits were calculated based on the leaf area of the canopy.

Fort Worth's tree canopy **removes over 6.6 million pounds (3,300 tons) of pollutants from the air annually, equating to a savings of $33.9 million** in terms of reduced air filtration needs, improved health, lowered asthma rates, and other factors based on U.S. Forest Service research (USDA Forest Service i-Tree Canopy).

Fort Worth's urban forest **prevents over 1.5 billion gallons of stormwater runoff annually,** which is **equivalent to nearly 2,300 Olympic-sized swimming pools**. The reduction in runoff translates to savings of approximately $10.8 million annually based on regional research on the costs for stormwater management systems (USDA Forest Service i-Tree Canopy).

The canopy and biomass of trees across the City capture **over 327,000 tons of carbon dioxide annually** (Stancil, 2015), resulting in a savings of **$15.2 million**. To put those numbers into perspective, that is **equivalent to carbon dioxide emissions of nearly 65,000 vehicles per year** (22 miles per gallon driving 11,000 miles per year).

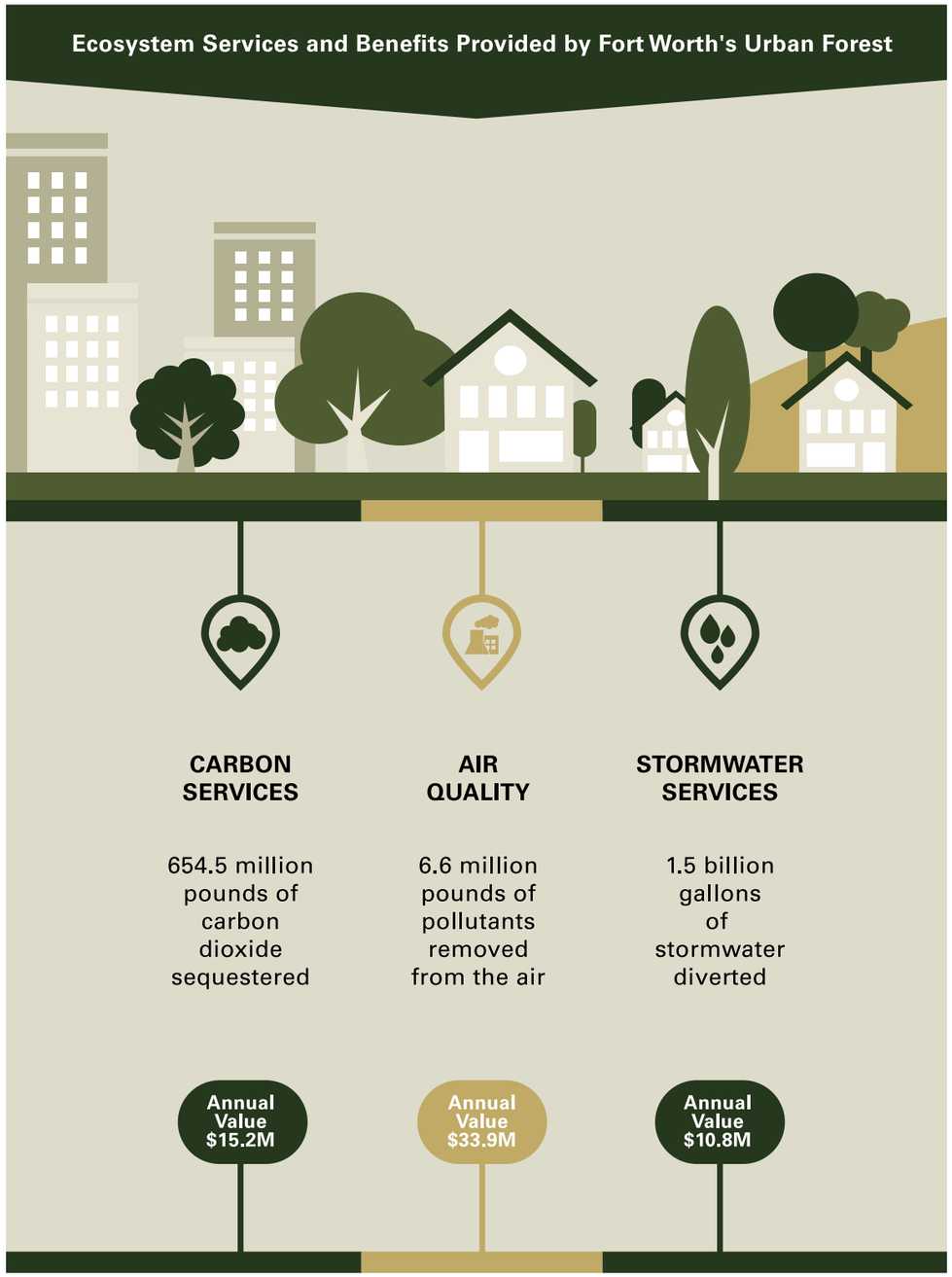
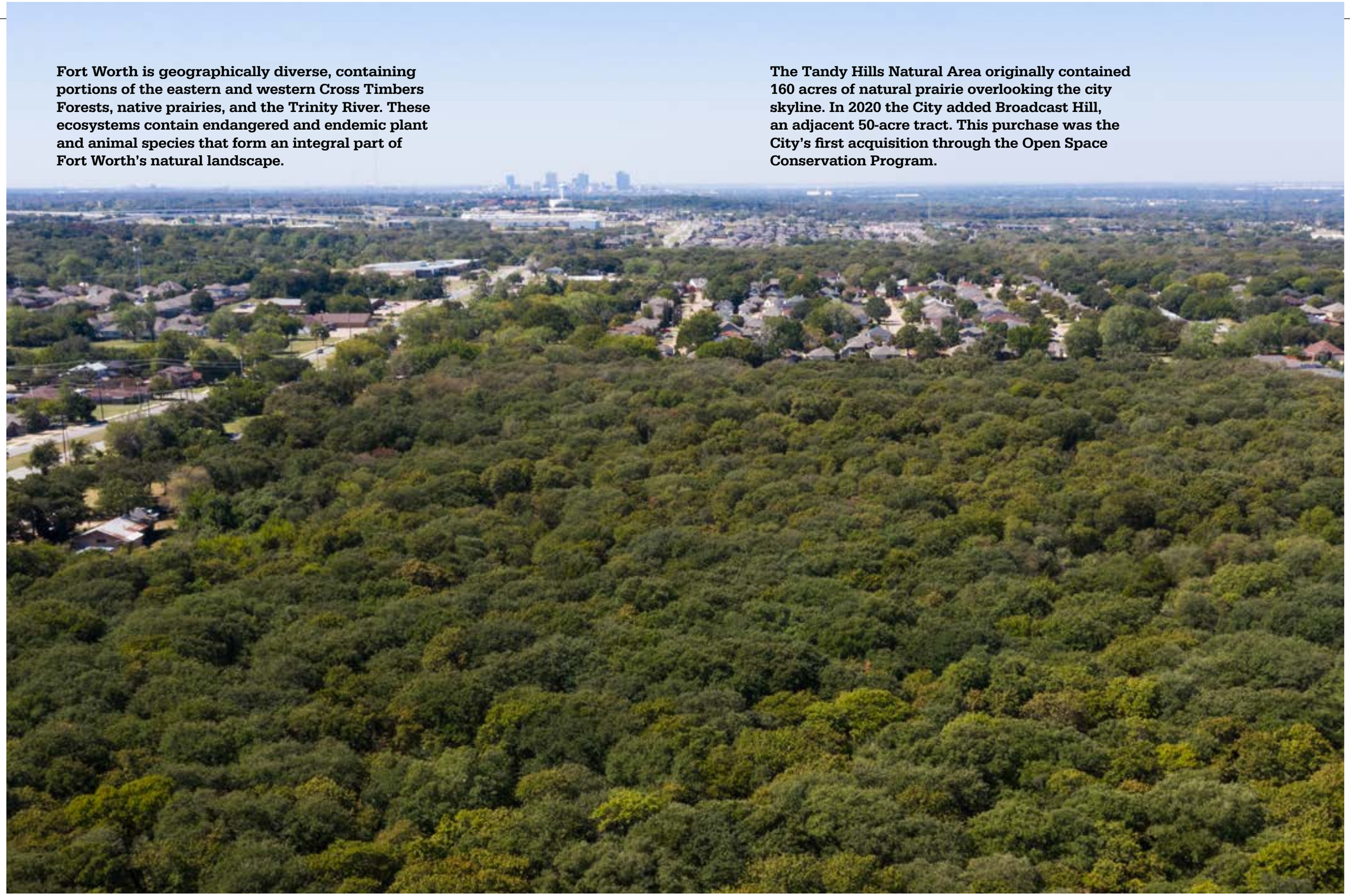
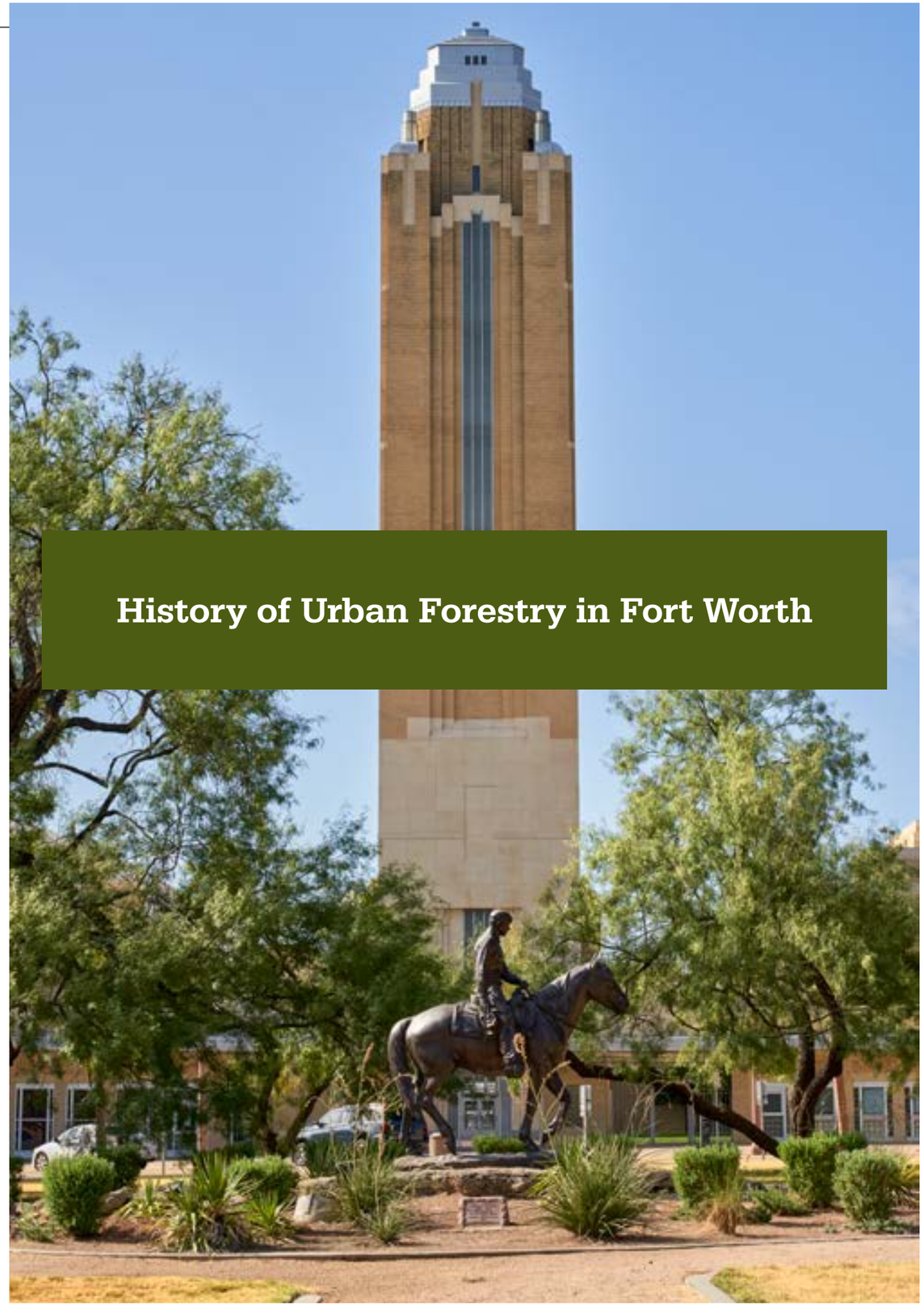


Figure 5. Estimated annual benefits of Fort Worth's urban tree canopy cover.

Fort Worth is geographically diverse, containing portions of the eastern and western Cross Timbers Forests, native prairies, and the Trinity River. These ecosystems contain endangered and endemic plant and animal species that form an integral part of Fort Worth's natural landscape.

The Tandy Hills Natural Area originally contained 160 acres of natural prairie overlooking the city skyline. In 2020 the City added Broadcast Hill, an adjacent 50-acre tract. This purchase was the City's first acquisition through the Open Space Conservation Program.





History of Urban Forestry in Fort Worth

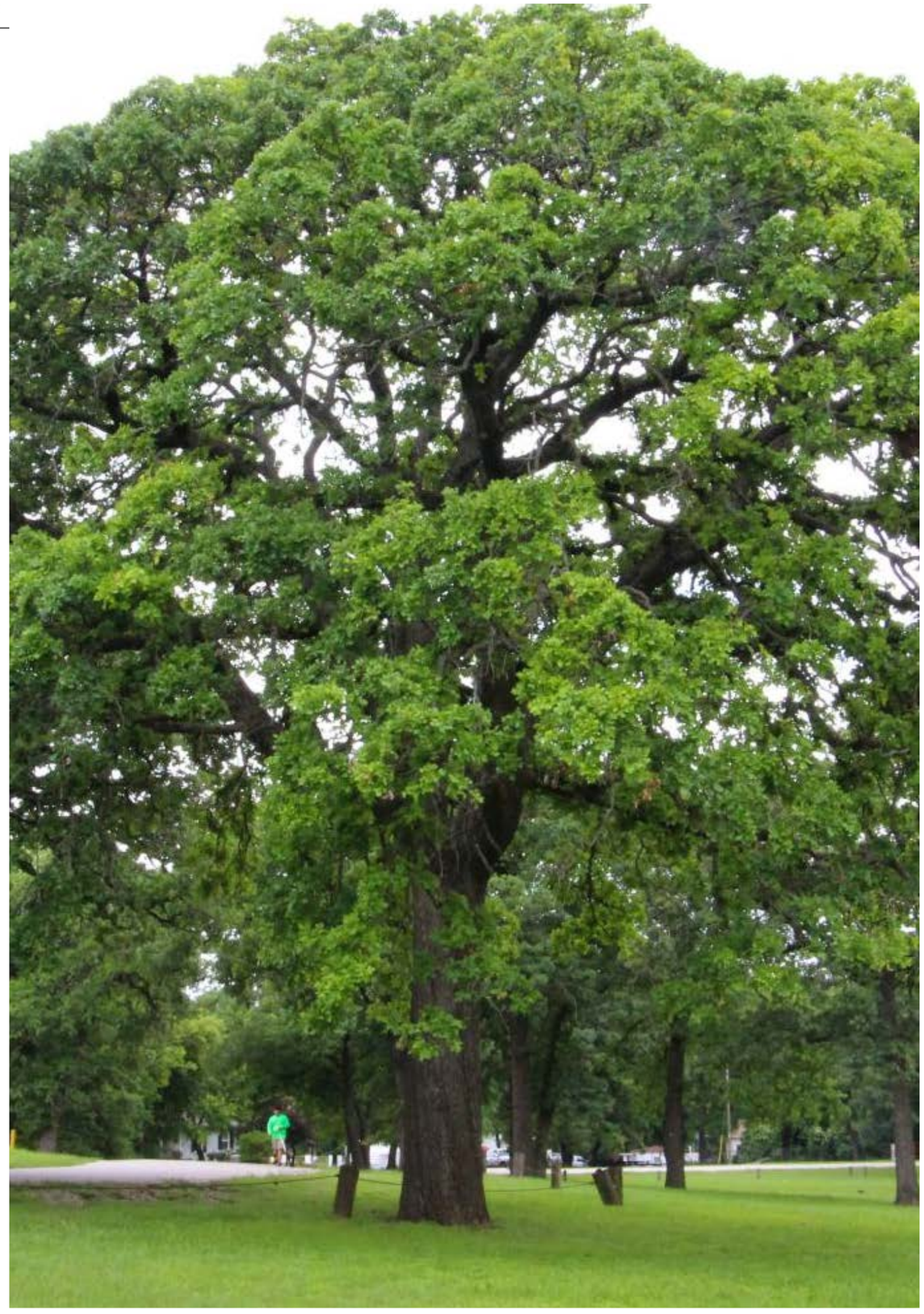
History of Urban Forestry in Fort Worth

Fort Worth has promoted sound urban forestry practices since 1873, when the City charter declared it illegal to hitch a horse to a tree. The City hired its first arborist in 1926 and began growing trees in various parks near Lake Worth in the late 1920s. Growing operations were consolidated at the current location in the late 1970s and early 1980s following the City's purchase of the 71-acre Rolling Hills property in 1971. Fort Worth achieved the Arbor Day Foundation designation of Tree City USA in 1978, becoming the first and longest–running Tree City USA in Texas.

In the early 1990's Fort Worth received a U.S. Forest Service grant for development of a Comprehensive Urban Forest Plan. The City partnered with Davey Tree Service to complete the plan in 1995. During this time, Fort Worth was in the process of developing its first landscape ordinance. Due to the political climate and controversy surrounding the landscape ordinance, the City decided not to pursue formal adoption of the Urban Forest Plan at that time. However, the Parks and Community Services Department (currently PARD) utilized the findings related to tree planting and public education efforts for development of internal policies and procedures.

In the 2000s, the City expanded its efforts to protect critical areas and native habitat. In response to community outcry over tree clearing in the Cross Timbers Forest of East Fort Worth, the City implemented interim regulations in 2004 while beginning work on a tree preservation ordinance. In 2007, Fort Worth passed an urban forestry ordinance to protect existing trees and ensure new trees were planted concurrently with land development. This ordinance was updated in 2009. The City implemented pre-grading inspections of tree protection in 2016 following a permit violation in the Cross Timbers Forest. In 2021, the penalty section of the ordinance was amended to strengthen the City's ability to levy civil penalties for violations.

With development pressure increasing, the City is striving to strike a balance between preservation and development in the remaining Cross Timbers Forest. In 2015, an attempt to amend the urban forestry ordinance failed due to a lack of consensus. Since that time, the City has met with diverse stakeholder groups in preparation for revising the ordinance to achieve the desired balance. An evaluation of the current urban forestry ordinance is included in the UFMP Technical Report.



Challenges Facing Fort Worth and its Urban Forest

Extreme Weather

Weather patterns in north central Texas typically include hot, dry summers and mild winters. However, in recent years the region has experienced high and low temperature extremes, seasonal flooding, extended periods of winter precipitation, and severe drought.

Drought and Heat

In 2011 Texas experienced the worst drought ever recorded with only 25.88 inches of rainfall, compared to normal precipitation of 36.14 inches. It was also the hottest year on record with 71 days at or above 100 degrees F (National Weather Service, 2023). The Texas A&M Forest Service estimated that the drought killed over 300 million rural trees and over 5 million urban trees (Henry, 2012). Continuing the trend of hot, dry summers, 2022 was the fourth hottest on record for North Texas with the second longest period without rainfall. The summer of 2023 was the third hottest and fourth driest summer on record for North Texas (CBS News, 2023).

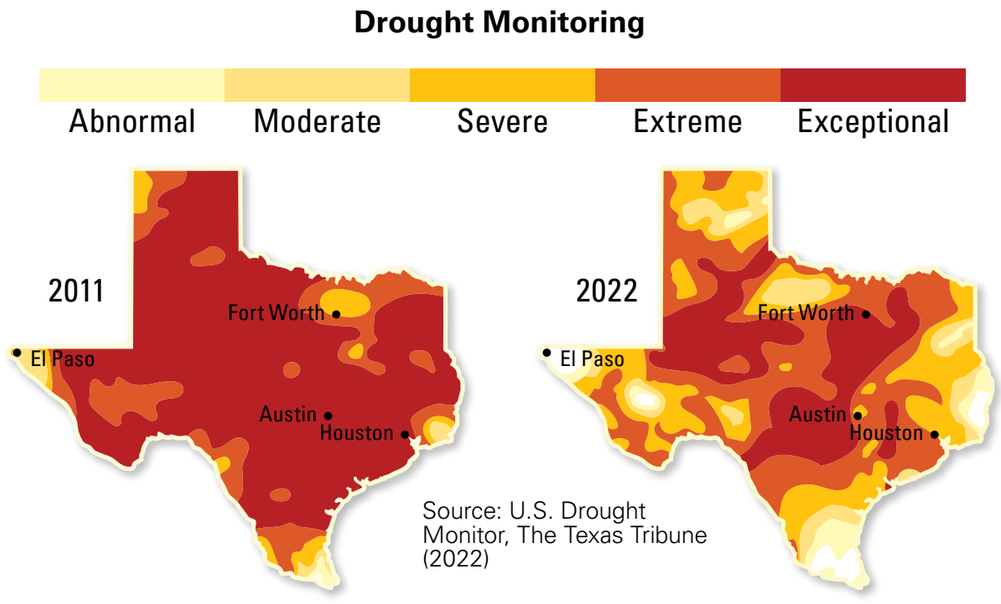


Figure 6. Drought conditions in Texas in 2011 and 2022. Source: U.S. Drought Monitor, The Texas Tribune (2022)

Cold and Ice

Recent extreme weather events include winter storms and record cold temperatures. In February 2021, winter storm Uri brought 139 consecutive hours below freezing and the second coldest temperature on record of -2 degrees F. In December 2022, a hard freeze brought 11-degree temperatures, endangering trees not yet in their dormant state. The following month, a record snowfall consisting primarily of ice and sleet caused damage to trees due to the weight and thickness of the ice.

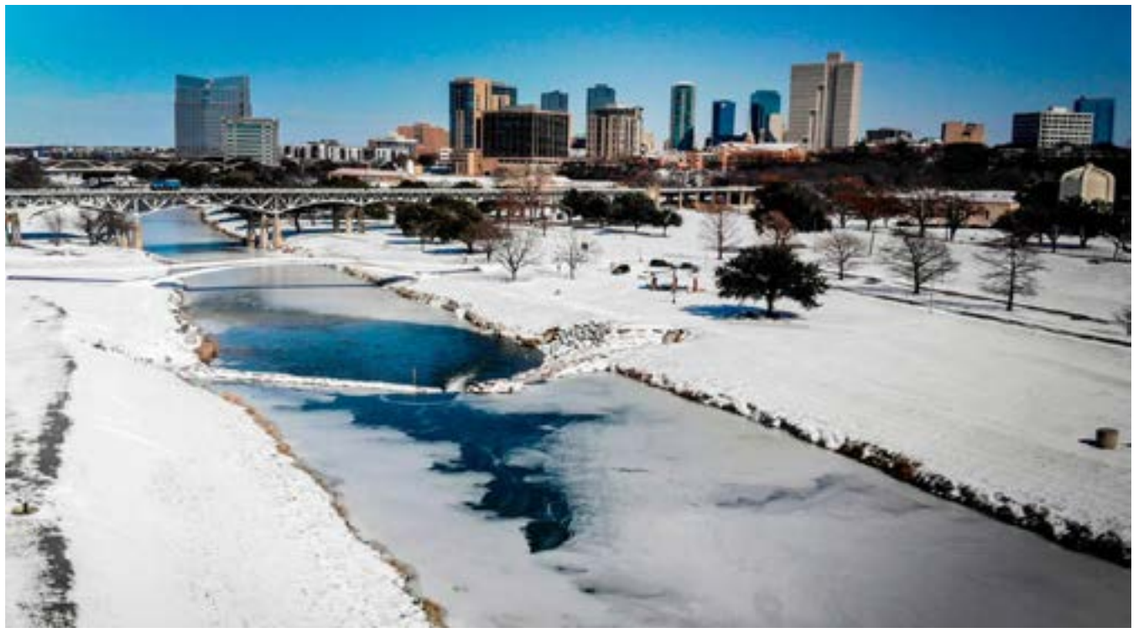


Photo taken during Winter Storm Uri. Source: Fort Worth Star Telegram.

Pests and Disease

Changing conditions can create environments that are favorable for the spread of pests and diseases. For example, warmer temperatures and increased precipitation can create ideal conditions for pests, such as the emerald ash borer, which has decimated ash tree populations in many areas, and diseases such as Dutch elm disease, which can kill large numbers of elm trees. Oak wilt, which is devastating oaks in North Central Texas (Texas A&M Forest Service, 2022), can proliferate in cool moist conditions that occur during winter and early spring, particularly when in combination with open wounds on trees due to storms or human activity.

Development is Outpacing Tree Planting

Fort Worth's growth is recognition of an outstanding city that welcomes families and businesses. Between 2010 and 2021, more than 194,000 people moved to Fort Worth, resulting in population growth of 25%. Fort Worth's population is expected to reach 1,000,000 by 2028 (City of Fort Worth, 2022).

Development and infrastructure projects such as roadway and housing expansions are needed to support the existing population and projected growth. However, impervious surfaces currently cover more of Fort Worth than tree canopy. The 2020 tree canopy assessment found that 19% of the City and its extra-territorial jurisdiction (ETJ) is shaded by tree canopy, while 21% is covered by parking lots, roadways, buildings, and other hardscapes. This equals 12,500 more acres of heat inducive land cover compared to tree canopy. Meanwhile, an additional 2,500 acres of open space are converted to development every year.

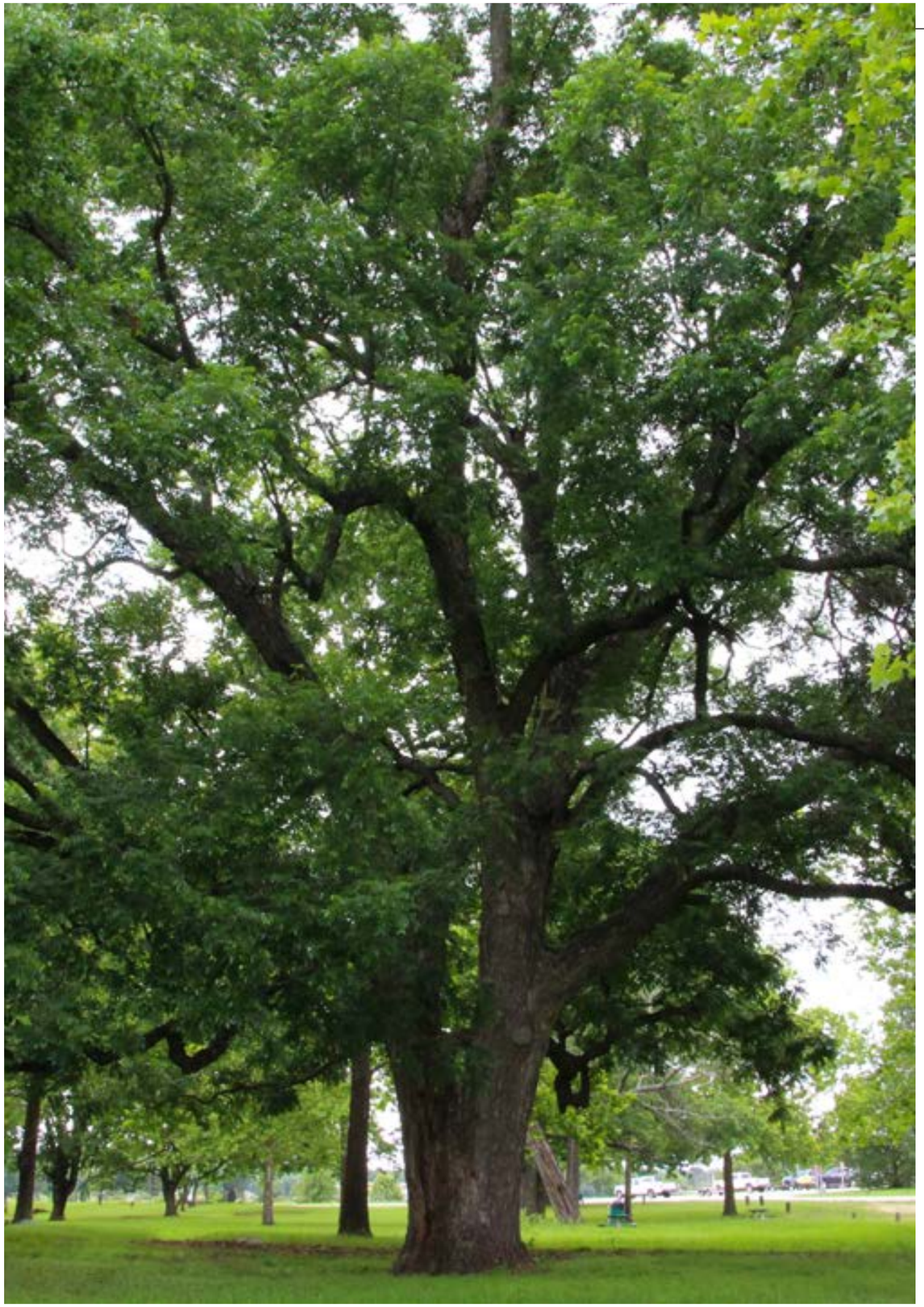
These are just a few of the challenges that threaten the urban forest. Challenges are discussed in more detail in Section 2 under Urban Forest Vulnerabilities.

The Time is Now

It is critical for Fort Worth's environment, economy, and community well-being that the City act now to sustainably manage the urban forest. The City has a Comprehensive Plan for how Fort Worth will grow and change with development. Undeveloped areas contain native trees and vegetation, fertile soils, vital water resources, natural prairie, wetlands, and the remaining remnants of the Cross Timbers Forest. Protection and conservation of these critical areas is up to the citizens and the choices made by the City.

Fort Worth's Urban Forest Master Plan provides the roadmap with goals and supporting recommendations to manage, grow, preserve, and strengthen the urban forest through invigorated partnerships that align with City and community priorities. Section 2 of this plan is an overview of the current state of Fort Worth's urban forest and will serve as a baseline to measure future progress. Section 3 is an overview of Fort Worth's priorities for the urban forest which were identified through community and stakeholder input. The Plan's goals, recommendations, and recommended action steps are presented in Section 4 and supported by the monitoring plan in Section 5.

Let's begin by exploring Fort Worth's urban forest.



SECTION 2

STATE OF THE URBAN FOREST

What Do We Have?

The City of Fort Worth covers approximately 350 square miles, and includes portions of Tarrant, Denton, Johnson, Parker, and Wise counties. It is located within the Cross Timbers and Prairies Ecological Region of Texas (Texas Parks and Wildlife). Fort Worth encompasses portions of three subregions — the East Cross Timbers, Fort Worth Prairie, and West Cross Timbers. Although mapped as distinct regions based on predominant characteristics, Fort Worth's native ecology is an intricate mosaic of woodland, grassland, and riparian/floodplain.

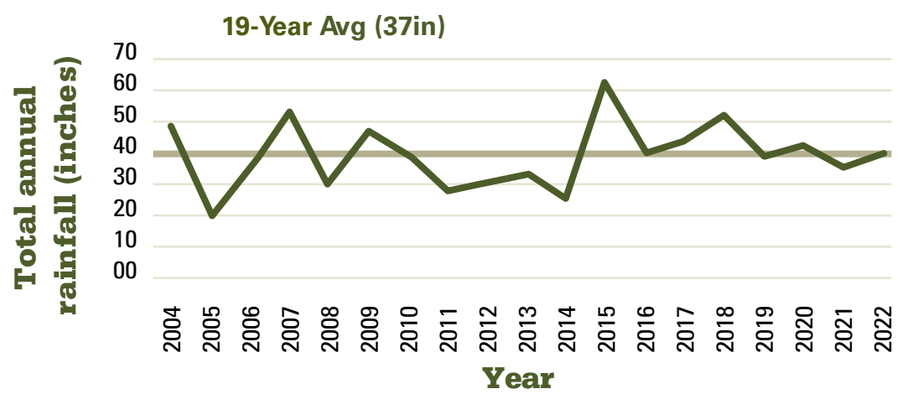


Figure 7. Fort Worth annual precipitation. Source: National Weather Service

Soils and Land Cover

Native soils in the East and West Cross Timbers consist of sand or sandy loam overlying a thick layer of sandstone. Native vegetation is dominated by post oak and blackjack oak. Other common species include cedar, elm, ash, eastern redcedar, osage orange, mesquite, and other oak species. Many mature post and blackjack oaks in the Cross Timbers are estimated to be 200 to 400 years old (University of Arkansas Tree Ring Laboratory, 2023). However, these hardy, slow-growing trees are very susceptible to construction damage and are not readily available commercially. As development of Cross Timbers forestland continues, these trees that play a key role in the native ecosystem are replaced with other tree species.

In the Fort Worth Prairie, native soils are relatively shallow clay overlying layers of limestone. Native vegetation consists of various species of tallgrass, depending upon the depth of the soil. Historically, much of this region was used for grazing, although areas with sufficient soil depth were cultivated. It is estimated that Fort Worth is losing 2800 acres of native prairie annually to development (City of Fort Worth, 2019). The Native Prairies Association of Texas classifies the tallgrass prairie as the most endangered ecosystem in North America.

It is important to note that urbanization and associated development have significantly altered both soils and vegetation across all three regions. Additionally, the Trinity River and its tributaries bisect much of Fort Worth, creating deep alluvial soils and associated vegetation.

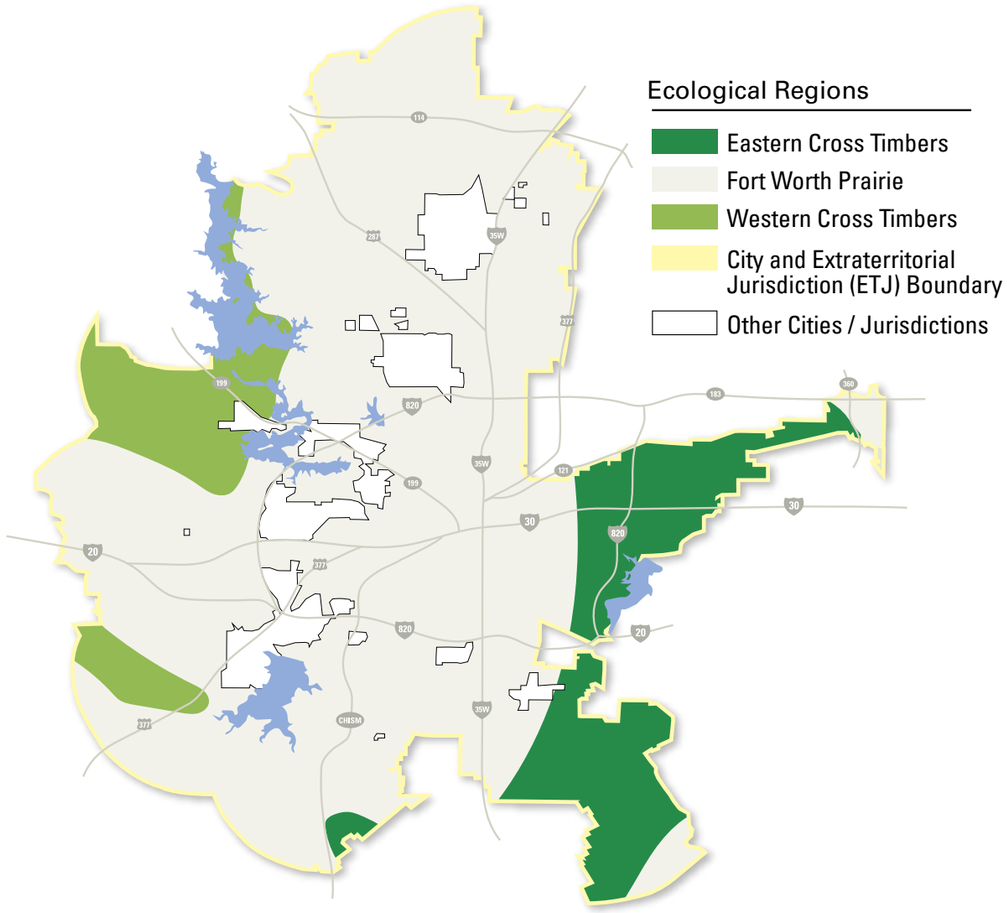


Figure 8. Map of the ecological regions in Fort Worth affecting soils and land cover.

Riparian Areas

At 710 miles, the Trinity River is the 7th longest river in Texas, and the third largest by average flow volume. Two of the river's four branches, the West Fork and the Clear Fork, flow through Fort Worth. Numerous tributaries to these branches flow through Fort Worth providing habitat for riparian species. The City is committed to managing the river as a valuable asset to the community and actively maintains parks and oversees development projects along the Trinity River.

Parks and Open Space

Fort Worth maintains an extensive municipal park system that includes the Fort Worth Nature Center, a 3,600-acre preserve in northwest Fort Worth, and Gateway Park, a 792-acre park on the east side of the City. In total, the Park and Recreation Department maintains close to 300 parks (12,893 acres) and public spaces citywide and numerous neighborhood parks.

In 2020, the City established the Open Space Conservation Program to identify and protect the City's most important natural areas. Acquisitions include 40 acres of future parkland near Lake Benbrook, 50 acres of natural prairie, and 24 acres of eastern Cross Timbers Forest. In 2023, Fort Worth established the Good Natured Fort Worth Greenspace Initiative to grow and improve the City's park system and preserve additional greenspace.

Subsurface Resources

Fort Worth contains a portion of the Barnett Shale natural gas reserve. The reserve is located approximately 1.5 miles below ground across a 15-county area. There are currently approximately 600 drilling sites and 1,900 gas wells within the City. Revenue from gas drilling on City-owned property supports Fort Worth's municipal tree farm and associated tree planting and distribution programs.

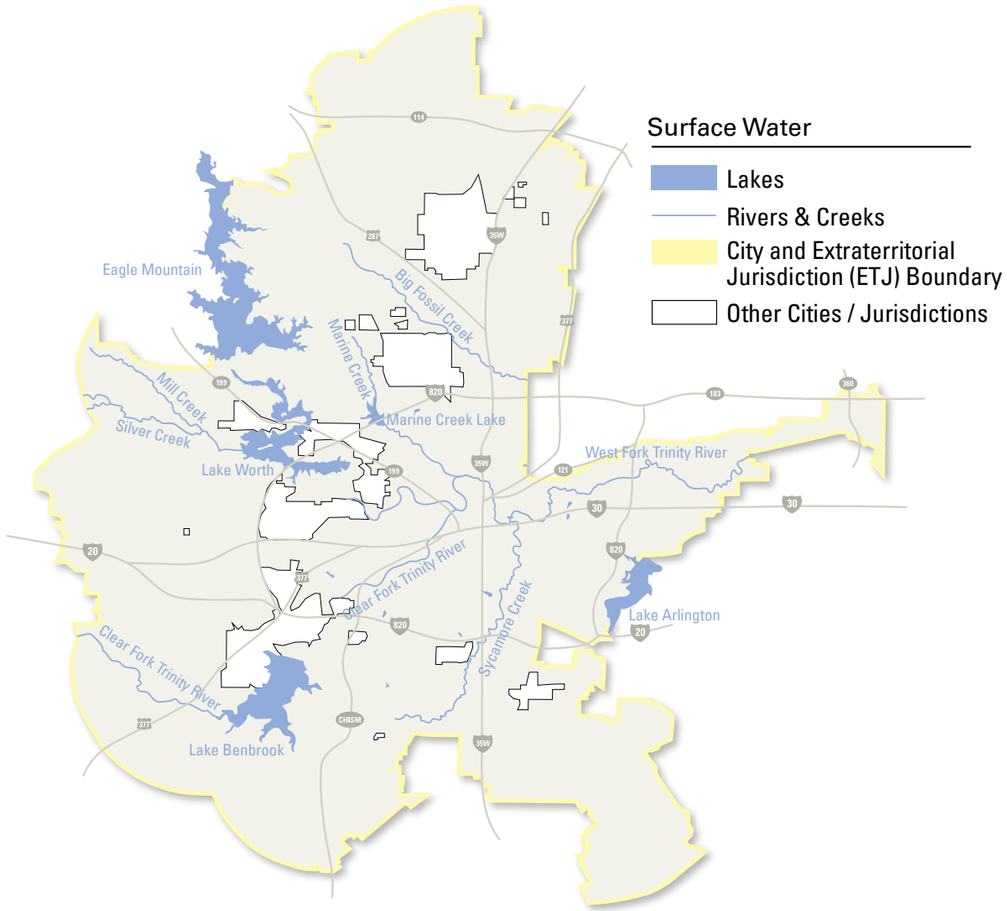


Figure 9. Map of the primary water bodies in Fort Worth.

Fort Worth's urban forest consists of all trees across public and private land. The City of Fort Worth is directly responsible for managing the trees within street rights-of-way, public parks, and other City-owned properties. Of the 19% canopy cover citywide, over 80% of it is on private land. Similarly, the possible planting space for new trees (existing land cover consisting of grass and soil) is primarily on private property with only about a quarter of it on public land. The distribution exemplifies the need to bolster community partnerships and programs to preserve and expand the urban forest resource on private and public property.

Fort Worth's Urban Forest: A Top-Down Approach

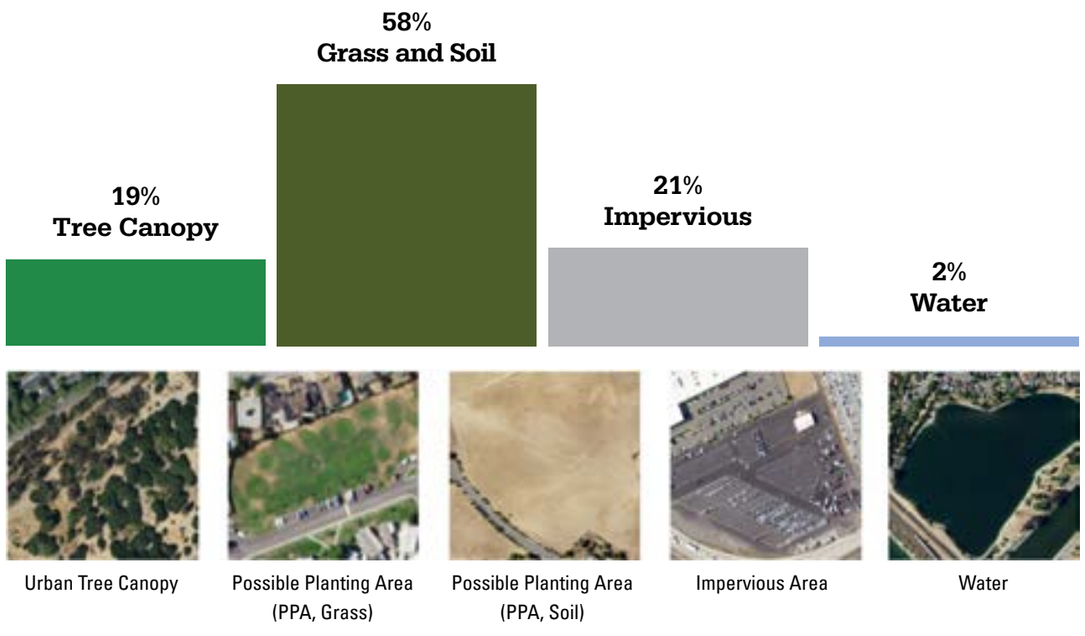


Figure 10. The 2020 tree canopy assessment and the land cover classes assessed.

Description and Distribution of Fort Worth's Tree Canopy

Understanding the distribution, amount, location, and health of Fort Worth's urban tree canopy (UTC) is one of the most useful methods for managing the urban forest at a citywide scale for sustainability, equity, and resiliency goals. The overhead tree canopy is responsible for most of the benefits of urban trees. The canopy is described and measured as the layer of leaves, branches, and stems of trees and other woody plants that cover the ground when viewed from above. By knowing how much canopy cover there is citywide and within various planning and community boundaries, benefits such as **heat reduction, air quality improvement, and stormwater mitigation** can be calculated to inform management decisions.

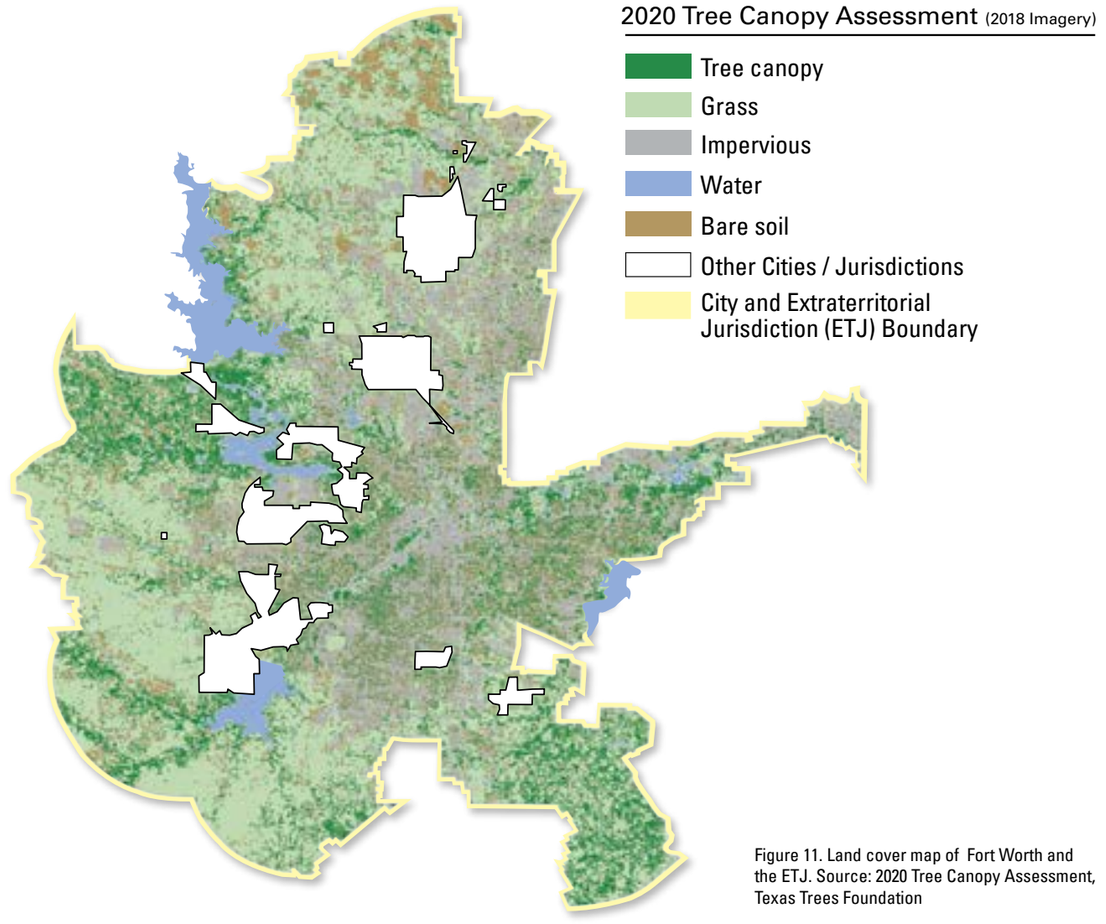


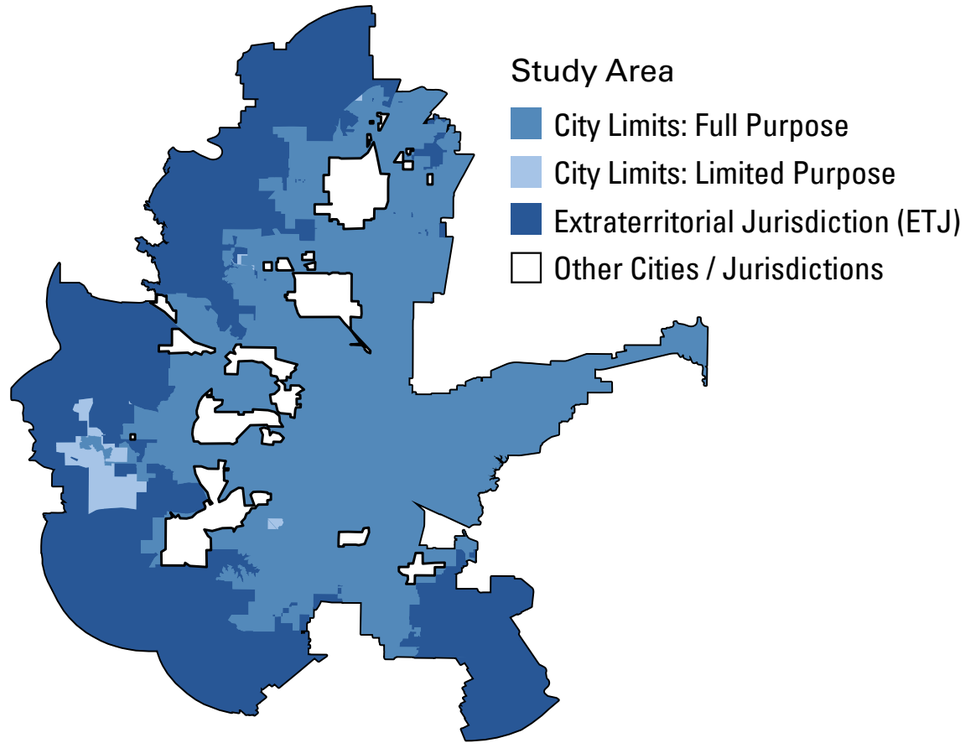
Figure 11. Land cover map of Fort Worth and the ETJ. Source: 2020 Tree Canopy Assessment, Texas Trees Foundation

Defining the Study Area

In 2020, the Texas Trees Foundation conducted a high-resolution canopy assessment based on 2018 imagery. The amount of canopy in acres and percentages was calculated for the area within Fort Worth City Limits and for the City's Extraterritorial Jurisdiction (ETJ). The ETJ is an area outside the City limits where the city has the authority to regulate some activities and to annex land. Texas Local Government Code defines the size of the ETJ boundaries according to a city's population. For Fort Worth, the ETJ can be up to five miles beyond the city limits. In 2018, the City's ETJ contained approximately 300 square miles of land.

The canopy assessment study area includes both full-purpose and limited-purpose annexation areas. All City ordinances, taxes, and services apply to full-purpose annexation areas. Under limited-purpose annexation, Fort Worth enforces planning, zoning, and health and safety ordinances, but the property owners do not pay City property taxes, and the City does not provide police or fire protection, roadway maintenance, or other services.

Most summaries and planning strategies for the UFMP are based on canopy cover data for the City limits and the ETJ. The data was evaluated and analyzed across various boundaries including City planning sectors, future land use, and U.S. Census Block Groups.



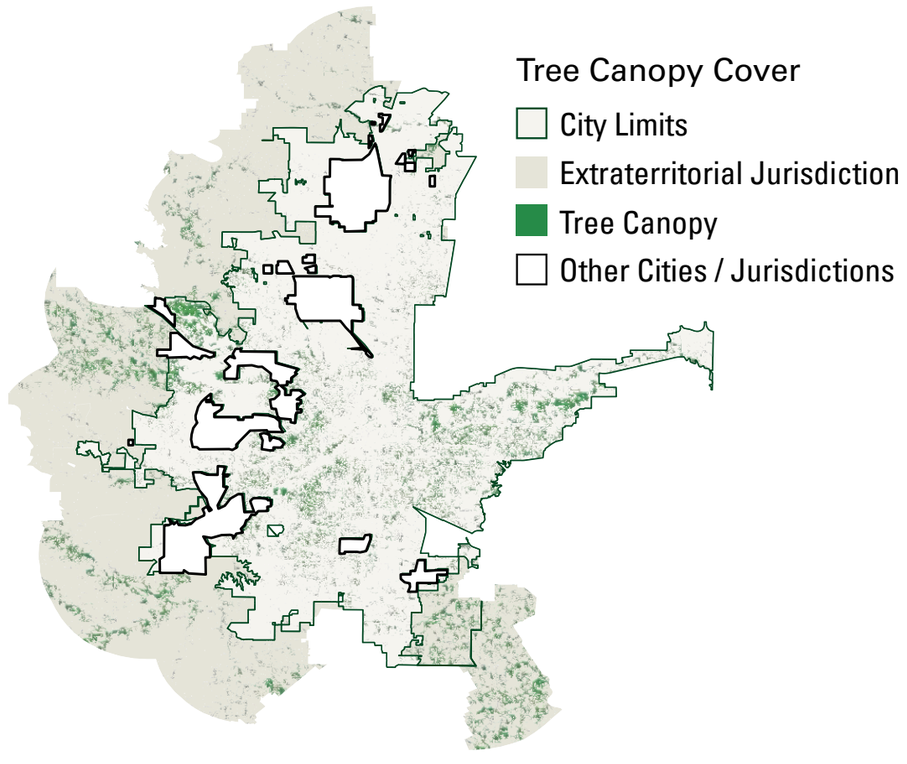


Figure 12. Maps of the study area showing annexation type and tree canopy cover.

Land Cover Type and Potential Planting Area

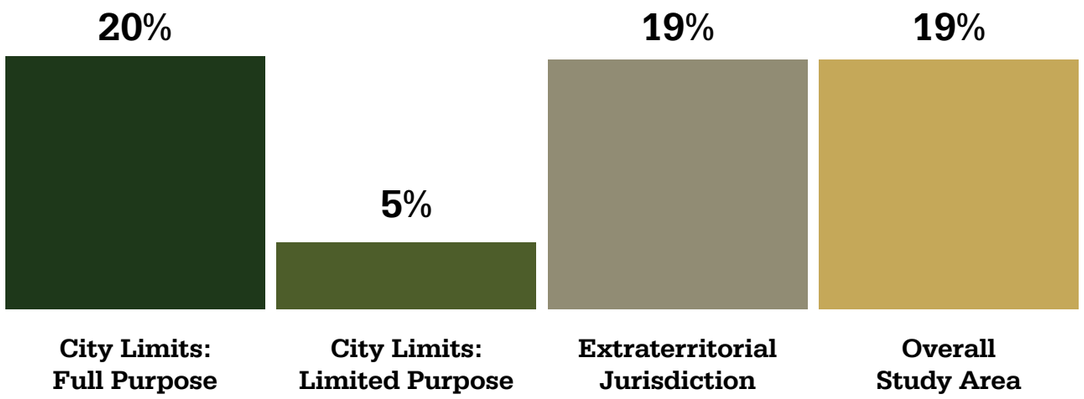


Figure 13. Tree canopy cover percentages for the study area. Source: Fort Worth 2020 UTC (TTF)

Currently, 19% of the study area is covered by tree canopy distributed across public and private property. Stated another way, of the 399,558 total land acres, 75,740 acres are shaded by tree canopy when viewed from above. This is equivalent to the area of over 57,000 NFL–sized football fields.

The assessment also identified areas where trees could be planted to create additional tree canopy. A total of 52% (206,875 acres) of the study area is either grass, low–lying shrubs, or turf. An additional 6% is made up of soil (23,998 acres). Of the 230,872 acres of permeable surface acre, 92,948 acres are classified as "unsuitable for urban tree canopy". Examples of unsuitable areas include recreational sport fields, golf greens, and airports. This leaves 35% (137,925 acres) of the study area as Total Possible Planting Area (PPA). The remaining 23% of the study area consists of 21% (88,282 acres) pavement or other impervious areas and 2% (7,991 acres) water.

The following summarizes findings from the 2020 canopy assessment:

FORT WORTH TREE CANOPY:

19% of Fort Worth (and the ETJ) is covered by tree canopy.

64% of existing tree canopy cover is on private residentially-zoned property.

FORT WORTH LAND COVER TYPE:

35% is grass and bare soil that could be considered potential planting area (PPA).

23% is grass and bare soil areas that are not suitable for planting (such as airports and recreational playing fields).

21% of the City is impervious area such as parking lots, buildings, and roadways.

2% of the City is covered by water.

Canopy Cover and Planting Area by City Planning Sectors

Fort Worth is divided into 16 planning sectors, with an average tree canopy cover of 22%. The TCU/Westcliff sector has the greatest proportion of canopy (39%). The Far West sector contains the greatest acreage of canopy with 13,574 acres (20% canopy cover). Far Southwest contains the greatest proportion of total possible planting area (grass and soil surface area) with 78% or 47,846 acres. Downtown has the highest proportion of impermeable/unsuitable area with 71%. These metrics are a starting point for identifying future planting sites, although further evaluations are needed to verify conditions and identify preferable locations.

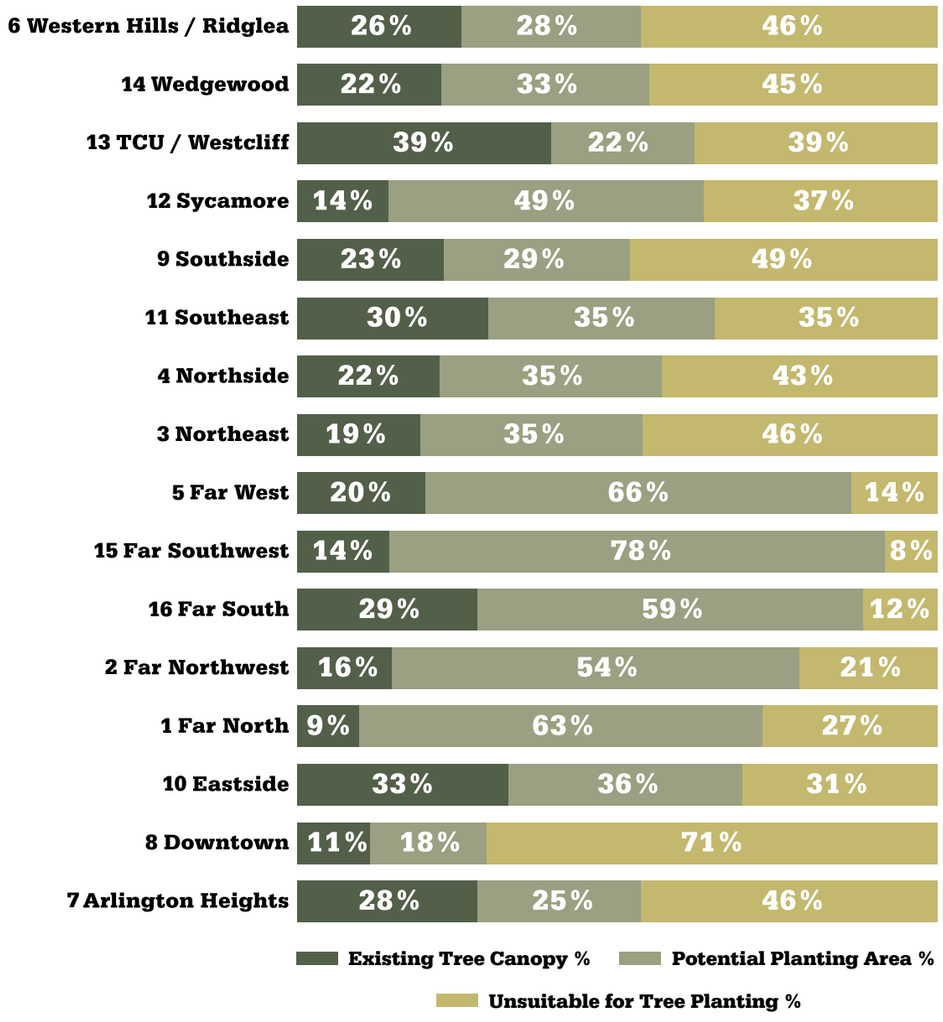


Figure 14. Tree canopy metrics by city planning sector. Data Source: Fort Worth UTC (TTF)

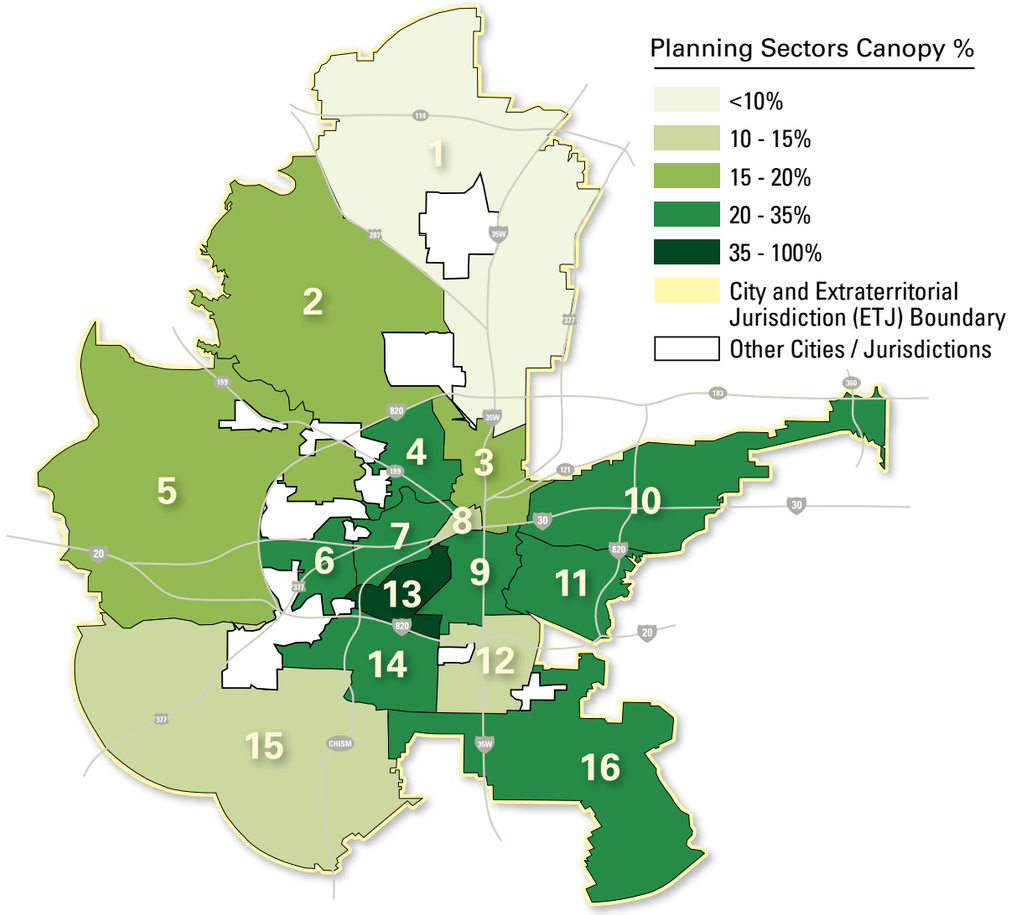


Figure 15. Map of city planning sectors by tree canopy cover range. Data Source: Fort Worth UTC (TTF)

Fort Worth's Urban Tree Canopy Compared to Other Cities

A comparison study was conducted to determine how the City's tree canopy cover compares to that of other local cities and select peer cities across the U.S. Peer cities were chosen based on their size, location, urban forest programs, availability of data, and other factors to represent a diverse cross-section of comparison cities. This study can help the City communicate the extent of the urban forest and promote opportunities to preserve and increase canopy. At 19%, Fort Worth's tree canopy is below the average for local cities (27%) and U.S. cities (26%) (Figures 16 and 17, respectively).

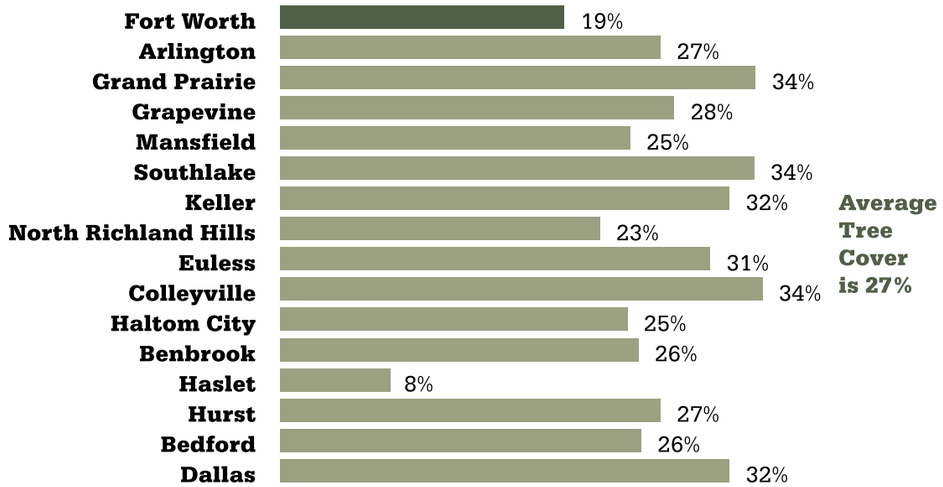


Figure 16. Tree canopy cover in Tarrant County, TX communities plus Dallas, TX. Source: Tarrant County UTC (TTF)

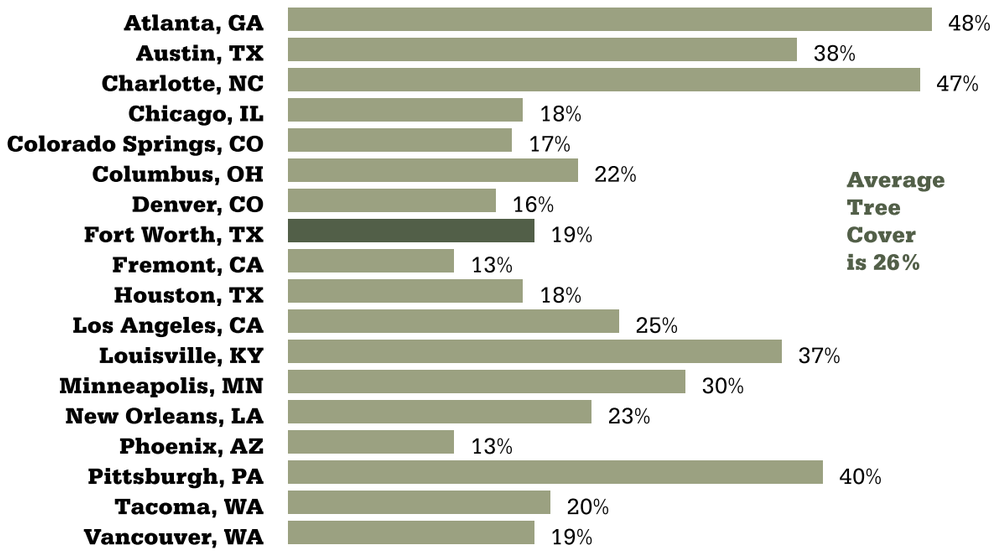


Figure 17. Comparison of tree canopy cover in Fort Worth and in select U.S. cities. Source: Tarrant County UTC (TTF)

Tree Canopy by Census Block Group

Figure 18 shows tree canopy distribution by census block groups. Differences in canopy cover are due to a combination of factors including native ecology, historic and current land use, weather events, and tree planting and maintenance conducted by the landowner, including City investment in parks and street trees.

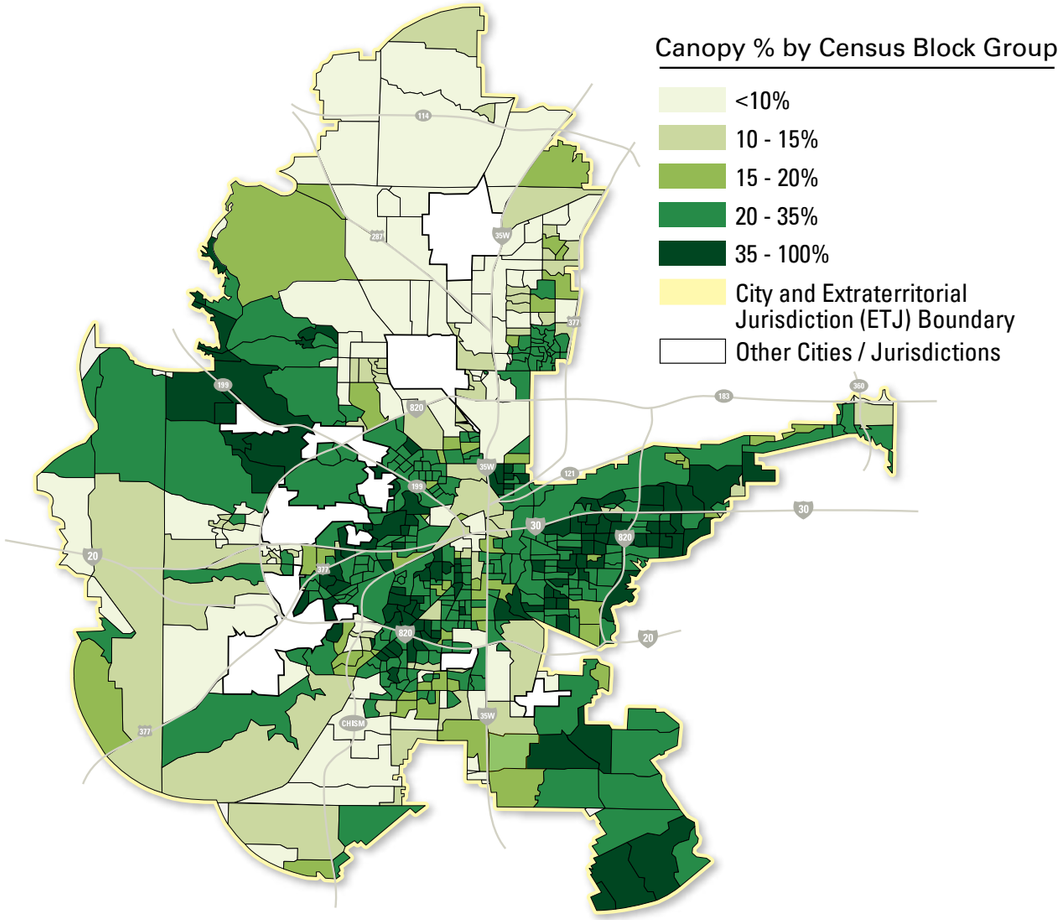


Figure 18. Tree canopy cover percentages by U.S. Census Block Group. Source: Tarrant County UTC (TTF)

Average Summer Surface Temperate by Census Block Group

Figure 19 shows summer temperature variation among census block groups. Comparison with Figure 18 illustrates the correlation between low canopy cover and higher surface temperatures.

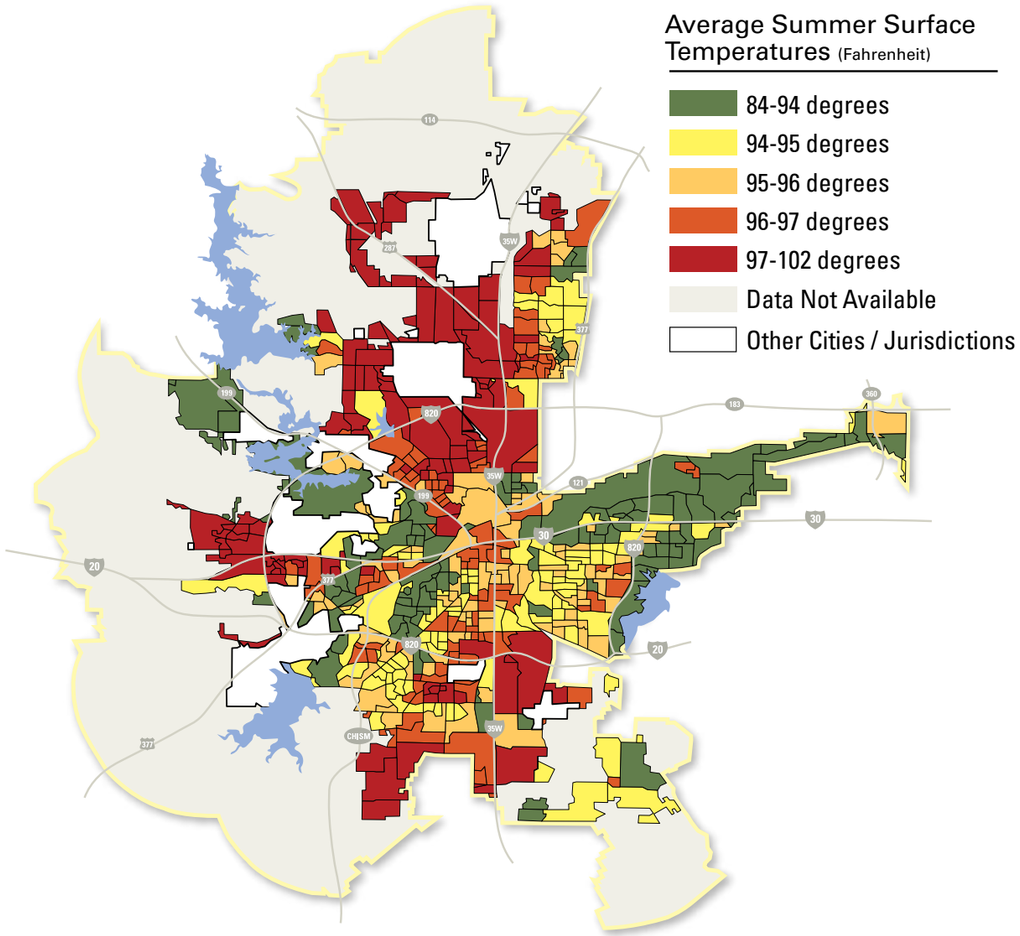


Figure 19. Average summer surface temperatures by U.S. Census Block Groups. Source: Tree Equity Score Tool, American Forests

Tree Canopy and Temperature

The City and its warm sunny weather are inviting to tourists, residents, and business owners. But the high temperatures experienced during a summer heat wave can prove dangerous and even life-threatening. These temperatures vary dramatically throughout the City. A major reason for these differences lies in the amount of shade in the form of tree canopy.

Figure 19 shows the average summer surface temperature in Fort Worth ranges between 84 and 102 degrees Fahrenheit. A comparison of temperature with tree canopy cover shown in Figure 18 reveals that the Far North sector has only 9% tree cover and the highest average surface temperature, between 97 and 102 degrees.

Tree Equity and Distribution

As shown by the census block group maps, tree cover is not evenly distributed across the City. Analyses and local assessments indicate that a city's wealthier areas zoned for single-family homes typically attract more city services, like wide sidewalks and trees (Drescher, 2019). A study conducted in 2021 in 37 U.S. cities showed that historically redlined neighborhoods, comprised of racial and ethnic minorities, have on average half the tree canopy cover when compared to neighborhoods comprised of U.S.-born white populations (Locke et al., 2021). Additionally, as time progresses, this disparity becomes a direct threat to public health. For example, in 11 Texas cities, neighborhoods with higher proportions of redlining had significantly more heat-related emergency department visits (Li et al., 2022).

In 2021, American Forests, the nation's oldest national conservation organization, released its **Tree Equity Score (TES)** tool, defined as "a calculation that evaluates equitable distribution of tree cover in the United States." The TES tool measures tree equity across 150,000 U.S. neighborhoods and 486 municipalities in urban areas. Each community's TES indicates whether there are enough trees for everyone to experience the health, economic, and environmental benefits that trees provide. The scores are based on how tree canopy and surface temperature align with income, employment, race, age, and health factors. A score of 100 means that a neighborhood or community has achieved tree equity, and its residents have access to tree benefits.

Tree Equity Score (TES) Results

Fort Worth's overall TES is 89 out of a possible 100. Compared to 15 other cities in Tarrant County and the City of Dallas, Fort Worth ranks 8th in terms of tree equity. The average TES for all 16 cities is 88. Compared to 17 select peer U.S. cities, Fort Worth ranks 6th in tree equity based on an average score of 85. Selection criteria for peer cities include size, location, urban forest programs, and availability of data. Figures 21 and 22 illustrate the local and national TES comparisons.

The Tree Equity Scores combined with the overall canopy comparison indicate that Fort Worth ranks lower than the average comparison city on amount of tree canopy, but higher than the average local city on equitable distribution. TES data was utilized in this plan to help identify potential areas to prioritize future tree plantings.

Of the 524 Census Block Groups (CBGs) in Fort Worth, 30% (156 CBGs) are below the City's overall score of 89. Of these block groups, tree canopy was the lowest in neighborhoods with 40%–60% people of color (96 CBGs). Comparing tree canopy to poverty levels, the neighborhoods with less than 20% people in poverty had the lowest tree canopy (131 CBGs) followed by neighborhoods with 60%–80% people in poverty (110 CBGs).

Fort Worth residents, community leaders, and tree advocates can use the tree equity score to address environmental and public health disparities. The information can be utilized to attract new resources and funding, make technical decisions, guide implementation of the Urban Forest Master Plan, and track progress toward achieving tree equity citywide.

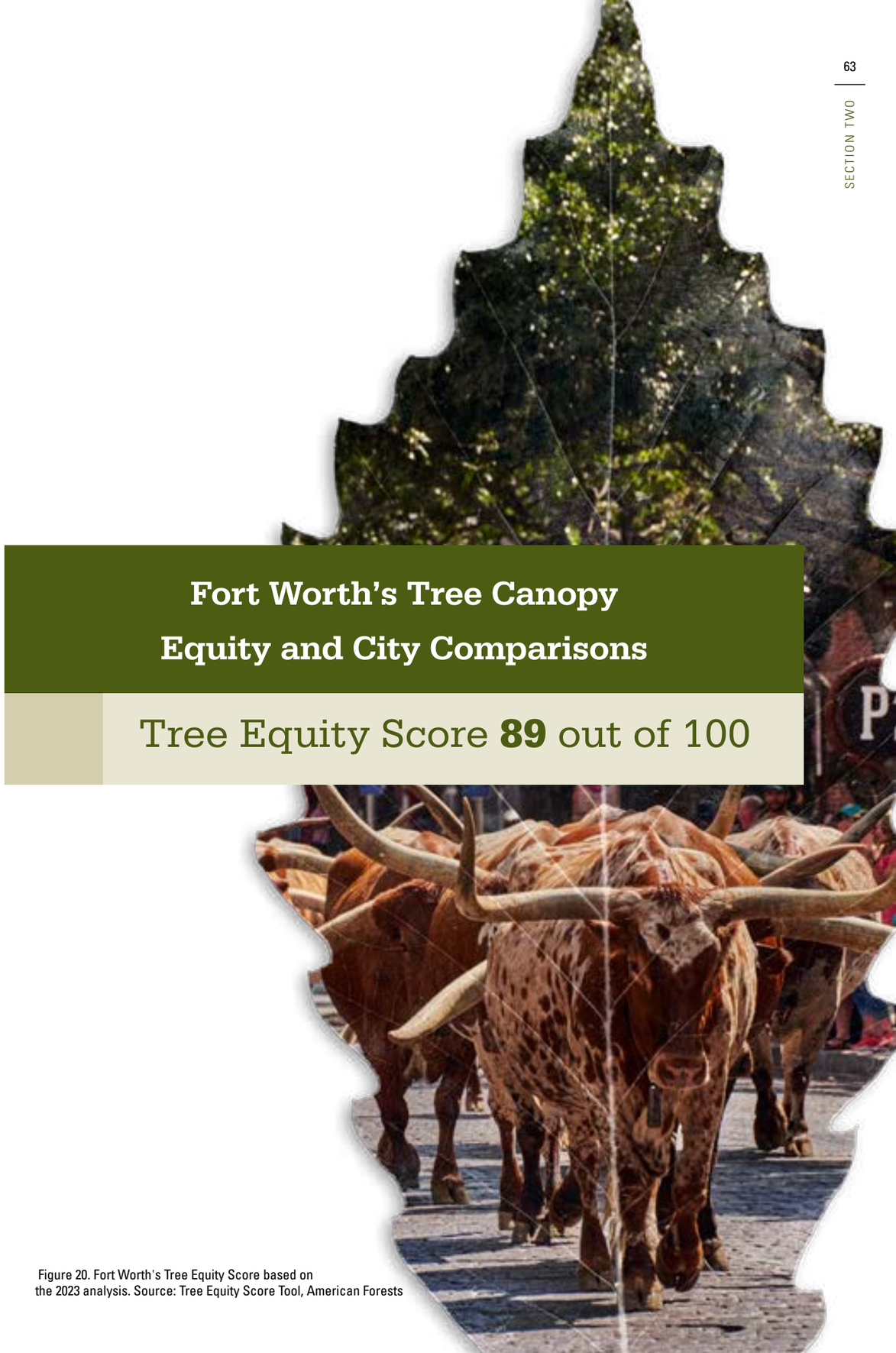


Figure 20. Fort Worth's Tree Equity Score based on the 2023 analysis. Source: Tree Equity Score Tool, American Forests

Comparison of Tree Equity Scores in Tarrant County and the City of Dallas (Average Tree Equity Score is 88 out of 100)

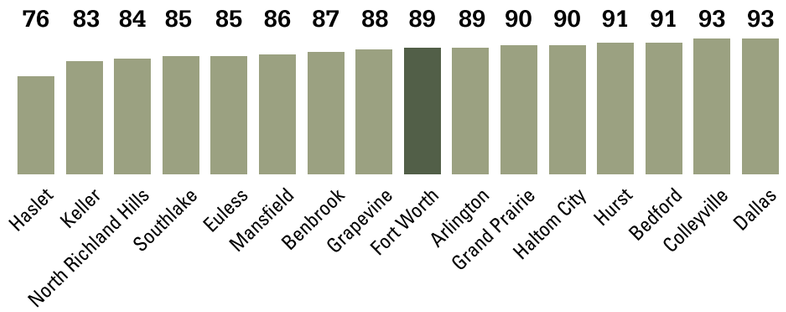


Figure 21. Comparison of Tree Equity Scores of Tarrant County cities and the City of Dallas, TX (2023).
Source: Tree Equity Score Tool, American Forests

Comparison of Tree Equity Scores in Select Peer Cities (Average Tree Equity)

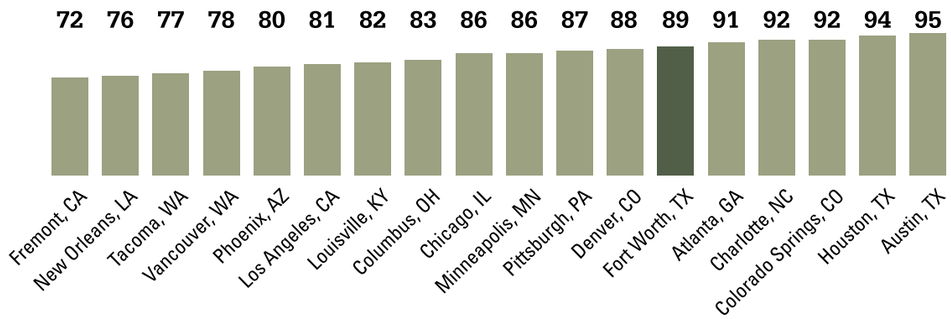


Figure 22. Comparison of Tree Equity Scores for select peer U.S. cities (2023). Source: Tree Equity Score Tool, American Forests

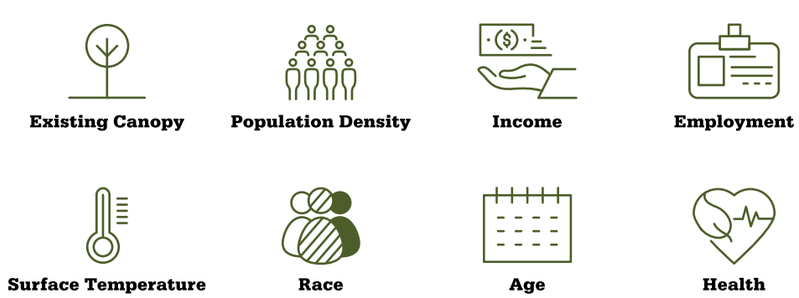
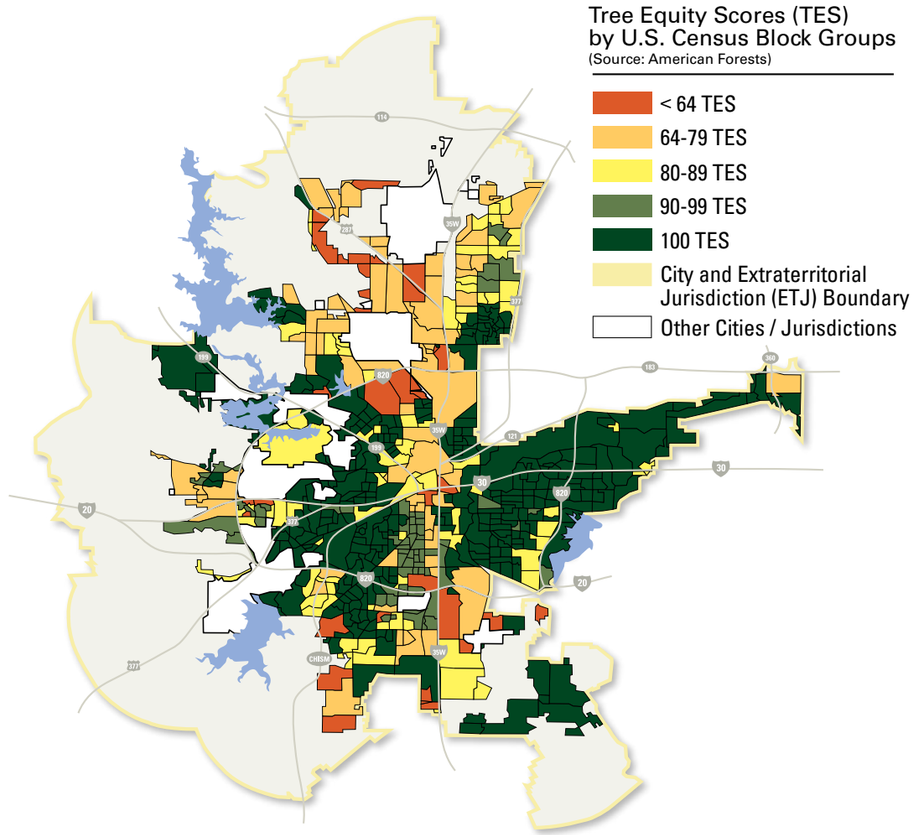


Figure 23. Inputs for Fort Worth's Tree Equity Score (2023). Source: Tree Equity Score Tool, American Forests.

Tree Equity by Census Block Group



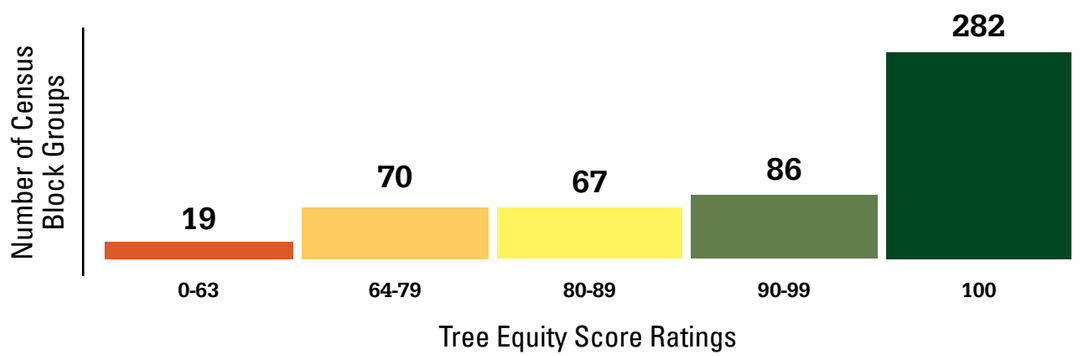


Figure 24. Map displaying tree equity scores (top) and distribution of Census Block Groups by score range (bottom).
Source: Tree Equity Score Tool, American Forests

In addition to differences based on socioeconomic status, canopy cover variations may be due to other factors, such as natural land cover and current or previous land use. For example, the Eastside and Southeast planning sectors contain portions of the eastern Cross Timbers Forest. These undeveloped areas have high amounts of tree canopy cover in proportion to their land area, while others like the Far North planning sector have much lower tree canopy cover. Southwest Fort Worth contains a higher percentage of natural prairie, resulting in less tree canopy cover on undeveloped areas.

Prioritizing Areas of Need for Tree Canopy Cover

Focusing tree planting, preservation, and care in areas with low tree canopy is one way to increase Fort Worth's overall canopy cover. However, using areas of low canopy cover as the only criteria for deciding where these activities occur will not necessarily ensure that tree benefits are maximized.

Understanding the extent and distribution of tree canopy relative to economic, demographic, environmental, and health factors can identify areas of greatest need. To support this goal, tree canopy data was analyzed to develop potential priority planting areas based on the following factors:

Considerations for Prioritizing Tree Plantings

- Ownership Type: Canopy and plantable space on public and private land. Data Source: Fort Worth's 2020 UTC Assessment (TTF)
- Impervious Area and Heat: Areas with the most impervious area and above average surface temperatures. Data Source(s): Fort Worth's 2020 UTC Assessment (TTF), and Tree Equity Score Tool (American Forests)
- Impervious Area and Flooding: Areas with the most impervious area and located within 100 feet of waterbodies. Data Source: Fort Worth's 2020 UTC Assessment (TTF)
- Demographics: Areas with high proportions of minority and lower income populations, and areas with the highest health risk index. Data Source(s): Fort Worth's 2020 UTC Assessment (TTF), Tree Equity Score Tool (American Forests), Centers for Disease Prevention

Data surrounding each of these factors was analyzed to develop a ranked priority planting map. The data was further evaluated to include high priority areas identified by community members during public engagement sessions. Figure 25 illustrates the resulting combined priority planting map.

Combined Priority Planting Map

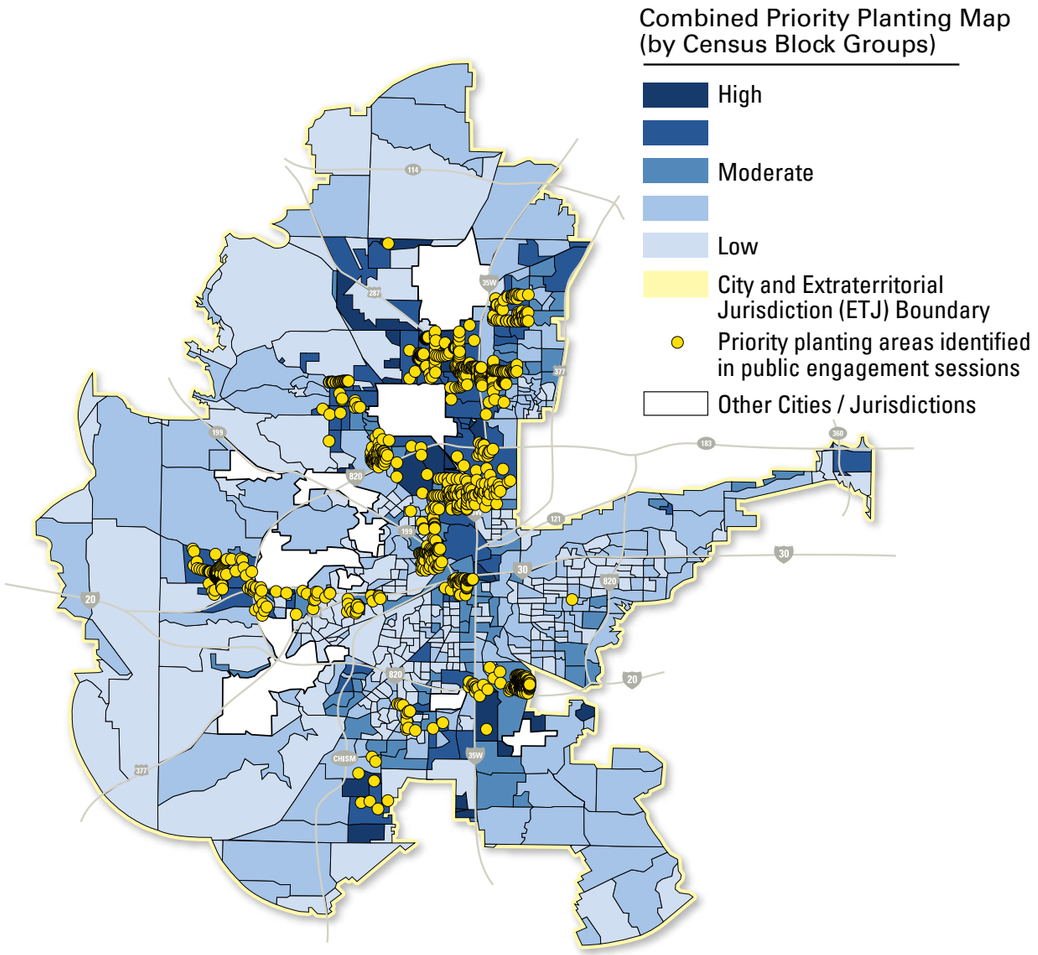


Figure 25. Map illustrates the priority planting areas based on data analysis and community input.

The priority maps provided in Appendix A and in the Data Analyses section (Element 4) of the Technical Report support the City's goal of establishing and maintaining a more equitable urban forest. The City and its partners should review and refine these priorities, further outlined in Element 4 of the Technical Report. Neighborhood-level assessments can then be conducted to create strategic plans that address local challenges. By prioritizing and developing strategies at the local level, tree plantings can be scaled to achieve citywide tree canopy cover goals.

Trees as Infrastructure

What comes to mind when you hear the word infrastructure? Roads, bridges, power lines, and storm drains are common answers, but urban trees fit into this category as well. Like other city infrastructure, urban trees require management and maintenance to succeed. The City of Fort Worth needs a baseline understanding of the composition, structure, condition, and maintenance needs of the trees that make up the urban forest to identify strategies for sustainable management.

The Bottom-Up Approach: Fort Worth's Trees

Types of Trees and Ownership

While the urban forest encompasses all landscapes and trees within Fort Worth's boundaries, this assessment focuses on trees and opportunities in urban areas of the City.

Trees within parklands, public rights-of-way, and city property are referred to as public trees and are under the purview of the Forestry Section of the Park and Recreation Department (PARD). Public trees located on lands purchased by the City's Open Space Conservation Program are maintained by the Forestry Section. The City's Stormwater Management Program manages trees located within drainage easements.

Private trees are those located on residential, commercial, industrial, educational, and other privately owned property. This includes trees planted or preserved as part of private development projects. Private trees are regulated by the Urban Forestry Section of the Development Services Department (DSD).

Figure 26 illustrates city departments' jurisdiction over public and private trees.

PARD Forestry (Park and Recreation Department)
DSD Urban Forestry (Development Services Department)

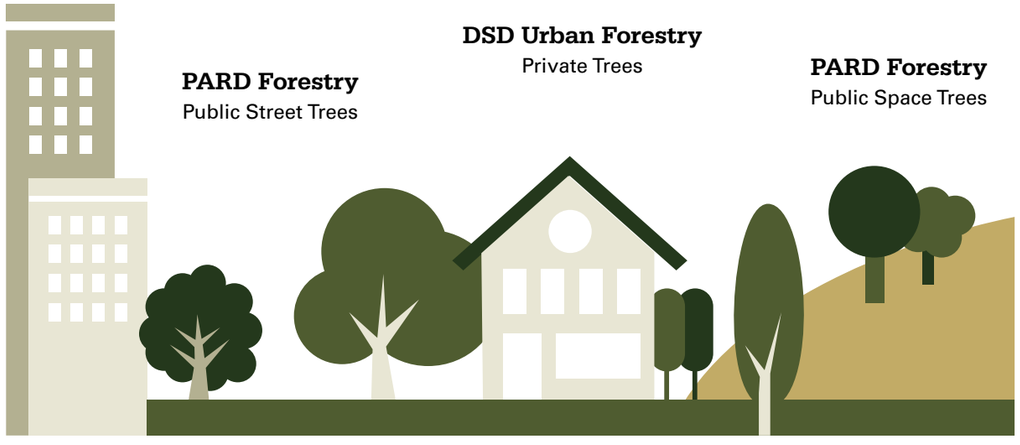


Figure 26. Illustration of the types and ownership of trees comprising the urban forest.

Public Street Trees

Private Residential Trees

Figure 27. Examples of the types of trees and ownership in Fort Worth.

A Closer Look at Fort Worth's Urban Forest

- Tree Species Composition and Structure: The composition and number of public trees was estimated based on a 6.6% sample inventory of street trees performed in 2011. Inventory data indicates there were an estimated 260,954 public street trees in 2011. The City's Forestry Section estimates there are currently over 300,000 street trees.

- Urban Forest Vulnerabilities: Fort Worth's trees face challenges from various sources including human activity, weather patterns, and pests and diseases. Data sources include the U.S. Forest Service Climate Change Tree Atlas, which models habitat vulnerability for the south-central U.S. region and research from the Texas A&M Forest Service, which highlights tree pests and disease.

In the UFMP, the term "Urban Forestry" is used to describe the Development Services Department program with jurisdiction over trees on private property. The term "Forestry" refers to the Park and Recreation Department programs related to public trees. The term "urban forest" refers collectively to trees located on both public and private property. The term "public trees" includes trees along streets, in medians, parks, open spaces and natural areas owned by the City, and on other public properties.

Fort Worth's landscape is a mixture of remnant (pre-settlement) trees and planted trees. Regional data indicates that trees in urban areas of the City have higher tree species diversity than the surrounding native landscapes. Parks, natural areas, and other open spaces tend to have a higher proportion of remnant native vegetation, whereas planted trees (both native and non-native) dominate developed areas. This is particularly evident when comparing converted to existing prairie land.

Tree Species Composition and Structure

Public Tree Counts

Fort Worth does not have a comprehensive inventory of public trees. The most recent data available is a 6.6% sample inventory of street trees that was completed in 2011 using the U.S. Forest Service's i-Tree tool. Results of this study indicate a street tree population of 260,964 in 2011. The sample inventory provides insights on the extent, composition, structure, and maintenance needs of public street trees. However, the accuracy is limited by the time that has elapsed since the study was done. Severe weather events, including prolonged droughts and winter freezes, have negatively impacted the street tree population. However, street trees are frequently incorporated in new development and redevelopment projects throughout the City. Based on these factors, it is estimated that there are currently approximately 300,000 public street trees in Fort Worth. Table 1 on the next page summarizes the available information regarding public trees. Implementation of the UFMP will help to provide additional information on the number and locations of public trees. Additional details are available in Element 4 (Data Analyses) of the Plan's Technical Report.

	Types of Public Trees	Tree Count Estimates*
	Public Street Trees	300,000
	Public Park Trees	Unknown
	Public Property Trees	Unknown
	Total Number of Public Trees	Unknown

* The public street tree estimate is based on a 2011 sample inventory representing 6.6% of the tree population. The study estimated the street tree population at 260,964 trees with a standard error of+/- 38,353, indicating the population may have been between 222,611 and 299,317 trees. Based on the City's planting efforts since 2011, the current street tree population is estimated to be approximately 300,000 trees. It is recommended the City conduct an inventory of public trees to obtain accurate values.

Table 1. Summary of the estimated number of public trees in Fort Worth.

Urban Forest Composition

Tables 2 and 3 provide a summary of the estimated composition of Fort Worth's public street tree population based on the 2011 sample inventory. Due to the time that has elapsed, it is recommended the City conduct an updated sample inventory using i-Tree Eco or data from the U.S. Forest Service's Urban Forest Inventory and Analysis program. This will provide a more accurate picture of the citywide urban forest composition. It is also recommended the City complete a comprehensive public tree inventory, beginning with street trees.

The summaries provided in the following tables give insight on the composition of public trees along streets in the public rights-of-way. Based on the 2011 sample, there are 54 unique tree genera. The tree genera *Celtis* (sugarberry), *Quercus* (oak), and *Ulmus* (elm) are the most common. The ten most common tree species account for 76% of the street trees with sugarberry, cedar elm, and Shumard oak as the most common street trees.

The variety of tree species in an urban forest is known as species diversity. Having a greater diversity of tree species increases the amount and type of benefits produced. It also helps to protect the urban forest from pests, diseases, and extreme weather events. A commonly accepted diversity goal is for no single tree species to account for more than 10% of the population, no genus more than 20%, and no family more than 30% (Santamour, 1990). This rule may be applied at the city, neighborhood, and block level. However, local conditions and the diversity of species recommended for a given area may limit diversity to some extent. Based on the street tree analysis, the genus *Celtis* exceeds the 20% threshold. Sugarberry and cedar elm exceed the 10% threshold for species diversity.

Tree Genera	Tree Type	%	Estimated total
Celtis	Sugarberry	34%	89,337
Quercus	Oak	15%	38,076
Ulmus	Elm	14%	30,047
Lagerstroema	Crape Myrtle	5%	14,093
Fraxinus	Ash	4%	10,041
Carya	Hickory, Pecan	3%	6,926
Sapindus	Soapberry	3%	6,684
Pyrus	Pear	2%	5,353
Morus	Mulberry	2%	3,992
Bumelia	Chittamwood	1%	3,811
Most Common Tree Genera (Top 10)		**83%**	**215,358**
Total		**100%**	**260,964**

Table 2. Public street tree genera based on 2011 sample inventory

Common Name	Scientific Name	%	Estimated total
Sugarberry	Celtis laevigata	34%	89,337
Cedar Elm	Ulmus crassifola	11%	27,884
Shumard Oak	Quercus shumardii	6%	14,879
Common Crapemyrtle	Lagerstroema spp	5%	14,093
Live Oak	Quercus virginiana	5%	13,276
Green Ash	Fraxinus pennsylvanica	4%	9,799
American Elm	Ulmes americana	3%	7,863
Pecan	Carya illinoinensis	3%	6,925
Post Oak	Quercus stellata	3%	6,805
Western Soapberry	Sapindus drummondi	3%	6,684
Most Common Trees (Top 10)		**76%**	**197,547**
Other Tree Species (78 tree species)		24%	63,419
Total		**100%**	**260,966**

Table 3. Most common public street trees by common name based on 2011 sample inventory

The following provides an illustration of the most common street trees in Fort Worth.

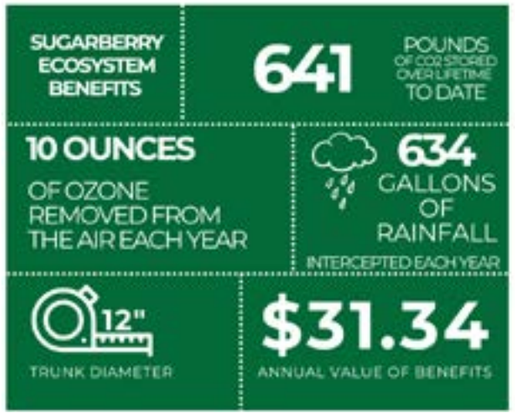
Benefits of Common Street Trees in Fort Worth

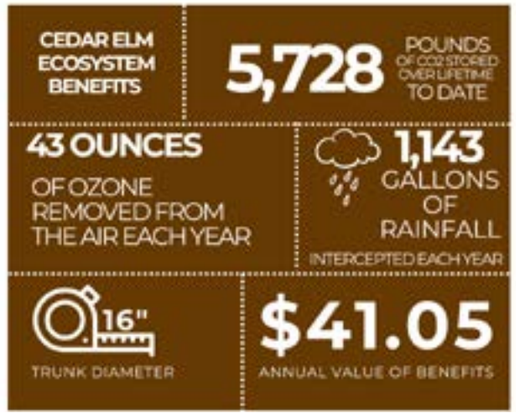
SUGARBERRY

Celtis laevigata

CEDAR ELM

Ulmus crassifolia





Benefits of Common Street Trees in Fort Worth

CRAPE MYRTLE

Lagerstroemia spp.

LIVE OAK

Quercus shumardii

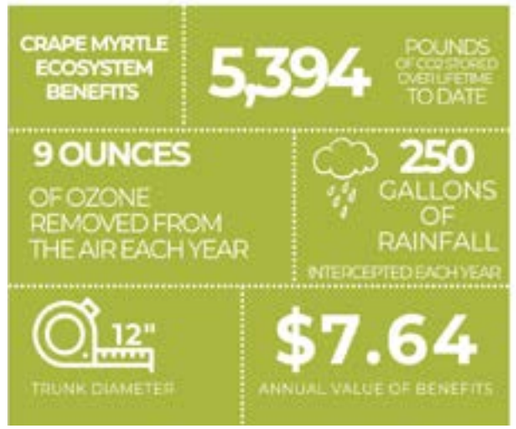


Figure 28. Benefits of four common street trees in Fort Worth. Tree sizes are for illustration purposes and may not be representative of existing street trees. Source: i-Tree, USDA Forest Service. Live oak image provided courtesy of Texas A&M Forest Service.

Urban Forest Structure

The distribution of tree sizes and relative age classes influences the structure of the urban forest, as well as the present and future costs. Relative age is based on a generalization of a tree's size, since trees have various growth rates and form. While Fort Worth does not have current data on the structure of the urban forest, the 2011 sample inventory provides insights into the structure of the public tree population.

Street Trees

An unevenly aged population of street trees offers a continued flow of benefits and a more uniform workflow. This allows managers to accurately allocate annual maintenance schedules and budgets. A healthy population of young trees ensures continued tree canopy as the more mature trees arrive at the end of their lifespans.

To optimize value and benefits, street tree composition should include a high percentage of large canopy trees which provide greater ecosystem benefits. However, available space often plays a determining role in species selection. To prevent future conflicts, small species should be used in spaces that will not accommodate future growth of large shade trees.

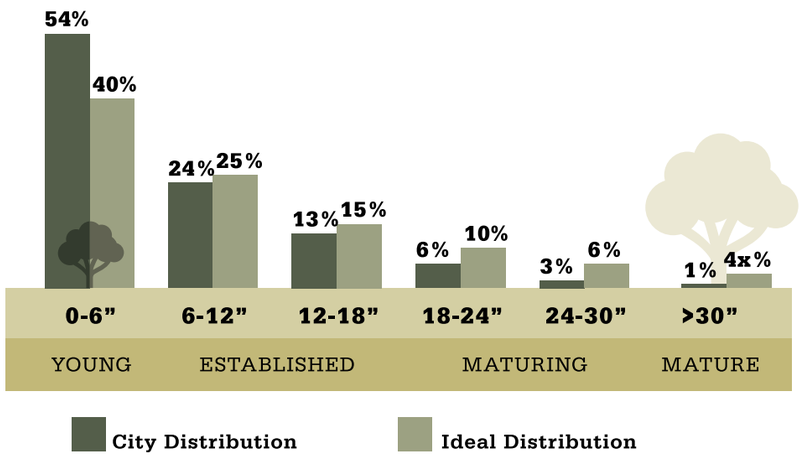


Figure 29. Comparison of the size distribution of Fort Worth's street trees to the ideal distribution in 2011 (Richards, 1983).

The “ideal distribution” (Richards, 1983 and 1993) is used to compare Fort Worth's public tree structure to industry–recommended standards. Figure 29 shows the recommended distribution relative to the existing street tree canopy in 2011. This comparison indicates that the distribution of size classes in Fort Worth is in accordance with the ideal distribution. The majority of Fort Worth's trees are young, smaller–sized trees compared to large maturing trees. This may be a result of the City's tree planting efforts. An ongoing public tree inventory system will enable the City to monitor this distribution and adjust management approaches over time.

Neighborhood Trees

A recent recommendation for neighborhood tree distribution is the 3-30-300 rule, which states that residents should be able to see at least three trees from their residence, each neighborhood should have 30% canopy cover, and each resident should be no more than 300 meters (328 yards) from a public green space Konijnendijk, 2022). This recommendation addresses tree equity and emphasizes ecosystem services. In combination with diversity goals, it can be used as a guideline for evaluating tree and greenspace distribution within neighborhoods.

Urban Forest Vulnerabilities

As noted in the Introduction, Fort Worth's trees face multiple challenges from various sources, including urbanization, extreme weather, and pests and diseases.

Development and Land Use Change

Relative to neighboring metroplex cities, Fort Worth has a large percentage of undeveloped land. However, it is estimated that Fort Worth loses an average of 50 acres per week to development (Trust for Public Land, 2023). By encouraging more dense development along with associated greenspace, Fort Worth can reduce urban sprawl while meeting the needs of a growing population.

Development often results in **fragmentation of tree canopy**, creating isolated populations that are less likely to cross-pollinate. This can reduce biological and genetic diversity of the ecosystem and change the species composition (Fahrig, 2003). It may also result in the loss of buffering potential, such as vegetative stabilization of stream banks. As sites become fragmented and the amount of ecosystem space is reduced, many plants and animals that rely on connected habitats may disappear from the region (Saunders et al., 1991).

Altered Soils

Urban trees must often survive in compacted soils that have been altered for the built environment. A good growing medium for trees contains approximately 50% pore space (which allows the root system access to the air and water it needs to survive) and a layer of organic matter. In contrast, construction soils typically have less than 25% pore space and organic matter combined.

Competition for Space

Conflicts with hardscapes and utilities often occur when trees are not provided adequate space for root and canopy growth. In rights-of-way, trees may compete for space with signs and streetlights, underground utilities, and overhead electric and telephone lines. As trees outgrow available space, their roots can raise sidewalks as they search for water, air, and growing space. The resulting sidewalk repairs may require removal of the tree or application of alternative sidewalk solutions. The City has regulations and best management practices (BMPs) for addressing these situations. The prevention of future conflicts requires streetscape design that considers the mature size of trees being planted, as well as available technologies that allow trees to thrive in this environment.

To prevent and address negative impacts from development, the City of Fort Worth coordinates efforts to ensure projects adhere to City requirements, such as tree canopy cover, stormwater management, public safety, and accessibility. The City's Urban Forestry Ordinance and permitting requirements on public property mandate tree preservation and planting as part of development of private and public property. It is important that these regulations and policies be updated and enforced to meet the changing needs of a fast-growing city.

Figure 30. An example of a tree outgrowing its space and in conflict with utilities.

Figure 31. Example of tree loss due to development. Note: the project complies with the City's Urban Forestry Ordinance, and the image serves as demonstration only.

Urban Heat

Like many urban areas, Fort Worth is experiencing the detrimental effects of excessive summer heat. Urban heat is a phenomenon that describes the higher air and surface temperatures in urban areas compared to surrounding rural areas. The temperature difference is largely due to the prevalence of buildings, roads, and other elements of the built environment that absorb and retain heat. Increased emissions of greenhouse gases and reduced tree canopy serve to magnify these impacts. Without strategic intervention, urban heat threatens the well-being and health of the community, particularly vulnerable populations lacking the cooling shade of trees.

With urban heat increasing, the concern of tree decline is at the forefront of planning in urban areas. To understand Fort Worth's urban forest vulnerability to urban heat, analyses were conducted to measure and project potential impacts on its trees. These impacts include:

- **Increased stress on trees:** Urban heat adds to stress that trees already face from other factors, such as air pollution, drought, and pests, making it more difficult for trees to survive and thrive.
- **Reduced tree growth:** Urban heat can slow down tree growth, which can lead to a decline in the overall health of the urban forest.
- **Increased tree mortality:** Urban heat increases the risk of tree loss, which can lead to gaps in the urban forest.
- **Reduced air quality:** Urban heat tends to hold pollutants in the atmosphere, worsening air quality. This places an additional burden on trees' air purifying capabilities, while also having a negative impact on human health and the environment.
- **Changes in plant communities:** Urban heat can lead to changes in the composition of plant communities, as some species are more tolerant of heat than others. This can lead to a loss of biodiversity in the urban forest.

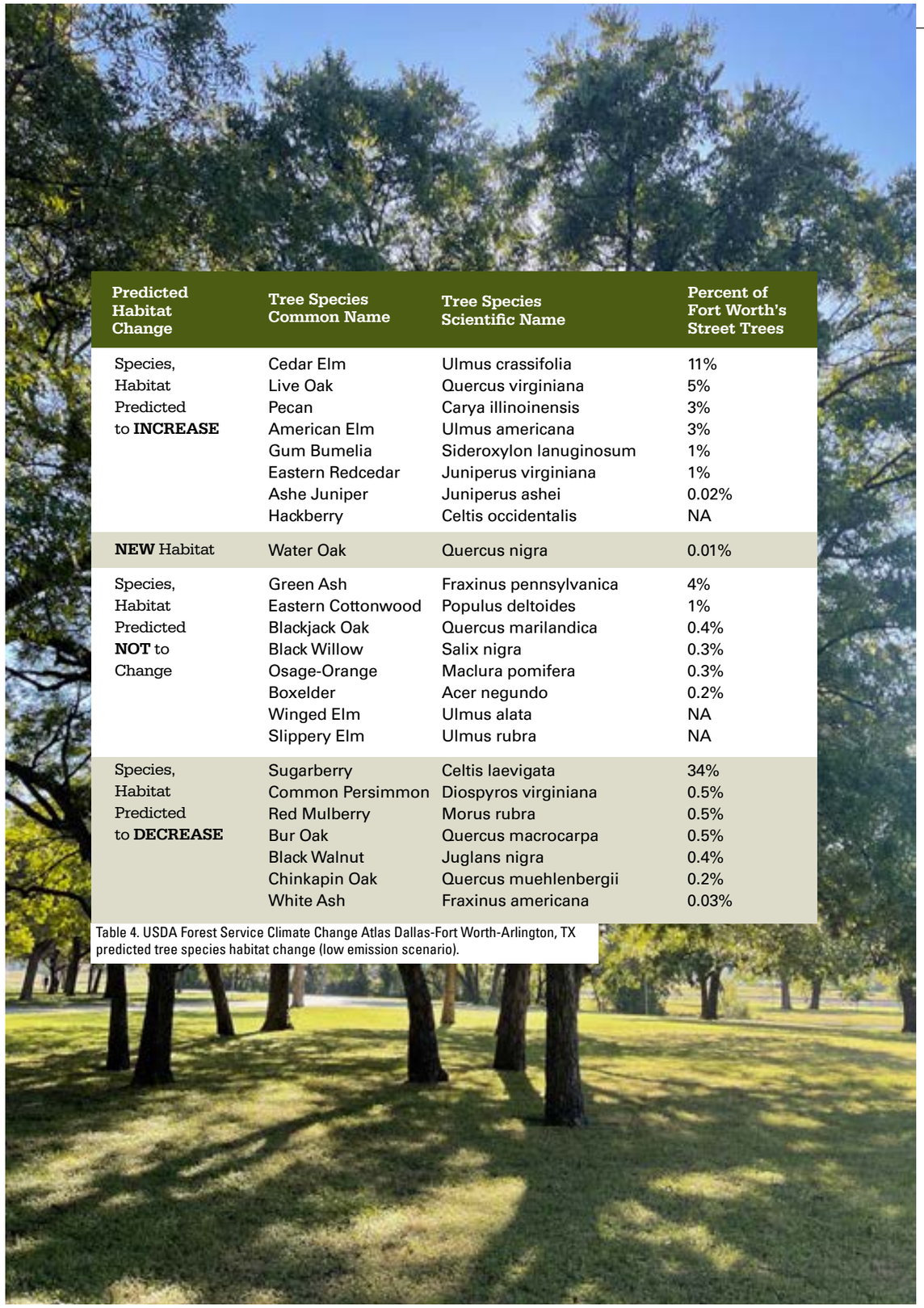
Extreme Weather

Changing weather conditions pose a significant challenge to the health of Fort Worth's urban forest. Rising summer temperatures, droughts, flooding, and severe winter storms and cold spells have taken a toll on trees throughout the state. Changing weather patterns may impact the tree species that are able to thrive in Fort Worth, as some existing species may not be able to adapt to changing conditions.

Changes in Plant Communities

The USDA Forest Service Climate Change Tree Atlas utilizes models to measure the current and future distribution of 134 native tree species in the eastern United States based on projections of changing conditions. The Atlas provides predicted habitat changes for tree species growing in the south-central region of the United States, which includes Texas. However, Texas is on the western edge of this region and many of Texas' native species are not currently modeled in the Tree Atlas (Iverson, et al., 2019).

Table 4 lists species that may be found growing in Fort Worth (though they may not be native) and their predicted vulnerability to habitat loss due to changing conditions. Based on the 2011 sample inventory, the study indicates that 36% or 94,660 street trees are potentially vulnerable to changing conditions. This table should be revised as information on the resilience, adaptation, and vulnerability of tree species becomes available.



Predicted Habitat Change	Tree Species Common Name	Tree Species Scientific Name	Percent of Fort Worth's Street Trees
Species, Habitat Predicted to **INCREASE**	Cedar Elm	Ulmus crassifolia	11%
	Live Oak	Quercus virginiana	5%
	Pecan	Carya illinoinensis	3%
	American Elm	Ulmus americana	3%
	Gum Bumelia	Sideroxylon lanuginosum	1%
	Eastern Redcedar	Juniperus virginiana	1%
	Ashe Juniper	Juniperus ashei	0.02%
	Hackberry	Celtis occidentalis	NA
NEW Habitat	Water Oak	Quercus nigra	0.01%
Species, Habitat Predicted **NOT** to Change	Green Ash	Fraxinus pennsylvanica	4%
	Eastern Cottonwood	Populus deltoides	1%
	Blackjack Oak	Quercus marilandica	0.4%
	Black Willow	Salix nigra	0.3%
	Osage-Orange	Maclura pomifera	0.3%
	Boxelder	Acer negundo	0.2%
	Winged Elm	Ulmus alata	NA
	Slippery Elm	Ulmus rubra	NA
Species, Habitat Predicted to **DECREASE**	Sugarberry	Celtis laevigata	34%
	Common Persimmon	Diospyros virginiana	0.5%
	Red Mulberry	Morus rubra	0.5%
	Bur Oak	Quercus macrocarpa	0.5%
	Black Walnut	Juglans nigra	0.4%
	Chinkapin Oak	Quercus muehlenbergii	0.2%
	White Ash	Fraxinus americana	0.03%

Table 4. USDA Forest Service Climate Change Atlas Dallas-Fort Worth-Arlington, TX predicted tree species habitat change (low emission scenario).

Tree Pests and Diseases

Pests and diseases add to the existing stresses faced by trees in an urban environment. Stressed trees are more vulnerable to insects and diseases, although some pests and diseases pose an equal threat to healthy trees. Changing conditions, such as temperature and precipitation, can create environments that are favorable for the spread of some pests and diseases. In Fort Worth, the primary pest and disease threats include the following:

Figure 32. Example of leaf discoloration and tree decline due to oak wilt. Source: Texas A&M Forest Service

Oak Wilt is a fungal pathogen (*Bretziella fagacearum*) that invades the vascular system of oak trees. It has been confirmed in 76 north, central, and west Texas counties including Tarrant County. While all oak trees are susceptible, live oak and red oak species are the most commonly affected trees. This disease attacks and kills healthy trees, as well as stressed trees and has been responsible for the deaths of millions of trees in affected regions of Texas (Texas A&M Forest Service, March 2022).

Figure 33. Emerald ash borer beetle. Source: USDA APHIS

The Emerald Ash Borer (EAB) is an invasive pest that is native to east Asia. It was first identified in the United States in 2002. Its presence in Fort Worth was confirmed in 2018. The insect attacks and kills healthy, as well as stressed trees, causing catastrophic loss to all ash (*Fraxinus*) species. Its impact on the structural integrity of host trees can cause these trees to become safety hazards. It is estimated that ash trees comprise approximately 5% of urban forests in Dallas/Fort Worth (Texas A&M Forest Service, May 2022).

Dutch Elm Disease (DED) is caused by a fungus (*Ophiostoma ulmi*) that infects the vascular system of elm (*Ulmus*) trees. DED was found in Texas in the 1970s, and small outbreaks have occurred in the Dallas/Fort Worth area, Lufkin, and Waco (Appel et al., 2021). The disease can impact a number of different elm species, but in Texas, it is most commonly found in American elm (*Ulmus americana*).

Abiotic Factors

Abiotic stresses are caused by changes in the environment, such as precipitation, heat, and soil level, that alter or interfere with the tree's natural processes. These can be harder to diagnose, because it may take years for visible symptoms to appear.

Biotic Factors

Biotic stress is caused by a living organism, such as insects, fungi or bacteria. Most biotic pests have evolved in conjunction with a species of tree and have become specific to those trees. Source: Texas Trees Foundation.

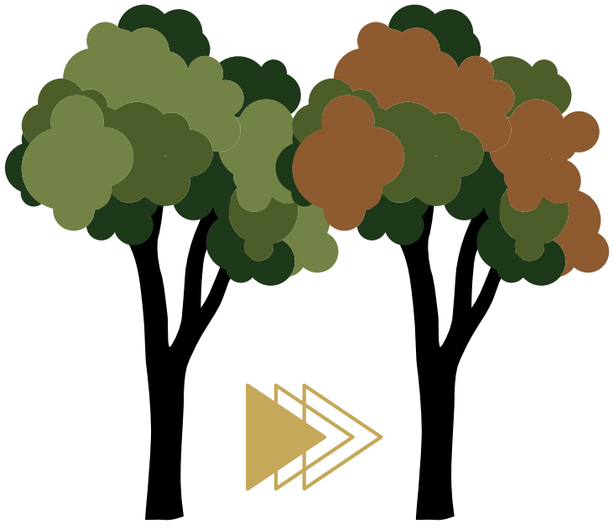


Figure 34. Illustration and definition of the types of tree stressors.

Figure 35. Cotton root rot on a young pecan tree. Source: Texas Pecan Growers Association

Cotton Root Rot is caused by a fungus (*Phymatotrichum omnivorum*) that can attack more than 2,000 species of plants, including ornamental, fruit, nut, and shade trees. The fungus spreads through plants' root systems, but can survive in the soil for many years (Texas A&M Agrilife Extension Service).

Bacterial Leaf Scorch (BLS) is a systemic disease caused by the bacterium *Xylella fastidiosa* that disrupts the transportation of water through the tree. It is commonly transmitted by insects with piercing mouthparts, impacting sycamore, sweetgum, American elm, and various maple, oak, and other tree species (Texas A&M Forest Service). With higher temperatures and drought, the impact of BLS on Fort Worth trees is likely to increase.

Hypoxylon Canker is a common disease of many trees in Texas, such as oak, pecan, elm, sycamore, and yaupon. It typically infects stressed trees, causing white rot decay of the sapwood. It is expected that more of Fort Worth's trees will be affected due to stress from projected biotic and abiotic conditions (Griffin, J., Texas A&M AgriLife Extension).

Fort Worth's Key Urban Forest Programs

- **Volunteer opportunities for tree stewardship and education**
- **Tree giveaways with trees produced at the City's Tree Farm**
- **Events celebrating and educating attendees about Fort Worth's urban forest**
- **Training and volunteer opportunities for the Cross Timbers Urban Forestry Council's Citizen Forester Program**
- **Planting and maintaining trees in support of Neighborhood Services' Neighborhood Improvement Program**

The Care and Management of Trees in Fort Worth

The City of Fort Worth has a long history of support for its trees, having hired its first arborist almost 100 years ago. Today, multiple City departments impact various aspects of the urban forest. However, the two main departments with tree care and management responsibilities are the Park and Recreation Department for public trees and the Development Services Department for private trees.

City Departments

Forestry Section | Park and Recreation Department (PARD)

The Park and Recreation Department maintains approximately 300 parks and public spaces and provides recreational activities and educational programming for Fort Worth residents and visitors. The Operations Section oversees the daily operations of the City's parks, performs basic pruning, and assists with clearing storm damage from parks and other public facilities. The Planning and Operations Division includes the Forestry Section, which is responsible for the care and maintenance of public trees, including regulation of planting, pruning, or removal of trees on public property.

The Forestry Section operates the 71-acre municipal Tree Farm, where trees are grown from locally harvested seed. These trees are planted on public property and schools through the Tree Grant Program or provided directly to residents through the Neighborhood Tree Planting Program. Tree farm operations are funded primarily through gas lease revenues and grants. Mitigation projects, such as planting trees in parks, are supported by tree removal fees and fines.

The Forestry Section provides education and training for the Cross Timbers Urban Forestry Council's Citizen Forester Program. Staff also train volunteers for tree planting, data collection, and ongoing care and maintenance of the tree farm. Additional services include hosting outreach events, such as the annual Arbor Day celebration, providing free trees at Mayfest, and conducting various tree planting projects.

Urban Forestry Section | Development Services Department (DSD)

The Development Services Department (DSD) works with applicants from the planning stage through project completion. DSD offers pre-development conferences to identify requirements for proposed development and land use, reviews plat and permit applications, conducts inspections, and issues certificates of occupancy.

The Urban Forestry Section of the Development Services Department enforces the Urban Forestry Ordinance, which regulates tree removal on private property and mandates tree preservation and planting on new development. Staff work with other sections and departments to ensure the ordinance is enforced throughout the development process. The Urban Forestry Section supports the departmental mission to make Fort Worth the most livable city in Texas by promoting sustainable growth and development and a healthy environment.

The Urban Forestry Section is part of the **Zoning and Design Review Division** of the Development Services Department. The other divisions within the department are: **Development Coordination, Development Support, Infrastructure, Plans Exam/Permits/Inspections, and Communications.**

Transportation and Public Works Department

The Transportation and Public Works Department is responsible for overseeing the planning, design, construction, maintenance, and operations of transportation-related infrastructure within the City. The Department consists of three divisions: **Street and Stormwater Operations, Transportation Management, and Stormwater Management.** These divisions interface with Forestry regarding street trees, and with Urban Forestry regarding stormwater management facilities on private property.

Environmental Quality Division | Code Compliance Department

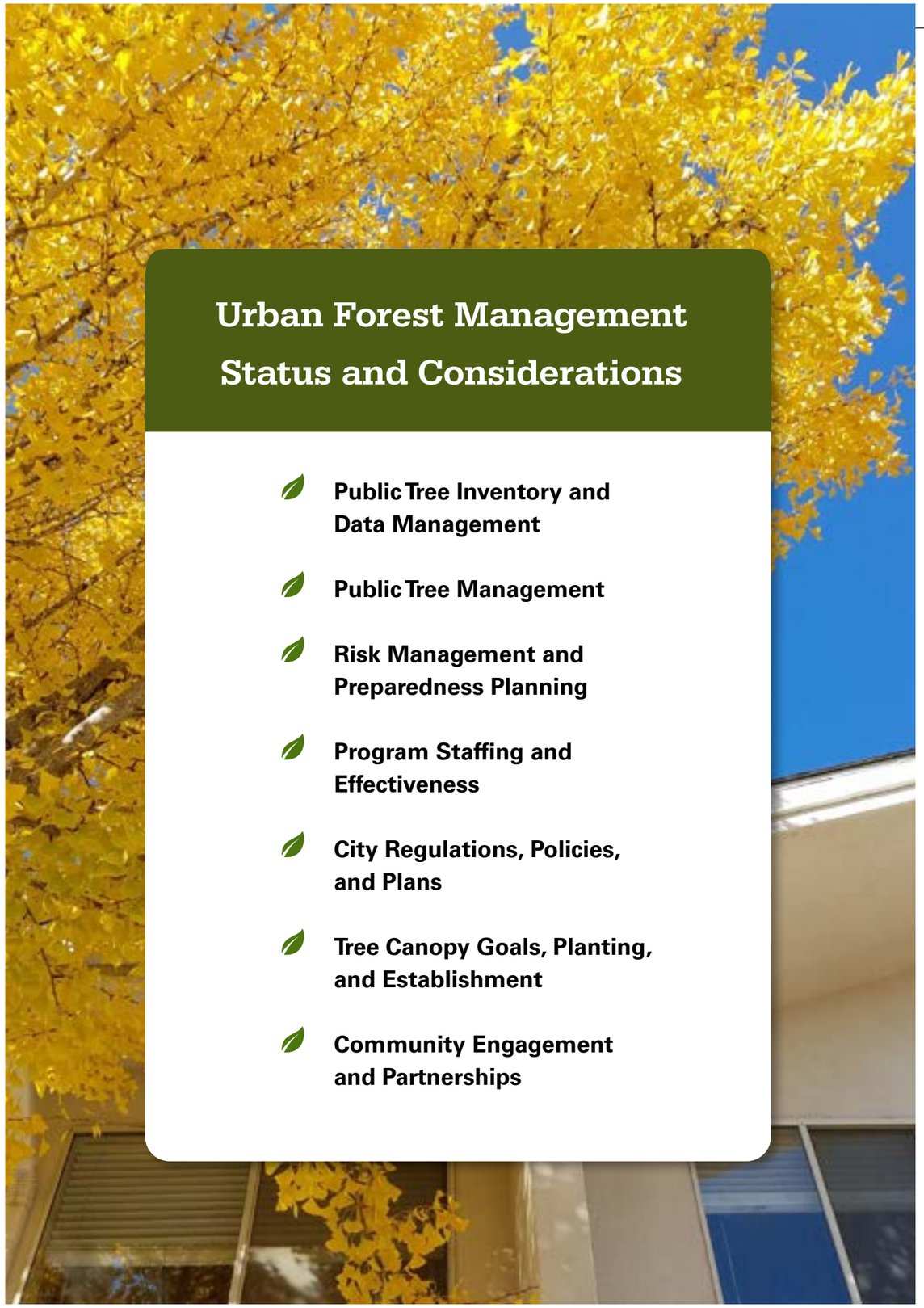
The Code Compliance Department conducts inspections and enforces regulations to maintain Fort Worth's status as a clean, livable city. **The Environmental Quality Division** performs construction inspections for stormwater and sediment control, air quality monitoring, and inspections for stream health and compliance with the City's Municipal Separate Storm Sewer System (MS4) permit. The Division's Keep Fort Worth Beautiful program conducts public education and works with volunteers to improve the environment through litter cleanup, recycling, stream restoration, and sustainability projects.

Neighborhood Improvement Program | Neighborhood Services Department

The Neighborhood Services Department focuses on building better neighborhoods and improving the quality of life for residents. The Neighborhood Improvement Program (NIP) is a pilot program which identifies neighborhoods in most need of assistance and facilitates projects to meet their needs. Projects often include tree plantings in street rights-of-way or neighborhood parks. The Forestry Section handles the planting and maintenance of these trees, including watering newly planted trees until established.

Diversity & Inclusion Department

The City of Fort Worth's Diversity and Inclusion Department promotes the values of diversity, equity, inclusion, and access as they apply to the City's employee and labor relations, its provision of municipal services and capital investments, and the quality of life that all Fort Worth residents experience. The department focuses on the following areas: Business Equity, Civil Rights Enforcement, Community Outreach, Municipal Equity, and Accessibility and Accommodations.



Urban Forest Management Status and Considerations

- **Public Tree Inventory and Data Management**
- **Public Tree Management**
- **Risk Management and Preparedness Planning**
- **Program Staffing and Effectiveness**
- **City Regulations, Policies, and Plans**
- **Tree Canopy Goals, Planting, and Establishment**
- **Community Engagement and Partnerships**

Public Street Trees

The City has jurisdiction over all trees within public rights-of-way including medians and parkways, typically defined as the first 10 feet from the curb. The Forestry Section of the Parks and Recreation Department (PARD) maintains these trees through the hazard abatement program. The program prunes trees for public safety, ensuring visibility at intersections and maintaining clearance for emergency vehicles. Hazard abatement requests are prioritized based on the level of hazard a tree presents. The Hazard Abatement program is responsible for the estimated 300,000 trees in street rights-of-way and an unknown number of trees in parks and other municipal property.

Although the City maintains jurisdiction, the adjacent property owner benefits from trees in the parkway and is typically responsible for watering them. Requests for hazard abatement pruning often come from the adjacent property owner. However, property owners who wish to prune trees for aesthetic purposes or would like work done more immediately may apply for a pruning permit. The permit requires that work be done in accordance with industry standards by a Certified Arborist accredited by the International Society of Arboriculture, or pre-approved equivalent credentials. The shared responsibility necessitates consistent and effective public education from the City to ensure the health and sustainability of public street trees.

Public Tree Inventory and Data Management

The foundation of a sustainable municipal urban forest program is a comprehensive understanding of the public trees under its purview. Cities across the country conduct inventories of public trees to understand the location, composition, structure, and other information to inform data-driven strategies, programs, and budgets.

An updated inventory of public trees will provide vital information about their condition, composition, maintenance needs, and potential risks. This inventory will serve as a foundation for prioritizing tree care activities, delivering cost-effective forestry services, and developing policies to maximize tree benefits while minimizing hazards. Utilization of tree inventory data will help to identify the necessary resources, including funding, staff, and equipment to ensure a sustainable, safe, and resilient urban forest.

Fort Worth's Forestry Section provides exceptional services to mitigate hazards observed or reported to them. However, the program is primarily reactive due to limited resources and a lack of current tree inventory data. The most recent data currently available is from a sample street tree inventory conducted in 2011. The City is considering options for updating and expanding the inventory, including the U.S. Forest Service Forest Inventory Analysis (FIA) program to update the public tree inventory data.

Proactive Tree Maintenance

One measure of sustainable management is the number of years it takes to prune all public trees, also referred to as the pruning cycle. Routine maintenance is the most cost-effective short- and long-term pruning management strategy for street tree maintenance. Efficiencies in mobilization, scheduling, and service tracking allow preventive and reactive maintenance to be performed in one operation, reducing the need for future priority pruning. Conversely, street trees that are not pruned on a regular cycle are frequently more costly to maintain when the need arises. A programmed pruning cycle of 5 to 7 years is typically recommended for public street trees. Studies show a decline in tree health and increase in maintenance costs associated with longer pruning cycles (Miller, et al., 2015).

Fort Worth recently approved funding for a structural pruning program and created a contract compliance position to oversee the program. This program will allow the City to take advantage of the economic and risk management benefits of proactive maintenance. An updated public tree inventory will serve to enhance the pruning program and inform pruning prioritization.

The Forestry Section should utilize inventory data and monitor the trees that are structurally pruned to support future budgetary and staffing requests. The City should also continue its efforts in raising awareness and educating the public about:

- **Forestry's role in care and maintenance of street trees**
- **Forestry's hazard abatement program**
- **Procedures for requesting pruning of hazardous trees**
- **The importance of utilizing Certified Arborists to perform tree care**
- **Responsibilities of adjacent property owners, including watering existing trees and obtaining a permit before planting, pruning, or removing a street tree**

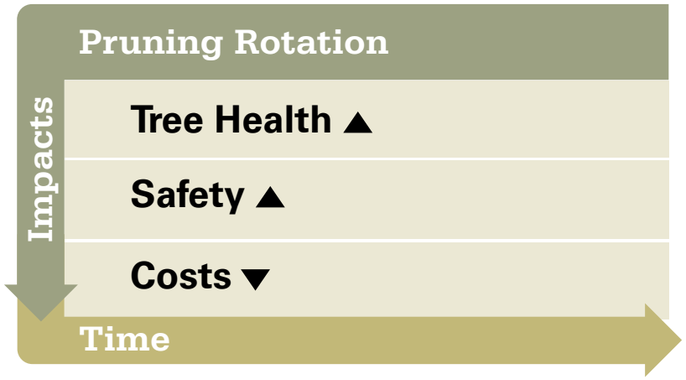
Contracting Public Tree Inventory Services

Many Texas cities request proposals for professional services to conduct public tree inventories. Considerations and best practices for tree inventories include:

- **Require 5 or more years experience conducting similar projects.**
- **Specify use of ISA Certified Arborists for tree inventories.**
- **Identify the necessary and optional data to collect.**
- **Evaluate software options for data collection and management.**

Source: Texas A&M Forest Service

Benefits of Proactive Tree Maintenance



Shorter pruning cycles result in increased safety and tree health and reduced costs.

- **Proactive pruning reduces per-tree pruning costs compared to reactive pruning done in response to storm damage.**
- **Proactive pruning eliminates sight clearance and immediate risks.**
- **Early identification and correction of insect and disease problems can reduce tree mortality.**
- **Properly pruned trees develop correct form and structure and are less susceptible to storm damage.**
- **Trees pruned on a regular cycle, especially when young, require less work in the future, lowering maintenance costs.**
- **Pruning before trees become hazardous reduces the number of tree-related service requests, decreasing response time.**
- **Proactive tree pruning helps to create a healthy, sustainable, and resilient urban forest.**

Public Support for a Sustainable Urban Forest

It is important for the City to share best management practices with property owners and to make them aware of the estimated costs associated with tree maintenance over time. Published studies estimate an average annual maintenance cost of $19 per year for a medium-size public street tree. This estimate is based on costs accumulated over a 40-year lifespan, although many trees can survive longer with proper care. The estimated cost includes planting (15%), pruning (45%), plant health care (35%), and removal (5%). More intensive care may be required in the early stages of growth to ensure the tree survives and thrives while dealing with challenges, such as urban heat and prolonged periods of drought. Adequate water and proper pruning of young trees (the first 5 years on average) is critical to a tree's survival. Hence, proper establishment and care in the short-term can reduce the long-term costs of street tree care (McPherson et al., 2016).

Property owners can help to ensure the health of adjacent street trees by monitoring trees for potential pests, diseases, and hazards, and contacting the Forestry Section when maintenance is required. Additionally, planting and caring for trees on private property will multiply the effect on the urban forest. Whether planted on public or private property, species and location should be in accordance with "right tree, right place" practices: **www.arborday.org/trees/righttreeandplace/**

For resources and programs on tree care and planting, visit the websites of the City of Fort Worth Forestry Section at **www.fortworthtexas.gov/departments/parks/services/forestry** and the Texas Trees Foundation at **www.texastrees.org**

Risk management is a well-established concept in the management of public spaces. Acceptable levels of risk have been recognized or defined for most basic infrastructure elements, such as sidewalks, streets, playgrounds, and utilities. In many communities, these elements are assessed and managed according to acceptable levels of risk that are specified within written policies or enacted through management practices. A successful risk management program provides a systematic approach to implement corrective actions within a reasonable timeframe.

Tree risk is managed in much the same way. Trees are evaluated for their potential to injure people or damage property. The Fort Worth Forestry Section's hazard abatement work is prioritized in the following manner:

Tree Risk Management and Preparedness Planning

- **Emergency:** An immediate threat to person, property, or commerce. Example: Tree uprooting and leaning toward a busy playground or a tree fallen and blocking all lanes of traffic on an arterial street.

- **Urgent:** A threat to life, property, or commerce that can be barricaded and made safe until the risk can be mitigated. Example: Large broken branch over the sidewalk in front of an elementary school.

- **Priority 1:** Significant and obvious danger. Example: dead tree in poor condition, serious traffic hazard, broken limbs, fallen trees.

- **Priority 2:** Hindrance or nuisance but not an immediate danger. Example: Dead trees which are still solid, trimming of dead wood and low limbs over sidewalks, minor traffic hazards.

- **Priority 3:** Routine maintenance that presents either a low or no safety risk. Examples: Minor trimming, limbs safely down on the ground/trunk removal in low use areas.

Fort Worth's hazard abatement program is comprised of two in-house crews and contracted crews working under annual purchasing agreements. These crews perform tree care related to trees that are on or affecting City-owned property. The program receives more than 3,000 service requests and addresses tens of thousands of trees annually. Feedback from service requests has been overwhelmingly positive.

It is recommended that risk assessors maintain International Society of Arboriculture's Tree Risk Assessment Qualification (TRAQ) and that the City continue to apply the American National Standards Institute's (ANSI) A300 Standards. Additional details are provided in the Recommendations Section of the Technical Report to the Urban Forest Master Plan, under Tree Risk Management.

Tree-related storm response and disaster preparedness planning is administered by the Forestry Section. The Storm Mitigation Plan was last updated in 2022. Topics addressed include chain-of-command, activation and response procedures, prioritization of calls, documentation, and interdepartmental coordination.

According to the FEMA National Risk Index, Tarrant County is in the 98.82 percentile nationally, and in the 97.60 percentile in Texas. Nationally rated risks percentiles include cold waves (97.4), hail (100.0), heat waves (97.7), ice storms (90.2), flooding (97.1), strong winds (92.2), tornados (99.9), wildfires (95.3), and winter weather (97.9).

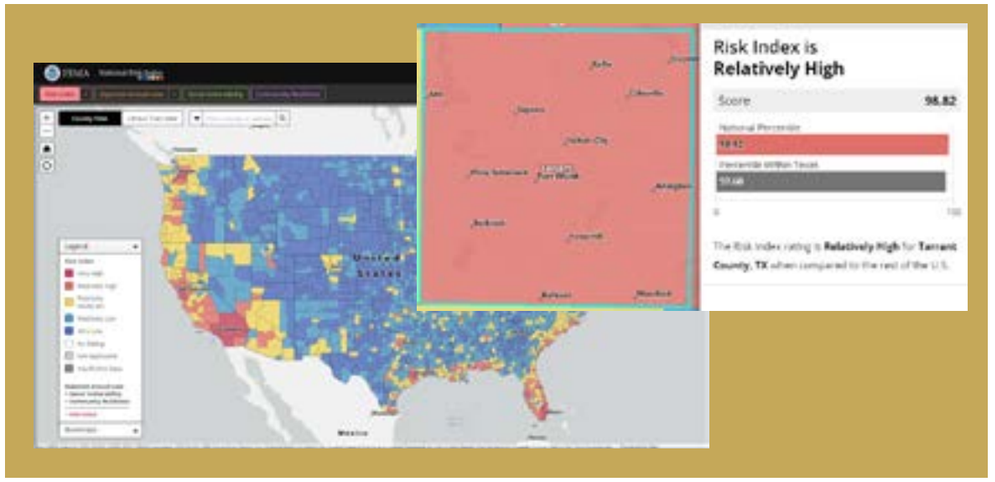


Figure 36. FEMA's National Risk Index for Tarrant County, TX.

Due to Fort Worth's high weather-related risk, it is vital for the City to periodically review and update the Storm Mitigation Plan to effectively prevent or mitigate damage caused by trees during storm events. The Storm Mitigation Plan supports the City's public safety, tree canopy cover, equity, and sustainability and resiliency goals and policies.

Objectives of a storm response and disaster preparedness plan:

- **Reduce the amount and severity of the damage and losses to people, property, the economy, and the environment that results from tree failures during storm events.**
- **Reduce tree canopy cover losses resulting from storm events.**

Purpose of a storm response and disaster preparedness plan:

- **Provide information and set policies.**
- **Describe actions to be taken related to trees and the urban forest.**
- **Effectively prepare for, respond to, and recover from a storm event.**
- **Support the expansion of funding resources for tree maintenance, debris management, and post-storm tree replacement.**

Additional details are provided in the Recommendations Section of the Technical Report to the Urban Forest Master Plan, under Urban Forest Emergency Preparedness and Response Strategy.

Storm Response and Disaster Preparedness

Extreme weather events are happening more frequently and with even greater intensity in the Fort Worth area. Recent notable events include:

- **10 tornadoes spotted across North Texas in May 2015**
- **A severe wind event in June 2019**
- **The historic winter storm and the arctic outbreak in February 2021**
- **17 tornadoes spotted across North and Central Texas in May 2022**
- **A sleet and ice event in late January through early February 2023**

These and other extreme weather events had a significant impact on trees in Fort Worth. Downed trees, limbs and debris can cause road closures, power outages and hazardous conditions.

Fort Worth is one of the few cities in Texas to have a Storm Mitigation Plan and Standard Operating Procedure for tree debris management. These plans and procedures help the City to minimize damage, costs and risks relating to trees.

A comprehensive inventory of public street and park trees would enable Fort Worth to improve its planning, response and recovery efforts relating to extreme weather events.

Program Staffing

Staffing Levels

Many cities struggle to maintain adequate staffing and resource allocation. Available resources may cover short-term needs while neglecting important initiatives necessary to sustain long-term urban forest management. Determining and maintaining optimal staffing levels is critical to a program's efficiency. Optimal staffing depends on several factors, including the number of public trees, how authority and responsibility are defined in the municipal code, internal and external expectations, operations, and existing programs and policies. Understaffed programs typically contend with excess overtime, morale issues, absenteeism, employee burnout, and difficulty with relief coverage and training requirements.

In Fort Worth, Forestry Section staff review permits and agreements related to public trees and perform hazard abatement, tree planting and maintenance, inspections, enforcement, and public education. Urban Forestry Section staff perform permit reviews for projects on private property, GIS entry of permit data, inspections, enforcement and compliance assistance, review and presentation of waiver requests with staff recommendations, and drafting of proposed amendments to the urban forestry ordinance. The City should evaluate the responsibilities and staffing levels within the Forestry and Urban Forestry Sections to ensure they are sufficient to meet the needs of the urban forest, the community, and goals of the Urban Forest Master Plan.

The City of Fort Worth's commitments to public health and safety, combatting urban heat, and addressing inequities translate into a growing demand for both long-term initiatives and the staff to implement them. The Forestry and Urban Forestry sections can utilize the following criteria to assess demand and staffing needs.

Evaluating Program Effectiveness and Staffing Levels

- **Identify and Analyze** responsibilities and staffing over time
- **Measure** the effectiveness in maintaining an inventory of public park and street trees
- **Evaluate** the costs for maintenance compared to tree benefits and services
- **Analyze the public tree database to understand and consider:** species and age diversity, relative performance of species, improper pruning incidents, frequency of tree and hardscape conflicts, presence of known tree pests and diseases and/or vulnerability of public trees, structural issues caused by deferred maintenance or lack of young tree pruning, tree establishment success, resilience to changing conditions, distribution of tree benefits and services, among others
- **Monitor** development impacts on tree canopy and effectiveness of regulations
- **Evaluate** effectiveness of enforcement activities to determine if additional resources or methods are needed
- **Evaluate** the effectiveness of programs and resources for tree hazard abatement and risk management
- **Measure** the response time for citizen service requests
- **Understand** the requirements and resources needed to plant and maintain an urban forest that grows into 30% canopy cover
- **Measure** the progress towards achieving the citywide tree canopy cover goal
- **Analyze** the effectiveness of community trainings, events, and volunteer management
- **Understand** the resources required to effectively remove barriers for inclusive and equitable community outreach, education, and engagement
- **Identify** areas where urgent short-term needs are frequently given priority over important long-term initiatives

City Regulations, Policies, and Plans

Regulations and Policies

Fort Worth's regulations and policies are an important component of a sustainable urban forest program. They establish the regulatory framework for the protection and preservation of the urban forest by regulating tree removals and requiring tree planting and maintenance. The City's tree-related ordinances and permits were reviewed against a set of criteria developed using research, industry standards, and best practices. Results are included in Element 1 of the Technical Report.

Tree Preservation Ordinances – Statewide Comparison

A 2019 study conducted by Lavy and Hagelman identified 60 cities in Texas with Tree Preservation Ordinances (TPOs). All of these cities were in or near one of three fast-growing metropolitan areas (Dallas-Fort Worth-Arlington, Austin-Round Rock, and Houston-The Woodlands-Sugar Land). The following observations and comparisons are based on this study (Lavy, Brendan L. and Hagelman III, Ronald R., 2019).

TPO ordinances with purpose statements referenced one or more of the following sustainability benefits of urban forests: environmental, social, and economic. Environmental benefits were the most frequently referenced, followed by social, with very few references to economic benefits. The purpose statement in Fort Worth's urban forestry ordinance contains references to all three categories, with the greatest emphasis on environmental benefits.

The study noted that tree protection on public property is greatest in the Dallas-Fort Worth-Arlington area. In Fort Worth, removal of trees from public property requires mitigation in the form of additional planting and/or payment into the tree fund. Development projects that include construction of either a parking lot or a structure that meets the applicability section of the UF ordinance must also meet urban forestry preservation and planting requirements.

Fort Worth's tree removal regulations apply to trees that are 6" or larger, which is consistent with the study findings for the DFW area. The urban forestry ordinance contains additional requirements for removal of trees 27" or larger citywide, and for removal of specific Cross Timbers species 18" or larger when located east of I-35. The tree removal permit for public property contains additional requirements for removal of tree 30" or larger. The mean diameter for mature tree protection in DFW was determined to be 24.75".

As with most other cities studied, Fort Worth does not regulate tree removal in the extra-territorial jurisdiction (ETJ). Unregulated tree removal prior to annexation may be partly responsible for the variance in tree canopy cover in the limited purpose annexation areas (5%) vs the citywide canopy cover (19%). However, Fort Worth has begun including tree preservation requirements in some of the service agreements with companies developing residential subdivisions in the ETJ.

The study noted that the impact of TPOs is limited by exemptions and by a lack of protection for the existing urban forest structure. Fort Worth's ordinance contains exemptions for multiple design districts across the City and for single-family residences located on lots smaller than one acre. Design districts are required to have urban forestry standards. However, most of these apply only to tree planting and do not address tree removal. In residential subdivisions, developers must plant a required number of trees, but homeowners are not required to obtain a permit to remove trees. Similarly, other forms of development are required to plant and maintain trees for two years (or until established), but the ordinance does not require them to maintain the canopy coverage over the lifetime of the development.

Tree-Related Ordinances – National Comparison

Public and private tree regulations were further evaluated using the U.S. Forest Service's Urban Forest Sustainability and Management Audit System (Abbot, et al., 2015), the framework provided in the 2014 census of 667 urban and community forestry programs (Hauer, et al., 2016), and compared with tree ordinances from five different cities. The ordinance review included: designation of authority, requirements related to canopy, tree preservation, tree protection during construction, planting, maintenance and management, mitigation for trees removed, and enforcement capabilities. Fort Worth's ordinances addressed each of the listed criteria to some extent.

In Element 1 of the Technical Report, Fort Worth's tree-related ordinances are compared to the ordinances of five other cities.

Fort Worth's tree-related ordinances scored among the highest in addressing the primary facets of urban forestry operations, including tree preservation, planting, maintenance, mitigation, and enforcement. Fort Worth's ordinances reflect its strong commitment to the urban forest, and the proposed changes employ innovation, industry standards, and the community's vision for a healthy, vibrant, and sustainable urban forest.

"Trees are a rich part of the fabric of the John. T White neighborhood. We've got more 150-year-old post oaks than any other area of our city, and we have seen them devastated (by development)."

DAVE FULSON

Director of the John T. White Neighborhood Association

Haley Samsel, Fort Worth Report 2022

Stakeholder Feedback

Ordinance evaluation findings were cross-examined with feedback from internal and external stakeholders. Throughout the engagement process, community members and City staff voiced concerns about the loss of trees in the remaining Cross Timbers Forest. Concerns were also expressed regarding the difficulty of meeting preservation requirements on properties with few existing trees. The approximate geographic boundaries of the eastern and western Cross Timbers Forests and Fort Worth Prairie are delineated in Figure 37.

The urban forestry ordinance currently requires preservation of 25% of the existing canopy regardless of the amount or composition of tree cover. Based on feedback received, regional ecological variation, the age of Cross Timbers trees, and the fact that key Cross Timbers species are not commercially available for planting, the UFMP recommends that the City consider increasing required preservation in the Cross Timbers and decreasing the requirement on sparsely wooded areas, such as native prairie and farmland.

As highlighted in the quotes from the Fort Worth Report, there is support for tree preservation and planting from both resident and developer viewpoints. The goal of the ordinance evaluation was to identify opportunities to improve the balance between gray and green infrastructure, supporting development while protecting and expanding the urban forest. Updates to the Urban Forestry Ordinance will necessitate extensive outreach to obtain the support of various stakeholder groups. However, feedback from the engagement conducted for the UFMP indicates that the ordinance update provides an opportunity to find common ground and a balanced solution.

"Any developer recognizes that trees are very important to their developments, whether it's single-family or commercial. The idea of clear cutting is not always beneficial to what they're trying to sell. Trees can also provide additional revenue."

TRAVIS CLEGG, a principal at Peloton Land Solutions, board member of the Real Estate Council of Greater Fort Worth, leads the Fort Worth's Development Advisory Committee

Haley Samsel, Fort Worth Report 2022

Recommended Amendments

The ordinance evaluation identified several criteria that are recommended for amendment, including:

- Identification and credentials of applicable City staff
- Required credentials for tree surveys
- Tree preservation requirements, particularly in the Cross Timbers regions
- Tree protection during construction
- Tree planting standards, establishment requirements, and incentives
- Ongoing tree care and maintenance of required canopy cover
- Development incentives that support UFMP canopy goals

The full review of Fort Worth's Urban Forestry Ordinance is found in Element 1 of the Technical Report, Existing Plans & Policies.

Cross Timbers and Prairie Map

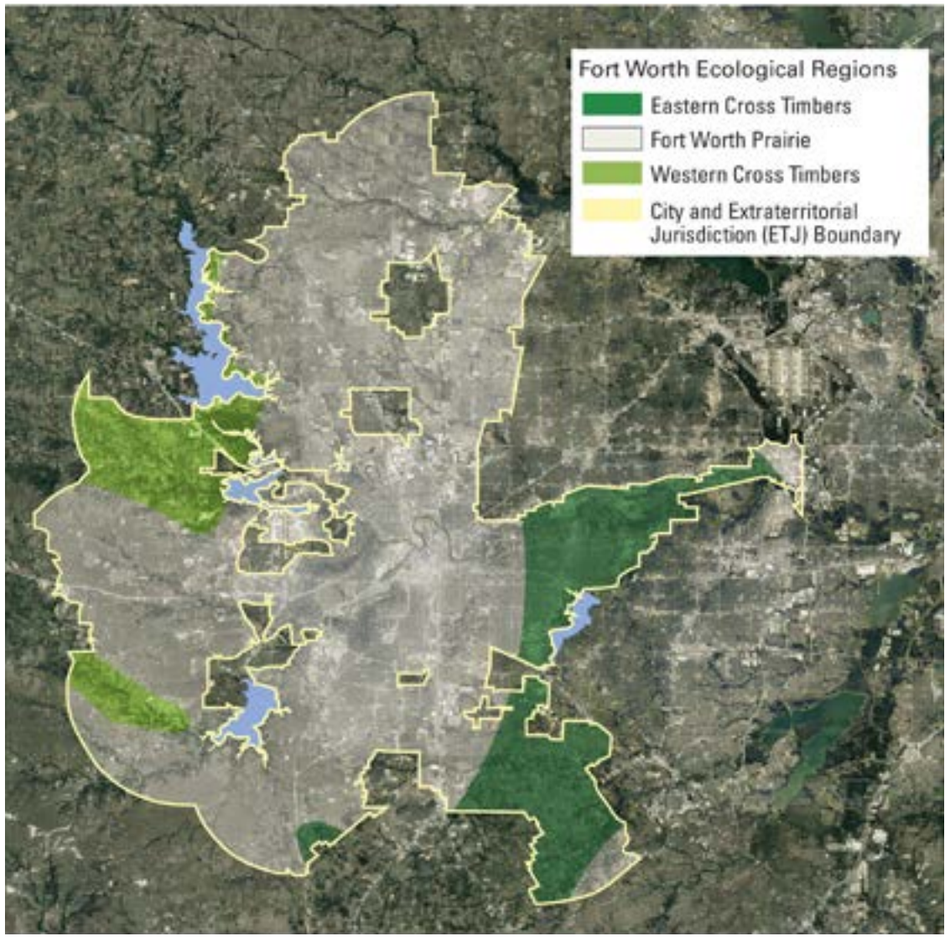


Figure 37. Map of the ecological regions in Fort Worth including the Cross Timbers and prairie

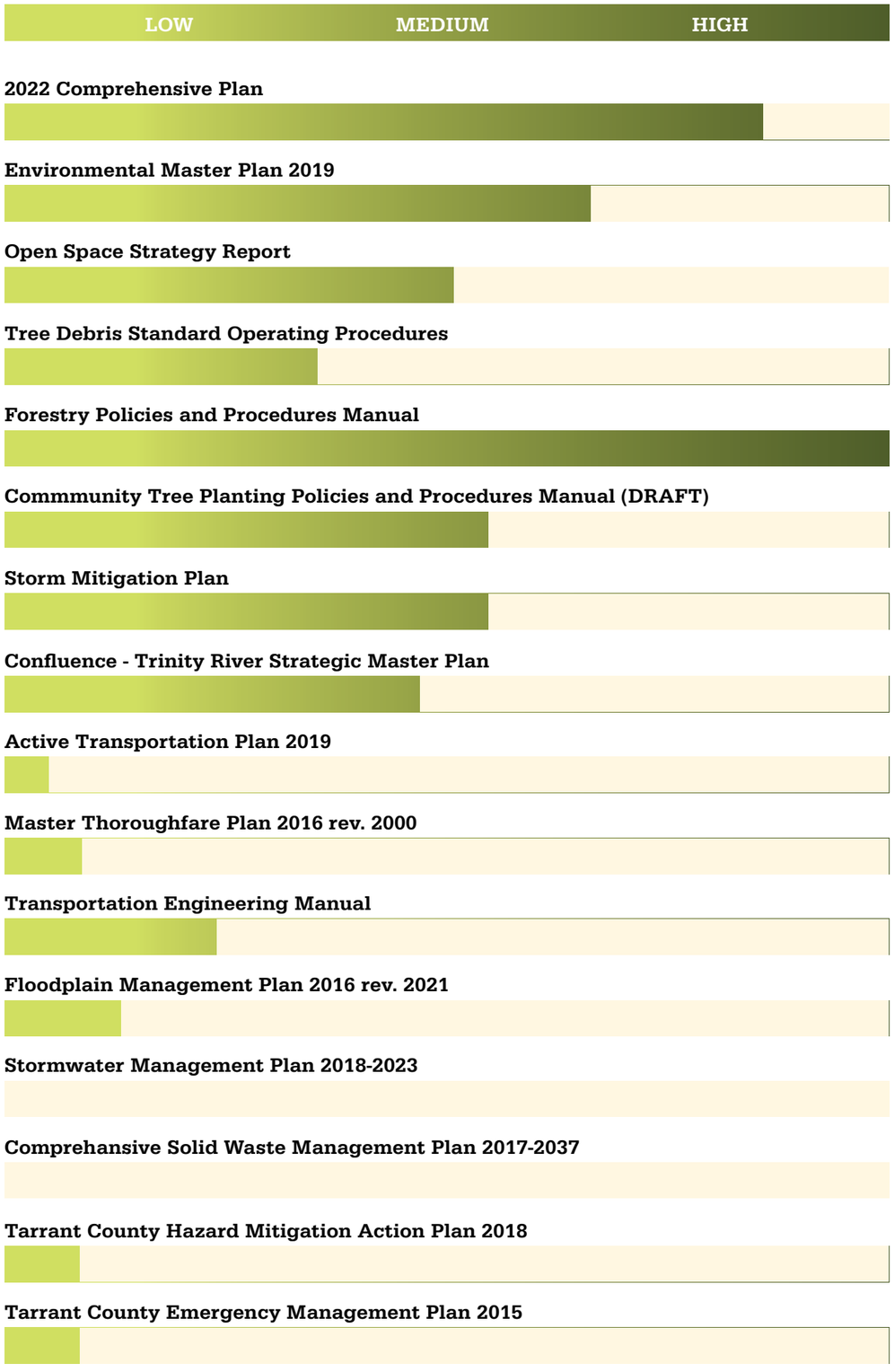


Figure 38. The degree to which trees are incorporated into select City and regional plans and resources

City Plans

Planning is crucial for a city's development. It impacts transportation systems, utilities, land use, and overall quality of life. City plans and policies also impact the allocation of resources for various initiatives. A review of select City/regional plans and policies was conducted to evaluate the degree to which tree preservation, protection, and planting are incorporated. City plans were also analyzed based on the U.S. Forest Service's Urban Forest Sustainability and Management Audit System (Abbot et al., 2017). This system consists of 11 categories and 130 subcategories related to management, sustainability, and equity.

As Figure 38 illustrates, many of Fort Worth's plans and policies support its urban forest. These plans and policies span multiple departments, as many facets of urban and ecological management cross departmental boundaries. The Urban Forest Master Plan will facilitate interdepartmental coordination regarding tree-related aspects of existing plans, while addressing canopy cover goals and urban issues such as heat, air quality, and human health and well-being.

Trees and other vegetation incorporated into stormwater management — an example of integrated planning.
Source: City of Fort Worth Stormwater Master Plan

Canopy Goals, Planting, and Survival

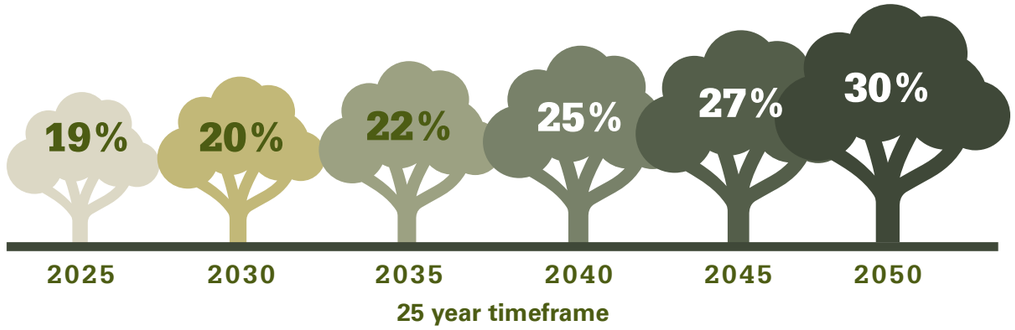
Communities frequently establish tree canopy goals to guide efforts to achieve a shared vision for the urban forest. When canopy data is available, goals are set based on a comparison of existing and potential tree canopy coverage with a focus on equitable distribution. According to a national analysis by U.S. Forest Service researchers, a 40-60% urban tree canopy is achievable in forested communities. Realistic baseline targets are lower in grassland cities (20%) and desert cities (15%). However, higher percentages are attainable through greater investment and prioritization. It is important to note that urban tree canopy percentage is just one of many criteria to consider. Age and species diversity, condition of trees, and equitable distribution are equally important (Leahy, American Forests, 2017).

Fort Worth established **a 30% tree canopy goal** as part of the Urban Forestry Ordinance adopted in 2007. A tree canopy assessment conducted by the Texas Trees Foundation in 2020 using 2018 imagery estimated Fort Worth's tree canopy at 19%. A canopy change analysis detailed in the Data Analysis Section (Element 4) of the Technical Report indicates that 19% is still an accurate estimate of Fort Worth's tree canopy cover.

For this plan, data from the 2020 canopy assessment and the American Forests Tree Equity Score (TES) tool were analyzed to validate the feasibility of the goal and to develop strategies to achieve it. Alternative strategies and timeframes are presented for consideration in the Data Analysis Section (Element 4) of the Technical Report (See "Alternatives to the 30% in 25 Years Citywide Canopy Goal" on page 165). The draft canopy goals were developed through examination of available land area, tree canopy cover, tree equity, City priorities, future land use, opportunities to mitigate urban heat, and preservation of native prairie and Cross Timbers forest land.

Achieving 30% Canopy Cover

Figure 40 depicts the recommended milestones to meet the 30% canopy goal by 2050. Achieving these milestones will require a combination of planting and preservation that is supported by City staff, community partners, and Fort Worth residents. Progress should be measured, tracked, and shared to guide urban forest management and maintain community interest and support.



10,000 trees planted across the City equal approximately 300 acres of canopy cover at maturity.

Figure 39. Fort Worth's 30% canopy goal and milestones

Increasing tree canopy to 30% will require replacement of lost canopy and planting approximately 76,200 new trees annually. Based on these projections, it is estimated that Fort Worth's urban forest will consist of 1.9 million trees in 2050. The new trees will increase canopy coverage by an area equivalent to over 34,000 professional football fields and will provide additional ecosystem services and **benefits of $35.4 million annually** once established. In addition, the 1.9 million trees will **sequester a total of 285 million pounds (142,500 tons) of carbon annually**. Figure 41 provides an illustration of carbon sequestration.

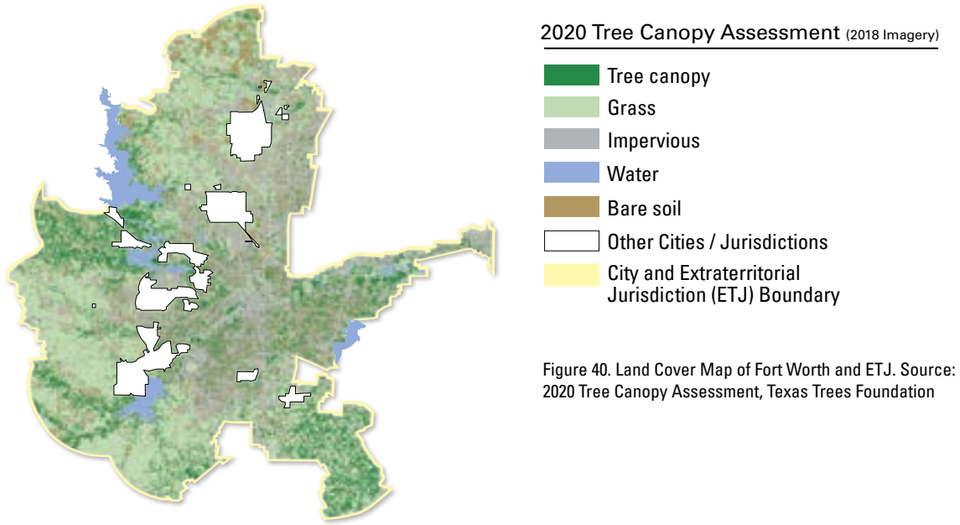


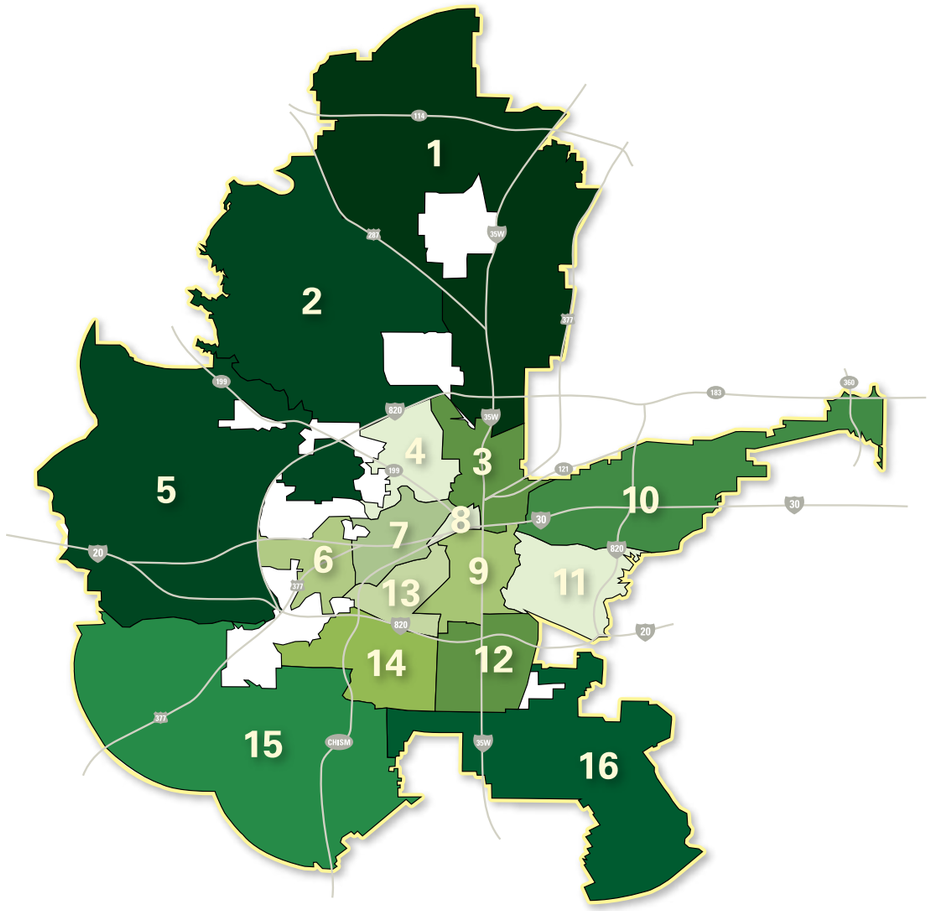
Figure 40. Land Cover Map of Fort Worth and ETJ. Source: 2020 Tree Canopy Assessment, Texas Trees Foundation

These calculations and estimates are based on industry research and practices, along with assumptions including planting primarily large-canopy native and adapted species in strategic locations, and a shared commitment to tree planting: 40% City-led (through planting on public property and tree giveaways), 30% through private development projects, and 30% planted by community partners/private landowners. Measuring and tracking progress will require data sharing and coordination between the Forestry and Urban Forestry sections.

Figure 41. Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide (US Geological Survey). Carbon sequestered is carbon not emitted into the atmoshpere. Less carbon in the atmosphere will reduce the greenhouse gas effect and lessen the impacts of climate change (USDA Forest Service).

The canopy goals shown in Figure 42 account for differences in canopy cover due to native vegetation. These differences are particularly evident on undeveloped land. However, tree planting in conjunction with land development will increase tree canopy in sectors with lower native tree canopy, helping to mitigate the temperature and stormwater challenges associated with urbanization.

Planting to Achieve 30% Tree Canopy Cover



Achieving 30% Canopy by Planning Sector

- 1 Far North: 26% (25,556 trees per year)
- 5 Far West: 35% (20,033 trees per year)
- 2 Far Northwest: 30% (12,703 trees per year)
- 16 Far South: 45% (12,370 trees per year)
- 15 Far Southwest: 20% (7,377 trees per year)
- 10 Eastside: 44% (5,630 trees per year)
- 12 Sycamore: 20% (1,092 trees per year)
- 3 Northeast: 25% (1,049 trees per year)
- 14 Wedgwood: 25% (636 trees per year)
- 9 Southside: 25% (293 trees per year)
- 7 Arlington Heights: 30% (273 trees per year)
- 6 Western Hills/Ridglea: 27% (216 trees per year)
- 13 TCU/Westcliff: 40% (133 trees per year)
- 4 Northside: 23% (118 trees per year)
- 8 Downtown: 15% (83 trees per year)
- 11 Southeast: 30% (78 trees per year)

Figure 42. Canopy Coverage and Annual Tree Planting Goals by Planning Sector

Planting a Resilient and Sustainable Urban Forest

To support the City's goals to preserve and increase tree canopy cover, maximize the benefits of trees sustainably and equitably, and grow a resilient urban forest, Fort Worth should implement a citywide tree planting plan with neighborhood-level strategies for public rights-of-way and greenspaces.

A planting strategy for Fort Worth will:

- **Sustain and expand tree benefits** to the community, including improving air quality, reducing stormwater runoff, reducing heat, and supporting wildlife habitats.
- **Beautify the City** and make it more attractive to residents and visitors.
- **Reduce the urban heat island effect,** making Fort Worth a healthier, more livable city.
- **Improve surface water quality** by decreasing runoff and increasing filtration.
- **Diversify the urban forest,** increasing resilience to changing conditions and tree pests and diseases.
- **Enhance survival of newly planted trees** by implementing best practices for planting, watering, and care.
- I**mprove community health and well-being** by providing a place for people to relax and enjoy nature.
- **Improve efficiency** by integrating tree plantings into City projects.
- **Expand and solidify local partnerships** with community members and organizations.
- **Increase awareness and community support** for protecting and expanding tree cover.

Volunteer tree planting event. Source: Texas Trees Foundation

The City of Fort Worth promotes tree planting through the Neighborhood Tree Planting and Tree Grant Programs, street tree planting permits, Citizen Forester programs, Tree City USA accreditation, Arbor Day and other events, tree-related ordinances, and planting of trees for City projects.

However, **Fort Worth should establish a long-term citywide planting plan** that includes existing efforts, such as replacing trees that are removed, planting trees in new sites, requiring tree establishment or replacement in development projects, and choosing the right species for planting locations. The citywide plan should include neighborhood-level strategies that support the 30% canopy goal and goals for tree species diversity and resiliency.

By developing a long-term planting strategy, the City can ensure that trees are planted in the right places and cared for properly. This will help to ensure that Fort Worth's trees continue to serve the community for generations to come.

A comprehensive long-term planting plan requires an **understanding of the potential impact of changing conditions**, threats from **pests**, **diseases**, and **invasive tree species**, opportunities to **integrate plantings into City projects**, requirements for **post-planting care and long-term maintenance**, and **strategies to enlist and maintain community support**.

Community Engagement and Partnerships

Urban forests play a crucial role in creating livable, sustainable cities. However, trees are not always equitably distributed, and not all communities have equal access to their benefits. Engaging members of the community with diverse backgrounds and viewpoints helps to ensure that decisions represent the priorities of the whole community. Specific efforts are often needed to reach historically underrepresented community members, such as people of color and low-income populations. Building relationships with diverse groups and actively seeking their input helps to ensure that policies and programs are responsive to their needs and priorities. The unique histories, cultures, and perspectives should play a key role in planning and managing the urban forest.

Equitable and inclusive community engagement helps to build trust and understanding between communities and decision-makers. When community members are involved in decision-making processes, they feel heard and valued, which leads to a sense of ownership and personal investment in the outcome. This results in greater support for urban forest initiatives and a higher likelihood of their success. Equitable and inclusive community engagement can also help to identify and rectify inequities in tree benefits. For example, economically vulnerable residents and minority communities often have less access to greenspaces and are more burdened by the negative impacts of urbanization, such as air pollution and heat island effects (Drescher, 2019).

The following strategies can be used to ensure equitable and inclusive community engagement regarding urban forest planning and management:

- Utilize neighborhood events such as food and clothing drives, farmers markets, and block parties to make connections. People are more likely to provide feedback and share ideas in familiar surroundings.
- Consider the challenges of transportation, childcare, health conditions, language, work schedules, and other considerations when planning engagement events.
- Engage with community boards, youth programs, and workforce development initiatives to reach historically underrepresented communities.
- Gather feedback and measure effectiveness of engagement efforts in underrepresented areas.

Citizen Foresters planting trees at the City's tree farm.

Citizen Forester and PARD staff member with volunteers from Alpha Kappa Alpha Sorority at tree planting event

Tree giveaway at Mayfest 2022. Photo courtesy of the Cross Timbers Urban Forestry Council.

Diversity and Inclusion

The City of Fort Worth has taken several steps to actively address diversity, equity, and inclusion. In 2019, the City established a Diversity and Inclusion Department to promote a culture of equity and inclusivity within the organization and throughout the community. The Department's initiatives include training and development programs, community outreach, and diversity and inclusion assessments. The City has also created a task force focused on addressing racial and social justice issues and has implemented a diversity and inclusion strategic plan to guide its efforts.

Partnerships and Programs

Following are some of the programs, projects, and initiatives that foster community engagement and partnerships regarding the urban forest.

Partnerships

The City develops and maintains partnerships with non-profit organizations, such as the Cross Timbers Urban Forestry Council (CTUFC) and the Texas Trees Foundation, that provide resources, programs, and volunteer opportunities to support the growth of Fort Worth's urban forest.

Community Tree Planting Program (CTPP)

The CTPP operates the Rolling Hills Tree Farm, which grows and distributes trees to the public and plants trees in public spaces. The value of trees provided exceeds $400,000 a year. Volunteers contribute over 6,000 hours annually to the tree farm and associated planting projects.

Training and Public Education Programs

The Forestry Section's Neighborhood Tree Planting Program trains individuals on best practices for planting, pruning, and maintaining trees in an urban environment. The section also provides training to community members participating in the CTUFC Citizen Forester Program.

Events and Celebrations

As the oldest Tree City USA community in Texas, the City hosts an annual Arbor Day celebration at various locations around the City. Free trees from the City's Tree Farm are provided during the annual Mayfest celebration.

Methodology

To assess the current state of Fort Worth's urban forest, the programs that manage it, and the community that shapes and benefits from it, a comprehensive evaluation was conducted using the framework of the U.S. Forest Service's Urban Forest Sustainability and Management Audit (Abbot, et al., 2015).

Indicators of a Sustainable Urban Forest

The framework was adapted from the Model of Urban Forest Sustainability (Clark et al., 1997) and subsequent iterations. The primary objectives of the evaluation of Fort Worth's urban forest are defined by the authors and adapted by the Fort Worth Urban Forest Master Plan consulting team:

- **Engage the full spectrum of the organizations' management team.**
- **Provide program direction that increases the level of professionalism in management.**
- **Conduct a gap analysis of management practices and the health of urban forests.**
- **Provide strategic direction to improve the health of the urban forest.**
- **Optimize management for environmental justice and equitable distribution of resources.**

A sustainable system is defined as one that survives or persists. In the context of urban forests, the objective can be stated as attempting to achieve the maximum long-term benefits over the greatest amount of time. Clark's framework provides specific criteria to evaluate sustainability along with measurable indicators. Social and economic factors, as well as natural science are considered, as sustainability is often viewed as the "overlap between what is **ecologically possible** and what is **societally desired** by the current generation." Recognizing that both conditions will change over time, sustainability is addressed as a process rather than a goal (Clark et al., 1997).

Clark's framework categorizes urban forest sustainability indicators in terms of the **trees** (or resource), the **management**, and the **people** who benefit from the urban forest. Within each category, a series of urban forestry industry standards and best management practices were used to evaluate Fort Worth's current performance level. Indicators were rated as low, medium, or high based on available data and information provided by stakeholders. Assessment results were used to identify areas where Fort Worth's urban forest can be improved and to develop recommendations.

The complete Indicators Assessment is located in Appendix B of the UFMP and in Element 6 (Urban Forest Audit) of the Plan's Technical Report. Graphic representation of Fort Worth's current performance level by indicator is provided in Figures 43 and 44.

Figure 43. Fort Worth's overall performance level for each of the three Indicators of a Sustainable Forest

LOW MEDIUM HIGH

The People

Public Awareness

Neighborhood Action

City Boards / Commissions

Green Industry Involvement

Department / Agency Coordination

Utility Engagement

Developer Engagement

Private / Industrial Landholder Involvement

Regional Collaboration

State Agency Engagement

The Trees

Urban Tree Canopy

Equitable Distribution

Size / Age Distribution

Species Diversity

Public Tree Condition

Private Property Trees

Sustainability

LOW MEDIUM HIGH

The Management

Tree Inventories

Tree Canopy Assessment

Urban Forest Plans

Professional Capacity / Training

Funding / Accounting

Decision / Management Authority

Public Tree Maintenance

Planting Program

Risk Management

Disaster Preparedness / Response

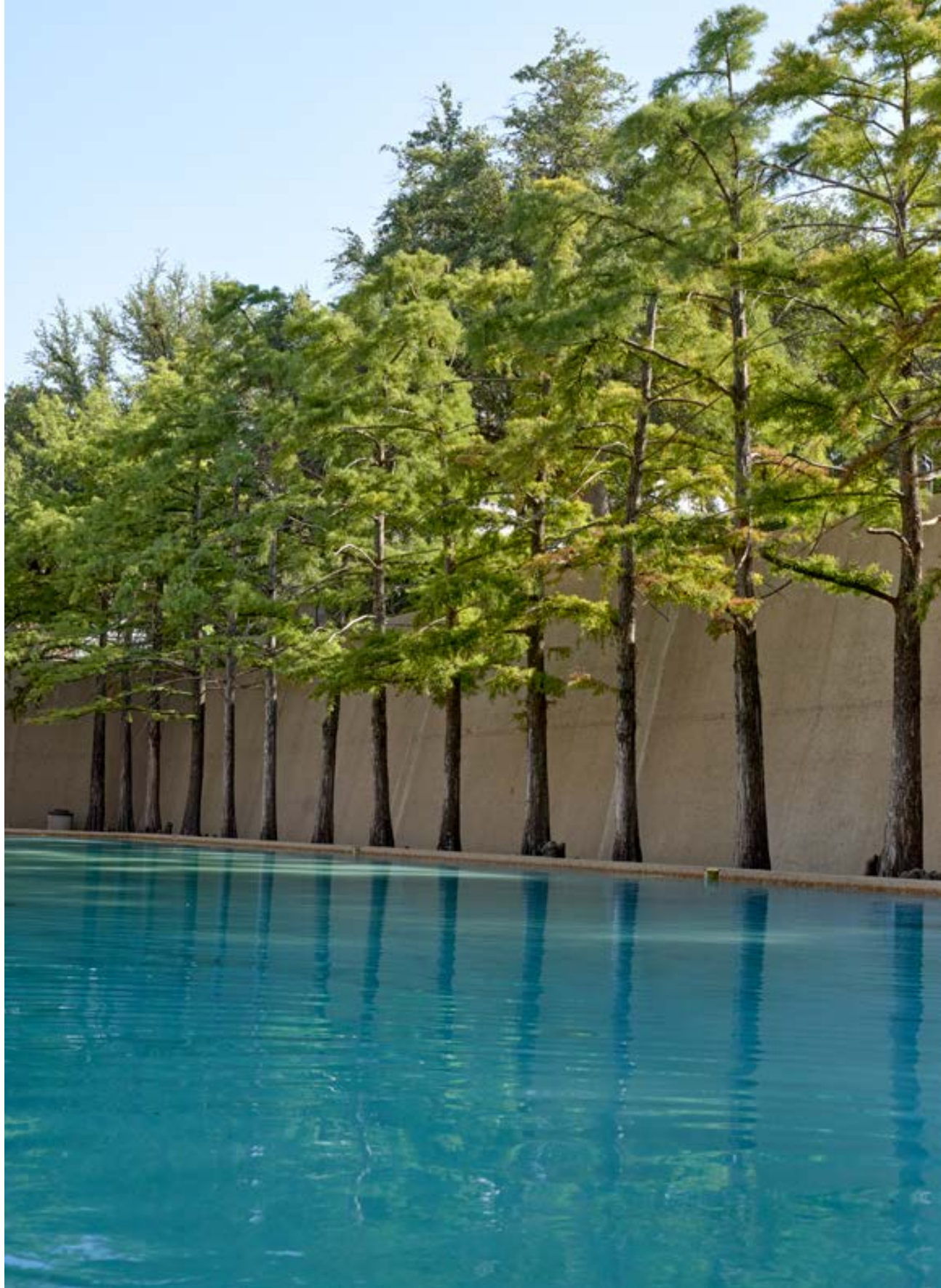
Contractor / Contracts

Communications / Structure

Tree Protection Policy

Standards / Best Mgmt. Practices

Figure 44. Fort Worth's rating on components of the Sustainable Forest Indicators.



SECTION 3

UNDERSTANDING FORT WORTH'S PRIORITIES

Community and Stakeholder Input

Project Team | **Steering Committee** | **Internal Stakeholders (80 City staff)**

External Stakeholders (55 groups) | **The Fort Worth Community**

The Urban Forest Master Plan was developed with input and guidance from five groups: the Project Team, Steering Committee, Internal Stakeholders, External Stakeholder groups, and the Fort Worth community.

Project Team. The Project Team's role was to develop the recommendations, provide technical input and guidance, create plan documents, and lead and facilitate the engagement process. The Project Team developed the recommendations and recommended action steps based on evaluation of available plans, data and input from participating groups. The Project Team included members from the Texas Trees Foundation, City of Fort Worth, and the consulting team from PlanIT Geo, MIG, Inc., and J. Williams Group.

Steering Committee. The Steering Committee was established to provide input and feedback on the direction, content, and recommendations of the Plan. Members represented community stakeholder groups, subject experts, Texas Trees Foundation, and City of Fort Worth leadership and elected officials.

Internal Stakeholders. Internal stakeholders consist of City staff from various departments, divisions, and sections that interact with trees and/or the Fort Worth community. A total of 80 staff representing 11 City departments participated in the survey, department-specific meetings, and/or public engagement sessions.

External Stakeholder Focus Groups. The External Stakeholder Focus Groups provided targeted input about urban forest issues, challenges, and opportunities in Fort Worth. Focus group participants represented over 65 different organizations throughout Fort Worth with interest or involvement in the urban forest, including

groups focused on development, real estate, transportation, watershed management, the environment, and the landscape, tree care, and nursery industry. Participants also included chambers of commerce, public agencies, educational institutions, and community organizations.

Fort Worth Community. The Fort Worth community was engaged during the planning process to understand their values and knowledge about trees and Fort Worth's urban forest and to identify priorities and issues important to them. Input gathered from the community and stakeholders during development of the Urban Forest Master Plan provided important context for understanding community priorities, where Fort Worth is today, and urban forest challenges and opportunities.

Purpose of Education and Engagement to Develop the Plan

The public outreach, education, and engagement in Fort Worth ensured the UFMP was developed with input from the community and reflected its needs and priorities. As stated by James Clark in A Model of Urban Forest Sustainability (1997),

> "Urban trees and forests are considered integral to the sustainability of cities as a whole. Yet, sustainable urban forests are not born, they are made. They do not arise at random, but result from a community-wide commitment to their creation and management."

The five-month community engagement process was designed to reach a diverse group of residents and other community stakeholders, informing them about the project and benefits of urban trees while collecting feedback to help guide plan development. Continued engagement will allow the City to utilize community support to preserve, manage, and grow Fort Worth's urban forest.

Process to Gather Representative Feedback from All Fort Worth Communities

The engagement process prioritized engaging with the communities most impacted by planning processes, especially those who have been historically left out of civic conversations, such as low-income communities, limited-English proficient individuals, and communities of color. The project team successfully provided grassroots outreach support in English and Spanish throughout the project. Community members were able to participate through in-person events, virtual meetings, and a community survey available in paper or digital format. The project team developed and designed a suite of highly visual outreach and engagement materials for use at in-person events and virtual workshops and meetings. Through various checkpoints during the process, the project team identified underrepresented groups and took part in strategically located events and meetings to increase participation rates.

Figure 45. Summary of the primary and supporting engagement activities.

External Engagement

Methods

Opportunities for public feedback included online and paper surveys, virtual and in-person meetings, and community events. These opportunities were publicized by the Texas Trees Foundation and the City of Fort Worth through their websites and social media, direct contact with neighborhood associations and other stakeholder groups, flyer distribution, and other City events. Targeted engagement efforts included outreach to specific neighborhood associations and community groups, and participation in meetings and events in areas with higher populations of underrepresented groups. Feedback received provided insight into community perceptions, priorities, and ideas for innovation and collaboration. Over 2,300 community members participated in the public engagement process. Element 3 of the Technical Report contains a detailed account of the public engagement process and results.

URBAN FOREST MASTER PLAN SURVEY

The online survey gathered feedback on the community's relationship and experiences with trees, priorities for trees and urban forest programs, areas where tree plantings should be prioritized, and where additional resources should be invested for the urban forest. Demographic questions helped to identify gaps in participation rates to inform engagement strategies. **Responses: 1,232**

VIRTUAL MEETINGS AND LOCAL EVENTS

Two online community meetings were held, the first in January 2023 and the second in February 2023. A brief presentation was shared with participants followed by an interactive mural board discussion that gathered feedback on their vision for trees in Fort Worth, areas where more tree canopy cover and increased preservation is needed, and other concerns and priorities.

Response Themes: Tree protection / / Incentives for preservation and planting / / Mitigating the effects of changing conditions / / Planting trees that will survive / / Planting trees in parks, along streets, and on campus and school grounds

EXTERNAL FOCUS GROUP MEETINGS

Throughout January and February 2023, virtual and in-person discussions were held among 7 focus groups with a total of 55 unique organizations, agencies, or individuals represented. Specific questions were prepared for each focus group category, and interactive mural boards gathered feedback from the online meetings.

Response Themes: Coordinate efforts to achieve common goals / / Plant trees resilient to changing conditions / / Preserve and plant more trees / / Balance canopy goals with intended use and native vegetation (e.g., prairies and riparian areas) / / Plant native and adapted species / / Locate trees where they do not conflict with infrastructure / / Incentivize preservation

Key Findings of the UFMP Survey and Meetings

Feedback Received

What are your favorite types of trees?

91% favor trees providing shade

84% for trees that benefit ecosystems

76% for trees with vibrant fall color

What is most important to you about the trees in Fort Worth?

86% would like more trees for shade

83% for more trees where there are none

82% would like to see more preservation

77% suggest planting trees where they can thrive

75% support private development preserving more trees

75% would like to see more funding for City programs

Where should the City prioritize resources for the urban forest?

90% would like to see trees planted that can withstand droughts

79% for more trees and preservation in development projects

70% for more trees along sidewalks to shade and beautify the City

Summary of Community Priorities and Themes

Through the input and engagement activities, the community and stakeholders identified a set of urban forest priorities for Fort Worth. They are listed in order below based on the frequency each was referenced by the engagement participants. For example, enforcing and strengthening tree ordinances is listed first from left to right, because it was referenced the most.

COMMON THEMES

Enforce and Strengthen City Ordinances

Prioritize Tree Planting in Underserved Areas

Preserve the Fort Worth Prairie

Plant Trees to Provide Shade and Cooling

Fund Tree Maintenance Programs and Public Training

These priorities along with the assessment of the Indicators of a Sustainable Urban Forest established the initial foundation of the Plan.

Guiding Principles

During the gathering of stakeholder input, collection of information, and analysis of data, a series of overarching guiding principles emerged that helped to set the plan's direction and solidify its foundation.

Prioritize the urban forest by preserving and protecting existing trees

Preservation and protection of existing trees was identified as a high priority. Existing mature trees have an outsized impact on sustainability, environmental justice, wildlife and ecosystems, and human health. Exploring changes to the Urban Forestry Ordinance was raised in most engagement activities and sessions. Preservation and planting requirements should be robust but not unduly burdensome to developers. They should also be tailored to the biome, e.g., different standards for natural prairies vs. Eastern Cross Timbers. Trees planted or protected should survive post-development and be replaced if they die.

Plan for the long term with an equitable canopy cover goal

Experts and stakeholders stressed the importance of setting and achieving local and citywide canopy goals to support the long-term health and sustainability of the urban forest. For example, planted trees must be resilient to drought and extreme weather events while supporting biodiversity in the urban ecosystem. A diverse mix of tree species is necessary to ensure the ability of the urban forest to survive pest and disease outbreaks. Success is predicated on planting trees matched to the site in terms of soils, water availability, space, and desired function. Post-planting care is required for trees to become established and thrive in the urban environment.

Align and clarify urban forest policies and messaging

Participants reported a perception of conflicting policies and priorities regarding the City's trees. City departments, partners, developers, and the community must have a common understanding of the challenges and opportunities surrounding the urban forest to develop a shared vision for addressing them.

A common theme across engagement efforts was the confusion around the roles and responsibilities of the City's Urban Forestry Section compared to the Forestry Section. A public communications plan stemming from a citywide coordinated effort was seen as a necessary step in bringing clarity and a shared vocabulary to the issues.

Proactively maintain trees and support residents

Participants at various sessions mentioned confusion surrounding the responsibility for maintaining public street trees, especially those trees which are adjacent to private property. Additionally, the community would like to see more shade trees along streets and sidewalks, recognizing that this will require additional resources. Participants stated that they would like the City to maintain street trees in a routine, proactive manner.

Secure sustainable funding and resources to meet current and future needs

During external and internal engagement, concerns were raised regarding limited resources in terms of staffing, funding, and time to address the current challenges. Additional resources are needed for monitoring compliance and enforcing tree regulations, proactive maintenance and hazard abatement, and planting trees to mitigate urban heat and tree losses from development projects and extreme weather. Participants largely supported the allocation of additional resources to ensure availability of the urban forest resource now and in the future.

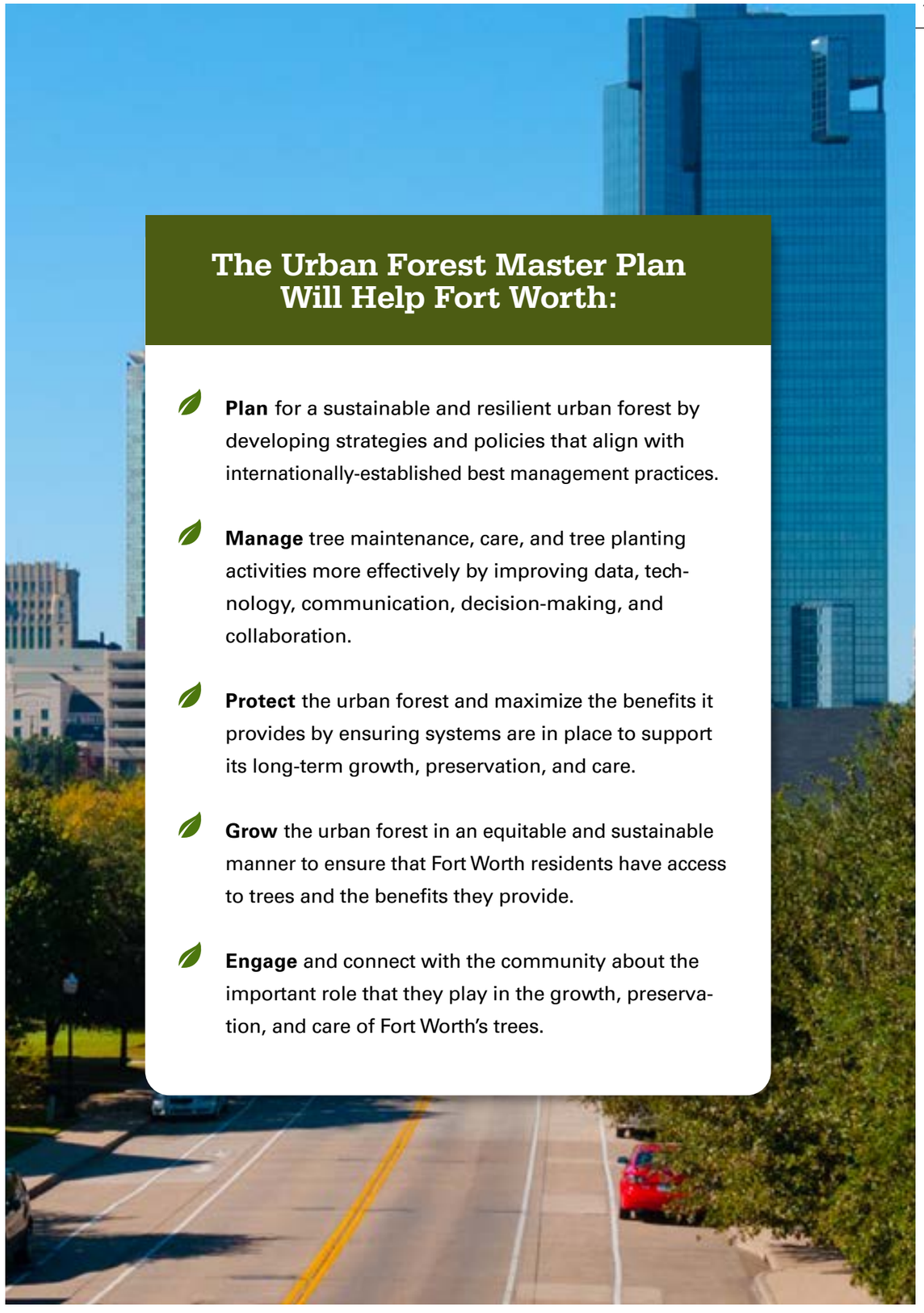
SECTION 4

ACHIEVING THE SHARED VISION FOR FORT WORTH'S URBAN FOREST

The Path Forward Together

Fort Worth's Urban Forest Master Plan was designed to guide the City in managing, protecting, and growing its urban forest. The goals, recommendations, and action steps were developed based on research and analysis of available data, extensive internal and external engagement, and an evaluation of urban forest sustainability indicators. The resulting goals and recommendations align with the shared priorities included in Section 3 and the challenges discussed in Section 2 of the Urban Forest Master Plan. The plan's long-term framework supports the shared vision for Fort Worth's urban forest:

Fort Worth's urban forest is an integrated and valued resource that enhances the livability, economic development, and environmental integrity of the City. We will strive to create and sustain a resilient, inclusive, and diverse urban forest that serves as the cornerstone of a vibrant, cool, healthy, and prosperous city.



The Urban Forest Master Plan Will Help Fort Worth:

- **Plan** for a sustainable and resilient urban forest by developing strategies and policies that align with internationally-established best management practices.
- **Manage** tree maintenance, care, and tree planting activities more effectively by improving data, technology, communication, decision-making, and collaboration.
- **Protect** the urban forest and maximize the benefits it provides by ensuring systems are in place to support its long-term growth, preservation, and care.
- **Grow** the urban forest in an equitable and sustainable manner to ensure that Fort Worth residents have access to trees and the benefits they provide.
- **Engage** and connect with the community about the important role that they play in the growth, preservation, and care of Fort Worth's trees.

Recommendations and Action Steps

Engagement and data analysis for the Urban Forest Master Plan led to identification of the following goals for Fort Worth's urban forest:

- **Goal 1.** Continue to manage the urban forest as an asset using industry standards and best practices and adequate resources for sustainable management.
- **Goal 2.** Preserve and expand the urban forest to address tree equity, resiliency, urban heat, air quality, human health, and other challenges facing Fort Worth.
- **Goal 3.** Strengthen urban forest programs through coordination, integration, professionalism, and funding to meet the needs of a growing city and urban forest.
- **Goal 4.** Invigorate equitable engagement for a community-wide commitment to care for and grow Fort Worth's urban forest.

RECOMMENDATIONS AND ACTION STEPS

The following recommendations are designed to achieve the four overall goals for the urban forest based on the feedback received during the engagement process combined with the evaluation of sustainable urban forest indicators. The recommended action steps form key components of a cohesive and integral urban forest management strategy. Sustainable long-term funding, detailed in recommendation 6, is critical to unlocking each of these recommendations and to the successful implementation of this Plan. It is recommended that the City strive to achieve all short-term targets within three years of Plan adoption.

The table to the right provides an overview of the Fort Worth Urban Forest Master Plan recommendations categorized by Sustainable Urban Forest Indicator.

Plan Recommendation	Sustainable Urban Forest Indicator
1) Conduct a comprehensive inventory of public trees in the rights-of-way, parks, and other public property.	Management
2) Explore and implement changes to tree regulations, standards, and best practices to support Fort Worth's tree canopy and sustainability goals.	Management, Trees
3) Expand and strengthen cooperation among departments to ensure adequate staffing, training, and integration of urban forest considerations into city plans, programs, and policies.	Management, Trees
4) Strengthen existing relationships and support new partnerships with neighborhoods and community organizations throughout the City.	People
5) Coordinate, create, and implement a public communications, education, and engagement plan focused on Fort Worth's urban forest.	People
6) Develop and implement a strategy to maintain sustainable funding and resources to achieve desired levels of service for urban forest programs and management.	Trees, People
7) Support and expand plans for maintenance, risk management, and resiliency of public trees.	Management, Trees
8) Create plans for tree planting, preservation, and maintenance to grow a resilient and equitable urban forest with 30% canopy cover.	Management
9) Develop protocols for monitoring the urban forest to identify and address pests and other threats throughout the City.	Trees
10) Strengthen, expand, and increase awareness of programs and strategies that utilize or repurpose urban wood waste generated from public tree operations.	Trees, Management

1. Conduct a comprehensive inventory of public trees in rights-of-way, parks, and other public property.

A comprehensive inventory of public trees maintained in a Geographic Information System (GIS) is critical to cost-effective and efficient urban forest management. The inventory provides information to make data-driven decisions regarding maintenance priorities and plantings.

A well-managed, integrated dataset can be used to track maintenance history and analyze data to identify vulnerabilities to pests and diseases, species performance, changes in condition, and other potential concerns. Tracking this data over time allows urban forest managers to evaluate what types of trees and nursery stock work best in specific environments and whether best practices have been utilized. Additionally, inventory and GIS data can be used to calculate the associated ecosystem benefits and increase public awareness.

RECOMMENDED ACTION STEPS

Identify the department staff/positions that will manage the tree inventory project and determine the intended use and end users. Utilize the 2011 sample inventory and i-Tree Streets data to estimate the total number of public trees that will need to be inventoried.

1.A) Create a work plan and budget to complete the inventory. Identify priority areas and method for conducting the inventory and tracking areas where inventory has been completed. Determine the data to be collected, such as species, size, condition, risk, etc. Research software programs for collecting, managing, and mapping data. Consider whether the inventory will be conducted by City staff or a consultant and the potential role of volunteers. Note that collecting possible planting sites while inventorying trees can be a low-cost add-on that provides information for other recommendations in the UFMP.

1.B) Estimate costs and consider options to conduct the inventory in phases or all at once. Utilize other cities in the region as a resource for cost estimates and methodology. Develop list of consultants if inventory will not be conducted in-house. Be mindful of economies of scale. Typically, the more trees inventoried, the lower the unit rate from contractors.

1.C) Develop a plan for managing, updating, and integrating inventory data. Inventory should be routinely updated to reflect plantings, removals, and maintenance activities. To improve operational efficiencies, identify additional departments that will utilize inventory data and ensure inter-departmental integration.

1.D) Secure funding to complete the inventory. Prepare the work plan and supporting materials to present the project to City leadership or external funders. To support City funding, emphasize community support and explain the operational efficiencies and cost-savings that will result from the project. Build support by stating how the project aligns with City policies, goals, and initiatives. For outside funding, communicate the impacts that resonate with the organization's initiatives and programs.

1.E) Prepare and release bid specifications and select a consultant (if applicable). If the inventory will be conducted by a consultant, bid specifications should include the timelines, required data fields, methods for data collection and communications, qualification requirements of the consultant (e.g., International Society of Arboriculture Certified Arborist, example projects, and references), and required deliverables.

1.F) Refine and implement the data management and integration plan as needed. Request input from key City staff regarding ways to make the process more efficient and to better utilize tree inventory data.

SHORT-TERM TARGET 1:

Complete the inventory in one City planning sector or other boundary (e.g., neighborhood). Prioritize underserved and disadvantaged neighborhoods within areas with low tree canopy. Recommended timeframe for completion: within two years of Plan adoption.

2. Develop and implement changes to tree regulations, standards, and best practices to support Fort Worth's tree canopy and sustainability goals.

A robust and fair regulatory framework that balances City and community priorities is essential. Incentives should be designed to encourage additional tree preservation and use of green infrastructure on development projects. Both monetary and non-monetary incentives should be considered to increase support for the citywide 30% canopy goal within the development community. Additionally, mandated compliance with industry standards and best practices will help maximize urban tree lifespans and associated benefits. The City of Fort Worth should set an example that reflects the values of the community when developing and maintaining public properties. **Recommended changes to the City's Urban Forestry Ordinance are provided for consideration in Element 1 of the Technical Report to the Plan.**

RECOMMENDED ACTION STEPS

Organize an internal team to review the Urban Forestry Ordinance and recommended changes. Establish a task force to identify creative monetary and non-monetary incentive structures designed to increase tree preservation and planting on development projects. Incentives should complement regulations to provide a balanced approach. Implementation and education will require additional staffing.

2.A) Draft proposed amendments to regulations and standards. Seek input from arborists, landscape architects familiar with Fort Worth's permitting process, and community leaders involved with urban forestry. Formalize the changes and work with the appropriate City personnel to prepare for presentation to City Council. Recommended changes to the Urban Forestry Ordinance, based on community engagement and benchmark assessment, are included in Element 1 of the Technical Report.

2.B) Conduct stakeholder engagement and public information sessions prior to presenting text amendments for adoption. The City should engage with diverse stakeholders and interest groups to obtain broadbased support for recommended changes. When engaging with specific interest groups, highlight changes that were influenced by their recommendations.

2.C) Update the City website and communicate changes to City staff, external stakeholders, and the public. Once adopted, substantial changes to regulations may require extensive education and training. Fort Worth will need to plan for a transition phase and determine how to handle applications that were submitted prior to adoption of ordinance changes. The City should create an accessible "one-stop-shop" resource containing information on tree regulations and be sufficiently staffed to assist applicants during the transition phase.

2.D) Create a manual for residents, tree care professionals, developers, and property managers containing the City's tree regulations, standards, and best practices. Consolidate Fort Worth's tree regulations, standards, protocols, and procedures into a resource that is available online and tailored to various end-users. Explain the permitting process and include FAQs. Consider translating the manual into Spanish and other relevant languages.

2.E) Work with other sections and departments to update additional regulations and policies impacting trees. Examples include updating Fill Material and Grading Permit articles of the City Code, and working with the Transportation/Public Works Department to increase use of trees for stormwater management. Repeat action steps 2A-2D to update ordinances and manuals.

2.F) Update City standards, specifications, and manuals related to hardscape/infrastructure conflicts with public trees. Develop a decision checklist and solution toolkit for consistent and transparent decision-making. The Recommendations Section of the Technical Report to the UFMP provides a strategy for handling infrastructure conflicts with public trees that can be utilized when updating City standards, specifications, and manuals.

SHORT-TERM TARGET 2:
Draft the changes to Urban Forestry Ordinance that do not require stakeholder involvement (e.g., updated terminology, definitions, authority, and alignment with other ordinances). Evaluate additional recommended changes and draft proposed ordinance language. Seek input from local

arborists, community leaders involved with urban forestry, and professionals familiar with Fort Worth's permitting process. Recommended timeframe for completion: one year from Plan adoption.

3. Expand and strengthen cooperation among departments to ensure adequate staffing, training, and integration of urban forest considerations into City plans, policies, and programs.

Where resources are limited, proper training, coordination, and collaboration can increase capacity and efficiency. The recommended action steps are intended to determine resources needed, provide justification for budget and staffing needs, and more thoroughly incorporate urban forest considerations into decision-making processes.

RECOMMENDED ACTION STEPS

Identify members, objectives, and roles of an internal urban forest working group to assess staffing and resources needed to implement the UFMP. Providing adequate staffing for urban forest programs will help to ensure other departments and sections are able to maintain necessary coverage.

Steel's Tavern Oaks, a cluster of Heritage live oaks in downtown Fort Worth.

3.A) Create an Urban Forest Working Group to support UFMP implementation and future decisions on staffing and programs. Initially, the working group should coordinate the implementation of the UFMP and monitor progress. Long term, the working group should evaluate ability of Forestry and Urban Forestry programs to meet UFMP goals and recommend budget and staffing changes needed.

3.B) Identify and budget for training, certifications, equipment, and other resource needs of forestry and urban forestry staff. Identify certifications needed based on roles and responsibilities. Consider local, regional, and national conferences, as well as online options for professional development and continuing education units. Ensure that budgets include adequate funding for memberships, professional development, equipment, and resources. Budget items should be reviewed and updated periodically to ensure staff have the tools they need for efficient and effective operations.

3.C) Update or create protocols and procedures for inter-departmental operations and cross-training. Continue existing cross-training programs with other departments (e.g., PARD currently cross-trains staff from Water and Transportation/Public Works departments). Review departmental structure to identify additional areas with overlapping responsibilities that would benefit from cross-training. Specifically, look for ways to increase tree planting/preservation in public rights-of-way and stormwater management projects. Continue to provide technical support to the City's open space conservation, riparian restoration, and other urban ecology programs.

3.D) Consider renaming the Urban Forestry Section and the Urban Forestry Ordinance to clarify the roles and responsibilities regarding public and private trees. The UFMP engagement process revealed that both internal and external stakeholders were unclear about the division of responsibilities between the Urban Forestry Section and the Forestry Section. It is recommended that the City gather input from staff and the community regarding a clearer name for the Urban Forestry section. Consider options such as "Private Forestry" or "Development Forestry" for the section title. For the Urban Forestry Ordinance, consider "Private Tree Ordinance", "Private Urban Forestry Ordinance", "Private Forestry Ordinance", or "Tree Preservation, Planting, and Maintenance."

3.E) Identify areas to streamline processes. Projects and initiatives that require interaction with multiple departments may be good candidates for streamlining. Determine if the activity could be handled within a single department or better coordinated between departments. Consider establishing a centralized Urban Forestry Department with jurisdiction over public and private trees. Ensure that processes and policies are clearly defined and readily available to City staff and external stakeholders.

3.F) Meet regularly as a working group to implement a continuous improvement framework. A continuous improvement framework consists of four elements: Commitment, Strategy, Process, and Performance. Each should be regularly considered to adjust operational workflows and improve coordination between departments with urban forest responsibilities.

3.G) Explore the benefits and feasibility of establishing a City Urban Forest Advisory Committee. The committee could serve as advocates for public and private trees, provide public education, advise the Mayor and Council on tree-related issues, and inform decision-makers on how staffing and resource levels translate to achieving urban forest goals.

3.H) Provide an annual update to City Council regarding the state of the urban forest and progress made toward UFMP goals. The update should also include any obstacles that need to be addressed. Determine whether the update will come from the Urban Forest Working Group and/or the Urban Forest Advisory Committee.

SHORT-TERM TARGET 3:
Establish an internal urban forest working group to organize, monitor, and report on Plan implementation. Recommended timeframe for completion: within two years of Plan adoption.

4. Strengthen existing relationships and support new partnerships with neighborhoods and community organizations throughout the City.

Collaborating with partners can provide access to funding, resources, and expertise that may not be available otherwise. Strong partnerships also promote community engagement and support, which is essential for the longterm sustainability of the urban forest. By forming diverse partnerships that represent a wide cross-section of demographics, experiences, and institutions, the City of Fort Worth can gather valuable insights to support innovative longterm management of the urban forest.

RECOMMENDED ACTION STEPS

Share the final UFMP with existing partners and provide a summary of how their input influenced the Plan.

4.A) Create a list of potential local partners including public, private, institutional, and non-profit organizations. Consider including utility companies, tree care contractors, and non-profit organizations with complementary missions. Utilize the stakeholders and focus groups engaged in developing the UFMP as a starting point.

4.B) Host virtual discussions with stakeholders to update them on the UFMP and encourage continued participation. Build upon the momentum of relationships formed during development of the UFMP to collaborate on implementation.

4.C) Lead or partner with one or more organizations to host an event highlighting Fort Worth's urban forest and the UFMP. Raise awareness of how the community can play an important role in supporting the UFMP's goals. Communicate the ways public engagement was integrated into the Plan and provide opportunities for future public participation toward realizing Plan goals.

4.D) Develop or support a program that documents voluntary tree planting and recognizes exemplary urban forest stewards. An awareness campaign that allows private property owners to document trees planted on their property could be used to encourage and track tree planting. A recognition program that includes various categories (e.g., youth, residents, organizations, developers, business owners) will encourage participation in urban forest efforts and relationship building with the community.

4.E) Regularly evaluate partnerships to ensure they are supporting UFMP goals and achieving greater representation of historically underserved and disinvested communities. UFMP progress reports should consider the state of the partnerships and the results achieved.

SHORT-TERM TARGET 4:
Review the City's list of neighborhood and community-based organizations and draft a list of potential partners for urban forest efforts. Recommended timeframe for completion: within two years of Plan adoption.

5. Coordinate, create, and implement a public communications, education, and engagement plan focused on Fort Worth's urban forest.

Public support and participation are critical to a sustainable urban forest. Private residentially-zoned property contains 64% of the City's tree canopy cover and also has the most available space for new tree plantings. Effective, inclusive, and equitable engagement should be a coordinated interdepartmental effort to ensure messaging reaches private property owners throughout the City. The communications plan should include multiple platforms that resonate with the general public and with specific interest groups. Ensure messaging is consistent and aligned with other City initiatives. Utilize expertise of City departments such as Diversity and Inclusion and Neighborhood Services for a successful public communications, education, and engagement plan.

RECOMMENDED ACTION STEPS

Maintain Arbor Day Tree City USA designation and post the UFMP on the City's website.

5.A) Continue to implement the Neighborhood Tree Planting Program, Tree Grant Program, Citizen Forester program, and volunteer efforts in support of the UFMP and citywide canopy goals. Identify areas where these programs can expand, especially in neighborhoods with vulnerable and underserved populations. Align programs with the priority planting areas to identify neighborhoods with the greatest need.

5.B) Create a public dashboard or other mechanism to increase transparency and keep the community updated on progress and opportunities for participation. This will help to sustain public support and obtain feedback from the community. Ensure information regarding the permitting process and mitigation requirements for tree removal from public and private property is clearly posted on Forestry and Urban Forestry webpages.

5.C) Regularly evaluate public education and engagement efforts. Measure the effectiveness of efforts and gather feedback from the community. Adapt strategies to align with changes to the City and its urban forest. Develop educational materials to increase awareness of tree benefits and encourage proper tree planting and care on private property.

5.D) Explore opportunities to engage with and support vulnerable and underserved populations in the planting of public street trees. Utilize the relationships built through previous recommended actions to offer volunteer opportunities to vulnerable and underserved populations and neighborhoods. In the longer-term, explore the need and feasibility of proactively maintaining public street trees in these areas.

SHORT-TERM TARGET 5:
Develop a public communications, education, and engagement plan where strategies are coordinated as a Citywide initiative rather than a departmental effort. This may necessitate additional staff to adequately engage the community. Recommended timeframe for completion: within two years of Plan adoption.

6. Develop and implement a strategy to maintain sustainable funding and resources to achieve desired levels of service for urban forest programs and management.

Increased funding is essential to advance each of the other recommendations and to support the City's efforts to grow its urban forest by 76,200 trees annually. A strategy that describes the needs, resources required, costs of inaction, impacts, and timelines will be necessary to secure additional funds. This strategy should address private, as well as public trees. For example, the urban forestry ordinance requires property owners to replace any newly planted trees that die within two (2) years and to mitigate for any preserved trees that die within five (5) years. However,

additional resources are required to enforce these regulations post-construction. Successful urban forest programs have strategies and resources for both long-term operational funding and short-term project-based funding. Projects that take less than five years to complete are typically considered short-term and can be funded through project partners, donations, grants, mitigation funds, and capital improvement budgets. Longer-term projects such as ongoing, proactive pruning programs may be funded through special assessment districts, beautification fees, parcel taxes for street frontage, stormwater utility fees, special revenue funds from gas well pad mitigation, and the sale of methane gas generated by City-owned landfills. Other funding paths include carbon trading, pest control fees, and consolidation of tree-related programs into one division or section that may offer cost-savings or more efficient allocation of resources.

RECOMMENDED ACTION STEPS

Develop an actionable, long-term plan to fully fund tree planting, maintenance, and preservation at levels needed to meet the City's 30% canopy goal, including funding for permitting, inspections, and regulatory enforcement.

6.A) Use data from the inventory, canopy assessment, and the UFMP Technical Report to determine the level of funding needed to achieve and sustain the goals of the UFMP. Information from the tree inventory, canopy assessment, and urban forest management plan will identify the work that needs to be done to improve and grow Fort Worth's urban forest. This data and information can be used to determine the level of service and funding required. A funding action plan can then be developed that includes what can be accomplished and puts a value on how additional funding will benefit the community. A frequently updated inventory can help to support continued funding during uncertain economic times.

6.B) Review and implement a funding mechanism provided in the UFMP Technical Report, Appendix C. The Technical Report provides various considerations for funding short- and long-term projects and offers the City options to diversify its funding portfolio for forestry and urban forestry programs.

6.C) Evaluate and measure performance indicators to adjust funding as needed to achieve the goals of the UFMP. The UFMP and the Technical Report provide benchmarks and methods for measuring progress. The urban forest working group could be used to monitor indicators.

6.D) Establish dedicated, sustained funding sources beyond the current budget for forestry and urban forestry operations to increase the level of service provided. It is often difficult for cities to acquire dedicated funding to meet the growing demand and changing conditions. However, uncertainties due to extreme weather, the economy, and other outside forces will have a lesser impact on program budgets if Fort Worth has a diverse portfolio of funding with contingency plans in place.

SHORT-TERM TARGET 6:
Develop an action plan and funding strategy for one (1) underfunded program or initiative. Recommended timeframe for completion: one year from Plan adoption.

7. Support and expand plans for maintenance, risk management, and resiliency of public trees.

The Urban Forest Master Plan builds momentum and lays out high-level policies for achieving sustainable management. At the ground level, operational plans such as urban forest management plans, public tree maintenance plans, tree risk management strategies, and pest and disease plans will direct the daily or seasonal urban forest activities that feed into the UFMP's long-term vision and goals.

RECOMMENDED ACTION STEPS

Review the strategies and recommendations provided in the Recommendations Section of the UFMP's Technical Report to develop an annual urban forest work plan. The plan should coordinate roles and responsibilities of various City departments involved in tree work, planting, permitting, inspections, and other tree-related activities on public property. Fulfillment of additional duties will require additional staffing.

7.A) Identify the departmental staff/positions to lead the development of an urban forest management plan. Draft the scope for the plan and consider including tree risk management and storm response/recovery components. Determine whether it will be completed in-house or with an outside consultant.

7.B) Secure funding and utilize the data from the public tree inventory to develop the urban forest management plan. A recent and up-to-date tree inventory is the foundation for the development of an urban forest management plan. The management plan can be developed for the entire city or for smaller planning areas that are based on the phases of the inventory or priority areas as funding allows.

7.C) Develop a tree pest and disease management plan for public trees and include a public education component. Use the Pest and Disease Management Strategy contained in the Recommendations Section of the Technical Report to identify the scope of the pest and disease plans. The public education component should also target large private landholders whose properties have significant tree canopy. Consider including a strategy for addressing invasive plant species on public land in the plan.

7.D) Utilize current research and innovation to adopt new or improved management strategies supporting urban forest sustainability and resiliency. State and federal agencies along with university extension services offer research summaries and other resources on current and emerging threats to the urban forest.

SHORT-TERM TARGET 7:
Develop the first annual work plan for the following fiscal year. Recommended timeframe for completion: within two years of Plan adoption.

Local Sources	Grants & Donations	Taxes & Fees	Special Districts	Additonal Sources
General Fund	Federal Grants	Tax Increment Financing	Special Benefit District	Memorial Programs
Capital Improvement Funds	State & Local Grants	Stormwater Utility Fees	Conservation District	Adopt-a-Tree Programs
General Obligation Bonds	Non-profit Grants	Frontage Tax	Business Improvement District	Mitigation & Escrow Funds
Urban Forestry Mitigation Costs	Corporate & Private Donations	Gas Tax, Permits, Pest Control Fees	Parking Benefit District	Wood Utilization & Carbon Trading

Examples of potential funding mechanisms for urban forest programs

8. Create plans for tree planting, preservation, and maintenance to grow a resilient and equitable urban forest with 30% canopy cover.

A citywide tree planting plan should include strategies for establishment and post-planting care. These comprehensive plans provide the framework for applying the "right-tree-right-place" principle: trees that are matched for the site, the soils, and the intended functions (e.g., shade, erosion control, wildlife habitat). Planting plans should include strategies for outreach to applicable property owners. Other considerations include the availability of water, staff and consultant roles and responsibilities, and plans for post-planting care and long-term maintenance. The planting plan for Fort Worth should align with the priority planting areas taking health, demographic and economic factors into account, as well as the goal of increasing citywide tree canopy cover to 30% in 25 years.

RECOMMENDED ACTION STEPS

Utilize the 2020 canopy assessment and UFMP priority maps to identify the target area for the first planting plan.

8.A) Continue to support and diversify funding sources for the City's Rolling Hills Tree Farm in growing, distributing, and planting quality native and adapted trees. At any given time, the tree farm has over 15,000 trees under cultivation. The annual value of trees planted or distributed for planting in public areas exceeds $400,000. However, the tree farm is currently funded largely through gas well revenues. Fort Worth should plan to diversify, increase, or replace this funding to ensure sufficient and stable funding.

8.B) Track plantings led by the City, its partners, and private development projects. Coordination between Forestry and Urban Forestry will allow Fort Worth to track numbers of trees planted and amount of canopy removed through development projects. The City's Communications and Neighborhood Services Departments can assist with increasing awareness regarding tree benefits and encouraging private property owners to report trees they plant on their property. Tracking tree plantings and removal will inform new priority areas, program success, and adjustments to planting plans.

8.C) Practice a no-net-loss for public trees principle by budgeting for and planting replacement trees for those removed on an annual basis. An updated GIS-based public tree inventory will support this approach and should inform public tree planting plans. A no-net loss approach should be utilized in annual budgeting. This approach is an important step toward achieving canopy cover goals.

8.D) Develop a multi-year public tree planting and maintenance plan that prioritizes areas of greatest need. Be cognizant of soil limitations, water availability, and native landscapes, such as natural prairies when considering planting locations.

8.E) Maintain a recommended tree planting list that supports urban forest resilience and maximizes tree benefits. The list should include preferred soil type and water needs and be revised periodically based on public tree inventory data. The list should be structured so that species diversity goals are achieved, making the urban forest less susceptible to widespread losses due to pests and disease. Analyses of inventories can also determine which tree species are performing well and which ones may be impacted by changing conditions, such as prolonged periods of drought and urban heat. Consider maintaining a list of invasive and other prohibited tree species and trees that may not be recommended due to their overabundance.

8.F) Explore opportunities and implement measures to expand the Heritage Tree Program. Fort Worth's Heritage Tree Program promotes public awareness that trees are a valuable resource for the community. The Forestry Section accepts nominations for trees that have unique, distinguished, and/or significant characteristics, history, or purpose. Heritage Trees can have special preservation and protection requirements. Look for innovative opportunities to increase awareness and encourage participation in the program.

8.G) Conduct an i-Tree Eco survey of the citywide urban forest or utilize the U.S. Forest Service Urban Forest Inventory and Analysis program data (when available). Analyze the citywide sample survey and the public tree inventory data for an understanding of the forest's vulnerability to inform future tree species selection. Alternatively, if the Urban Forest Inventory and Anyalsis (FIA) data is available, utilize the information for vulnerability assessments and plan for an i-Tree Eco survey as a follow-up in five years.

8.H) Reassess the citywide tree canopy cover using the latest recommended technology and adapt planting targets and priorities. Conduct the updated assessment in fiscal year 2025 and budget for reassessments every 5 years. Consider identifying opportunities for Fort Worth to acquire more land for conservation and tree planting.

SHORT-TERM TARGET 8:

Develop and implement a multi-year tree planting and maintenance plan for a priority area. Recommended timeframe for completion: within two years of Plan adoption.

9. Develop protocols for monitoring the urban forest to identify and address pests and other threats throughout the City.

Monitoring Fort Worth's urban forest is critical to sustainable management. Trees in urban areas are in constant struggle for survival with urban heat, competition for space, prolonged droughts, and pollutants, all of which can weaken trees and make them more susceptible to pests and disease. The City should implement a comprehensive program to monitor public trees and educate private landowners about the threats facing trees and how they can combat those threats.

RECOMMENDED ACTION STEPS

Gather and review the latest research on tree pests and diseases of concern and share information with community groups. Include information on the City's website.

9.A) Expand the public tree monitoring program to conduct field assessments and monitor threats to a growing tree population. The UFMP and Technical Report highlight current and potential threats to Fort Worth's urban forest, but new threats are constantly emerging. Monitoring can be conducted in-house, with consultants, through trained volunteers and partners, or a combination of these.

9.B) Expand opportunities for cross-training staff in other sections and departments that may encounter trees in their operations. The Park and Recreation and Development Services departments provide cross-training opportunities for staff outside of the Forestry and Urban Forestry sections. Increased awareness by other City staff can translate to increased support and additional eyes and ears for the forestry and urban forestry programs. During the engagement process, staff from various programs, including Open Space Conservation, Environmental Quality, Neighborhood Improvement, Inspections, and street maintenance crews, expressed interest in receiving training and additional information about tree care best practices.

9.C) Continue and strengthen City inspections of development projects to ensure they remain in compliance with the Urban Forestry Ordinance. Compliance with the urban forestry ordinance supports the City of Fort Worth's efforts to identify and address urban forest threats. City inspections should verify that development projects meet the requirements of maintaining the required canopy cover, replacing trees that die after planting, and ensuring the survival of preserved trees.

9.D) Keep up with current research and emerging tree pests and diseases. Participation in conferences, webinars, and resources offered by partners, agencies, and extension services will support effective urban forest management.

9.E) Provide information to property owners, especially large landholders, regarding current and emerging tree pests and diseases of concern. Most of the City's tree canopy cover is on private land. It is essential that property owners are prepared to monitor, treat, and recover from tree pest and disease outbreaks. Many times, an invasive pest is present in a community years before it is recognized. With training and resources, Fort Worth can grow a more resilient urban forest.

SHORT-TERM TARGET 9:
Develop and implement a public tree monitoring program for pests and diseases of concern, such as emerald ash borer. Recommended timeframe for completion: within three years of Plan adoption.

10. Strengthen, expand, and increase awareness of programs and strategies that utilize or repurpose urban wood waste generated from public tree operations.

There are many conditions requiring removal of urban trees, such as age, storm damage, environmental stress, space limitations, and pest or disease infestation. However, removal does not mean that a tree's usefulness has come to an end. Wood utilization programs facilitate the reuse and repurposing of wood debris from tree pruning and removal.

Currently, most wood debris from public trees is mulched and made available to the public at various locations across the city. Logs generated from removal of park trees are cut to a manageable size and left for nearby residents to collect for firewood. Remaining logs are brought to the City's Tree Farm for employees or Fire Department training. The Forestry program also provides tree debris to the Fort Worth Zoo for use as animal habitat, food, and enrichment activities. Trees which have not suffered decay and are suitable for woodwork are offered to the City's network of cabinet shops, artisans, millworkers, and sawmills.

These wood utilization practices divert the debris from the landfill while also eliminating the need for plastic bags associated with retail mulch sales. However, Fort Worth may benefit from documenting specific guidance and standard operating procedures to communicate wood utilization processes and to raise awareness about the programs. This will allow Fort Worth to identify opportunities to expand the program and strengthen its efforts toward sustainable management of the urban forest.

RECOMMENDED ACTION STEPS

Determine how much wood waste is generated from City Forestry operations, where the wood waste is generated, and how it is currently distributed.

10.A) Document the procedures and protocols for utilizing alternatives to mulching and landfilling woody debris resulting from public tree maintenance. Currently, most of the debris from hazard abatement and storm cleanup is mulched and left for free pickup by residents. The City should continue these efforts in addition to expanding the reuse of logs for wood products such as furniture. Clear protocols with information on the location of mulch drop-off / pick-up sites and woodworkers accepting wood waste could support an expansion of the program and less time in coordinating the effort. Also, if the City were to perform more extensive proactive pruning, clearly defined protocols would support efficiencies. The protocols should include the means for tracking and reporting of wood volume generated and utilized and should be included in the City's Storm Related Tree Debris Standard Operating Procedure.

10.B) Quantify the potential carbon and waste diversion impacts of reusing wood waste. Utilize the wood volume tracking data from the previous action step to quantify the amount of carbon sequestered and repurposed through wood utilization. Also, quantify the reduced costs associated with the program along with the increased awareness and engagement of the public. Utilize the data and protocols to expand the wood utilization program and network of woodworking facilities. Alternately, consulting firms such as Cambium Carbon provide or conduct stakeholder engagement, biomass inventories and assessments, strategy and policy development, carbon and waste diversion impact studies, community education plans, business models, and revenue opportunities.

10.C) Increase awareness and provide opportunities for private tree care companies to support sustainable practices such as urban wood utilization. Tree care companies performing tree maintenance and removals throughout the city should be aware of and be a part of Fort Worth's sustainability efforts. Provide guidance or best practices for tree care companies to participate in wood waste reuse programs and activities.

SHORT-TERM TARGET 10:
Quantify the current amount of wood volume repurposed annually on average and the potential amount of wood volume that would be generated by expanding the program. Recommended timeframe for completion: within three years of Plan adoption.

SECTION 5

ASSESSING PROGRESS

How Are We Doing?

Monitoring and Measuring

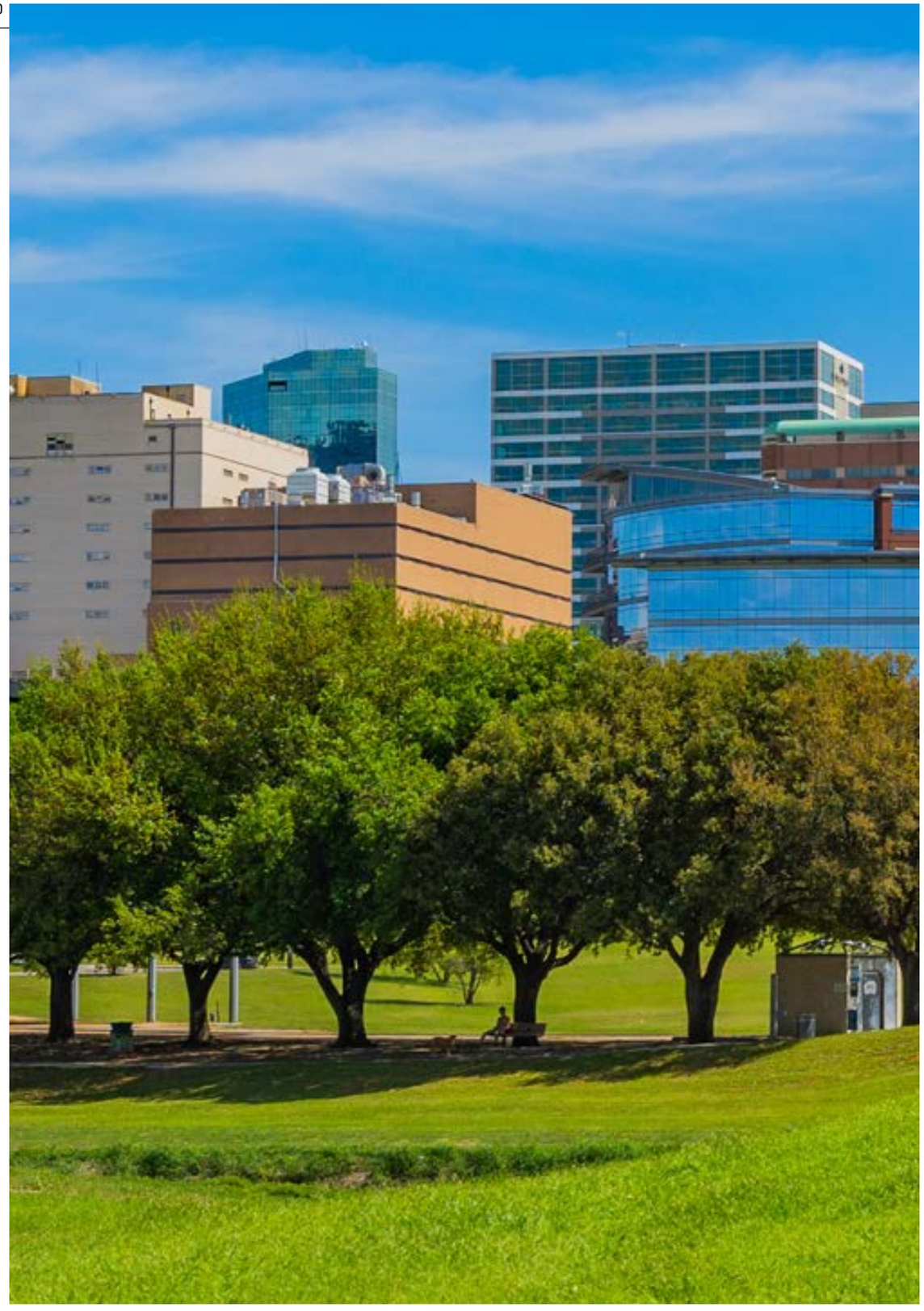
Fort Worth's Urban Forest Master Plan will need to be monitored and updated based on progress made, urban forest conditions, and community priorities. Changes to the Plan should be based on the evolving urban forest structure, latest research, and community needs. This process should be implemented by the Forestry and Urban Forestry Sections with support from other sections and departments, and potentially an urban forest working group or other subcommittee. The implementation and monitoring protocols for the Plan follow the Evaluate, Monitor, Report, and Revise methodology.

The assessment of the Indicators of a Sustainable Urban Forest established the baseline of where Fort Worth's urban forest is today:

The People
LOW TO MEDIUM

The Management
MEDIUM

The Trees
LOW



Tree Canopy Assessments

Cities around the world use tree canopy goals, typically in the form of percent tree canopy cover, to guide urban forest management and improve the livability of their communities. Urban tree canopy is ideal for goal-setting, because it can represent the complex distribution and benefits of the urban forest within a single metric. Urban tree canopy goals must walk a careful line of ambition, inspiration, and practicality. Change in tree canopy cover can be used as a baseline metric to inform updates to the Urban Forest Master Plan. Innovations in technology now offer an affordable approach to canopy assessments and enable communities to examine canopy change in as little as two-year intervals. Based on the rate of growth, Fort Worth should plan and budget for reassessing its tree canopy cover at least once every five years.

As Fort Worth's population and land area expand, the value of its urban forest increases. Sustainable management of this resource starts with an understanding of the extent and distribution of tree canopy, establishing a goal for growth, and monitoring progress. "By knowing the amount of and direction in which urban tree cover is moving, urban forest management can be adjusted to provide desired levels of urban tree cover and benefits for current and future generations." (Nowak et al., 2018)

Changes in Tree Benefits

In addition to measuring canopy cover change, Fort Worth can measure progress by examining changes to urban forest benefits. The USDA Forest Service's i-Tree suite of tools measures and quantifies the benefits of trees and canopy cover. These tools are routinely updated based on the latest research and science to measure benefits over time. However, for accurate comparison, the same version of i-Tree should be utilized for the initial and subsequent assessments.

Tracking Tree Planting and Care Activities

Evaluating the impact of urban forest efforts involves tracking criteria, such as tree planting and preservation, tree care, and occurrence of hardscape conflicts. Developing a uniform system where this information can be accessed by the City, residents, and community organizations can help standardize data collection and reporting. Sample data for a tree planting event could include:

- **Location**
- **Number and species of trees planted**
- **Event hours**
- **Number of participants**

Uses of this information go beyond just tracking the number of trees planted. For example, surveys and participation rates could be used to assess whether residents' attitudes toward trees change following a planting event in their neighborhood. Data can also be used to verify if planted trees have a measurable impact on the amount of tree canopy cover in the area. Monitoring of trees' condition over time can provide information regarding a species' ability to survive and thrive under various soil and site conditions.

Progress Reporting

The City's urban forest working group or a similar team for monitoring the plan should record and report on the metrics and indicators that are tracked for implementation. Some examples of the types of reports are listed below. These and other metrics are measures or indicators of success that should be communicated to stakeholders, policy and decision-makers, and the community. Note, the following list is not comprehensive nor listed in any particular order or priority. These reporting elements can be incorporated into an annual report and posted on the City's website.

Green Asset Management

- **Report the number of public trees inventoried.**
- **Report the ecosystem benefits of the inventoried tree population.**
- **Report the number of public trees pruned, removed, and planted.**
- **Report the number of trees managed for pests and diseases.**
- **Report the number of trees planted in stormwater management projects.**
- **Report progress towards canopy goals and tree planting targets.**
- **Report the volume of woody biomass utilized.**
- **Report the condition, structure, and diversity of the public trees.**
- **List indicator scores and actions/targets achieved, ongoing, or not started.**

Community Engagement and Partnerships

- **List existing and potential partners.**
- **Report the number of planting events and trees planted.**
- **Report the history/count of Tree City USA and supporting awards.**
- **Report the number of volunteers, events, and volunteer hours.**
- **Report the number of private tree plantings, as feasible.**
- **Report the number of trainings, workshops, and attendees.**
- **Report the results of public surveys.**
- **Recognize exemplary urban forest stewards.**
- **List indicator scores and actions/targets achieved, ongoing, or not started.**

Tree Regulations and Policies

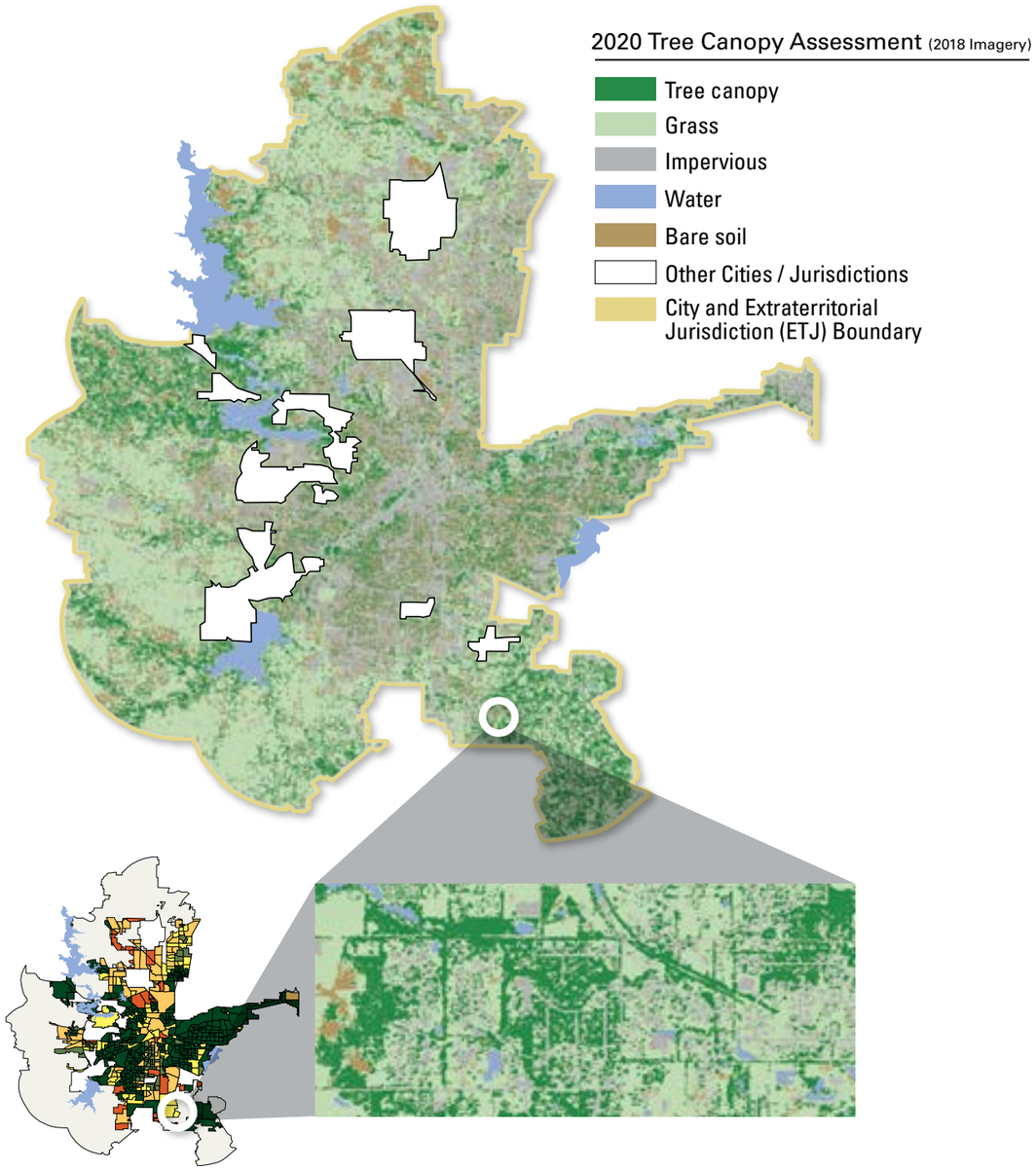
- **Report the number of permits reviewed and approved.**
- **Report the number of trees preserved, planted, and mitigated for development.**
- **List all City and partner-led planning efforts.**
- **Describe related planning efforts.**
- **Establish a Citywide canopy goal and local planting targets.**
- **List recommended changes to City Code, policies, and manuals.**
- **List indicator scores and actions/targets achieved, ongoing, or not started.**

APPENDICES AND REFERENCES

APPENDIX A: MAPS

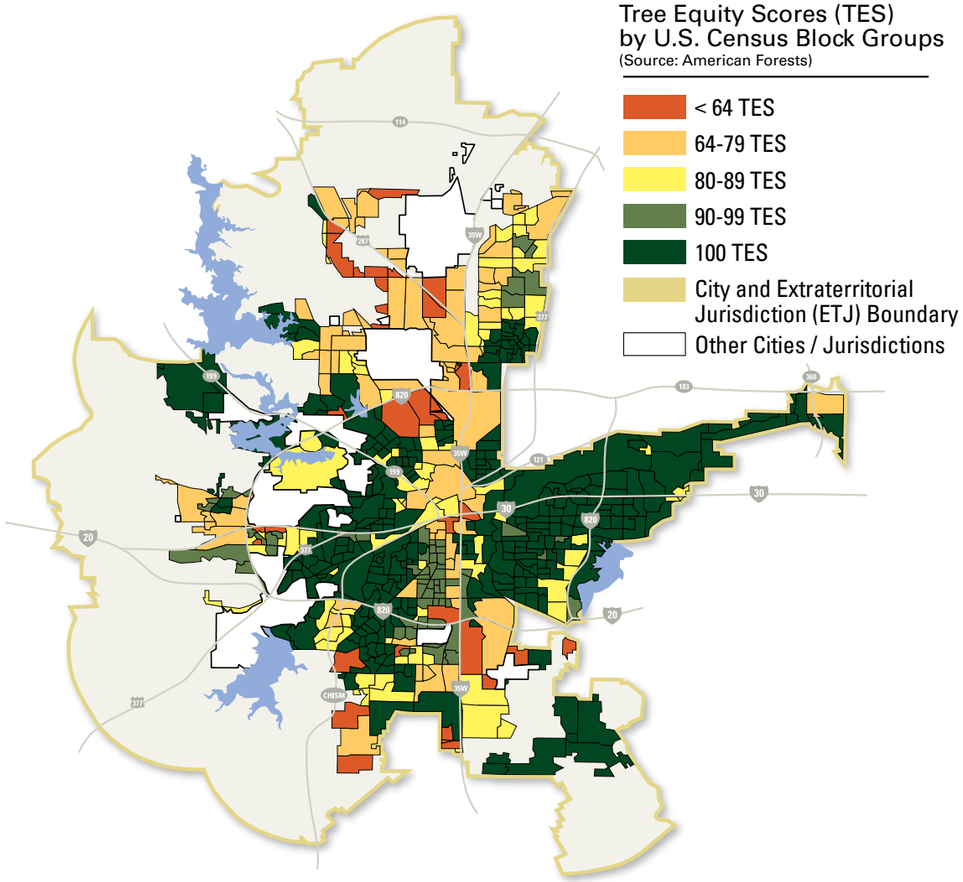
Tree Canopy Cover

Map displaying the 2018 tree canopy assessment in relation to the Tree Equity Score map

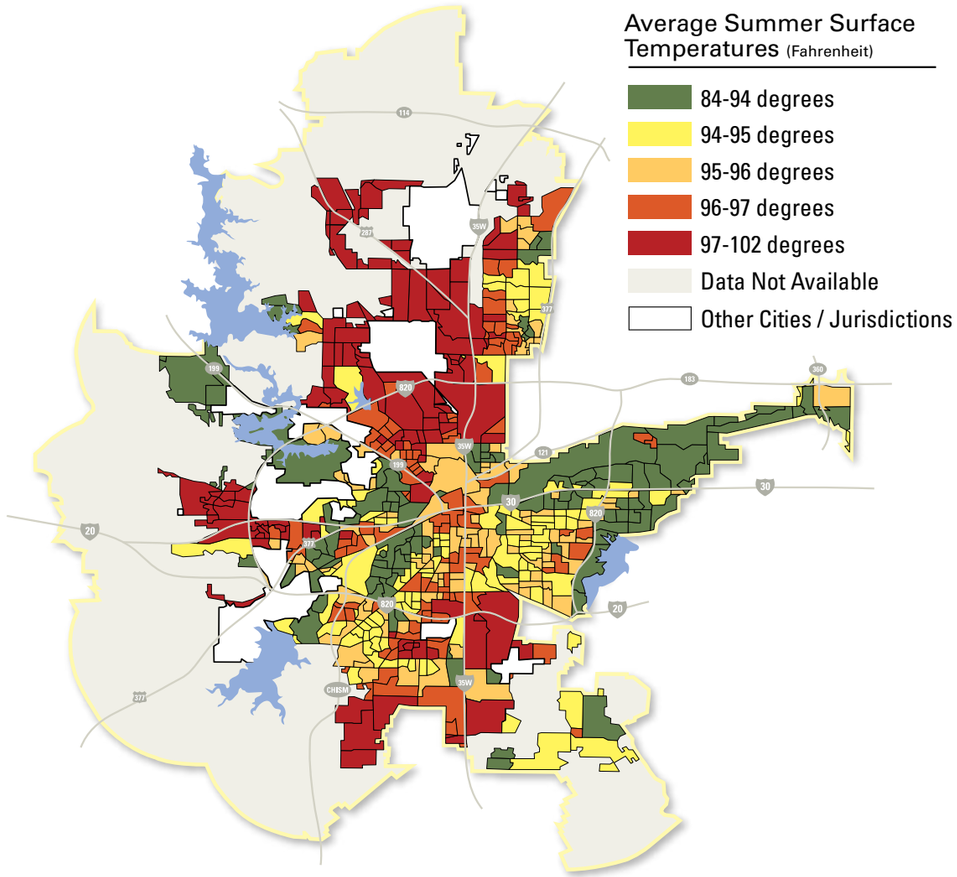


Tree Equity Score

Tree Equity Scores (TES, American Forests' Tree Equity Score Tool) by Census Block Group as of 2023 with Fort Worth's Planning Sectors labeled

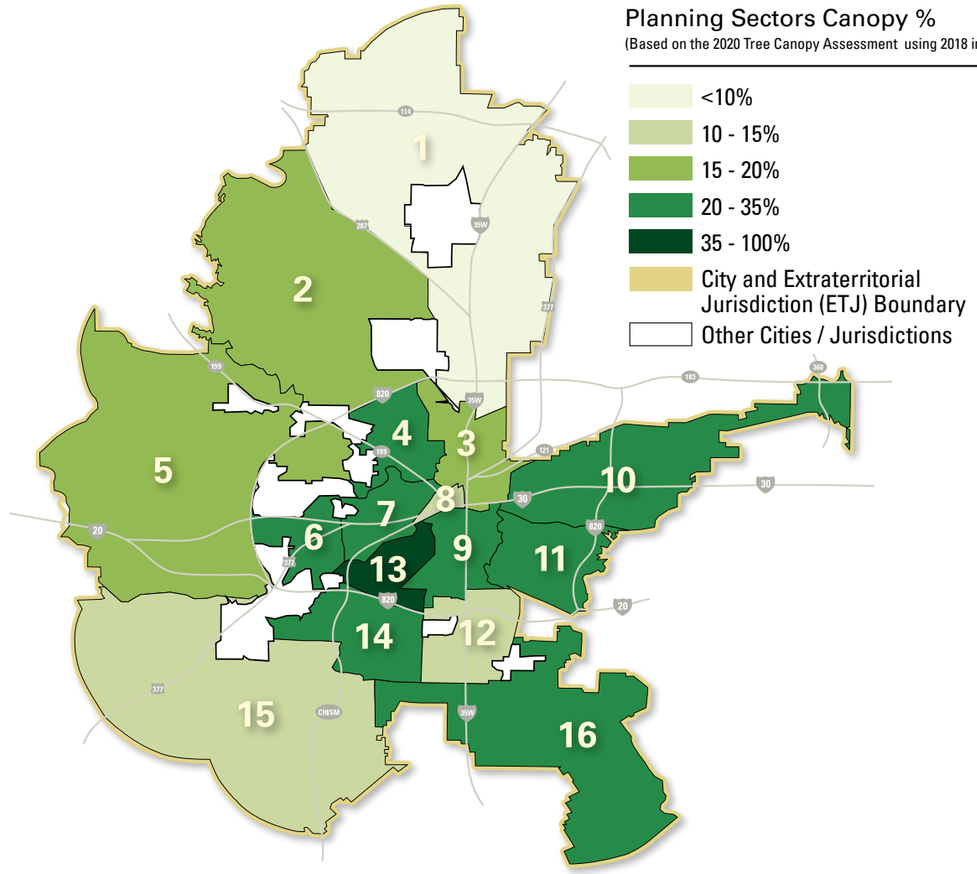


Average Surface Temperatures by Census Block Group



Existing Canopy Cover by Planning Sector

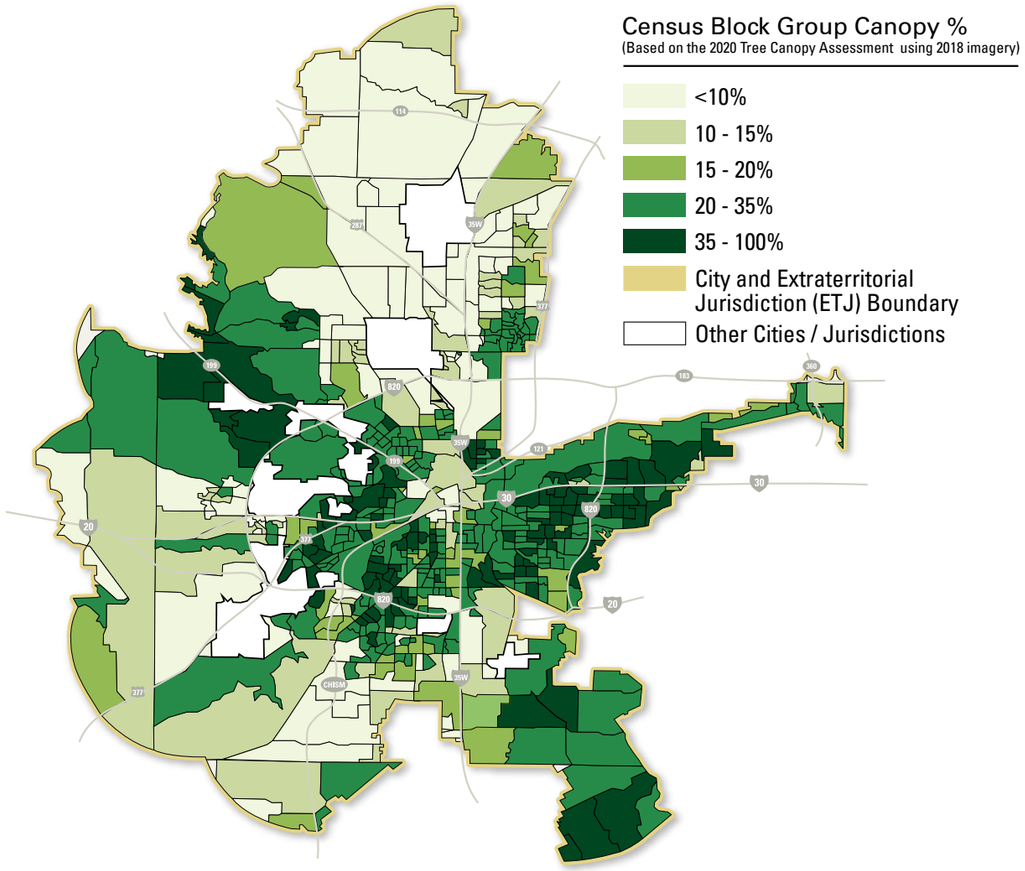
Map of the City planning sectors by tree canopy cover range



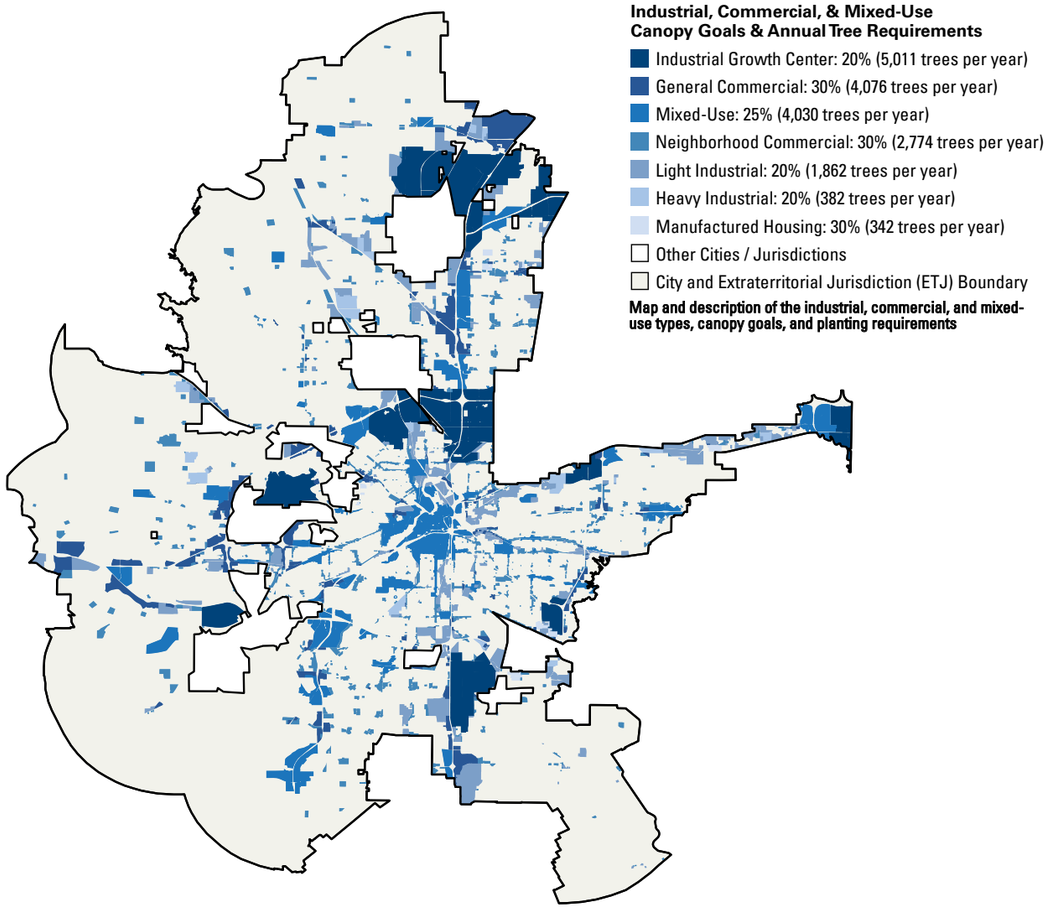
1	Far North	9	Southside
2	Far Northwest	10	Eastside
3	Northeast	11	Southeast
4	Northside	12	Sycamore
5	Far West	13	TCU/Westcliff
6	Western Hills/Ridglea	14	Wedgwood
7	Arlington Heights	15	Far Southwest
8	Downtown	16	Far South

Existing Canopy by Census Block Group

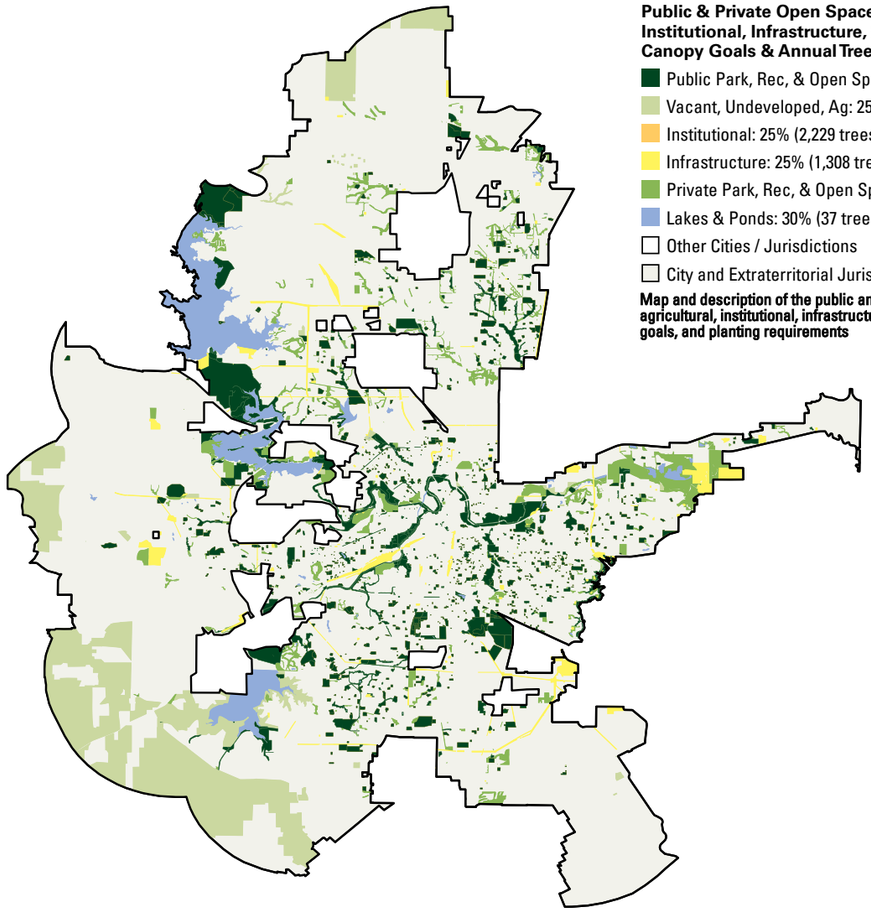
Map of Census Block Groups by tree canopy cover range



Achieving 30% Canopy by Future Land Use



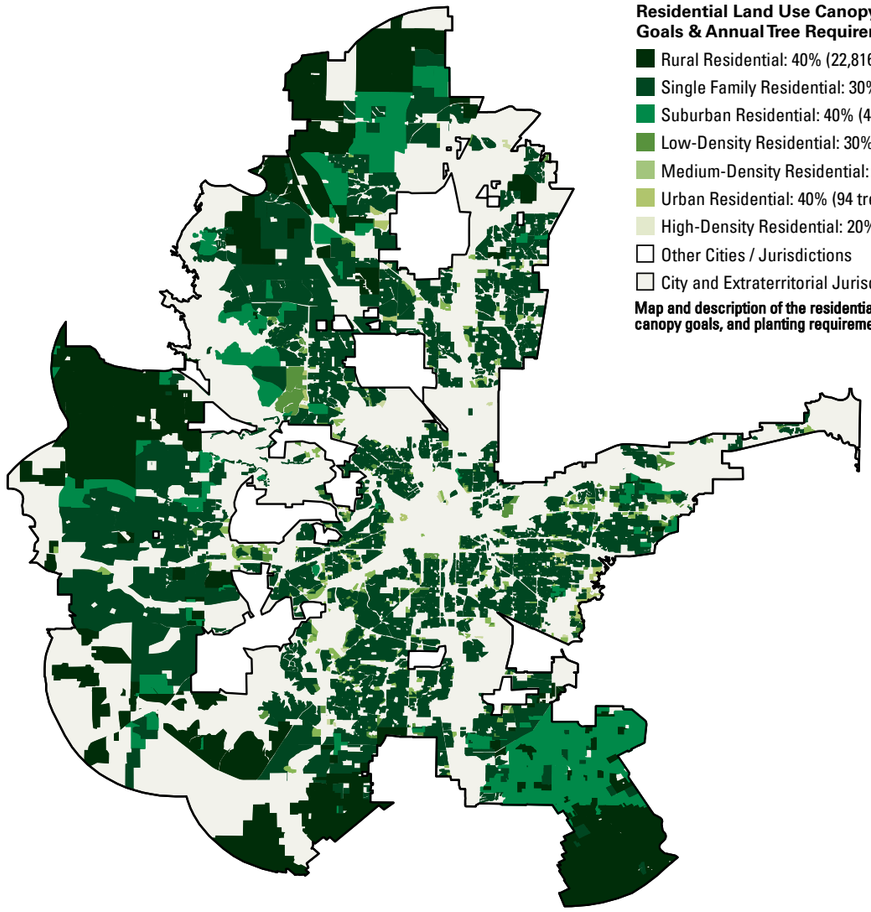
Achieving 30% Canopy by Future Land Use cont.



Public & Private Open Space, Vacant, Ag, Institutional, Infrastructure, & Water Canopy Goals & Annual Tree Requirements

- Public Park, Rec, & Open Space: 40% (8,658 trees per year)
- Vacant, Undeveloped, Ag: 25% (5,743 trees per year)
- Institutional: 25% (2,229 trees per year)
- Infrastructure: 25% (1,308 trees per year)
- Private Park, Rec, & Open Space: 45% (855 trees per year)
- Lakes & Ponds: 30% (37 trees per year)
- Other Cities / Jurisdictions
- City and Extraterritorial Jurisdiction (ETJ) Boundary

Map and description of the public and private open space, vacant, agricultural, institutional, infrastructure, and water types, canopy goals, and planting requirements



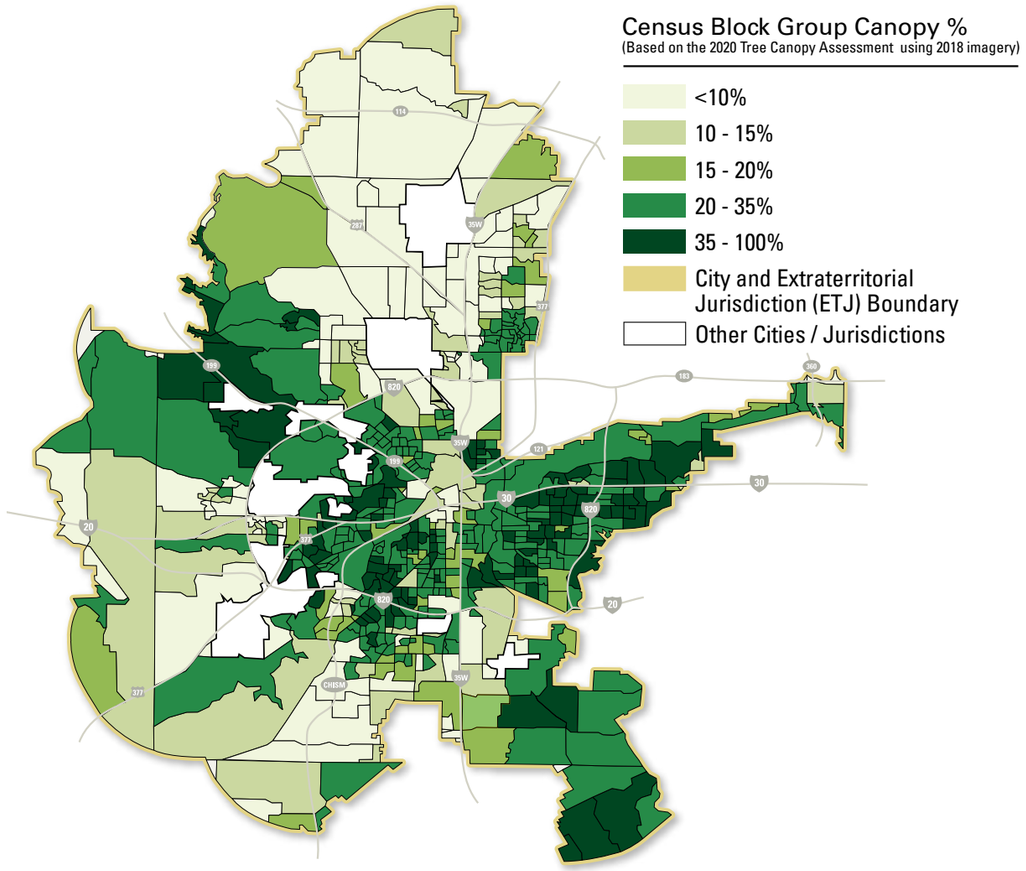
Residential Land Use Canopy Goals & Annual Tree Requirements

- Rural Residential: 40% (22,816 trees per year)
- Single Family Residential: 30% (16,578 trees per year)
- Suburban Residential: 40% (4,665 trees per year)
- Low-Density Residential: 30% (1,048 trees per year)
- Medium-Density Residential: 20% (477 trees per year)
- Urban Residential: 40% (94 trees per year)
- High-Density Residential: 20% (45 trees per year)
- Other Cities / Jurisdictions
- City and Extraterritorial Jurisdiction (ETJ) Boundary

Map and description of the residential future land use types, canopy goals, and planting requirements

Achieving 30% Canopy by Planning Sector

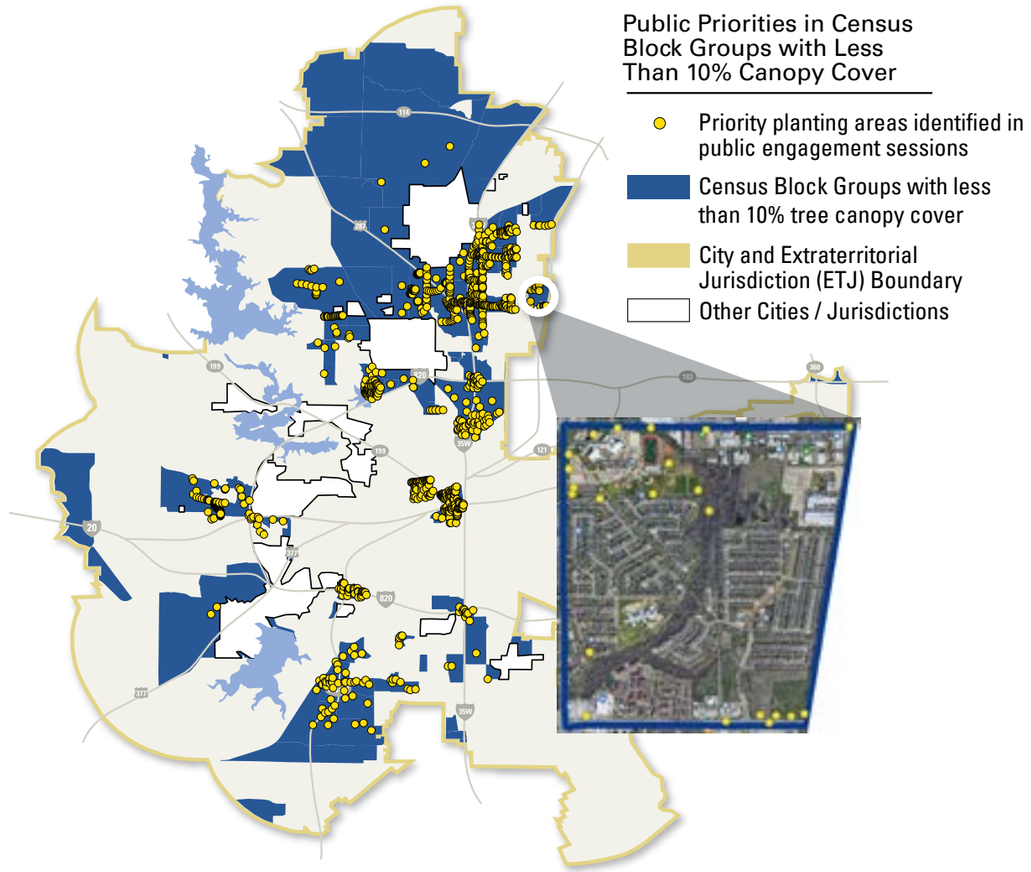
Scenario to achieve 30% canopy by planning sector canopy goals and planting requirements



- Far North: 26% (25,556 trees per year)
- Far West: 35% (20,033 trees per year)
- Far Northwest: 30% (12,703 trees per year)
- Far South: 45% (12,370 trees per year)
- Far Southwest: 20% (7,377 trees per year)
- Eastside: 44% (5,630 trees per year)
- Sycamore: 20% (1,092 trees per year)
- Northeast: 25% (1,049 trees per year)
- Wedgwood: 25% (636 trees per year)
- Southside: 25% (293 trees per year)
- Arlington Heights: 30% (274 trees per year)
- Western Hills/Ridglea: 27% (216 trees per year)
- TCU/Westcliff: 40% (133 trees per year)
- Northside: 23% (118 trees per year)
- Downtown: 15% (83 trees per year)
- Southeast: 30% (78 trees per year)
- City Boundary & the Extraterritorial Jurisdiction (ETJ)

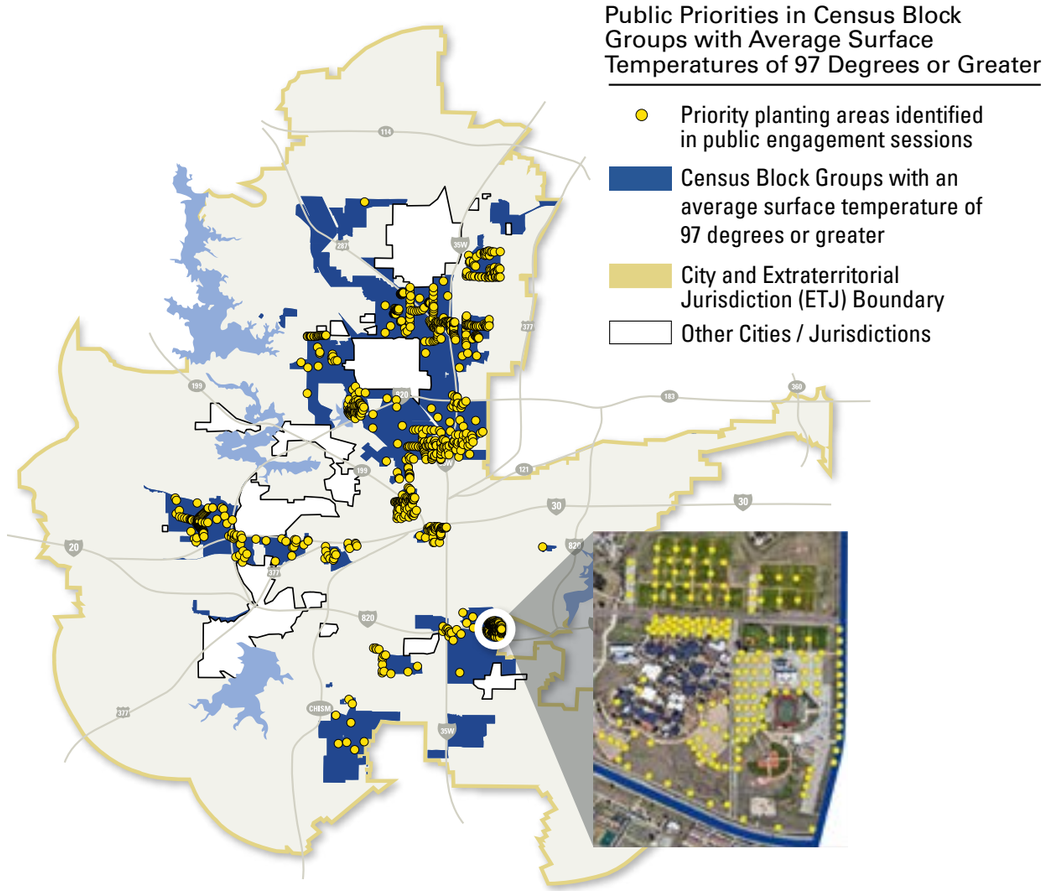
Planting Priority: Public Input on Priorities and Low-Tree Canopy Census Blocks

Map displaying public priorities for planting within Census Block Groups that have less than 10% tree canopy cover



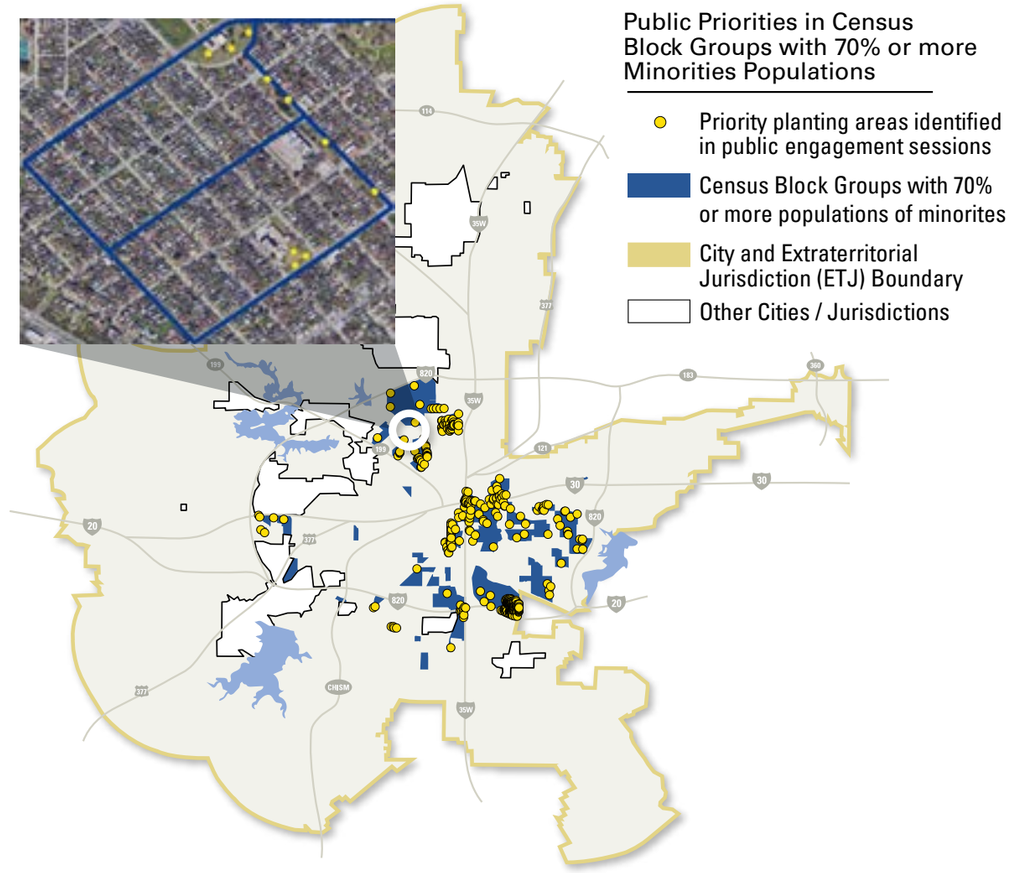
Priority: Public Input and CBGs with Average Surface Temperature of ≥97

Map displaying public priorities for planting within Census Block Groups that have an average surface temperature of 97 degrees or greater



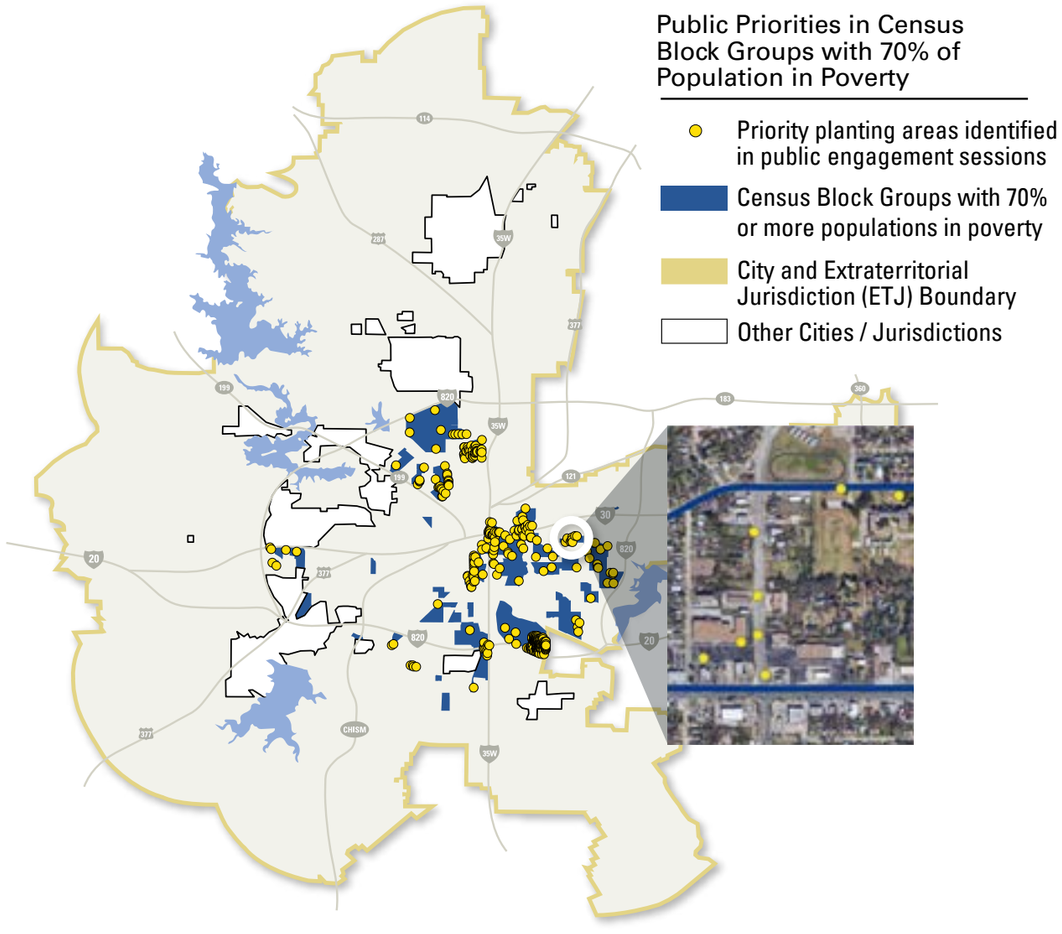
Priority: Public Input and CBGs with ≥70% Minority Populations

Map displaying public priorities for planting within Census Block Groups with 70% or more minority populations



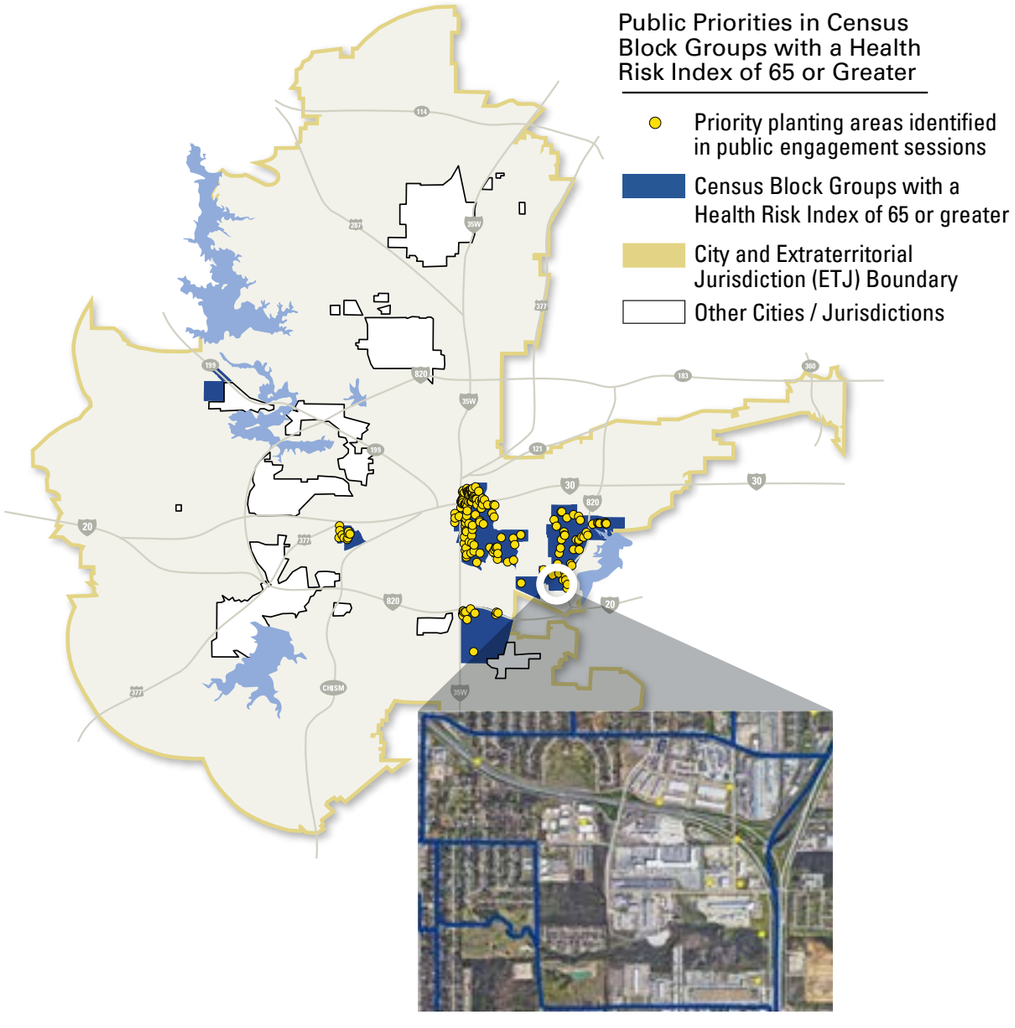
Priority: Public Input and CBGs with ≥70% Economically Vulnerable Populations

Map displaying public priorities for planting within Census Block Groups with 70% or more populations in poverty



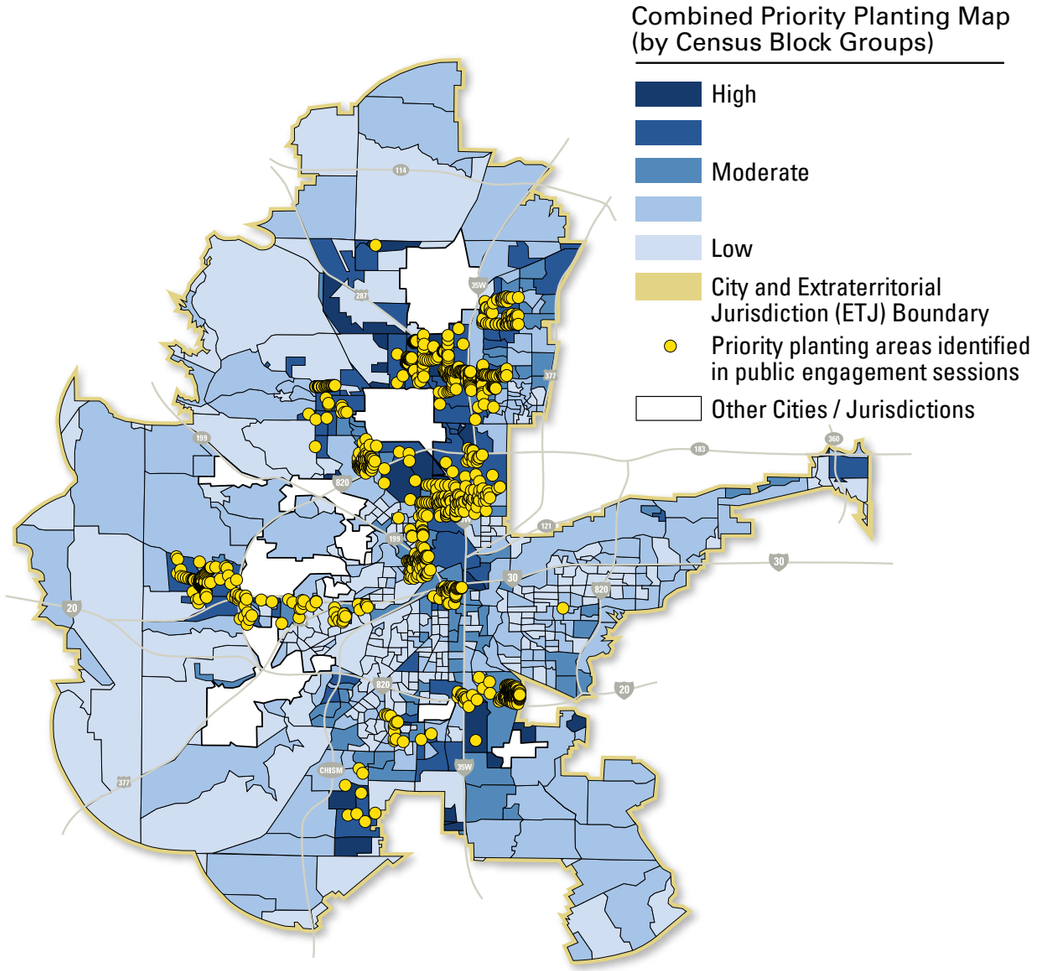
Priority: Public Input and CBGs with a Health Risk Index of 65 of Greater

Map displaying public priorities for planting within Census Block Groups with a Health Risk Index rating of 65 or greater (CDC source)



Combined Priority Map

Map displaying the combined priorities of the public for tree plantings and the integrated data analyses



APPENDIX B:
INDICATORS OF A SUSTAINABLE URBAN FOREST

THE PEOPLE				
Indicators of a Sustainable Urban Forest	**Overall Objective or Industry Standard**	**Fort Worth: Current Performance Level**		
		Low	**Medium**	**High**
Public Awareness	The general public understands the benefits of trees and advocates for the role and importance of the urban forest.		MEDIUM: Multiple partners and programs involved but lacking coordinated messaging and engagement.	
Neighborhood Action	Citizens understand, cooperate, and participate in urban forest management at the neighborhood level.		MEDIUM: Groups that promote urban forest activities/tree planting are active at the neighborhood level, but not coordinated and lack unified goals /priorities.	
City Boards and Commissions	The City has a board for public participation (advisory or with authority) in the urban forest.	LOW-MEDIUM: A Board or Commission exists, but it is not dedicated solely to urban forestry.		
Green Industry Involvement	The green industry works together to advance citywide urban forest goals and objectives. The city and its partners capitalize on local green industry expertise and innovation.		MEDIUM: Limited involvement on short-term projects.	
Department / Agency Coordination	All city departments and agencies cooperate to advance citywide urban forest goals and objectives.		MEDIUM: Coordinated effort between City departments that manage/maintain trees could be improved. Recognition of recent improvements.	
Utility Engagement	All utilities are aware of and vested in the urban forest and cooperate to advance citywide urban forest goals and objectives.	LOW-MEDIUM: Lack of collaboration or coordination.		
Developer Engagement	The development community is aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.		MEDIUM: Conflicting priorities and perception that developers do not value trees.	

THE PEOPLE cont.				
Indicators of a Sustainable Urban Forest	**Overall Objective or Industry Standard**	**Fort Worth: Current Performance Level**		
		Low	**Medium**	**High**
Large Private and Institutional Landholder Involvement	Large, private, and institutional landholders embrace citywide goals and objectives through targeted resource management plans.	LOW-MEDIUM: Limited involvement by large landholders, but the City owns and manages the Fort Worth Nature Center & Refuge.		
Regional Collaboration	Neighboring communities and regional groups are actively cooperating and interacting to advance the region's stake in the city's urban forest.	LOW-MEDIUM: Regional groups exist, but lack a shared regional vision for the urban forest.		
State Agency Engagement	State of Texas agencies are aware of city urban forest goals and objectives and assist in achieving them.	LOW-MEDIUM: Engagement with state agencies for technical assistance, resources, and/or funding could be improved.		

THE MANAGEMENT				
Indicators of a Sustainable Urban Forest	**Overall Objective or Industry Standard**	**Fort Worth: Current Performance Level**		
		Low	**Medium**	**High**
Tree Inventories	Comprehensive, GIS-based, current inventory of all intensively-managed public trees to guide management, with mechanisms in place to keep data current and available for use. Data allows for analysis of age distribution, condition, risk, diversity, and suitability.	LOW: A comprehensive inventory of Fort Worth right-of-way and park trees has not been conducted.		
Tree Canopy Assessment	Accurate, high-resolution, and recent assessment of existing and potential city-wide tree canopy cover that is regularly updated and available for use across various departments, agencies, and/or disciplines.			HIGH: Urban tree canopy assessment completed in 2020 (based on 2018 imagery).
Urban Forest Plans	Existence and buy-in of a comprehensive urban forest management plan to achieve city-wide goals. Re-evaluation is conducted every 5 to 10 years. Other tree-related plans score a low to low-medium.	LOW: No urban forest management plan exists.		
Professional Capacity and Training	A City program is in place for the management of public trees and is adequately funded and staffed (with appropriate qualifications and training) to meet the needs of the trees and the community.	LOW-MEDIUM: Fort Worth's public tree program is staffed with trained professionals, but additional staffing is needed.		
Funding and Accounting	Appropriate funding in place to fully implement both proactive and reactive needs based on a comprehensive urban forest management plan.		MEDIUM: Fort Worth's public tree program is funded to provide standard of care.	

THE MANAGEMENT cont.				
Indicators of a Sustainable Urban Forest	**Overall Objective or Industry Standard**	**Fort Worth: Current Performance Level**		
		Low	**Medium**	**High**
Decision and Management Authority	Professionals are clearly identified and designated for public tree management and standard operating procedures/communications are in place to define roles and authority.		MEDIUM: Professional urban forest manager in place for public tree management. Manager has authority over the program and daily activities.	
Public Tree Maintenance	All intensively-managed, publicly-owned trees are well maintained for optimal health and condition in order to extend longevity and maximize benefits. A reasonable cyclical pruning program is in place, generally targeting 5 to 7 year cycles. The maintenance program is outlined in the management plan.	LOW-MEDIUM: Public trees are pruned for clearance and hazard abatement, certified arborists are required for street tree care, but public street trees are not currently pruned on a routine cycle.		
Planting Program	Comprehensive and effective tree planting and establishment program is driven by canopy cover goals, equity considerations, and other priorities according to the plan. Tree planting and establishment is outlined in the management plan.		MEDIUM: A planting program exists but lacks a systematic citywide strategy that aligns with the 30% canopy goal or other City priorities and initiatives.	
Risk Management	All publicly-owned trees are managed for maximum public safety by way of maintaining a city-wide inventory, conducting proactive annual inspections, and eliminating risks within a set timeframe based on risk level. Risk management program is outlined in the management plan.		MEDIUM-HIGH: The City has a hazard abatement program and established protocols for monitoring and mitigating public tree risk, but could benefit from additional staffing, resources, and inventory data / technology.	
Disaster Preparedness and Response	A disaster management plan is in place related to the City's urban forest. The plan includes staff roles, contracts, response priorities, debris management and a crisis communication plan. Staff are regularly trained and/or updated.		MEDIUM: A storm mitigation plan is in place with a standard procedure for debris cleanup, but a comprehensive inventory would improve planning and response.	
Contractors and Contracts	Specifications and requirements are documented, communicated, implemented, and updated		MEDIUM: Certified arborists are required to perform street tree pruning. Contractor specs for large tree	
	as needed to reflect industry standards, best practices, and City requirements.		removals, planting, maintenance, and plant health care should be updated.	

THE MANAGEMENT cont.				
Indicators of a Sustainable Urban Forest	**Overall Objective or Industry Standard**	**Fort Worth: Current Performance Level**		
		Low	**Medium**	**High**
Communications and Structure	Effective avenues of two-way communication exist between the City departments and between City and its citizens. Messaging is consistent and coordinated, when feasible.		MEDIUM: Collaboration and coordination among City departments and programs exists, but documented procedures are needed to streamline management.	
Tree Protection Policy	Comprehensive and regularly updated tree protection ordinance with enforcement ability is based on community goals. The benefits derived from trees on public and private property are ensured by the enforcement of existing policies.		MEDIUM-HIGH: The Urban Forestry Ordinance regulates tree canopy preservation, protection, planting, and mitigation. The ordinance has not been updated since 2009, and updates to regulations and enforcement are needed.	
Standards and Best Management Practices	Comprehensive manual of tree care, planting and maintenance best management practices and standards for use by City staff, contractors, residents, developers or anyone engaged in tree related activities.		MEDIUM: The PARD Forestry Policies and Procedures Manual details the standards and practices to be implemented, but these could be better communicated and implemented by private property owners and contractors.	

THE TREES				
Indicators of a Sustainable Urban Forest	**Overall Objective or Industry Standard**	**Fort Worth: Current Performance Level**		
		Low	**Medium**	**High**
Urban Tree Canopy	Achieve the desired tree canopy cover according to goals set for the entire city, neighborhoods, and/or future land use classes.	LOW-MEDIUM: Fort Worth's tree canopy goal is 30%. As of 2018, the City's canopy cover was estimated at 19%, which is lower than the regional average of 27%.		
Location of Canopy (Equitable Distribution)	Achieve low variation between tree canopy and equity factors citywide and by neighborhood. Ensure that the benefits of tree canopy are available to all, especially for those most affected by these benefits.		MEDIUM: Fort Worth's Tree Equity Score (American Forests) is 89 out of 100 compared to the regional average of 85.	

THE TREES cont.				
Indicators of a Sustainable Urban Forest	**Overall Objective or Industry Standard**	**Fort Worth: Current Performance Level**		
		Low	**Medium**	**High**
Age of Trees (Size and Age Distribution)	Establish a diverse-aged population of public trees across the entire city and for each neighborhood. Ideal standard: 0-8" DBH: 40% 9-17" DBH: 30% 18-24" DBH: 20% Over 24" DBH: 10%	LOW: No current information available. A comprehensive inventory of Fort Worth's right-of-way and park trees has not been conducted, only an outdated 6.6% sample inventory is available from 2011.		
Tree Species Diversity	Establish a genetically diverse population of publicly-owned trees across the entire city and for each neighborhood. Tree populations should be comprised of no more than 30% of any family, 20% of any genus, or 10% of any species.	LOW: No current information available. A comprehensive inventory of Fort Worth's right-of-way and park trees has not been conducted, only an outdated 6.6% sample inventory is available from 2011.		
Public Tree Condition	Possess a detailed understanding of tree condition and potential risk of all intensively-managed, publicly-owned trees. This information is used to direct maintenance actions.	LOW: No current information available. A comprehensive inventory of Fort Worth's right-of-way and park trees has not been conducted, only an outdated 6.6% sample inventory is available from 2011.		
Trees on Private Property	Possess a solid understanding of the extent, location and general condition of trees on private lands.		MEDIUM: An academic campus in Fort Worth has an inventory. Tree plans are required for private development projects, but no comprehensive database exists.	
Sustainability	Policies with reference to urban trees. Addresses the long-term health and productivity of the natural resource.		MEDIUM: Multiple City plans, programs, and services in place relating to environmental/ natural resource sustainability.	

APPENDIX C: Implementation Plan Timetable

The following tables are representations of the contents of an Excel spreadsheet provided to assist with implementing the recommended action steps for Fort Worth's Urban Forest Master Plan. The recommended steps and short-term targets should be adapted to align with available resources and priorities. The interactive worksheet and key performance indicator tracking tool are provided as a separate resource to the Plan.

RECOMMENDATION 1.
Conduct a comprehensive inventory of public trees in rights-of-way, parks, and other public property.

Short-Term Target 1: Complete the inventory in one City planning sector or other boundary (e.g., neighborhood). Prioritize underserved and disadvantaged neighborhoods within areas with low tree canopy.

Recommended Action Steps		Timeframe
First Step	Identify the department staff/positions that will manage the tree inventory project and determine the intended use and end users. Utilize the 2011 sample inventory and i-Tree Streets data to estimate the total number of public trees that will need to be inventoried.	Immediate (1-5 years)
1.A	Create a work plan and budget to complete the inventory.	
1.B	Estimate costs and consider options to conduct the inventory in phases or all at once.	
1.C	Develop a plan for managing, updating, and integrating inventory data.	
1.D	Secure funding to complete the inventory.	
1.E	Prepare and release bid specifications and select a consultant (if applicable).	
1.F	Refine and implement the data management and integration plan as needed.	

RECOMMENDATION 2.
Develop and implement changes to tree regulations, standards, and best practices to support Fort Worth's tree canopy and sustainability goals.

Short-Term Target 2: Draft the changes to Urban Forestry Ordinance that do not require stakeholder involvement (e.g., updated terminology, definitions, authority, and alignment with other ordinances). Evaluate additional recommended changes and draft proposed ordinance language. Seek input from local arborists, community leaders involved with urban forestry, and professionals familiar with Fort Worth's permitting process.

Recommended Action Steps		Timeframe
First Step	Organize an internal team to review the Urban Forestry Ordinance and recommended changes. Establish a task force to identify creative monetary and non-monetary incentive structures designed to increase tree preservation and planting on development projects. Incentives should complement regulations to provide a balanced approach. Implementation and education will require additional staffing.	Immediate (1-5 years)
2.A	Draft proposed amendments to regulations and standards.	
2.B	Conduct stakeholder engagement and public information sessions prior to presenting text amendments for adoption.	
2.C	Update the City website and communicate changes to City staff, external stakeholders, and the public.	
2.D	Create a manual for residents, tree care professionals, developers, and property managers containing the City's tree regulations, standards, and best practices.	
2.E	Work with other sections and departments to update additional regulations impacting trees.	
2.F	Update City standards, specifications, and manuals related to hardscape/infrastructure conflicts with public trees.	

RECOMMENDATION 3.
Expand and strengthen cooperation among departments to ensure adequate staffing, training, and integration of urban forest considerations into City plans, policies, and programs.

Short-Term Target 3: Establish an internal urban forest working group to organize, monitor, and report on plan implementation.

Recommended Action Steps		Timeframe
First Step	Identify members, objectives, and roles of an internal urban forest working group to assess the staffing and resources needed to implement the UFMP. Providing adequate staffing for urban forest programs will help to ensure other departments and sections are able to maintain necessary coverage.	**Immediate/Ongoing (1-3 years)**
3.A	Create an Urban Forest Working Group to support UFMP implementation and future decisions on staffing and programs.	
3.B	Identify and budget for training, certifications, equipment, and other resource needs of forestry and urban forestry staff.	
3.C	Update or create protocols and procedures for inter-departmental operations and cross-training.	
3.D	Consider renaming the Urban Forestry Section and the Urban Forestry Ordinance to clarify the roles and responsibilities regarding public and private trees.	
3.E	Identify areas to streamline processes.	
3.F	Meet regularly as a working group to implement a continuous improvement framework.	
3.G	Explore the benefits and feasibility of establishing a City Urban Forest Advisory Committee.	
3.H	Provide an annual update to City Council regarding the state of the urban forest and progress made toward UFMP goals.	

RECOMMENDATION 4.
Strengthen existing relationships and support new partnerships with neighborhoods and community organizations throughout the City.

Short-Term Target 4: Review the City's list of neighborhood and community-based organizations and draft a list of potential partners for urban forest efforts.

Recommended Action Steps		Timeframe
First Step	Share the final UFMP with existing partners and provide a summary of how their input influenced the plan.	**Immediate (1-3 years)**
4.A	Create a list of potential local partners, including public, private, institutional, and non-profit organizations.	
4.B	Host virtual discussions with stakeholders to update them on the UFMP and encourage continued participation.	
4.C	Lead or partner with one or more organizations to host an event highlighting Fort Worth's urban forest and the UFMP.	
4.D	Develop or support a program that documents voluntary tree planting and recognizes exemplary urban forest stewards.	
4.E	Regularly evaluate partnerships to ensure they are supporting UFMP goals and achieving greater representation of historically underserved and disinvested communities.	

RECOMMENDATION 5.
Coordinate, create, and implement a public communications, education, and engagement plan focused on Fort Worth's urban forest.

Short-Term Target 5: Develop a public communications, education, and engagement plan where strategies are coordinated as a Citywide initiative rather than a departmental effort. This may necessitate additional staff to adequately engage the community.

Recommended Action Steps		Timeframe
First Step	Maintain Arbor Day Tree City USA designation and post the UFMP on the City's website.	Short-Mid Term (1-10 years)
5.A	Continue to implement the Neighborhood Tree Planting Program, Tree Grant Program, Citizen Forester Program, and volunteer efforts in support of the UFMP and citywide canopy goals.	
5.B	Create a public dashboard or other mechanism to increase transparency and keep the community updated on progress and opportunities for participation.	
5.C	Regularly evaluate public education and engagement efforts.	
5.D	Explore opportunities to engage with and support vulnerable and underserved populations in the planting of public street trees.	

RECOMMENDATION 6.
Develop and implement a strategy to maintain sustainable funding and resources to achieve desired levels of service for urban forest programs and management.

Short-Term Target 6: Develop an action plan and funding strategy for one (1) underfunded program or initiative.

Recommended Action Steps		Timeframe
First Step	Develop an actionable, long-term plan to fully fund tree planting, maintenance, and preservation at levels needed to meet the City's 30% canopy goal.	Short-Mid Term (1-10 years)
6.A	Use data from the inventory, canopy assessment, and the UFMP Technical Report to determine the level of funding needed to achieve and sustain the goals of the UFMP.	
6.B	Review and implement a funding mechanism provided in Appendix C of the UFMP's Technical Report.	
6.C	Evaluate and measure performance indicators to adjust funding as needed to achieve the goals of the UFMP.	
6.D	Establish dedicated, sustained funding sources beyond the current budget for forestry and urban forestry operations to increase the level of service provided.	

RECOMMENDATION 7.
Support and expand plans for maintenance, risk management, and resiliency of public trees.

Short-Term Target 7: **Develop the first annual work plan for the following fiscal year.**

Recommended Action Steps		Timeframe
First Step	Review the strategies and recommendations provided in the Recommendations Section of the UFMP's Technical Report to develop an annual urban forest work plan. The plan should coordinate roles and responsibilities of various City departments involved in tree work, planting, permitting, inspections, and other tree-related activities on public property. Fulfillment of additional duties will require additional staffing	Short-Mid Term (1-10 years)
7.A	Identify the departmental staff/positions to lead the development of an urban forest management plan.	
7.B	Secure funding and utilize the data from the public tree inventory to develop the urban forest management plan.	
7.C	Develop a tree pest and disease management plan for public trees and include a public education component.	
7.D	Utilize current research and innovation to adopt new or improved management strategies supporting urban forest sustainability and resiliency.	

RECOMMENDATION 8.
Create plans for tree planting, preservation, and maintenance to grow a resilient and equitable urban forest with 30% canopy cover.

Short-Term Target 8: **Develop and implement a multi-year tree planting and maintenance plan for a priority area.**

Recommended Action Steps		Timeframe
First Step	Utilize the 2020 canopy assessment and UFMP priority maps to identify the target area for the first planting plan.	Mid-Term (3-10 years)
8.A	Continue to support and diversify funding sources for the City's Rolling Hills Tree Farm in growing, distributing, and planting quality native and adapted trees.	
8.B	Track plantings led by the City, its partners, and private development projects.	
8.C	Practice a no-net-loss for public trees principle by budgeting for and planting replacement trees for those removed on an annual basis.	
8.D	Develop a multi-year public tree planting and maintenance plan that prioritizes areas of greatest need.	
8.E	Maintain a recommended tree planting list that supports urban forest resilience and maximizes tree benefits.	
8.F	Explore opportunities and implement measures to expand the Heritage Tree Program.	
8.G	Conduct an i-Tree Eco survey of the citywide urban forest or utilize the U.S. Forest Service Urban Forest Inventory and analysis program data (when available).	
8.H	Reassess the citywide tree canopy cover using the latest recommended technology and adapt planting targets and priorities.	

RECOMMENDATION 9.
Develop protocols for monitoring the urban forest to identify and address pests and other threats throughout the City.

Short-Term Target 9: Develop and implement a public tree monitoring program for pests and diseases of concern, such as emerald ash borer.

Recommended Action Steps		Timeframe
First Step	Gather and review the latest research on tree pests and diseases of concern and share information with community groups. Include information on the City's website.	Long-Term (5-10 years)
9.A	Expand the public tree monitoring program to conduct field assessments and monitor threats to a growing tree population.	
9.B	Expand opportunities for cross-training staff in other sections and departments that may encounter trees in their operations.	
9.C	Continue and strengthen City inspections of development projects to ensure they remain in compliance with the Urban Forestry Ordinance.	
9.D	Keep up with current research and emerging tree pests and diseases.	
9.E	Provide information to property owners, especially large land-holders, regarding current and emerging tree pests and diseases of concern.	

RECOMMENDATION 10.
Strengthen, expand, and increase awareness of programs and strategies that utilize or repurpose urban wood waste generated from public tree operations.

Short-Term Target 10: Quantify the current amount of wood volume repurposed annually on average and the potential amount of wood volume that would be generated by expanding the program.

Recommended Action Steps		Timeframe
First Step	Determine how much wood waste is generated from City Forestry operations, where the wood waste is generated, and if and how it is currently distributed	Long-Term (5-10 years)
10.A	Document the procedures and protocols for utilizing alternatives to mulching and landfilling woody debris resulting from public tree maintenance.	
10.B	Quantify the potential carbon and waste diversion impacts of reusing wood waste.	
10.C	Increase awareness and provide opportunities for private tree care companies to support sustainable practices such as urban wood utilization.	

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Tom Galbraith	Development Advisory Committee, Dunaway Associates
Bowie Holland	Real Estate Council of Greater Fort Worth, Empire Holdings, LLC
Stacey Pierce	Streams & Valleys, Executive Director
Brendan Lavy	Dept. of Environmental & Sustainability Sciences, TCU
Courtney Blevins	Texas A&M Forest Service, Regional Urban Forester

Technical Advisors

Janette Monear, President/CEO, Texas Trees Foundation
Norm Daley, Chief Operations & Communications Officer, Texas Trees Foundation
Emily Plauche, Urban Forestry Coordinator, Texas Trees Foundation

Contributing Organizations (Alphabetized)

- American Society of Civil Engineers (ASCE) Texas, Fort Worth Branch
- American Society of Landscape Architects (ASLA) Texas, DFW Section
- Botanical Research Institute of Texas (BRIT) / Fort Worth Botanic Garden
- City of Fort Worth, TX
- Climate Reality Project, DFW Chapter
- Community Design Fort Worth
- Community Frontline
- Cross Timbers Urban Forestry Council (CTUFC)
- CTUFC Citizen Foresters
- Downtown Fort Worth Inc
- Fort Worth Audubon Society
- Fort Worth Bicycling Association
- Fort Worth Botanical Society
- Fort Worth Development Advisory Committee
- Fort Worth Garden Club, Inc
- Fort Worth Hispanic Chamber of Commerce
- Fort Worth Independent School District
- Fort Worth Metropolitan Black Chamber of Commerce
- Fort Worth Neighborhood and Homeowners Associations
- Fort Worth Urban Forestry Advisory Committee
- Friends of Fort Worth Nature Center & Refuge
- Friends of Tandy Hills Natural Area, Inc.
- Girl Scouts Texas Oklahoma Plains
- Greater Fort Worth Association of Realtors
- Greater Fort Worth Builders Association
- Greater Fort Worth Chamber of Commerce
- Greater Fort Worth Sierra Club
- Hispanic Real Estate Brokers Association
- Keep Fort Worth Beautiful
- Kids Environmental Education Network
- League of Women Voters, Tarrant County
- National Association of Hispanic Real Estate Professionals (NAHREP)
- Near Southside Inc.
- North Central Texas Council of Governments
- North Tarrant Express Mobility Partners
- North Texas Tollway Authority
- Real Estate Council of Fort Worth
- Riverside Alliance
- RxPlore / Fort Worth Climate Safe Neighborhood Coalition
- Scenic Texas / Scenic Fort Worth
- Streams and Valleys
- Tarleton University, Fort Worth Campus
- Tarrant County Asian Chamber of Commerce
- Tarrant County College
- Tarrant County Master Gardeners Association
- Tarrant Regional Water District (TRWD)
- Tarrant Transit Alliance
- Texas A&M AgriLife Extension Service District 4
- Texas A&M Forest Service
- Texas Blossoms / Eastside Blossoms
- Texas Christian University
- Texas Department of Transportation (TxDOT) Fort Worth District
- Texas Master Naturalists, Cross Timbers Chapter
- Texas Nursery and Landscape Association (TNLA) Region V
- Texas Wesleyan University
- Trinity Metro
- Trinity River Vision Authority (TRVA)
- Trust for Public Land
- University of North Texas Health Science Center
- Urban Land Institute
- US Army Corps of Engineers (USACE), Fort Worth District
- Visit Fort Worth

FORT WORTH

URBAN FOREST

MASTER PLAN

2023

We invite you to collaborate with us.

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