City of Fort Collins

Rooted In Community

Urban Forest Strategic Plan

Technical Appendix

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About This Document

This technical appendix, prepared by Davey Resource Group, Inc., is an accompaniment to the Fort Collins Urban Forest Strategic Plan (2024). It provides more detailed information about the methodology and findings that underlie the Plan and its recommendations.

Strategic Planning Framework

When viewed from above, the green tree canopy of Fort Collins stands out against the surrounding steppe, shrubland, and grassland of the Front Range. Trees that have been planted over the past 160 years have grown to become one of the hallmarks of the city, enhancing the natural beauty and hospitability of the Cache la Poudre River valley.

The city of Fort Collins is in a period of growth—the city is expected to add 70,000 new residents by 2040 (City Plan, 2019). The shade, cooling effects, and carbon absorption of trees will make tree canopy a key component in regional approaches to climate mitigation, adaptation, and resilience as the city grows. Trees make streets and sidewalks safer and more comfortable for cycling, walking, and public transit. Trees cool the air, helping residents to save on energy costs and reducing the incidence of heat-related illness. Trees also capture stormwater and help to conserve irrigation water by cooling the ground and air.

In recent years, the city's Forestry Division, founded in 1977, has been moving toward a more proactive approach to managing public trees. This Urban Forest Strategic Plan summarizes the state of Fort Collins' urban forest, the near-term outlook for its public trees, the forestry program, public sentiment, and the City's planning and policy framework. Then it proposes seven recommendations with tiered actions that the City can take to ensure that its urban forest remains healthy and vibrant into the future.

The Urban Forest Strategic Plan

An urban forest strategic plan is a comprehensive plan for the management, protection, and improvement of the urban forest. It analyzes the existing condition, value, and resources of the urban forest and outlines a vision for the future, guided by input from the community. The plan provides a roadmap for implementation by prioritizing initiatives and actions to improve the urban forest over time. The development of an urban forest strategic plan is an important step in ensuring the long-term sustainability and resilience of the urban forest.

In 2023, the Forestry Division partnered with Davey Resource Group, Inc. to develop the *Fort Collins Urban Forest Strategic Plan*. The plan uses the principles of *adaptive management* to establish a 20-year vision for managing the urban forest (figure 1). Adaptive management is commonly used for resource planning and management and provides a conceptual framework for managing the urban forest. It seeks to develop an effective plan by answering a series of questions about Fort Collins' present and future:

Adaptive Management Process

1. **What do we have?** We looked at Fort Collins' existing urban forest, its current management, and public perception about trees. We put this into context by examining climate and social factors and the City's policy and planning framework.
2. **What do we want?** We engaged with City staff, partners, and the public and incorporated existing planning documents and urban forestry industry tools to identify priorities for the urban forest and the desired outcomes for the Forestry program.
3. **How do we get there?** We looked for gaps, opportunities, challenges, and desires for future canopy growth, social equity, staffing, and alignment with Fort Collins' future plans. This guided the creation of goals, initiatives, and actions that will be needed to achieve the desired outcomes.
4. **How are we doing?** We developed methods to create responsibility and accountability for the plan through audits and evaluations. Resulting metrics and information will feed back into the future adaptive management approach by providing an updated perspective on "What do we have?".

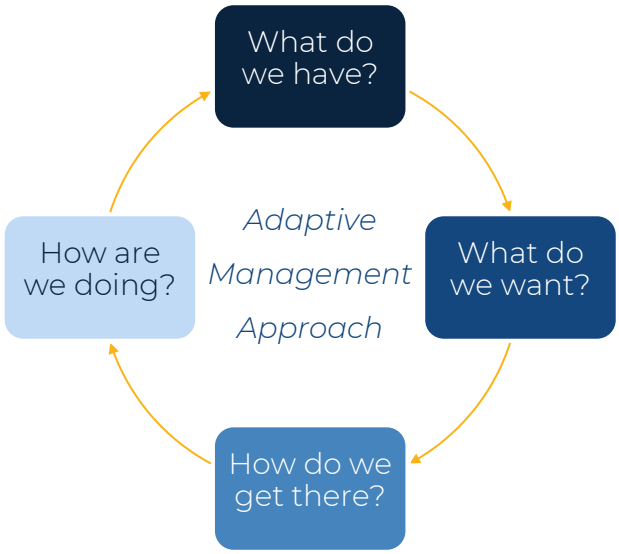


Figure 1. The adaptive management planning process used to create the Urban Forest Strategic Plan.

Trees Support Fort Collins' Strategic Objectives

Fort Collins' 2024 Strategic Plan outlines seven Key Outcome Areas by which the city measures progress toward the vision and goals of its comprehensive plan:

1. High Performing Government
2. Culture & Recreation
3. Economic Health
4. Environmental Health
5. Neighborhood & Community Vitality
6. Safe Community
7. Transportation & Mobility

Trees relate to each of these seven Outcome Areas through the many social, ecological, and economic benefits that trees provide. Tree benefits and their relationships to the City's Key Outcome Areas are detailed throughout this document—look for the tree icon.

Fort Collins' Urban Forest

Fort Collins' urban forest includes trees growing along streets, in public parks and natural areas, and in the yards of homes, schools, and businesses. Together, these trees are a dynamic, living system that provides invaluable environmental, economic, and societal benefits to enhance the quality of life in Fort Collins.

URBAN TREE CANOPY

An **urban tree canopy assessment** was conducted by Davey Resource Group, Inc. in collaboration with the City of Fort Collins to better understand the city's urban tree canopy—where it is, how it's changing, the benefits it provides to residents, and where potential tree planting opportunities exist. The urban tree canopy assessment uses aerial imagery to measure the amount of tree canopy on both public and private property as viewed from above.

The urban tree canopy assessment analyzed 2021 high-resolution aerial imagery of Fort Collins to determine:

- **tree canopy cover by land use and geography:** land area that is shaded by trees when viewed from above, summarized by social and political boundaries
- **change in tree canopy cover from 2011–2021 by land use and geography:** how tree canopy cover has changed within social and political boundaries over the past decade
- **ecosystem benefits analysis:** estimates the benefits provided by the city's entire tree canopy
- **priority planting analysis:** prioritizes possible tree planting locations by stormwater, urban heat island, social equity, and human health benefits
- **tree placement analysis:** characterizes potential planting areas based on their suitability for large-, medium-, and small-stature trees

The information derived from the urban tree canopy assessment:

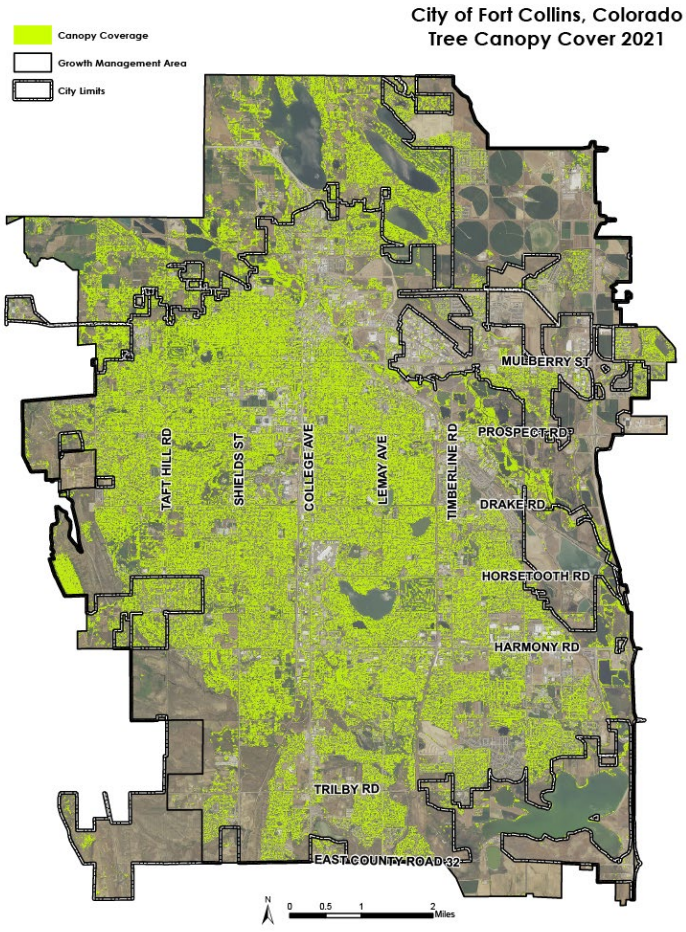
1. Establishes a baseline of tree canopy cover for future analysis
2. Estimates the rate of change in tree canopy over the past decade
3. Estimates the public benefits that are provided by existing tree canopy
4. Can help inform decision making about urban forest management, tree preservation, and future planting

Tree Canopy Cover and Change, City Limits & Growth Management Area

The urban tree canopy assessment measured tree canopy cover within current city limits. To provide a baseline for growth over the next 20 years, the assessment also measured tree cover across city limits plus the growth management area.

Within the current city boundaries, Fort Collins has 5,116 acres of tree canopy, equal to 13.7% tree cover (map 1). The growth management area includes an additional 1,280 acres of tree canopy, bringing the total tree canopy area for city limits plus the growth management area to 6,396 acres (12.6% cover).

Tree canopy cover derived from 2021 aerial imagery was compared to a 2011 tree cover analysis that was conducted by PlanIt Geo to examine how tree canopy has changed across Fort Collins in the prior decade. During this period, Fort Collins experienced a net gain of 753 acres within city limits and a total gain of 936 acres of tree canopy across city limits plus the growth management area (equivalent to 708 football fields), a net increase of 17.2% tree cover since 2011.

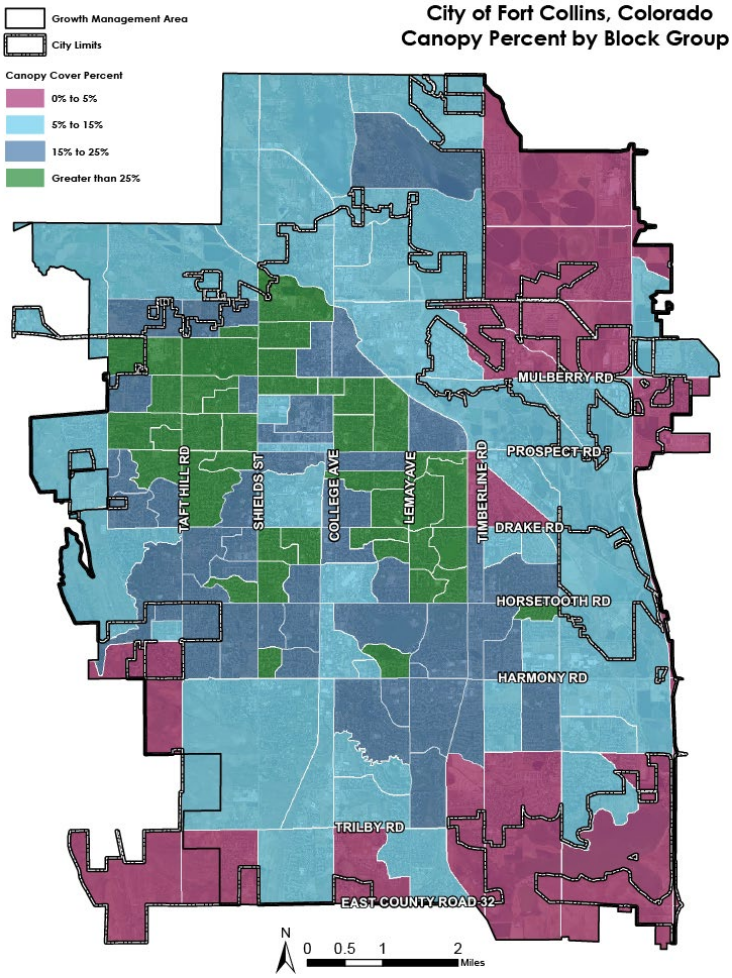


Map 1. Tree canopy cover in Fort Collins city limits and the growth management area, based on 2021 high-resolution aerial imagery.

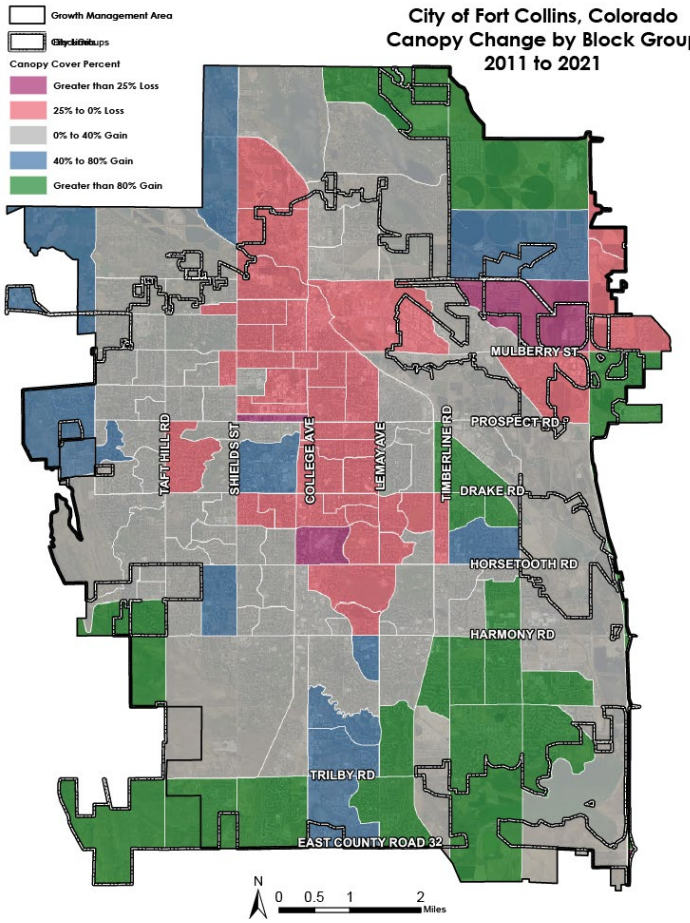
Tree Canopy Cover and Canopy Change by US Census Block Group

US Census *block groups* are federally defined geographic areas that are variable in size and typically contain between 600–3,000 residents. Block groups make for useful study areas due to the wide variety of sources that use census boundaries to report social and economic data. In Fort Collins during the 2020 U.S. Census, there were 137 block groups ranging in size from 2–3,025 acres.

Among Fort Collins' block groups, tree cover ranges from <0.1% to 41% (map 2). From 2011–2021, 69% of block groups experienced tree canopy growth (maximum growth: +378% tree cover), while 30% of block groups lost tree canopy (maximum loss: -53% tree cover; map 3; figure 2).



Map 2. Tree canopy cover within Fort Collins city limits and the growth management area by U.S. census block group.



Map 3. Tree canopy change by U.S. census block group, 2011–2021.

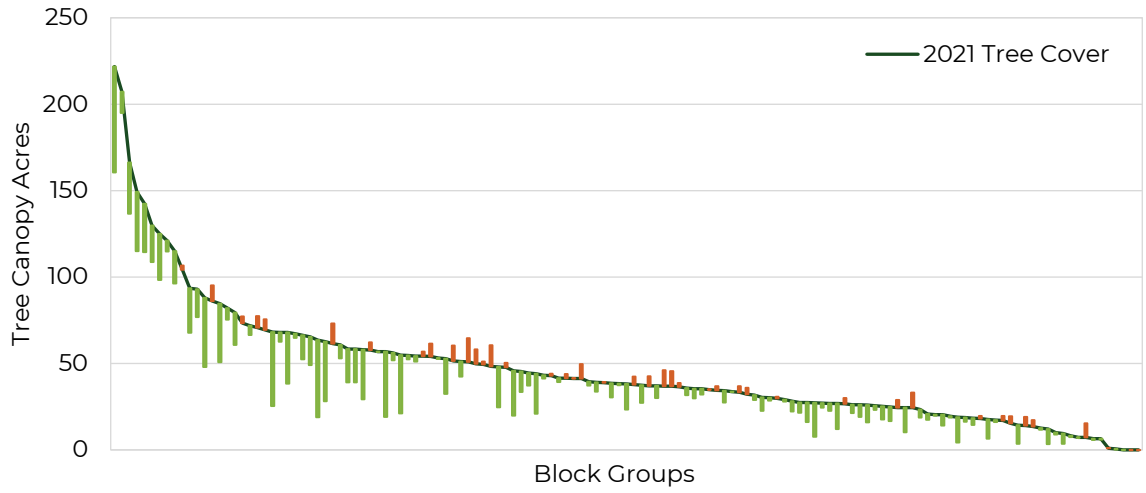
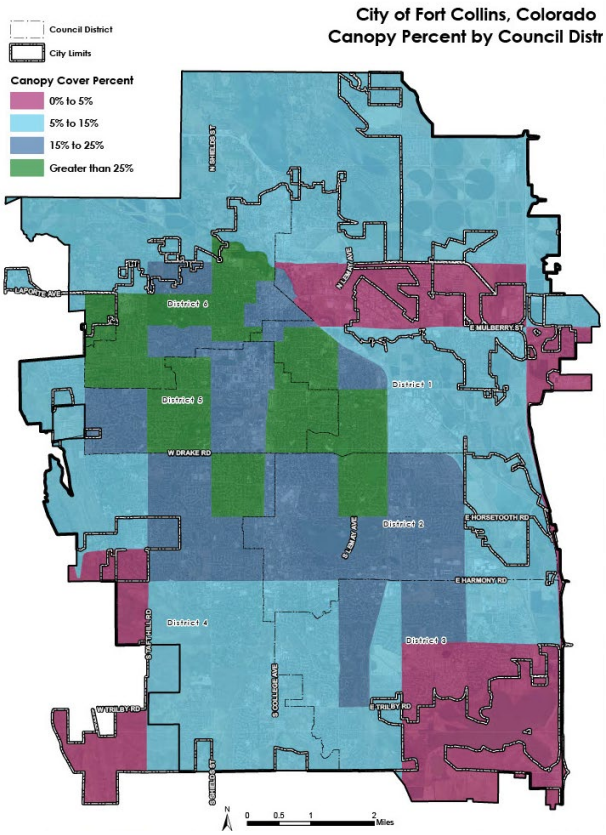


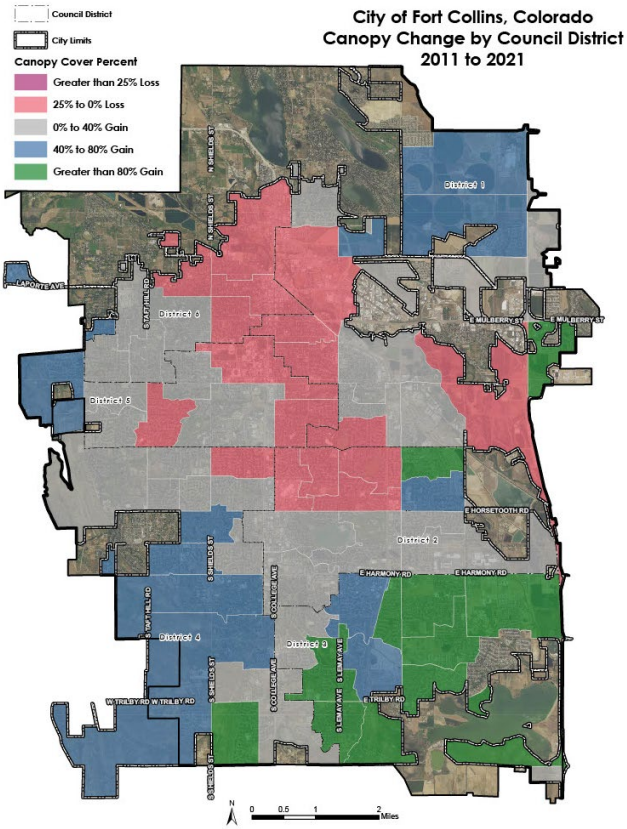
Figure 2. Census block groups in order of largest to smallest by tree canopy acres. Change in tree canopy acres from 2011-2021 is represented by green bars (net gain) and orange bars (net loss).

Canopy Cover and Canopy Change by City Council District & Precinct

Among the six city council districts, tree canopy cover ranges from 8.9% to 25.1% (map 4). From 2011–2021, council districts 1–5 experienced net growth in tree cover (range: +6.1% in District 5 to +110% in District 3), while District 6 experienced a slight net loss of tree cover (-0.6%; map 5, figure 3).



Map 4. Tree canopy cover by city council precinct and district.



Map 5. Tree canopy change by city council precinct and district, 2011–2021.

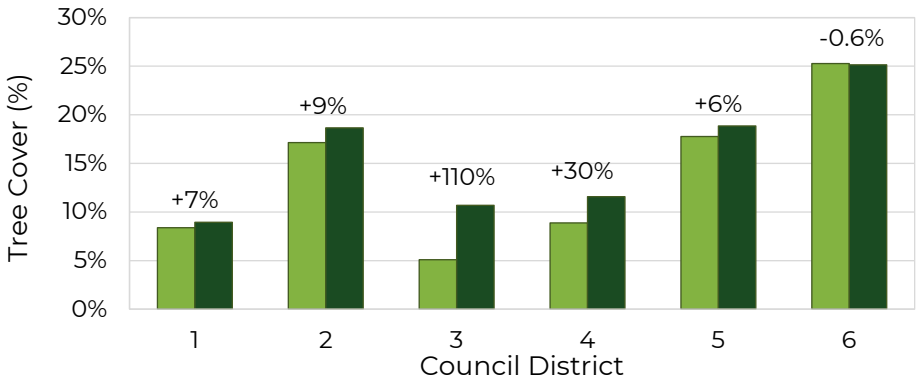


Figure 3. Tree canopy cover by council district in 2011 and 2021. Labels indicate net change in tree cover from 2011-2021.

Canopy Cover and Canopy Change within Parks

Trees add to the natural beauty of parks and enhance the value of green space for many types of recreational uses. Trees within parks and natural areas also serve as important habitat for urban wildlife. For these reasons, planting, maintaining, and preserving canopy trees, with a focus on native species, are priority actions that are named in Fort Collins' *Recreate: Parks & Recreation Master Plan* (2021).

Among Fort Collins' 60 parks, cemeteries, and golf courses, average tree cover is 18.9% over 1,379 total park acres (figure 4, table 1), greater than the city average of 13.7% tree cover. Tree cover ranges from no measurable tree canopy at Richards Lake Park to up to 62% cover at Indian Hills Park. In the study period from 2011–2021, there was a net gain of 47.7 acres (+1.7%) of tree canopy across the studied parks.

Six future park sites provide a potential for up to 102 acres of new tree canopy area.

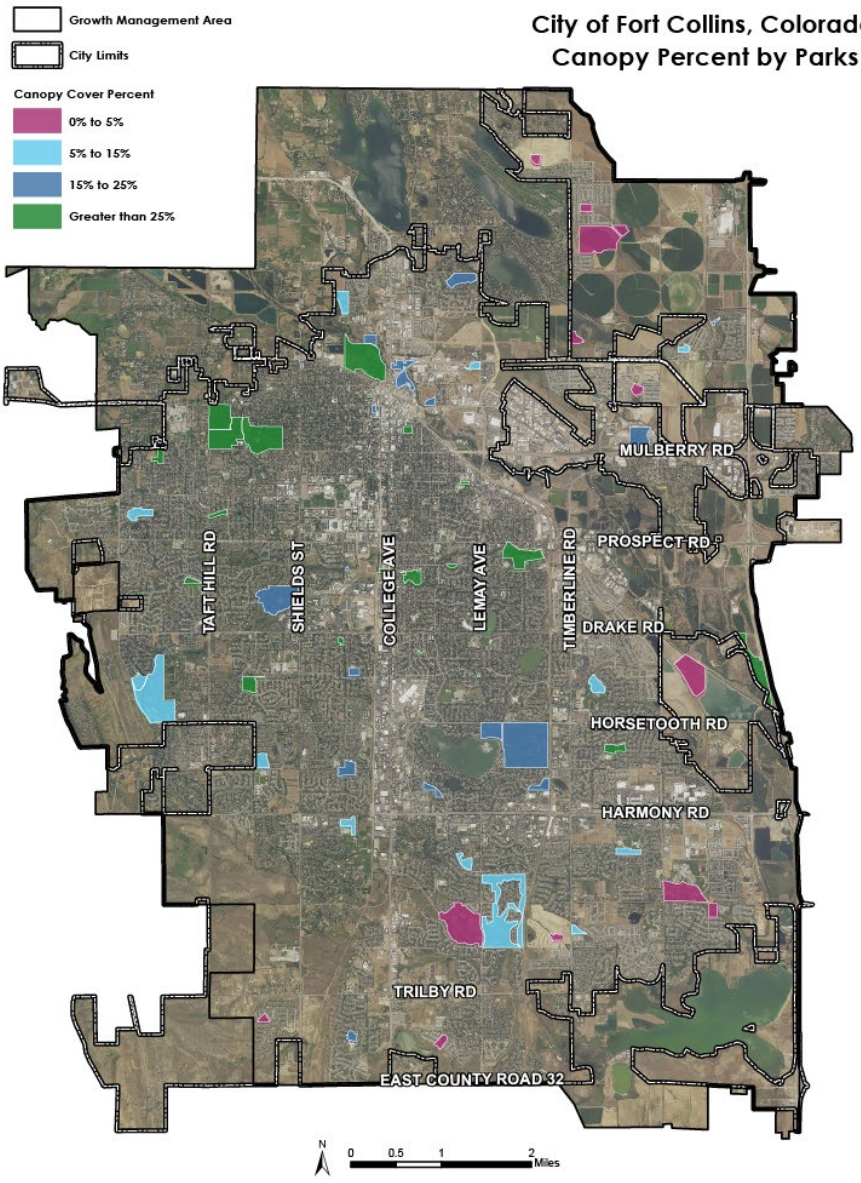


Figure 4. Tree canopy cover within Fort Collins parks.

Table 1. Tree canopy cover and change by park. Possible tree canopy includes grassy and vegetated areas where trees could potentially be planted. Maximum tree canopy is the sum of existing and possible canopy.

PARK	ACRES	TREE CANOPY	CHANGE 2011-2021	POSSIBLE CANOPY	MAXIMUM CANOPY
Alta Vista Park	0.6	41%	2%	15%	56%
Archery Range	54	34%	14%	50%	84%
Avery Park	6	45%	8%	36%	81%
Beattie Park	7	23%	5%	17%	40%
Blevins Park	6	33%	23%	59%	93%
Buckingham Park	5	15%	1%	46%	62%
City Park	76	29%	9%	29%	58%
City Park Nine Golf Course	55	28%	5%	1%	29%
Civic Center Park	2	24%	-6%	44%	69%
Collindale Golf Course	157	16%	12%	1%	16%
Cottonwood Glen Park	12	12%	119%	60%	72%
Creekside Park	3	29%	37%	39%	68%
Crescent Park	7	0.1%	100%	78%	78%
Eastside Park	2	31%	28%	53%	84%
Edora Community Park	42	25%	34%	40%	65%
English Ranch Park	12	26%	143%	38%	63%
Fossil Creek Community Park	96	4%	241%	51%	54%
Freedom Square Park	0.5	25%	-28%	22%	47%
Golden Meadows Park	11	22%	39%	43%	65%
Grandview Cemetery	43	39%	1%	0%	40%
Greenbriar Park	22	17%	75%	49%	67%
Harmony Park	10	11%	>600%	64%	75%
Homestead Park	6	16%	>600%	73%	89%
Indian Hills Park	2	62%	3%	36%	99%
Landings Park	8	22%	30%	36%	59%
Lee Martinez Community Park	90	33%	-2%	47%	80%
Legacy Park	9	16%	-21%	75%	91%
Leisure Park	0.9	54%	14%	27%	80%
Library Park	5	51%	9%	21%	72%
Lilac Park	0.7	18%	51%	59%	77%
Miramont Park	10	12%	269%	66%	78%
Oak St Plaza Park	0.3	55%	-9%	0%	55%
Old Fort Collins Heritage Park	14	22%	38%	38%	60%
Overland Park	16	15%	56%	48%	62%
Poudre River Whitewater Park	11	15%	-43%	47%	63%
Rabbit Brush Park	2	18%	155%	55%	73%
Radiant Park	9	3%	100%	71%	73%
Registry Park	5	2%	363%	78%	80%
Richards Lake Park	6	0%	0%	100%	100%
Ridgeview Park	11	11%	167%	67%	77%
Rogers Park	8	32%	69%	55%	88%
Rolland Moore Community Park	71	22%	27%	36%	58%
Romero Park	0.2	37%	28%	35%	72%
Roselawn Cemetery	28	20%	2%	46%	66%
Rossborough Park	16	26%	45%	69%	95%

PARK	ACRES	TREE CANOPY	CHANGE 2011-2021	POSSIBLE CANOPY	MAXIMUM CANOPY
Soft Gold Park	17	14%	192%	64%	78%
Southridge Golf Course	127	12%	73%	7%	19%
Spencer Park	0.4	45%	-1%	45%	90%
Spring Canyon Community Park	116	14%	77%	64%	77%
Spring Park	16	32%	16%	42%	74%
Stewart Case Park	14	6%	129%	67%	73%
Sugar Beet Park	6	8%	74%	71%	79%
Traverse Park	5	7%	0%	80%	87%
Troutman Park	15	22%	68%	48%	69%
Twin Silo Community Park	54	2%	-15%	51%	53%
Warren Park	25	21%	13%	37%	58%
Washington Park	0.7	56%	15%	42%	98%
Water's Way Park	8	1%	>600%	80%	81%
Westfield Park	15	9%	511%	63%	72%
Woodwest Park	3	36%	1%	60%	96%

Trees Enhance Culture & Recreation

Trees enhance urban parks and green space by providing shade, beauty, and by contributing to the ecological function of green islands within the built environment. Trees along transit corridors build connectivity to parks and green space that eases the passage of both humans and wildlife.

According to Trust For Public Land's ParkServe mapping tool, **73%** of Fort Collins residents live within a 10-minute walk of a park, which is above average for all U.S. cities and towns (55%) and on par with the 100 most populous U.S. cities (74%). Increasing tree canopy within and around these parks is one way that urban forestry can support the Culture and Recreation. Fort Collins City Council has set a priority for all residents to live within a 15-minute walk to nature and have trees visible where they live, work, and play.

Trees are not compatible with all recreational uses, however. For example, trees are undesirable within ballfields, skate parks, and amphitheaters. Recreation centers and pavilions can limit the area where trees can be planted. Lastly, many of Fort Collins' natural areas are intended to protect native habitat including grassland and shrubland; in such places, contiguous tree canopy is not desirable.

Sources: Trust For Public Land; Fort Collins' ReCreate: Parks & Recreation Master Plan, 2021; Nature in the City, 2015; Natural Areas Master Plan, 2014.

Tree Canopy by Land Use

Examining tree canopy cover and change by land use shows how different land uses are affecting citywide tree canopy trends, which can be useful for guiding policy decisions. Land uses that comprise larger areas have the greatest impact on citywide trends.

In Fort Collins, residential land contains 56% of the city's urban forest (figure 5). Tree cover has grown 15% on residential land since 2011. The largest tree canopy losses by total acreage have taken place on commercial land, which lost 30 acres (10%) of tree cover since 2011.

The largest potential for additional tree canopy occurs within residential and mixed-use zoning types, which together contain 8,083 acres of possible additional tree canopy.

By zoning district, the highest proportions of tree canopy cover occur within the Neighborhood Conservation Districts (19%–36%), the Low-Density Residential District (26%), and Manufactured Housing District (24%; table 2). The highest proportions of tree canopy loss occurred within several commercial zoning districts (-36% to -23%) and the High-Density Mixed-Use Neighborhood District (-34%). Canopy cover within the Residential Foothills District is low (5%) but grew by 248% over the past decade.

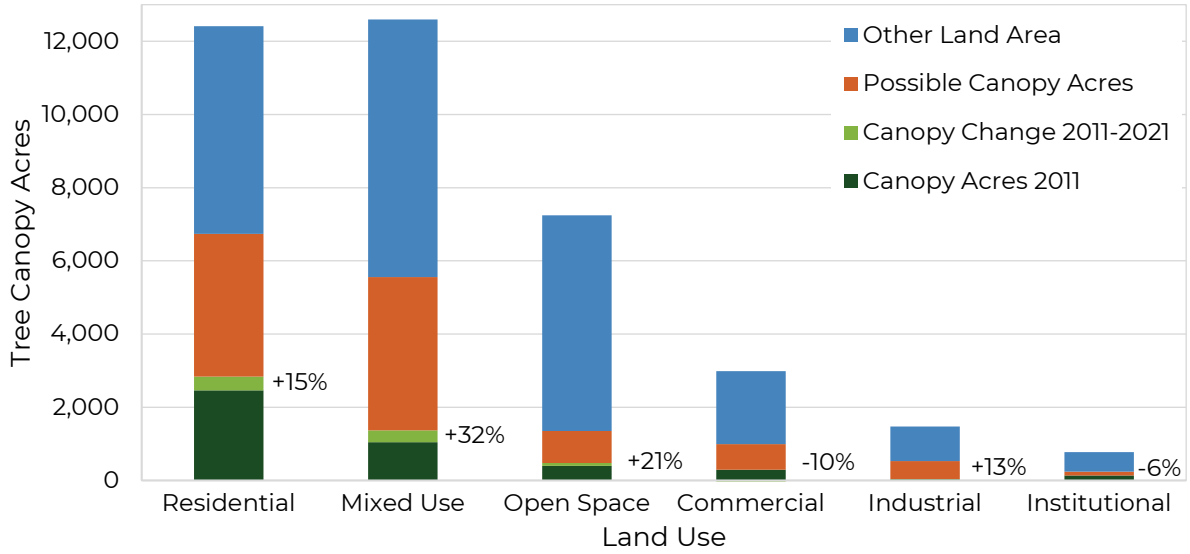


Figure 5. Tree canopy cover in 2011, net change from 2011–2021, and possible additional tree canopy by land use type.

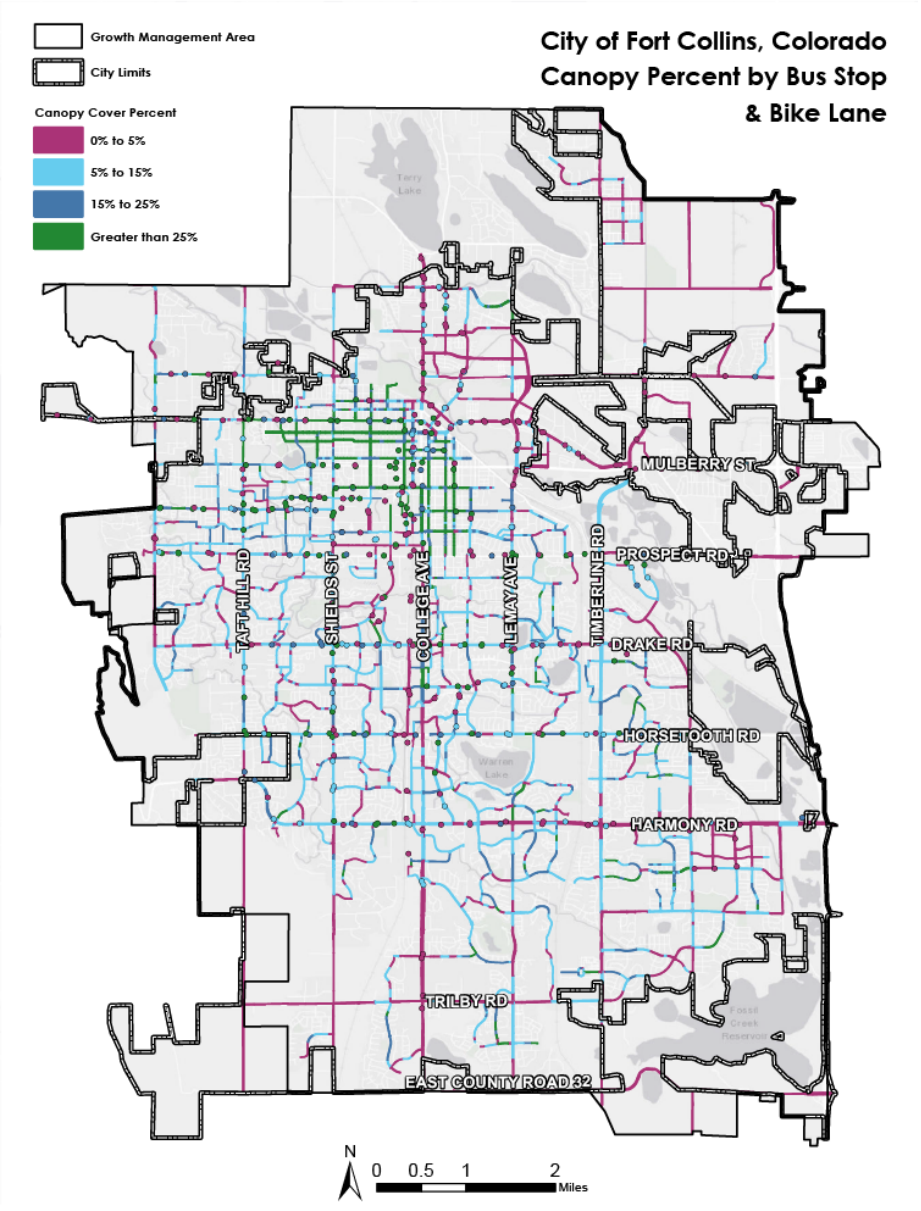
Table 2. Tree canopy cover and change by zoning district.

ZONING DISTRICT	ACRES	TREE CANOPY	CHANGE 2011-2021	POSSIBLE CANOPY	MAXIMUM CANOPY
Commercial	**2,958**	**9%**	**-10%**	**24%**	**32%**
Community Commercial - North College District	155	4%	7%	27%	31%
Community Commercial - Poudre River District	28	13%	-23%	24%	38%
Community Commercial District	244	5%	-35%	30%	35%
Downtown District	682	13%	-19%	17%	31%
General Commercial District	1,218	7%	-1%	25%	32%
Limited Commercial District	48	8%	-36%	17%	26%
Neighborhood Commercial District	299	14%	34%	22%	36%
Service Commercial District	284	6%	-32%	28%	34%
Industrial	**1,478**	**3%**	**13%**	**34%**	**36%**
Industrial District	1,478	3%	13%	34%	36%
Institutional	**762**	**17%**	**-6%**	**13%**	**31%**
CSU Jurisdiction	762	17%	-6%	13%	31%
Mixed Use, Low Density	**6,434**	**9%**	**88%**	**38%**	**47%**
Low Density Mixed-Use Neighborhood District	6,434	9%	88%	38%	47%
Mixed Use, Medium Density	**6,103**	**13%**	**10%**	**28%**	**42%**
Employment District	1,960	6%	16%	32%	38%
Harmony Corridor District	1,499	9%	44%	27%	35%
Medium Density Mixed-Use Neighborhood District	1,940	17%	23%	30%	47%
Neighborhood Conservation - Buffer District	159	29%	-20%	13%	42%
Neighborhood Conservation - Medium Density District	546	34%	-16%	17%	51%
Mixed Use, High Density	**56**	**15%**	**-34%**	**16%**	**30%**
High Density Mixed-Use Neighborhood District	56	15%	-34%	16%	30%
Open Space	**7,248**	**7%**	**21%**	**12%**	**19%**
Public Open Lands District	6,600	6%	20%	9%	16%
River Conservation District	226	18%	23%	30%	48%
Rural Lands District	288	3%	169%	61%	64%
Transition District	135	4%	10%	14%	18%
Residential	**12,416**	**23%**	**15%**	**31%**	**54%**
Low Density Residential District	8,654	26%	14%	26%	52%
Manufactured Housing District	128	24%	0%	20%	44%
Neighborhood Conservation - Low Density District	539	36%	-4%	20%	56%
Residential Foothills District	445	5%	248%	32%	38%
Urban Estate District	2,650	13%	32%	51%	64%

Canopy Cover at Bus Stops

Trees an important part of the layered strategies to increase the use of public transit that are outlined in the city's transportation master plan. Shaded bus stops make public transit safer for riders, particularly during hot summer months. Growing tree canopy cover at bus stops supports Fort Collins' intent to reduce Vehicle Miles Traveled by encouraging multimodal transportation (*City Plan,* 2019).

The urban tree canopy analysis quantified tree cover within 30-ft buffers of bus stops and bus stations to characterize tree canopy within areas that support the City's goals for encouraging multimodal transportation. Average tree cover is 18.3% at 22 bus stations and 423 bus stops across Fort Collins (map 6). Among 263 bus stops that did not have a built-in shelter, average tree cover is 21.2%, a loss of 2.3% tree cover since 2011. A majority of bus stops have less than 20% tree cover and experienced losses of tree cover since 2011 (figure 6).



Map 6. Tree canopy cover within a 30-ft buffer of bus stops and transit stations and within bike lanes by street segment.

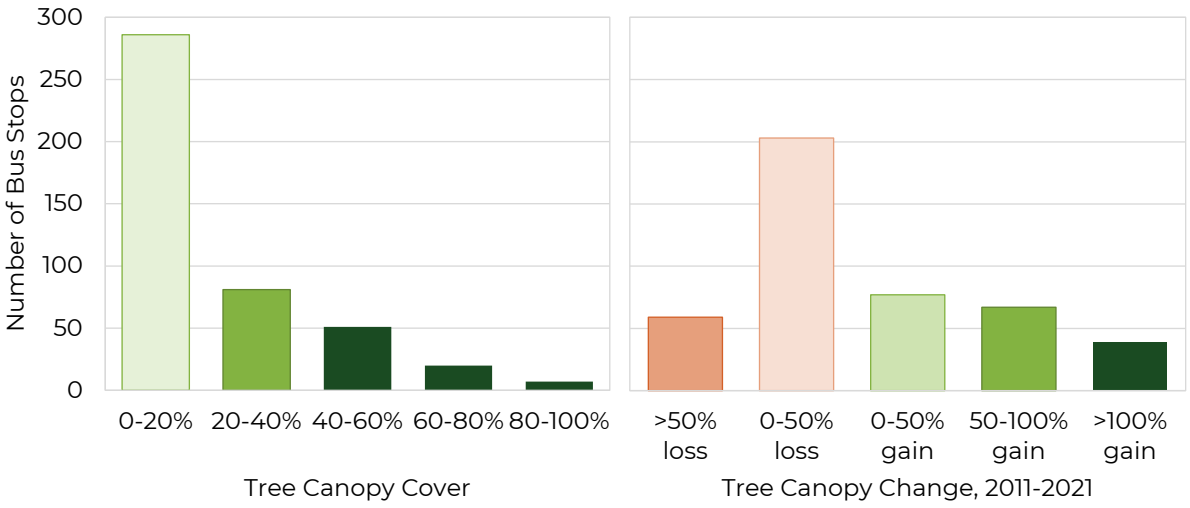


Figure 6. Tree canopy cover and change (2011–2021) at Fort Collins bus stops.

Tree Benefits for Transportation & Mobility

Over the past several years, Fort Collins has experienced substantial growth in transit ridership and bicycling. Encouraging individuals to shift their short vehicle trips to active transportation modes (e.g. biking, walking) is one of the most effective ways to reduce vehicle miles traveled, a goal of both the City's transportation master plan and its *Our Climate Future* plan (2021).

Trees contribute to Fort Collins' goals of increasing multimodal transportation use. Trees growing in street rights-of-way help to slow traffic, making streets safer for pedestrians and cyclists. Shade and evapotranspiration cooling provided by street tree canopy allow for more comfortable walking, biking, and use of public transit and increase the appeal of cycling routes. Trees and other vegetative buffers can also reduce the exposure of cyclists and pedestrians to air pollution. For these and other reasons, residents are three times more likely to be physically active when they live in areas with high levels of trees and vegetation.

Sources: Ellaway et al., 2005; Ozdemir, 2019; Eisenman et al., 2021; Ewing & Dumbaugh, 2009.

Canopy Cover within Bike Lanes

Trees along bike lanes contribute to the City's goals of building low-stress, high-comfort bicycle facilities that promote a physically active and environmentally sustainable community (*City Plan*, 2019). Trees not only shade bike lanes; they also contribute to the safety of cyclists by slowing traffic.

Over 267 miles of bike lanes across Fort Collins, average tree canopy cover is 9.5% (map 6) approximately the same as it was in 2011 (+0.1%). Among street segments with bike lanes, 82% of segments have less than 20% tree cover; tree canopy change within these spaces has been variable in the period from 2011–2021 (figure 7).

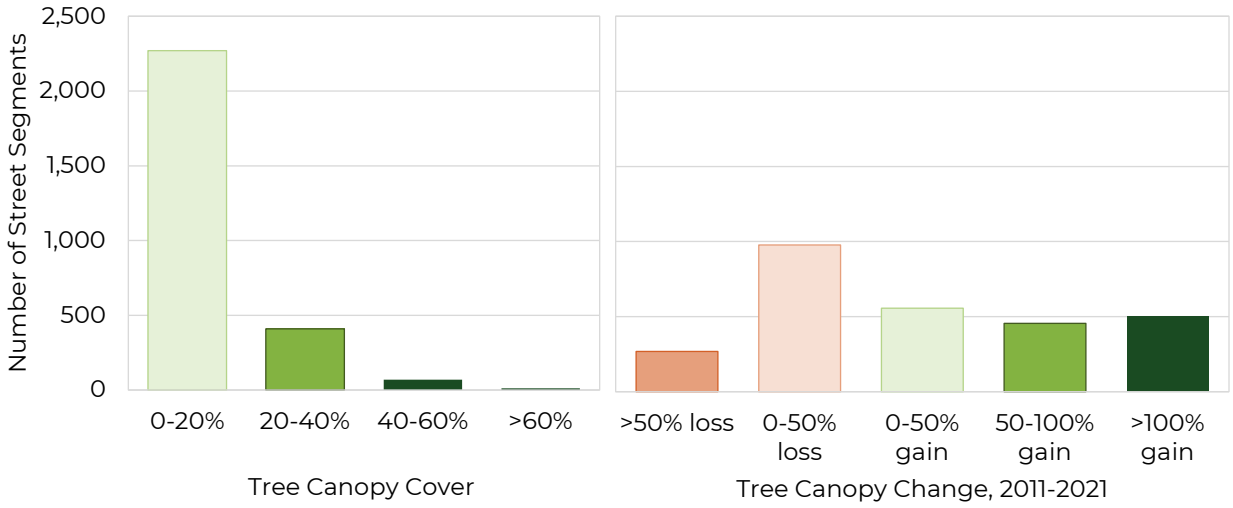


Figure 7. Tree canopy cover and canopy change, 2011–2021, in bike lanes by street segment.

TREE CANOPY STUDY: SUMMARY OF FINDINGS

The results of the urban tree canopy assessment, which was based on an analysis of 2021 aerial imagery and compared to a prior analysis of 2011 imagery, show that tree canopy cover varies widely across Fort Collins and the growth management area, ranging from almost no trees in some parts of the city to over 40% tree cover. In general, tree cover tends to be highest within the oldest parts of the city, where residents have been planting trees since the nineteenth century. Citywide tree cover is 13.7%; including the growth management area, average tree cover is 12.6%.

From 2011–2021, the city and the growth management area experienced an overall increase in tree canopy cover of 17.2%. The largest gains in tree canopy cover took place within low-canopy areas around the periphery of the city, while canopy losses

tended to take place within the more densely developed urban core where tree cover is highest.

Tree canopy cover within parks, bus stops, and bike lanes was analyzed as part of an effort to evaluate tree canopy in relation to multiple city priorities. Publicly owned trees in these areas provide benefits that enhance quality of life and contribute to climate change mitigation. Future investments in the planting and maintenance of trees in parks and along streets rights-of-way is a dual investment in Key Outcome Areas including Neighborhood & Community Vitality, Culture & Recreation, and Transportation & Mobility.

Trees and Economic Health

Economic benefits of trees are derived from both added value and avoided costs.

Cost Savings. Trees save energy by providing shade and blocking wind, which reduce the need for heating and cooling and lower energy costs for homes and businesses. Properly placing three trees around a home can reduce energy costs for the average household by $100 to $250 per year. Trees that shade air conditioning units can help them run up to 10% more efficiently.

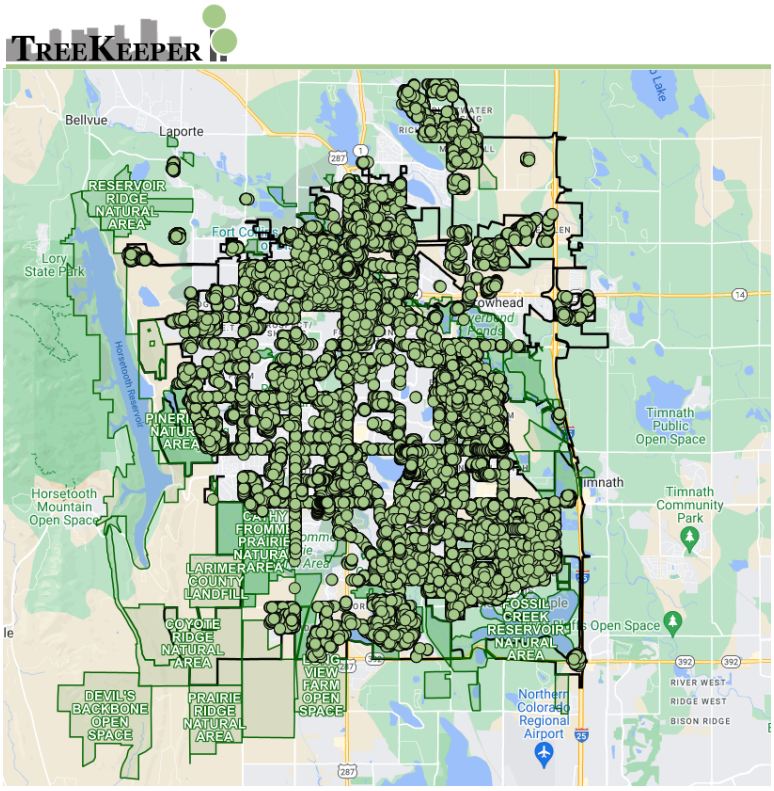
Trees also help residents save money on health care costs. Trees reduce the incidences of medical complications due to asthma, heart disease, and heat-related illnesses.

Economic Development. Trees and green spaces have a positive impact on the local economy by increasing property values, attracting tourism, and supporting local businesses. Mature, healthy trees can increase property values for both residential and commercial properties by 3%–7% or more, as well as increase values of neighboring properties. In business districts, trees attract customers. Shoppers spend more time and money in retail areas with mature, healthy tree canopies and are willing to spend 11% more for products, services, and parking at businesses with trees in front of them.

Sources: McPherson et al., 2005; Wolf, 2005; Vargas, 2007; Siriwardena et al., 2016; Hughes, 2013. Vargas et al., 2007; U.S. Department of Energy (n.d.)

PUBLIC TREE INVENTORY

The Forestry Division is responsible for the care of public trees. From 2018–2023, the Forestry Division and trained volunteers from the City's Urban Forest Ambassador program inventoried 57,991 trees and 3,397 possible tree sites within street rights-of-way, parks, and city property (map 7). Detailed information about public trees is used by the Forestry Division to guide management decisions.



Map 7. Public trees and planting sites as documented in TreeKeeper.

61,388 Inventoried Sites

Nearly two-thirds of all inventoried sites were street trees (figure 8). Together, vacant planting sites and stumps comprise 3,397 potential planting sites where additional trees can be planted over time (figure 9).

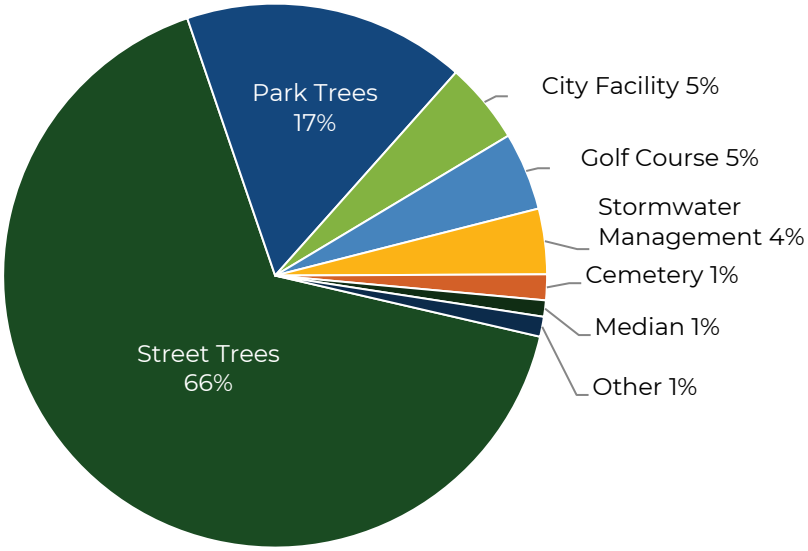


Figure 8. Public trees by location.

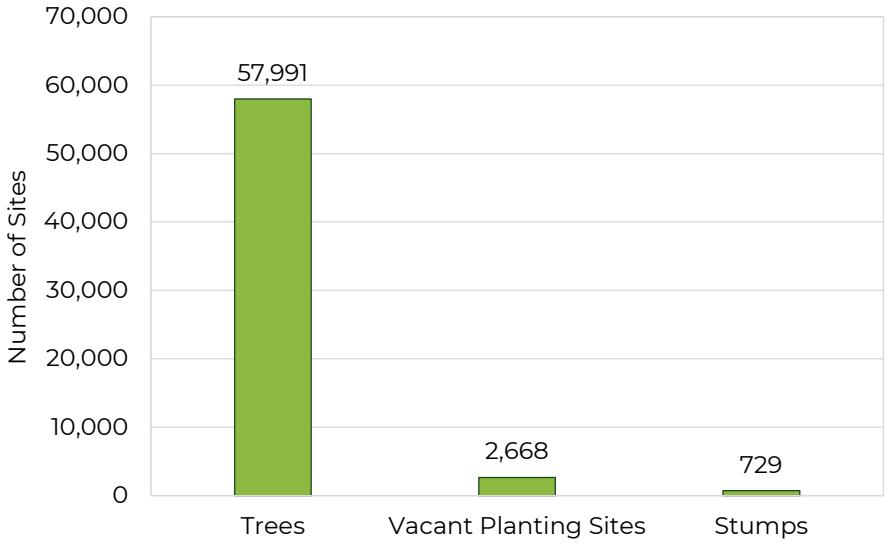


Figure 9. Inventoried sites, 2018–2023.

Tree Diversity

The inventory of public trees cataloged 214 unique species of trees that represent 56 genera and 26 families. Diversity helps to make the tree population resilient to pests and diseases. Urban forestry industry standards for diversity recommend that no single species of tree should exceed 10% of the total inventory; no one genus should exceed 20%; and no one family of tree should exceed 30% of the total tree inventory (the "10-20-30 Rule" for species abundance).

Top 5 Species of Public Trees Relative to the 10% Rule for Species Abundance

Among inventoried trees, green ash (*Fraxinus pennsylvanica*) and honeylocust (*Gleditsia triacanthos* and *G. triacanthos inermis*) exceeded recommended limits for species abundance (11% of public trees each; figure 10, table 3). The abundance of ash is expected to decline over time due to emerald ash borer and implementation of the city's *Emerald Ash Borer (EAB) Management and Response Plan (2020)*, climate change, and city code. The Forestry Division is reducing the planting of honeylocust on public property and is encouraging developers to shift away from planting honeylocust as part of required street tree plantings that are associated with development.

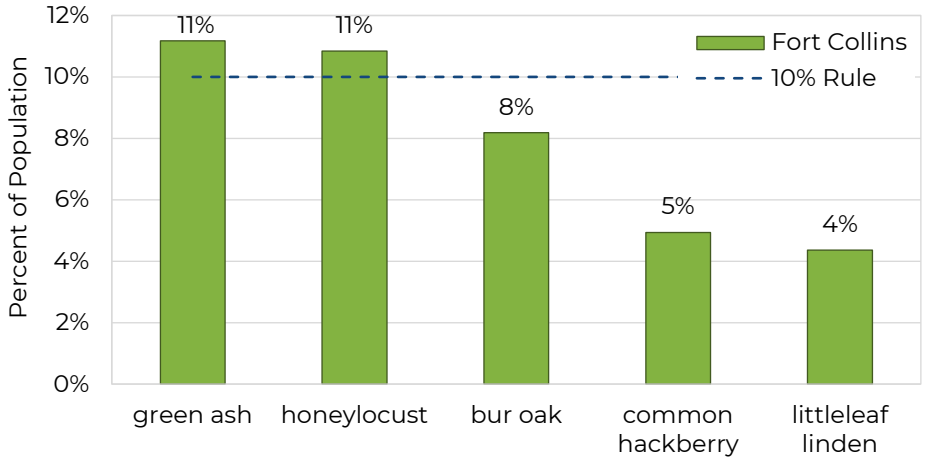


Figure 10. Top five species of public trees relative to a recommended 10% Rule for abundance of any single species.

Table 3. Top five species of public trees.

COMMON NAME	BOTANICAL NAME	NUMBER OF PUBLIC TREES
green ash	*Fraxinus pennsylvanica*	6,478
honeylocust	*Gleditsia triacanthos**	6,286
bur oak	*Quercus macrocarpa*	4,749
common hackberry	*Celtis occidentalis*	2,864
littleleaf linden	*Tilia cordata*	2,527

* includes *var. inermis*

Top 5 Genera of Public Trees Relative to the 20% Rule for Genus Abundance

At the level of genus, which groups similar species of trees, oaks are the most abundant trees in Fort Collins (15% of inventoried trees; figure 9). All genera remain below the recommended threshold of 20% abundance.

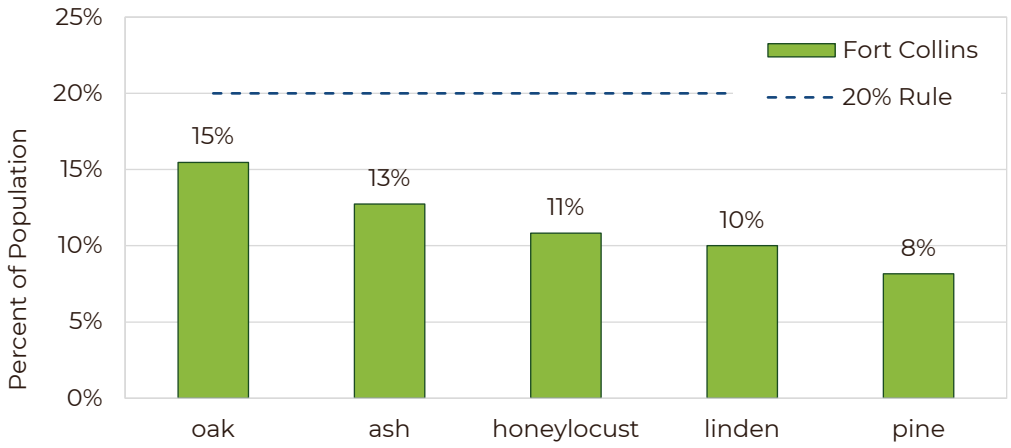


Figure 11. Top five genera of public trees relative to the 20% Rule for genus abundance.

Top 5 Families of Public Trees Relative to the 30% Rule for Family Abundance

Families are larger groupings of similar trees, containing similar species and genera. All tree families that are represented in Fort Collins' inventory are well below recommended limits of 30% of the total public tree population (figure 10).

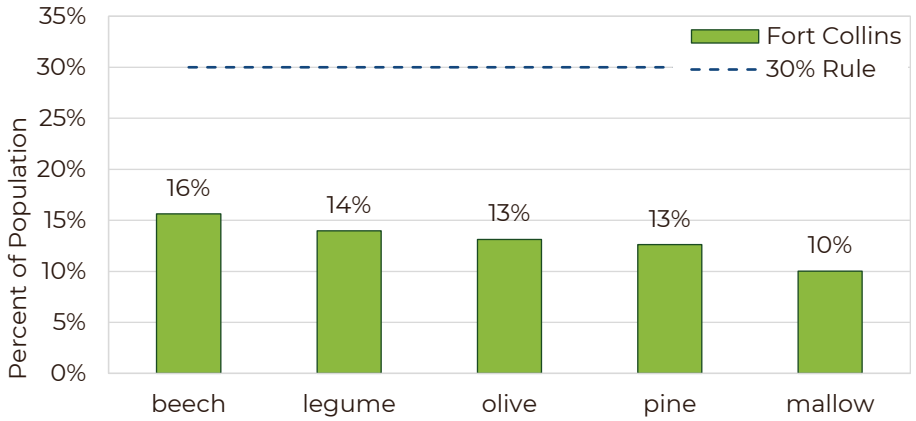


Figure 12. Top five taxonomic families of public trees relative to the 30% Rule for family abundance.

Trees and Environmental Health

Trees provide innumerable ecological benefits that improve urban environments.

Trees Cool Our Cities. High temperatures in urbanized areas contribute to *urban heat island*, in which impervious surfaces such as roads, buildings, and sidewalks trap and hold heat. Urban heat island can raise air temperature in cities up to 7°F higher during the day and 5°F higher at night compared to neighboring rural areas. Urban heat island raises higher energy costs and power plant emissions and increases heat-related illnesses, which cause more deaths in the United States each year than any other natural disaster. Large, healthy trees lower temperatures through both shading and evapotranspiration. Trees reduce peak summer temperatures by 2-9°F and prevent an average of 1,200 heat-related deaths each year in the U.S, making them a critical tool to combat the negative health impacts of high temperatures.

Trees Clean the Air. Trees act as natural air filters, removing pollutants from the air and reducing their negative impacts on humans and the environment. Through the removal of air pollutants, trees save over 850 lives and prevent 670,000 incidents of acute respiratory symptoms in the U.S. each year. Trees are also an important carbon sink for climate change mitigation through the removal of carbon dioxide and greenhouse gasses from the air. One large, healthy oak tree growing in Fort Collins can remove over 30 pounds of pollutants from the air over 20 years.

Trees Intercept and Conserve Water. Trees intercept and retain stormwater, reducing runoff and water pollutants by 20%–60%, thereby reduce flooding, erosion, and the level of sediment and pollutants that enter local waterways. A mature deciduous tree can intercept 700 gallons of stormwater per year, and a mature evergreen tree can intercept 4,000 gallons of water per year. Underground, tree roots and decomposition help to increase the amount of water that soil can hold, allowing for more efficient use of irrigated water. In addition, the cooling effects of trees during summer months helps to reduce the amount of moisture that is lost through evaporation. Through both processes, trees can retain water in the soil and reduce irrigation quantity and frequency.

Trees Provide Food & Habitat for Wildlife. Trees provide habitat and food for a wide variety of wildlife species, supporting biodiversity and maintaining the health of local ecosystems. Oaks can support over 500 species of pollinators and other beneficial insects. In the Colorado Front Range, broadleaf deciduous forests are relatively new to the region. The tree canopy of Fort Collins provides migratory birds with an important stopover point. At the same time, trees can provide refuge for species such as hawks and corvids that hunt or outcompete native grassland birds and mammals. For these reasons, tree canopy in natural areas must be thoughtfully placed. In backyards and along streets, however, tree canopy acts as an important buffer for wildlife within the built environment.

Sources: Michigan Audubon, n.d.; USDA Forest Service, n.d.; US Environmental Protection Agency, n.d.; McPherson et al., 2002; Cappiella et al., 2005; VerCauteren & Gillihan, 2007; Nowak et al. 2014; Johnson et al., 2017; National Weather Service, 2021; McDonald et al., 2020; Shah et al., 2022; Breidt et al. 2022.

Condition of Public Trees

In the tree inventory, more than half of public trees (55%) are rated to be in Good or Fair-Plus condition, meaning that their trunks and crowns are generally healthy and strong, and an additional one-third (34%) are rated to be in Fair condition, indicating that they are healthy and show no major defects (figure 11).

Structural integrity, overall tree health, and form are often improved through proper pruning. Routine pruning, young tree training, and other proactive maintenance can help keep trees within Fair, Fair Plus, and Good categories over time.

Though it is difficult to move a significant number of trees from a lower to a better condition category, structural and routine pruning on a five-year rotation will help maintain a majority of trees within Fair to Good tree condition ratings over time.

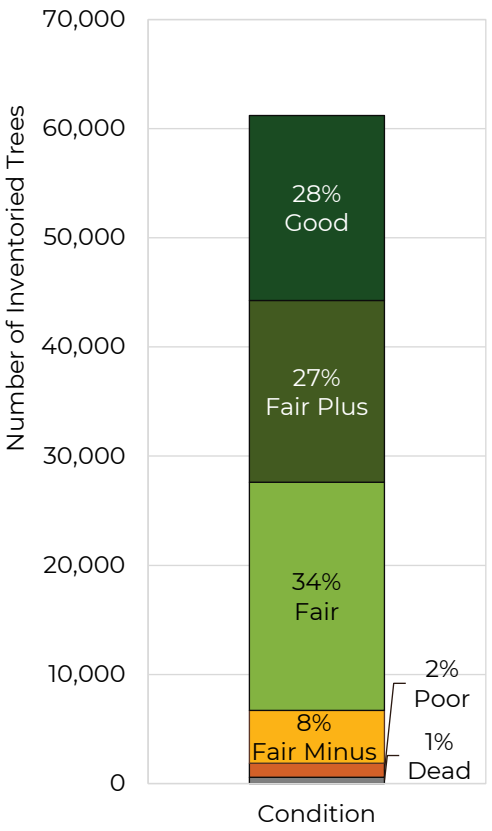


Figure 13. Condition ratings of public trees.

Size-Age Classes of Public Trees

The relative age of trees can be estimated from trunk diameter. In Fort Collins, public trees were classified into four categories based on their trunk diameter at standard height (DSH): young (0–8 inches DSH), established (9–17 in), maturing (18–24 in), and mature (>24 in) trees.

Urban forestry industry standards recommend a mixed-age tree population to balance maintenance needs of the tree population over time and protect against significant canopy loss within a short period. Sixty percent of public trees in Fort Collins are in the young size class, reflecting sustained tree planting efforts within the city, including tree planting that occurs through new development as the city has grown (figure 12). Care of young trees during the establishment period, as well as proactive maintenance of older age classes, will help increase the proportion of older trees to balance age classes over time.

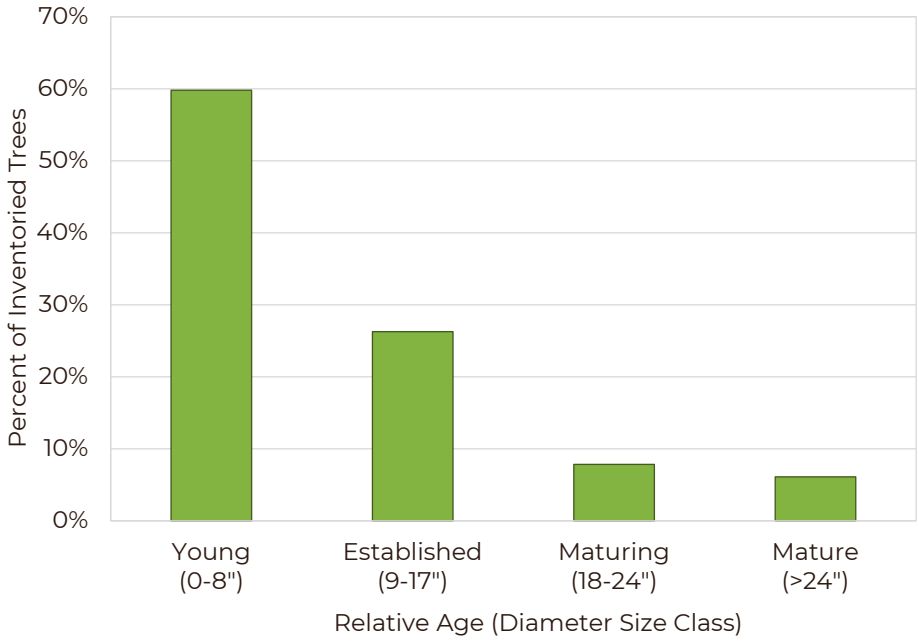


Figure 14. Relative age classes of public trees, estimated from trunk diameter.

PUBLIC TREE INVENTORY: SUMMARY OF FINDINGS

The inventory of 61,388 public trees and planting sites in Fort Collins revealed that the diversity of public trees is approaching a level that will help the urban forest remain resilient to pests and diseases. The importance of such measures is currently reflected in the City's response to emerald ash borer, which threatens 13% of its public tree inventory. Reductions to ash and honeylocust, paired with species-level diversification of future tree plantings, will help increase diversity over time.

The condition of public trees reflects significant investments in routine maintenance as the Forestry Division moves toward its goal of a five-year pruning cycle and away from reactive maintenance, which is comparably more costly. Shifting toward proactive maintenance can reduce per-tree maintenance costs by as much as 50% compared with maintenance that relies heavily on storm and emergency response (AECOM, 2013).

Fort Collins' public trees skew young, reflecting an uptick in more recent tree plantings that are associated with city activities and increased development. Future maintenance needs are expected to increase over time as trees grow into larger size classes, which will require additional budget and capacity for the Forestry Division to keep pace.

GOALS FOR FORT COLLINS' TREE CANOPY AND PUBLIC TREES

The findings of the urban tree canopy assessment and public tree inventory suggest potential goals for Fort Collins' urban forest that can guide Forestry Division activities and priorities over the next 20 years.

- Grow tree canopy in Fort Collins and make it more evenly distributed over time.
- Mitigate tree canopy losses on public and private property.
- Preserve and expand tree canopy cover at bus stops and along bike routes to encourage multi-modal transportation.
- Expand tree canopy within and around parks to support compatible recreational uses, conservation goals, and to build connectivity to green space that is accessible to all residents.
- Protect and enhance tree diversity to increase the resilience of the public tree population.
- Establish young trees, and proactively maintain older trees, to improve and/or maintain the general condition and even the age distribution of public trees over time.
- Expand collection of inventory data to include information such as risk, irrigation status, and EAB treatment priority to inform management decisions.

Strategies for Resilience and Sustainable Growth

Urban tree canopy and public tree inventory data were further analyzed to characterize the benefits that are provided by existing trees; evaluate the potential resilience of the urban forest to future threats from pests, diseases, and climate change; and to identify priority locations for tree canopy growth to address environmental, social, and human health needs.

PUBLIC TREE BENEFITS

Two benefits analyses were conducted to quantify the annual benefits and carbon storage of public trees using i-Tree Eco software from the U.S. Forest Service and partners. i-Tree Eco models (estimates) the benefits that trees provide based on data inputs about the location and quantity of tree canopy cover and the species, size, condition, and location of inventoried public trees. The resulting benefits calculations reflect the benefits that are provided by Fort Collins' total tree canopy, as well as the benefits provided by public trees.

Benefits Provided by Fort Collins' Tree Canopy

Ecosystem benefits including air pollution removal, carbon sequestration and storage, and stormwater runoff reduction were estimated from urban tree canopy assessment data. The resulting model estimates reflect the benefits that are provided by all of Fort Collins' trees, including trees on both public and private tree canopy, across city limits and the growth management area (table 4). In addition, the change in tree canopy benefits was estimated from the prior 2011 urban tree canopy assessment to quantify the change in tree benefits from 2011–2021.

Fort Collins' tree canopy provides ecosystem benefits valued at more than $2.2 million per year in savings to residents and businesses. Annual savings have increased by $346,000 since 2011 with growth of tree canopy across the city.

Table 4. Ecosystem benefits provided by Fort Collins' total tree canopy, 2011-2021.

ECOSYSTEM BENEFITS OF TREE CANOPY	2011		2021		2011–2021 CHANGE IN VALUE
	QUANTITY	VALUE	QUANTITY	VALUE	
Annual benefits					
Air quality: pollution removal (lb)	482,600	$797,881	570,300	$942,949	$145,068
CO removal	3,900	$2,598	4,600	$3,071	$473
NO_2 removal	72,660	$12,855	85,860	$15,192	$2,337
O_3 removal	256,320	$210,223	302,920	$248,445	$38,222
SO_2 removal	15,400	$1,033	18,200	$1,220	$187
$PM_{2.5}$ removal	4,360	$163,864	5,140	$193,657	$29,793
PM_{10} removal	129,960	$407,308	153,580	$481,364	$74,056
Carbon sequestration (tons)	4,920	$839,102	5,810	$991,666	$152,564
Stormwater: avoided runoff (gal)	29,720,000	$265,610	35,130,000	$313,902	$48,292
Total Annual Benefits		**$1,902,593**		**$2,248,517**	**$345,924**
Structural Value					
Carbon storage (tons)	191,920	$32,732,674	226,820	$38,684,069	$5,951,395

Benefits Provided by Fort Collins' Public Trees

i-Tree Eco modeling software was also used to estimate the benefits of public trees using data from the tree inventory, including the species, size, and condition of public trees (table 5). Public trees account for more than $69,000 in benefits each year and have an estimated replacement value of more than $112 million.

Table 5. Ecosystem benefits provided by Fort Collins' public trees.

ECOSYSTEM BENEFITS OF PUBLIC TREES	QUANTITY	VALUE
Annual benefits		
Air quality: pollution removal (lb)	21,320	$32,038
CO removal	199	$139
NO_2 removal	790	$111
O_3 removal	15,336	$9,042
SO_2 removal	445	$10
PM_{10} removal	4,421	$14,512
$PM_{2.5}$ removal	122	$8,225
Carbon sequestration (tons)	276	$47,013
Stormwater: avoided runoff (gal)	2,318,837	$20,721
Total Annual Benefits		**$69,374**
Structural Value		
Carbon storage (tons)	18,616	$3,175,046
Total Replacement Value		**$112,489,358**

Air Pollution Reduction

Trees improve air quality by intercepting and filtering particulate matter from the air, including dust, ash, pollen, and smoke. Leaves absorb harmful gaseous pollutants such as carbon monoxide, nitrogen dioxide, and sulfur dioxide and reduce ozone formation by shading surfaces and reducing air temperatures. The air cleaning benefits of trees is important for improving human health outcomes.

In total, the tree canopy of Fort Collins removes 285 tons of air pollutants each year, a service valued at $942,949. Tree canopy growth from 2011–2021 has resulted in an additional 44 tons of pollutants being removed from the air each year. Of total air quality benefits, public trees account for the removal of 11 tons of air pollutants each year, valued at $32,038.

Stormwater Runoff Reduction

Trees play a significant role in local hydrology and water cycling, helping to reduce the amount of stormwater runoff that is generated during rain events. The value of reduced stormwater runoff is calculated based on avoided water treatment costs; not reflected in this value are also costs related to erosion and flooding.

Public trees in Fort Collins absorb 2.3 million gallons of stormwater each year, valued at $20,721.

Sequestering and Storing Carbon

Trees are carbon sinks, which means they absorb carbon from the atmosphere. As they grow, trees absorb carbon dioxide from the air through their leaves during photosynthesis and store it in their tissue.

Fort Collins' tree canopy stores an estimated 226,820 tons of carbon in tree trunks, branches, and roots, valued at $39 million. Each year, all of the city's trees sequester (absorb and store) an additional 5,810 tons of carbon. Of this, public trees store 18,616 tons of carbon and sequester an additional 276 tons each year.

PEST SUSCEPTIBILITY

Tree pests and diseases often have preferred hosts. The susceptibility of an urban forest to a pest or disease can be predicted based on its species and genus diversity. Early identification of tree pests and diseases can reduce the impact of infestations on the urban forest.

Of the pests and diseases of concern in Colorado, emerald ash borer threatens 13% of the public tree inventory—the portion that is composed of the genus *Fraxinus*—with potential tree losses valued at $22 million (table 6). If Asian longhorned beetle

reaches Fort Collins, it poses the greatest threat to public trees, with predicted economic impacts of up to $51 million. Replacement values are based on actual tree attributes including size and are calculated using i-Tree Tools.

Other pests and diseases not listed here may affect the tree population in Fort Collins, and many more trees, including those on private property, may be susceptible to these invasive pests.

Table 6. Susceptibility of Fort Collins' public trees to pests and diseases of concern in Colorado.

PEST NAME	NUMBER OF SUSCEPTIBLE TREES	PERCENT OF PUBLIC TREE INVENTORY	TREE REPLACEMENT VALUE ($)
Asian longhorned beetle	20,687	36%	$51,310,744
Oak wilt	8,706	15%	$7,553,465
Spotted lanternfly	8,628	15%	$13,100,340
Emerald ash borer	7,388	13%	$22,038,024
Honeylocust spider mite	6,284	11%	$10,104,137
Thyronectria & *Nectria* cankers	6,284	11%	$10,104,137
Red turpentine beetle	4,878	8%	$10,827,409
Pine wilt nematode	3,830	7%	$9,957,809
Western spruce budworm	3,689	6%	$12,940,510
Large aspen tortrix	2,582	4%	$946,085
Dutch elm disease	2,351	4%	$14,876,845
Spruce beetle	2,398	4%	$10,078,587
Mountain pine beetle	2,126	4%	$3,940,686
Spruce *Ips* beetle	2,046	4%	$9,102,307
Drippy blight	1,153	2%	$922,703
Aspen leaf miner	624	1%	$1,757,006
Fir engraver	103	<1%	$205,077
Aspen running canker	82	<1%	$53,658
Douglas-fir beetle	77	<1%	$155,075

Emerald Ash Borer Response

Emerald ash borer (EAB) was first confirmed in Fort Collins in May 2020. The City's response is detailed in the *Fort Collins Emerald Ash Borer Management and Response Plan* (2020). There are 7,388 ash trees in the Fort Collins tree inventory—13% of the total inventoried tree population. Citywide, it is estimated that ash trees comprise 33% of total tree canopy.

Forestry staff began to identify ash trees that are good candidates for prophylactic treatment against emerald ash borer in 2016. Treatment of public trees began in 2021; to date, 2,054 trees have been treated. The tree inventory categorizes trees into priority rankings for treatment and removal and identifies trees that have been

treated by the adjacent property owner. Of these, 4,578 ash trees have been categorized; however, a plurality of ash trees (2,649; 37%) have not been categorized into treatment or removal priorities, and their treatment status remains unknown.

Ash trees should be routinely inspected to monitor for EAB infestations and symptom progression due to the rapidity of decline caused by EAB infestation and the safety implications of dead and dying trees in the right of way. A tier of inspection priority is recommended. Priority 1 should be ash trees with an unknown treatment status, so that these 2,649 trees can be assigned to a treatment group or a removal schedule.

The 76 trees being treated by the adjacent property owner should also be inspected regularly. Treatment is required every 2-3 years (depending on intensity and insecticide used) for the remainder of the tree's life; as property ownership changes, trees may fall out of regular treatment schedules. It is important that Fort Collins maintains the treatment record for these trees so that if adjacent property owners are no longer able to manage the insecticide treatment, the City is able to efficiently incorporate trees into their prioritization workflow.

Pest & Disease Resilience Strategies

Trees should be monitored for signs and symptoms of pests and diseases on a regular basis. This can be done as part of the tree inventory process and during other routine maintenance activities such as pruning. When a pest or disease is suspected, act quickly to confirm the identification and begin management. Pay special attention to tree species that are preferred host plants for pests and diseases, and proactively remove specimens of invasive, exotic host species. For example, spotted lanternfly can infest many tree genera but prefers tree of heaven (*Ailanthus altissima*). Tree of heaven is currently rare in the state of Colorado; no specimens are currently noted in Fort Collins' public tree inventory.

Using the City's EAB Management and Response Plan as a model, it is recommended that the City prepare an invasive species management plan to guide the response to future pest or disease infestations. Use preventative pesticide treatments on high-value or historic trees that are susceptible to problematic pests and/or diseases. Lastly, when planting trees, select pest- and disease-resistant species or cultivars whenever possible.

CLIMATE VULNERABILITY

Although trees require water to survive, in irrigated spaces, they help to conserve more water than they use. Trees cool air and surface temperatures through evapotranspiration and shade, which reduces the water requirements of the entire landscape. For example, planting trees over turfgrass can reduce outdoor water use by up to 50% (Shashua-Bar et al., 2009). For these reasons, Fort Collins' tree canopy will become an increasingly valuable resource for mitigating the effects of climate change.

Land Surface Temperature

Land surface temperature was measured and averaged across two summer dates to classify urban heat island effect in Fort Collins (figure 15). The analysis used satellite data that were collected during the late afternoon on August 10, 2022 and July 3, 2023. On both dates, high air temperatures of 93–95 degrees were recorded, which are close to the average high temperature of 89 degrees. Areas with higher tree canopy cover show up on the map as having lower surface temperature.

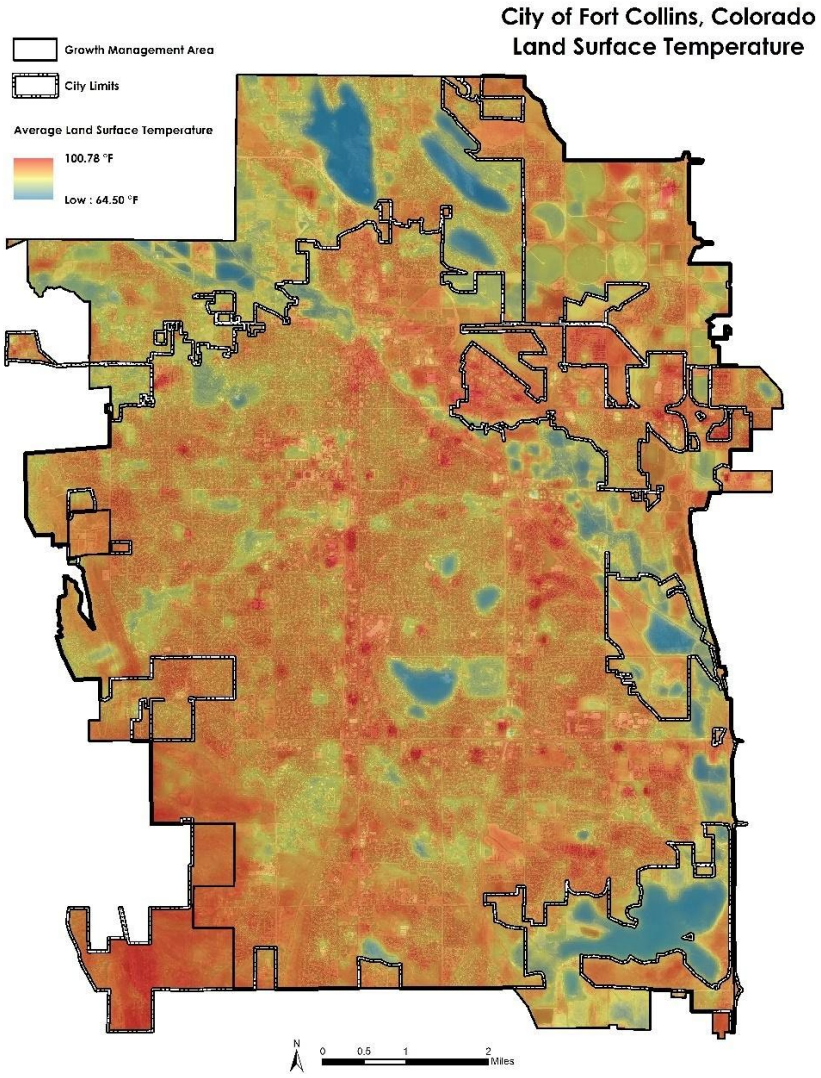


Figure 15. Land surface temperature of Fort Collins, averaged from recorded Landsat 8 satellite data across two summer dates in 2022 and 2023.

Climate Vulnerability and Risk Indices

The U.S. Climate Vulnerability Index is a web tool that quantifies future climate vulnerability based on a combination of social, economic, infrastructure, and climate factors. It compares U.S. census tracts and counties and provides a percentile score that summarizes each location's climate vulnerability relative to other census tracts and counties. In this index, the *national vulnerability percentile* is the number of other census tracts or counties that score better than Fort Collins for a given indicator—a higher score indicates greater levels of vulnerability.

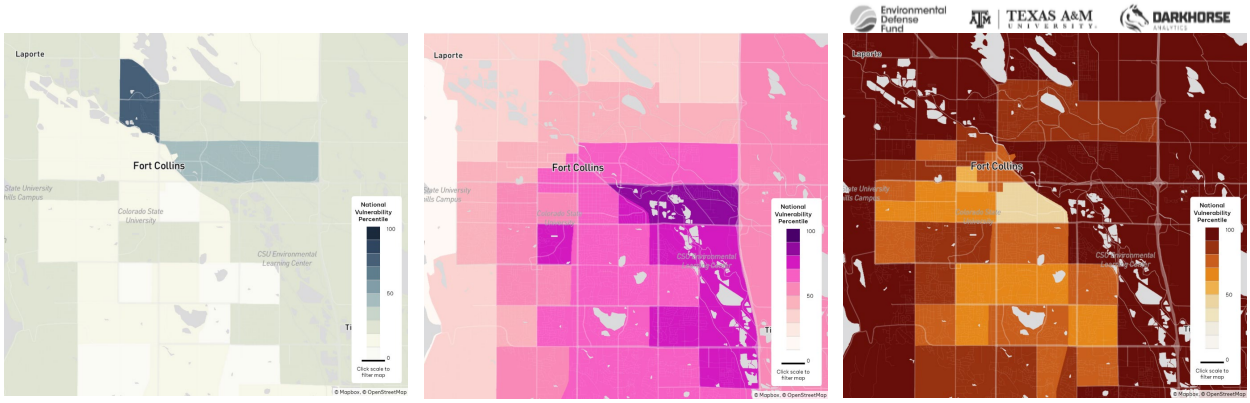


Figure 16. U.S. Climate Vulnerability Index maps for Fort Collins census tracts showing overall climate vulnerability (left), vulnerability that relates to the built environment (middle), and vulnerability related to the likelihood of extreme weather events (right).

Climate vulnerability of Larimer County ranks in the 13th percentile nationally, which means that only 13% of other U.S. counties are more vulnerable to climate change overall. This is **LOW** overall climate vulnerability. However, at the level of census tract, Fort Collins has highly variable overall climate vulnerability, suggesting inequality in the resilience of the city to future climate impacts (figure 16, left). In addition, Fort Collins ranks **HIGH** nationally in climate vulnerability that is related to two sets of factors: climate impacts due to the built environment (figure 16, middle), and the future impacts of extreme weather events (figure 16, right).

Climate vulnerability factors that relate to the built environment in Fort Collins and Larimer County compared to other U.S. areas include high levels of impervious surfaces, toxic air pollutants, vehicle traffic, agricultural pesticides, and a large number of facilities with existing EPA enforcement or violations that serve as pollution sources. Notably, low forested land cover relative to other U.S. counties and census tracts (95th percentile) is included as one factor that raises Fort Collins' environmental vulnerability.

U.S. Climate Mapping and Resilience Assessment provides more detailed information about climate projections for Fort Collins. It projects future climate risks based on two greenhouse gas emissions scenarios. A lower-emissions scenario

projects the climate effects if humans were to eliminate global fossil fuel combustion, resulting in no further greenhouse gas emissions, by 2040. The higher-emissions scenario projects the climate effects if the date of this achievement were not to occur until the year 2100.

Climate Vulnerability Due to Extreme Weather Events

There are several mid-century climate factors that can affect tree growth and survival in Fort Collins. The national vulnerability percentile from the U.S. Climate Vulnerability Index is listed below. For select extreme weather events where there is additional information, the projections from the U.S. Climate Mapping and Resilience Assessment are given for lower and higher emissions scenarios (compared to the reference period from 1975–2005).

- Consecutive dry days: **94**th percentile. The maximum number of consecutive dry days is predicted to be 18 days by mid-century, a change of +0.6 days compared to 1975–2005.
- Daily maximum temperature: **93**rd percentile. The number of days per year with a high of >95°F is predicted to increase by 5-8 days by mid-century.
- Urban heat island extreme heat days: **82**nd percentile. The number of days per year with an air temperature of >90°F is predicted to increase by 16–21 days, which due to urban heat island effect will feel hotter within highly built areas of the city.
- Cold waves: **73**rd percentile. Overall, the number of days that remain below 32°F is predicted be reduced by 11-14 days per year, but the threat posed by cold waves will remain relatively high compared to other parts of the U.S.
- Frost days: **77**th percentile. Temperature extremes are predicted to become more erratic, leading to potentially more early and late frost days that can damage trees.

Drought Tolerance of the Public Tree Inventory

The public tree inventory has begun adding information about the irrigation status of trees; at present, irrigation status is known for 16,665 trees. Of these, 14,754 trees have access to irrigation. The irrigation status of trees is important for evaluating the risk of the tree inventory to drought and planning emergency response including hand watering during periods of extreme drought.

An analysis examined drought tolerance of 151 species of trees in the public tree inventory, which comprise 78% of public trees (45,345 trees), based on species information from a 2006 study by Niinemets and Valladares (table 7).

- 1,765 public trees in Fort Collins have **LOW** drought tolerance

- 28,999 public trees have **MEDIUM** drought tolerance
- 14,581 public trees have **HIGH** drought tolerance

Together with information about projected climate impacts, including growth in the number of extreme heat days and consecutive dry days, the city can increase the resilience of its public tree inventory by planting more drought-tolerant species over time.

Table 7. Drought tolerance of the 35 most abundant species in the public tree inventory.

DROUGHT TOLERANCE		
LOW	MEDIUM	HIGH
*Populus angustifolia**	*Acer grandidentatum*	*Catalpa speciosa*
*Populus sargentii**	*Acer negundo**	*Elaeagnus angustifolia**
Ulmus davidiana	*Acer platanoides*	*Gleditsia triacanthos*
	Acer saccharinum	*Juniperus scopulorum*
	Acer saccharum	*Pinus edulis*
	Acer tataricum	*Pinus nigra*
	Aesculus glabra	*Pinus ponderosa*
	Celtis occidentalis	*Pinus sylvestris*
	*Fraxinus americana**	*Pyrus calleryana*
	*Fraxinus pennsylvanica**	*Quercus gambelii*
	Malus domestica	*Quercus shumardii*
	Picea glauca	
	Picea pungens	
	Pinus strobiformis	
	Quercus macrocarpa	
	Quercus robur	
	Syringa reticulata	
	Tilia americana	
	Tilia cordata	
	Ulmus americana	
	*Ulmus pumila**	

* Planting these species is prohibited by city code

PRIORITY PLANTING ANALYSIS

The tree cover analysis of Fort Collins identified 15,418 acres of possible tree planting space within the city and growth management area. This space comprises areas on both public and private land that do not have existing tree canopy. It excludes areas including agricultural fields, recreational fields, and major utility corridors where tree canopy would conflict with existing land uses.

The priority planting analysis ranked possible tree planting area on a five-point scale from Very Low to Very High based on the potential for tree benefits to positively impact environmental, human health, and social factors (table 8).

Priority Planting Factors

- **Environmental:** Priority areas for stormwater management were identified based on proximity to hardscape, proximity to tree canopy, floodplain proximity, soil permeability, slope, and soil erosion factor. Areas of higher potential for runoff and erosion were considered higher priority due to their ability to diminish water quality within urban areas. Priority areas for urban heat island mitigation were based on land surface temperature calculations (see figure 15, above). Higher surface temperatures were considered higher priority due to the adverse effects of elevated microclimates within urban areas.
    - The priority planting analysis identified 1,802 acres of possible planting area that rank High or Very High in the ability to mitigate stormwater runoff (figure 17).
    - The analysis identified 3,167 acres of possible planting area that rank High or Very High for urban heat island mitigation (figure 18).
- **Social Equity:** The priority planting analysis incorporated social equity factors that correlate with vulnerabilities that can be partially mitigated by tree benefits based on scientific research. The analysis used U.S. Census data of income, population density, racial and ethnic minority percent, and home renter percent. Priority areas for social equity are places where additional tree canopy would benefit vulnerable populations.
    - The priority planting analysis identified 2,287 acres of possible planting area that rank High or Very High for proximity to residents that have increased vulnerability to environmental and climate concerns that can be mitigated by trees (figure 19).
- **Human Health:** The priority planting analysis also incorporated three human health concerns that are prevalent in Fort Collins and most impacted by tree benefits: asthma, heart disease, and mental health disorders (see box, “Trees

Contribute to Neighborhood & Community Vitality"). Priority areas for human health are areas where these concerns are most prevalent.

  - The priority planting analysis identified 3,342 acres of possible planting area that rank High or Very High for proximity to residents that have health concerns that can be mitigated by trees (figure 20).

- **Composite (All) Priorities:** This analysis overlays each of the factors above to identify priority planting areas where trees can address all issues.

  - The priority planting analysis identified 2,250 acres of possible planting area that rank High or Very High for the combined effects of all the factors listed above (figure 21).

Table 8. Possible tree planting area in Fort Collins, ranked by priority to address environmental, social equity, and/or human health factors.

	PRIORITY PLANTING ACRES				
PRIORITY	STORMWATER	HEAT ISLAND	SOCIAL EQUITY	HEALTH	ALL
Very Low	10,472	2,007	6,165	5,353	8,218
Low	1,989	3,723	3,565	4,418	3,337
Moderate	1,155	6,521	3,401	2,305	1,613
High	936	2,841	1,153	556	1,206
Very High	867	326	1,135	2,787	1,044

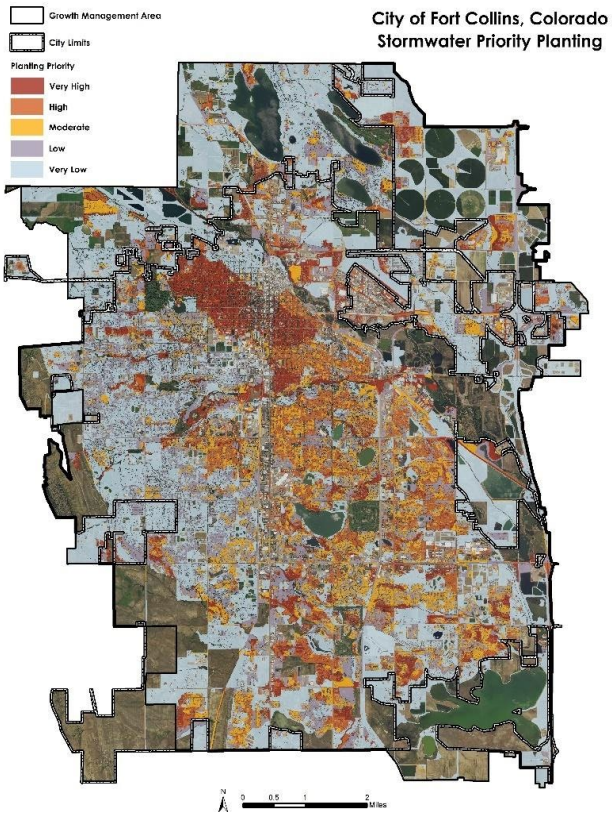


Figure 17. Priority planting areas for stormwater management, based on a combination of environmental factors that contribute to increased stormwater runoff.

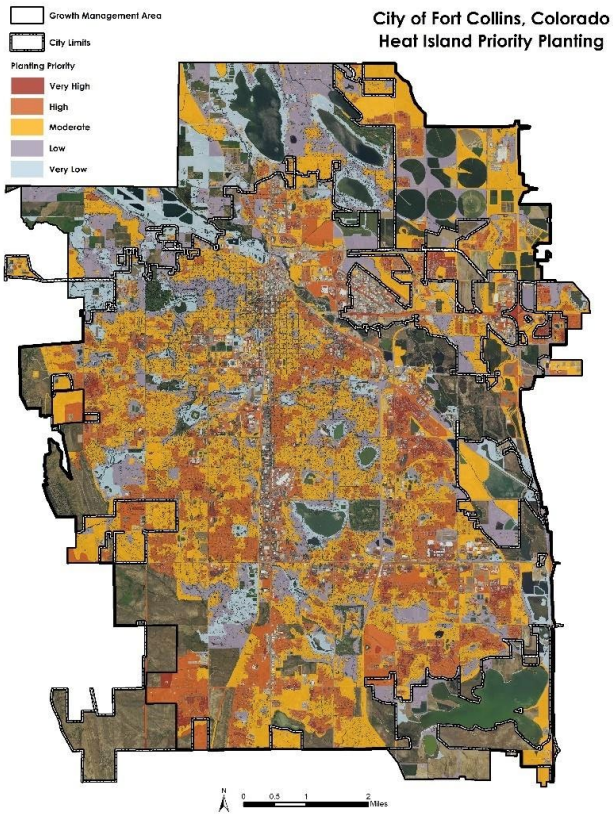


Figure 18. Priority planting areas for urban heat island mitigation based on land surface temperatures.

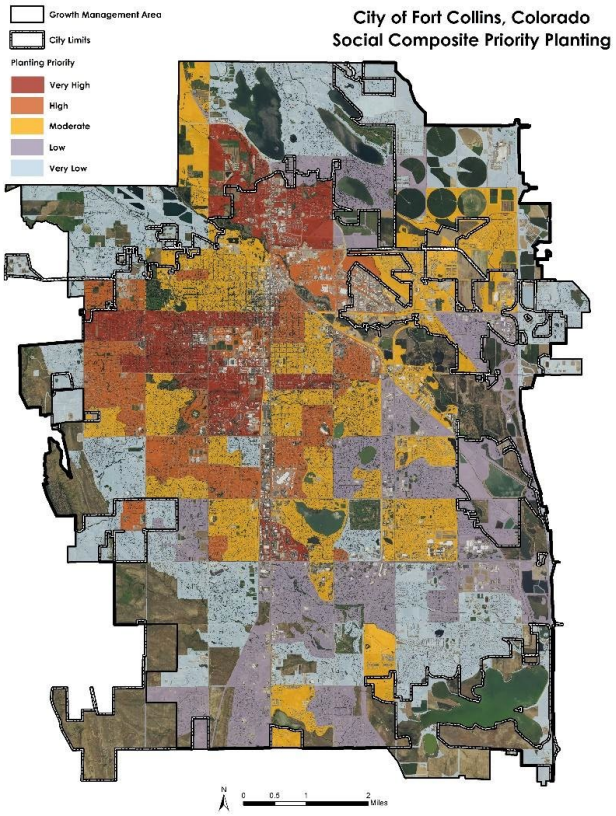


Figure 19. Priority planting areas where tree benefits can be placed in proximity to vulnerable resident populations.

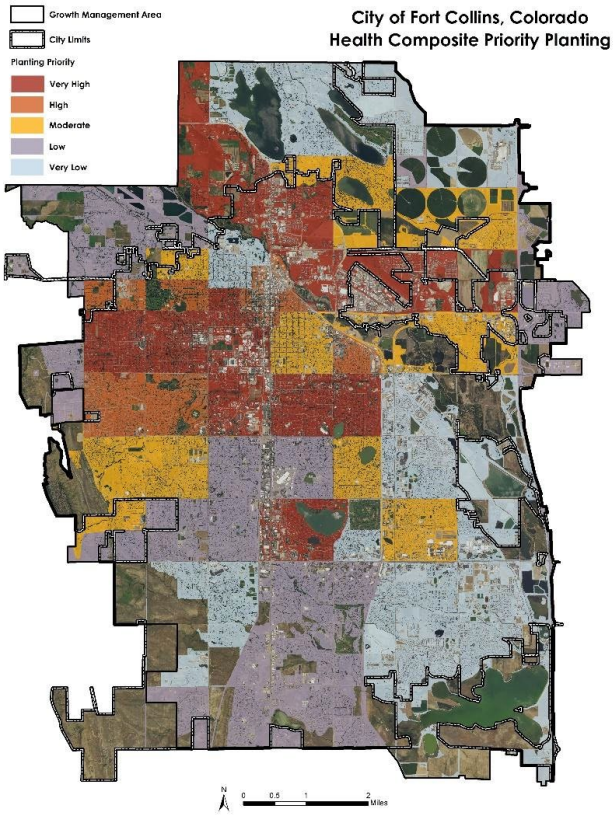


Figure 20. Priority planting areas where tree canopy can help mitigate asthma, heart disease, and mental health disorders.

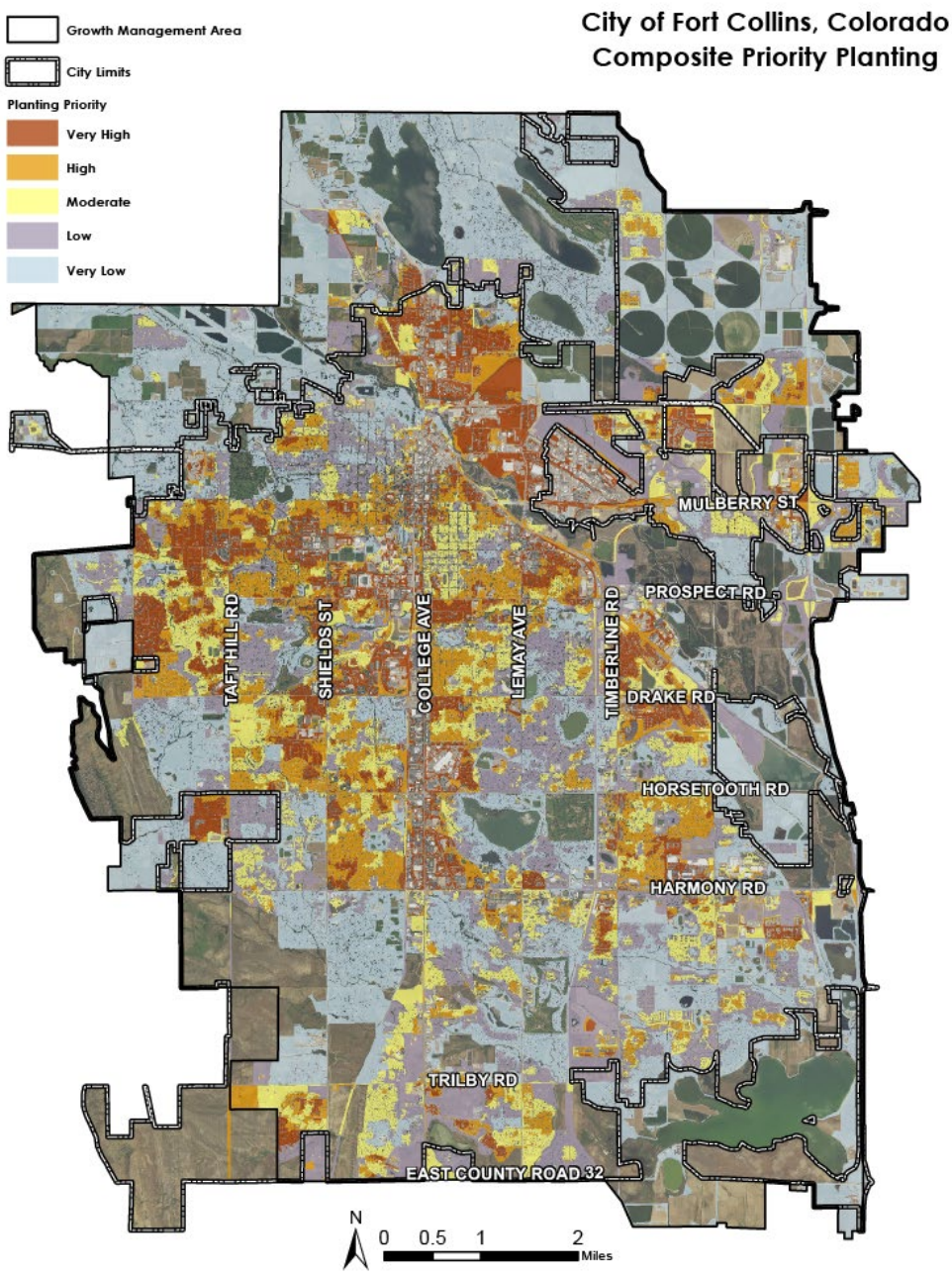


Figure 21. Priority planting areas that maximize the environmental, social, and human health benefits of trees.

Tree Placement

A tree placement analysis identified 465,507 possible tree planting sites across Fort Collins, including on both public and private land (table 9). Sites were classified as being suitable for trees based on small, medium, or large crown size. Large trees were placed first, as they provide the greatest benefit; then, the remaining planting area was populated with small- and medium-statured trees.

The analysis produced a GIS data file with all planting sites and accompanying information about priority planting metrics for environmental, social, and human health factors (figure 22). Data are provided to the City of Fort Collins as a standalone GIS tool.

Table 9. Possible tree planting sites, classified by the size of tree that they can accommodate.

TREE CROWN SIZE	NUMBER OF PLANTING SPACES
Large	207,695
Medium	56,139
Small	201,673
Total Sites	**465,507**

Figure 22. A snapshot taken from the tree placement analysis showing possible planting locations for small-, medium-, and large-stature trees along a street right-of-way.

RESILIENCE & SUSTAINABLE GROWTH: SUMMARY OF FINDINGS

Trees provide innumerable benefits to the people of Fort Collins. Select tree benefits can be assigned a monetary value that is based on avoided costs, including air pollution reduction, stormwater runoff mitigation, and carbon sequestration and storage. Based on these benefits alone, Fort Collins' trees produce at least $2.2 million in ecosystem services each year. This amount has increased in the past decade with tree canopy growth—today, trees provide an additional $346,000 in services per year than they did in 2011. These benefits can be used to explain expenditures for tree planting and maintenance activities to taxpayers and city leadership. These benefits also form the basis for efforts to preserve and expand tree canopy as part of climate resilience strategies and to more equitably distribute tree canopy across the city.

It is important to preserve the function and survival of trees in the face of future threats from pests, diseases, and climate change. Ash comprises a large portion of the city's tree canopy, making emerald ash borer a significant threat into the foreseeable future. Oak wilt may present a concern for public trees in the future. The city's EAB response can serve as a model for expanded pest and disease planning and management.

Future climate predictions include increases in periods of extreme heat, drought, and early/late freezes, all of which can be challenging conditions for trees. New species are coming to Fort Collins in the future that present additional options for drought tolerance and urban resilience. Species recommendations, such as the trees and shrubs that are recommended by Plant Select, have few specimens in the existing public tree inventory, demonstrating a potential for expanded planting. Collaborative partnerships with local growers will be needed for the continued management of pests and to secure desired climate-resilient nursery stock.

Comparing maps of canopy change (for example, see map 3) to priority planting maps for social and human health benefits show that many areas of greatest tree canopy loss have occurred where tree canopy is most needed to build social equity. The priority planting and tree placement analyses can be used to guide future planting efforts on both public and private land where trees can have the greatest impact.

Operational Efficiency and Resource Management

INDICATORS OF A SUSTAINABLE URBAN FOREST

To better understand and evaluate the level of urban forest care, management, and engagement in Fort Collins, the city's forestry program was assessed on 30 sustainable urban forest indicators (tables 10, 11, and 12). The Indicators of a Sustainable Urban Forest is a program assessment tool that uses industry standards and best management practices to assess the city's urban forest, its management, and the community and stakeholders that influence it.

Fort Collins' performance level for 30 Indicators of a Sustainable Urban Forest was assessed as:

- **Low** on 3 indicators (10%)
- **Low-Moderate** on 1 indicators (3%)
- **Moderate** on 15 indicators (50%)
- **Moderate-High** on 5 indicators (17%)
- **High** on 6 indicators (20%)

Summarized by each of the three categories of indicators, Fort Collins' performance level is:

- The Trees: **Moderate**
- The Community & Stakeholders: **Moderate**
- The Management Program: **Moderate-High**

The Trees: MODERATE

Table 10. Fort Collins' urban forestry performance level for eight indicators of a sustainable urban forest that relate to trees and tree canopy.

INDICATOR	OVERALL OBJECTIVE OR INDUSTRY STANDARD	PERFORMANCE LEVEL			NOTES
		LOW	MODERATE	HIGH	
Urban Tree Canopy	Achieve the desired tree canopy cover according to goals set for the entire city and neighborhoods. Alternatively, achieve 75% of the total canopy possible for the entire city and in each neighborhood.	Canopy is decreasing. - and/or - No canopy goals have been set.	Canopy is not dropping, but not on a trajectory to achieve the established goal.	Canopy goal is achieved, or well on the way to achievement.	No canopy goal has been set, but canopy grew 17.2% in past 10 years.
Equitable Distribution of Canopy	Achieve low variation between tree canopy and equity factors citywide by neighborhood. Ensure that the benefits of tree canopy are available to all, especially for vulnerable populations for whom tree benefits are of particular importance.	Tree planting and public outreach and education is not determined by tree canopy cover or benefits.	Tree planting and public outreach and education is focused on neighborhoods with low tree canopy.	Tree planting and public outreach and education is focused in neighborhoods with low tree canopy and a high need for tree benefits.	A planting plan can help the city plan canopy growth for low-canopy, high-need neighborhood s.
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%	Age distribution is not proportionately distributed across size classes at the city level.	Age distribution is evenly distributed at city level, though unevenly distributed at the neighborhood level.	Age distribution is generally aligned with the ideal standard diameter classes at the neighborhood level.	Citywide age distribution is 60% young trees.
Condition of Publicly Owned Trees	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.	No current information is available on tree condition or risk.	Information from a partial or sample or inventory is used to assess tree condition and risk.	Information from a current, GIS-based, 100% complete public tree inventory is used to indicate tree condition and risk.	Condition information is available, and there is partial information about risk.
Condition of Publicly-Owned Natural Areas	Possess a detailed understanding of the ecological structure and function of all publicly-owned natural areas (such as woodlands, ravines, stream corridors, etc.), as well as usage patterns.	No current information is available on tree condition or risk.	Publicly-owned natural areas are identified in a sample-based "natural areas survey" or similar data.	Information from a current, GIS-based, 100% complete natural areas survey is utilized to document ecological structure and function, as well as usage patterns.	Limited tree inventory within public natural areas.

INDICATOR	OVERALL OBJECTIVE OR INDUSTRY STANDARD	PERFORMANCE LEVEL			NOTES
		LOW	MODERATE	HIGH	
Trees on Private Property	Possess a solid understanding of the extent, location and general condition of trees on private lands.	No data is available on private trees.	Current tree canopy assessment reflects basic information (location) of both public and private canopy combined.	Detailed information available on private trees. Ex. bottom-up sample-based assessment of trees.	Current citywide UTC assessment based on 2021 data.
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.	Fewer than five species dominate the entire tree population citywide.	No species represents more than 20% of the entire tree population citywide.	No species represents more than 10% of the entire tree population citywide.	Only *Fraxinus pennsylvanica* (11%) and *Gleditsia triacanthos* (11%) exceed 10%, and there are plans in place to reduce their population.
Suitability	Establish a tree population suited to the urban environment and adapted to the overall region. Suitable species are gauged by exposure to imminent threats, considering the "Right Tree for the Right Place" concept and invasive species.	Less than 50% of trees are considered suitable for the site.	50% to 75% of trees are considered suitable for the site.	More than 75% of trees are considered suitable for the site.	Many trees are reliant on irrigation for survival; predictions of future drought, extreme heat, and abrupt cold will pose a challenge to many species.

The Players: MODERATE

Table 11. Fort Collins' urban forestry performance level for nine indicators of a sustainable urban forest that relate to partnerships and the community.

INDICATOR	OVERALL OBJECTIVE OR INDUSTRY STANDARD	PERFORMANCE LEVEL			NOTES
		LOW	MODERATE	HIGH	
Neighbor-hood Action	Citizens understand, cooperate, and participate in urban forest management at the neighborhood level. Urban forestry is a neighborhood-scale issue.	Little or no citizen involvement or neighborhood action.	Some active groups are engaged in advancing urban forestry activity, but with no unified set of goals or priorities.	The majority of all neighborhoods are organized, connected, and working towards a unified set of goals and priorities.	UFA program; HOA tree planting programs

Large Private & Institutional Landholder Involvement	Large, private, and institutional landholders embrace citywide goals and objectives through targeted resource management plans.	Large private land holders are unaware of issues and potential influence in the urban forest. No large private land management plans are currently in place.	Education materials and advice is available to large private landholders. Few large private landholders or institutions have management plans in place.	Clear and concise goals are established for large private land holders through direct education and assistance programs. Key landholders and institutions have management plans in place.	Several partners noted a good relationship with Forestry. CSU coordinates with Forestry on management of trees along their boundaries. Opportunity to increase cooperation on campuses for Broadcom/Hewlitt-Packard, Poudre School District, Woodward Governor, and Budweiser.
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.	Little or no involvement from green industry leaders to advance local urban forestry goals.	Some partnerships are in place to advance local urban forestry goals, but more often for the short-term.	Long-term committed partnerships are working to advance local urban forestry goals.	Forestry staff are highly involved in regional conversations about EAB, wood waste utilization, and other topics.
City Department and Agency Cooperation	All city departments and agencies cooperate to advance citywide urban forestry goals and objectives.	Conflicting goals and/or actions among city departments and agencies.	Informal teams among departments and agencies are communicating and implementing common goals on a project-specific basis.	Common goals and collaboration occur across all departments and agencies. City policy and actions are implemented by formal interdepartmental and interagency working teams on all city projects.	Veg Team meets to discuss vegetation across city departments. Partners noted that Zoning and Forestry may require closer cooperation.
Funder Engagement	Local funders are engaged and invested in urban forestry initiatives. Funding is adequate to implement citywide urban forest management plan.	Little or no funders are engaged in urban forestry initiatives.	Funders are engaged in urban forestry initiatives at minimal levels for short-term projects.	Multiple funders are fully engaged and active in urban forestry initiatives for short-term projects and long-term goals.	Share Some Shade and Living Tribute Trees programs; private donation of $50,000 per year in 2022 and 2023.

Utility Engagement	All utilities are aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.	Utilities and city agencies act independently of urban forestry efforts. No coordination exists.	Utilites and city agencies have engaged in dialogues about urban forestry efforts with respect to capital improvement and infrastructure projects.	Utilities, city agencies, and other stakeholders integrate and collaborate on all urban forestry efforts, including planning, site work, and outreach/education.	There is some coordination between Forestry and utilities. Additional coordination may be needed for education and outreach to private property owners. Utilities and Engineering/CIP have concerns about increased mitigation requirements of draft Land Use Code.
Developer Engagement	The development community is aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.	Little or no cooperation from developers in (or awareness of) municipality-wide urban forest goals and objectives.	Some cooperation from developers and general awareness and acceptance of municipality-wide goals and objectives.	Specific collaborative arrangements across development community in support of municipality-wide goals and objectives.	Developers exhibit good understanding and acceptance of city rules. New LUC updates demonstrate capacity for city goals & objectives.
Public Awareness	The general public understands the benefits of trees and advocates for the role and importance of the urban forest.	Trees are generally seen as a nuisance, and thus, a drain on city budgets and personal paychecks.	Trees are generally recognized as important and beneficial.	Trees are seen as valuable infrastructure and vital to the community's well-being. The urban forest is recognized for the unique environmental, economic, and social services it provides to the community.	The public is generally supportive of the urban forest on public land. Support for the private urban forest needs further assessment to tease apart public sentiment about specific issues.
Regional Collaboration	Neighboring communities and regional groups are actively cooperating and interacting to advance the region's stake in the city's urban forest.	Little or no interaction between neighboring communities and regional groups.	Neighboring communities and regional groups share similar goals and policy vehicles related to trees and the urban forest.	Regional urban forestry planning, coordination, and management is widespread.	Numerous local communities have indicated an interest in partnering. There's an opportunity to share planning and resources and coordinate more on education/outreach. Additional

					opportunities at county level (Larimer, Weld), CO State Forest Service, CSU/CSU Extension, and Poudre School District.

The Management: MODERATE-HIGH

Table 12. Fort Collins' urban forestry performance level for 12 indicators of a sustainable urban forest that relate to Forestry operations.

INDICATOR	OVERALL OBJECTIVE OR INDUSTRY STANDARD	PERFORMANCE LEVEL			NOTES
		LOW	MODERATE	HIGH	
Tree Inventory	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.	No inventory or out-of-date inventory of publicly-owned trees.	Partial or sample-based inventory of publicly-owned trees, inconsistently updated.	Complete, GIS-based inventory of publicly-owned trees, updated on a regular, systematic basis.	Current inventory dates from 2018-2023
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.	No tree canopy assessement.	Sample-based canopy cover assessment, or dated (over 10 years old) high resolution canopy assessment.	High-resolution tree canopy assessement using aerial photographs or satellite imagery.	Current UTC from 2021 data with comparison to 2011.
Management Plan	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.	No urban forest management plan exists.	A plan for the publicly-owned forest resource exists but is limited in scope, acceptance, and implementation.	A comprehensive plan for the publicly owned forest resource exists and is accepted and implemented.	City demonstrates elements of a management plan, such as a proactive pruning program. There is opportunity to create a planning document that can be circulated for support.

INDICATOR	OVERALL OBJECTIVE OR INDUSTRY STANDARD	PERFORMANCE LEVEL			NOTES
		LOW	MODERATE	HIGH	
Risk Management Program	All publicly-owned trees are managed for maximum public safety by way of maintaining a city-wide inventory, conducting proactive annual inspections, and eliminating hazards within a set timeframe based on risk level. Risk management program is outlined in the management plan.	Request-based, reactive system. The condition of publicly-owned trees is unknown.	There is some degree of risk abatement thanks to knowledge of condition of publicly-owned trees, though generally still managed as a request-based reactive system.	There is a complete tree inventory with risk assesment data and a risk abatement program in effect. Hazards are eliminated within a set time period depending on the level of risk.	Forestry has noted a decrease in risk assessment needs and tree failures with shorter pruning rotation. Forestry is trying to shift away from a request-based reactive system.
Maintenance Program of Publicly-Owned Trees	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.	Request-based, reactive system. No systematic pruning program is in place for publicly-owned trees.	All publicly-owned trees are systematically maintained, but pruning cycle is inadequate.	All publicly-owned trees are proactively and systematically maintained and adequately pruned on a cyclical basis.	There is extensive pruning taking place, currently on a 5–6 year cycle. Young trees are visited more frequently—every 2-3 years to manage clearance.
Maintenance Program of Publicly-Owned Natural Areas	The ecological structure and function of all publicly-owned natural areas are protected and enhanced while accommodating public use where appropriate.	No natural areas management plans are in effect.	Only reactive management efforts to facilitate public use (risk abatement).	Management plans are in place for each publicly-owned natural area focused on managing ecological structure and function and facilitating public use.	Management plans are in place for natural areas by zone, but with minor exceptions, they do not include tree management components; in many places, trees are not desired
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.	Tree establishment is ad hoc.	Tree establishment is consistently funded and occurs on an annual basis.	Tree establishment is directed by needs derived from a tree inventory and other community plans and is sufficient in meeting canopy cover objectives.	Data from Urban Forest Strategic Plan can be used to create a data-driven planting plan to address priorities.

INDICATOR	OVERALL OBJECTIVE OR INDUSTRY STANDARD	PERFORMANCE LEVEL			NOTES
		LOW	MODERATE	HIGH	
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.	No tree protection policy.	Policies are in place to protect trees, but the policies are not well-enforced or ineffective.	Protections policies ensure the safety of trees on public and private land. The policies are enforced and supported by significant deterrents and shared ownership of city goals.	Policies are in place to protect trees during development, and a permitting process is in place for public trees. Policies are enforced, but there are currently no policies to protect trees on private land outside of development scenarios.
City Staffing and Equipment	Adequate staff and access to the equipment and vehicles to implement the management plan. A high level urban forester or planning professional, strong operations staff, and solid certified arborist technicians.	Insufficient staffing levels, insufficiently-trained staff, and/or inadequate equipment and vehicle availability.	Certified arborists and professional urban foresters on staff have some professional development, but are lacking adequate staff levels or adequate equipment.	Multi-disciplinary team within the urban forestry unit, including an urban forestry professional, operations manager, and arborist technicians. Vehicles and equipment are sufficient to complete required work.	City Forestry is adequately staffed but has identified near-term needs to scale department with growth of canopy. Equipment is in good shape overall, but some equipment needs were noted. City is approaching maximum capacity of existing staff.
Funding	Appropriate funding in place to fully implement both proactive and reactive needs based on a comprehensive urban forest management plan.	Funding comes from the public sector only, and covers only reactive work.	Funding levels (public and private) generally cover mostly reactive work. Low levels of risk management and planting in place.	Dynamic, active funding from engaged private partners and adequate public funding are used to proactively manage and expand the urban forest.	Most funding is from the public sector, but work is more than reactive. Risk management and planting could be increased.

INDICATOR	OVERALL OBJECTIVE OR INDUSTRY STANDARD	PERFORMANCE LEVEL			NOTES
		LOW	MODERATE	HIGH	
Disaster Prepared-ness & 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.	No disaster response plan is in place.	A disaster plan is in place, but pieces are missing and/or staff are not regularly trained or updated.	A robust disaster management plan is in place, regularly updated and staff is fully trained on roles and processes.	Storm response plan in place
Communi-cation	Effective avenues of two-way communication exist between the city departments and between city and its citizens. Messaging is consistent and coordinated, when feasible.	No avenues are in place. City departments and public determine on an ad-hoc basis the best messages and avenues to communicate.	Avenues are in place but used sporadically and without coordination or only on a one-way basis.	Avenues are in place for two-way communi-cation, are well-used with targeted, coordinated messages.	Avenues are in place including the City's Access FC system. Additional points of contact include phone and email to various staff. Outside of Access FC system, communication may be one-way and/or harder to track.

Trees Help Build a Safe Community

Trees enhance neighborhoods by providing a sense of community and safety. This is not just perception; a 10% increase in neighborhood tree canopy cover has been associated with a 12%–15% reduction in violent and property crimes. Along streets, trees help to slow traffic, making streets safer for pedestrians and cyclists. Trees also cool streets and sidewalks, creating more comfortable conditions for walking, biking, and public transit.

In communities with high incidences of crime, trees and shrubs can reduce sight lines. In such communities, poorly maintained trees can contribute to a perceived lack of care, which can have negative effects on mental health. An equitable approach to urban forestry cover seeks to increase the benefits that trees provide while mindfully addressing real concerns that residents may have about tree canopy in their neighborhood, such as by ensuring proper maintenance.

Sources: Swift et al., 1997; Kuo, 2003; Ewing & Dumbaugh, 2009; O'Neil-Dunn, 2012; Gilstad-Hayden et al., 2015; USDA Forest Service, 2018.

OPERATIONS REVIEW

An operations review of the Forestry Division was conducted via surveys, staff interviews, and review of written policies and data. Select metrics lend themselves to comparison with findings from a 2014 municipal urban forestry census, which provides benchmarks for forestry programs among U.S. cities by region and population size (Hauer & Peterson, 2016).

Number of Public Trees per Capita

Fort Collins' public tree inventory of 57,991 trees is 0.34 public trees per capita (figure 23). While this is lower than the average for U.S. cities, it is also reflective of Fort Collins' native shrubland and grassland ecosystems.

Figure 23. The number of public trees per capita for 330 U.S. cities who provided data to a 2014 municipal forestry census, compared to figures for cities with populations from 100,000-249,999, cities in the West region of the U.S., and Fort Collins.

Public Tree Activities by Year

The Forestry Division pruned 8,832 trees per year, on average, in the years from 2019–2023 (figure 24). This marks a gradual increase in pruning activities over prior years as part of efforts to achieve a five-year pruning rotation for all public trees (figure 25).

In 2022, the Division pruned 10,877 trees or 22.4% of the public tree inventory, which meets the standard for a five-year pruning cycle. Industry standards recommend a regular pruning cycle of 5–10 years. Only approximately one-half of U.S. cities proactively prune their trees on a regular cycle of any duration (Hauer & Peterson, 2016).

Beginning in 2021, public tree planting exceeded tree removals (figure 26). In this year, the Forestry Division also began prophylactic treatments of public ash trees for emerald ash borer.

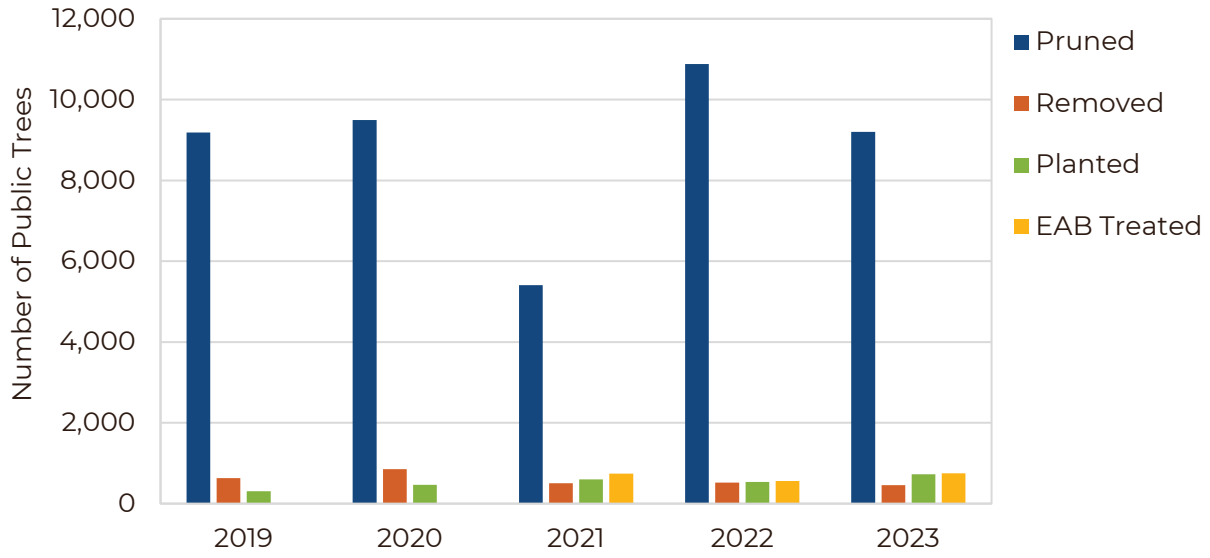


Figure 24. Forestry Division tree activities by year, 2019-2023.

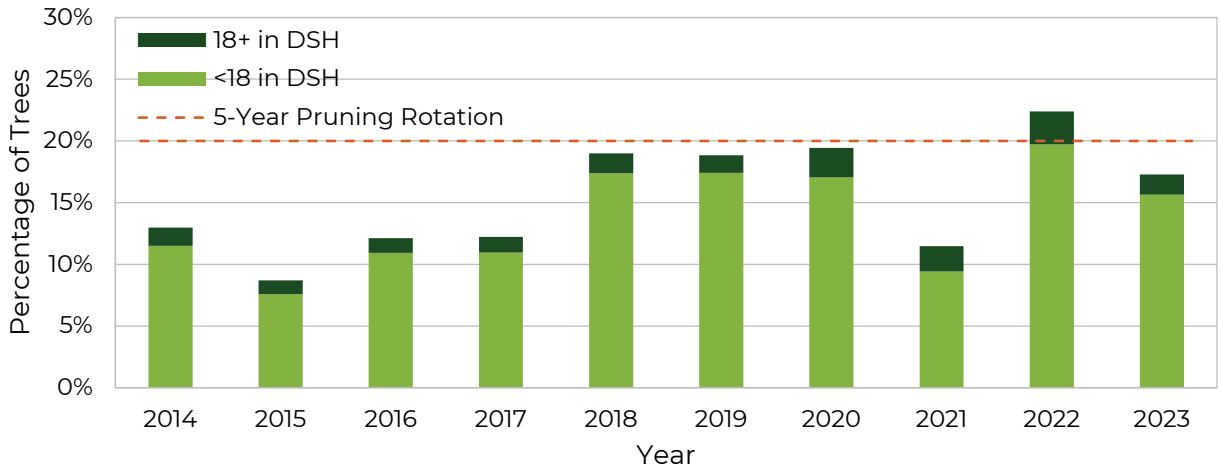


Figure 25. Percentage of public trees pruned by year. Public trees less than 18 inches DSH (light green) and trees 18 inches DSH or larger (dark green) are shown relative to the percentage necessary for a 5-year pruning cycle.

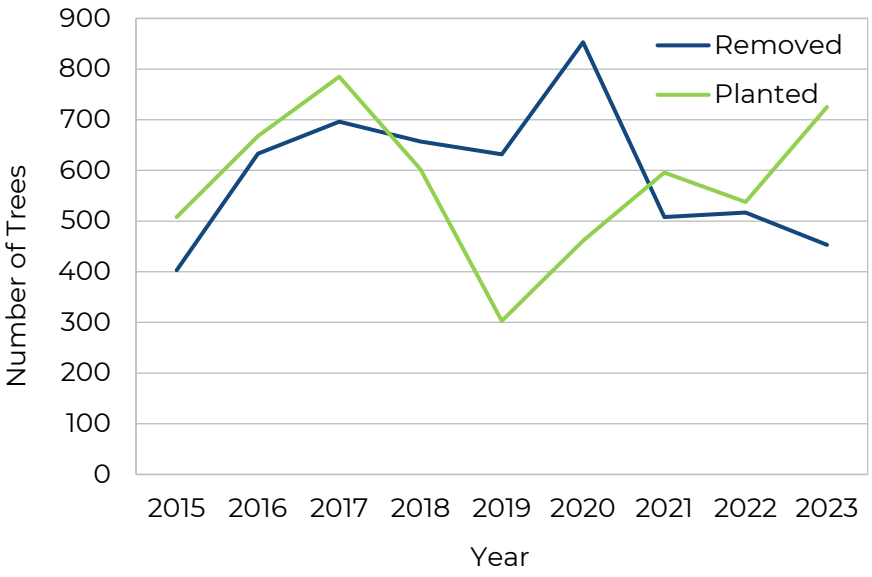


Figure 26. Number of public trees planted and removed by year.

Staffing

The Forestry Division currently employs 17 full-time staff, 5 hourly staff, and receives part-time assistance from one office assistant (table 13, figure 27). One additional full-time staff is housed within the Zoning Department; city council added this position in 2023 to support forestry needs related to development.

Table 13. Forestry Division staffing, 2024.

STAFF TITLE	NUMBER OF STAFF	NUMBER OF VACANCIES
City Forester	1	0
Assistant City Forester	1	0
Senior Specialist, Forestry	3	0
Forestry Zoning Inspector (Zoning Dept.)	1	0
Senior Supervisor, Forestry	1	0
Crew Chief, Forestry	3	0
Technician II, Forestry	6	0
Technician I, Forestry	2	0
Hourly Staff	5	0
Office Assistant	0.25	0

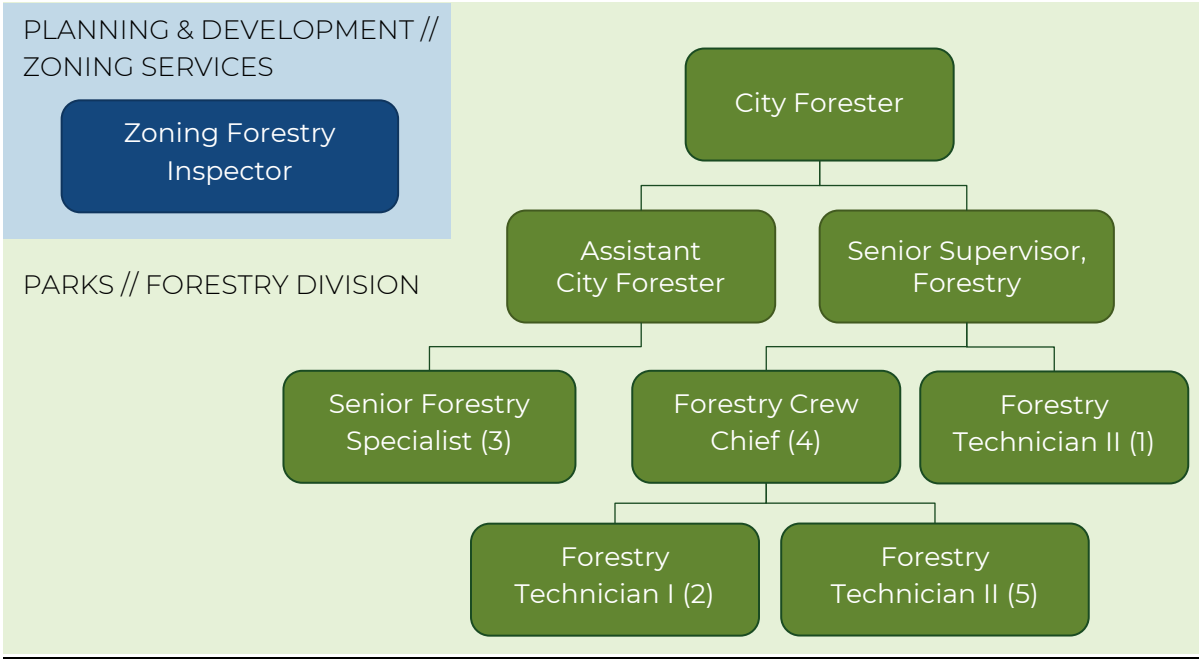


Figure 27. Organizational chart, City forestry staff.

Needed Capacity

Additional capacity needs have been identified for grant writing, development plan review, and for operations including pruning, removal, planting, stump grinding, potholing, infrastructure conflicts, and contract management. Grant writing capacity can assist the Division with securing external funding sources to support expanded planning, policy development, and operations. In plan review, additional capacity would help the Division manage a growing number of requests for tree plan and permit review as staff members are increasingly working with developers to ensure that tree standards are met.

Operations needs can be summarized as one additional crew that will facilitate staff rotations to ease physical demands, reduce injuries, and provide opportunities for cross-training staff in various tree activities.

Credentials and Training

Among 17 existing staff members, fifteen hold Certified Arborist credentials from the International Society of Arboriculture (ISA; figure 28). The Forestry Division was compared to 655 U.S. cities that reported on forestry staff credentials in a national municipal urban forestry census (Hauer & Peterson, 2016). The portion of Forestry Division staff that have advanced training in arboriculture is similar to, or higher than, the average among all U.S. cities for ISA Certified Arborist and Municipal Specialist credentials but slightly lower than the average for cities that are similarly sized to Fort Collins.

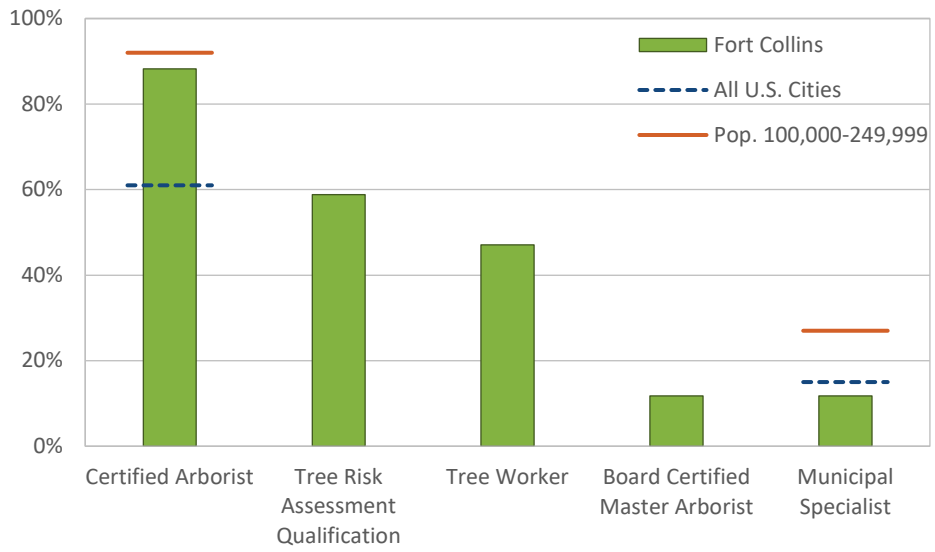


Figure 28. Portion of City forestry staff with ISA credentials compared to forestry staff in 655 U.S. cities of all sizes (blue dashed line) and a subset of cities with a population between 100,000 and 249,999 (red solid line).

Interviews of Forestry Division staff reported that city government is generally supportive of training opportunities as budget allows. The Division is highly participatory in regional working groups and discussions that relate to wood waste diversion and utilization, pest and disease management, and other forestry topics, providing team members with advanced regional learning opportunities. The Division also hosts trainings for external arborists and has Tree Worker Certified Proctors on staff who assist with annual tests.

Interviews supported a need for a more formal, consistent, and organized training process, as well as written policy and processes for training that can be referenced. There is also an opportunity for the Forestry Division to provide wage increases for advanced certification so that compensation rates keep pace with the labor market.

Facilities

The Forestry Division has two office locations. Staff are divided between the two offices. Building, wood yard, and mulch space is approaching maximum capacity.

Equipment

The Forestry Division is adequately equipped for its current workload, but equipment needs require frequent reevaluation (table 14). Staff noted equipment needs including replacements for equipment that is frequently used and currently in Fair condition: a grapple, utility lift, and large aerial lift. Staff also noted needs for additional equipment including a water truck, a small bucket truck, a traffic attenuator, and trucks that are able to haul a skid steer and/or stump grinder. If an

additional operations crew were to be added to the Division, there would be equipment needs related to outfitting that crew.

Table 14. Forestry Division equipment, quantity, and condition.

TYPE OF EQUIPMENT	QUANTITY	CONDITION RATING
Aerial lift	3	2 Fair, 1 Good
Chip truck	3	Fair
Chipper	3	Fair
Grapple truck	2	Good
Stump grinder	2	1 Fair, 1 Good
Dump truck	3	Fair
Pickup trucks	8	2 Good, 6 Fair
Electric vehicle	1	Fair
Traffic attenuator	1	Fair
Front loader	1	Fair
Electronic message & arrow board	1	Good
Utility trailer	5	Good

Budget & Funding

The Forestry Division is supported by the City's General Fund, which is the main operating fund for the City of Fort Collins. The Division also has a revenue account that captures restitution and payment-in-lieu monies from development activities.

From 2019–2023, the Forestry Division annual budget ranged from $2.34 million–$3.35 million (figure 29). As a percentage of the total city budget, Fort Collins is on par with the average for 463 cities that provided budgetary information to a 2014 municipal forestry census (figure 30).

A significant snowstorm in March 2021 that brought up to 27 inches of snow resulted in extensive tree damage, which led to an additional allocation of $273,837 to the Forestry Division for storm response that funded storm cleanup and additional pruning activities in 2021–2022. In addition, the Division received two private donations of $50,000 each in 2022 and 2023, designated for tree planting.

Of the cities that provided budgetary information, only one-half (53%) reported that their annual budget was adequate to meet their city's forestry needs. Their average budget shortfall was 45%. Among cities that were similarly sized to Fort Collins, the percentage who said their annual budget was adequate to meet their forestry needs dropped to 39%. In these cities, the average budget shortfall was approximately 36%.

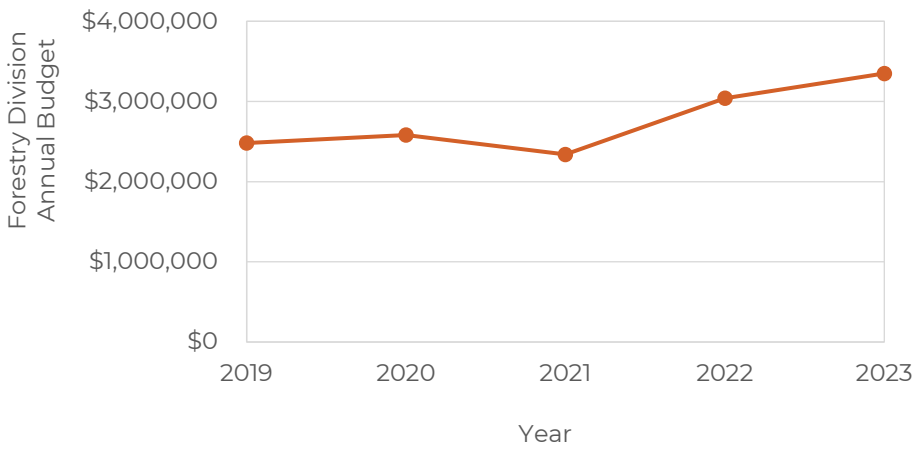


Figure 29. Forestry Division annual budget, 2019–2023.

Figure 30. Municipal forestry budgets as a percentage of total municipal budgets for 463 U.S. cities (adjusted for inflation from 2014 values) compared to the Forestry Division's 2023 annual budget.

The Forestry Division's budget supports tree activities that are completed by both in-house staff and contractors. The largest annual expenditures relate to pruning (figure 31). From 2019–2023, average expenditures for contractual pruning were $224,000 per year (table 15). In 2023, the Forestry budget allotted $300,000 for contractual pruning.

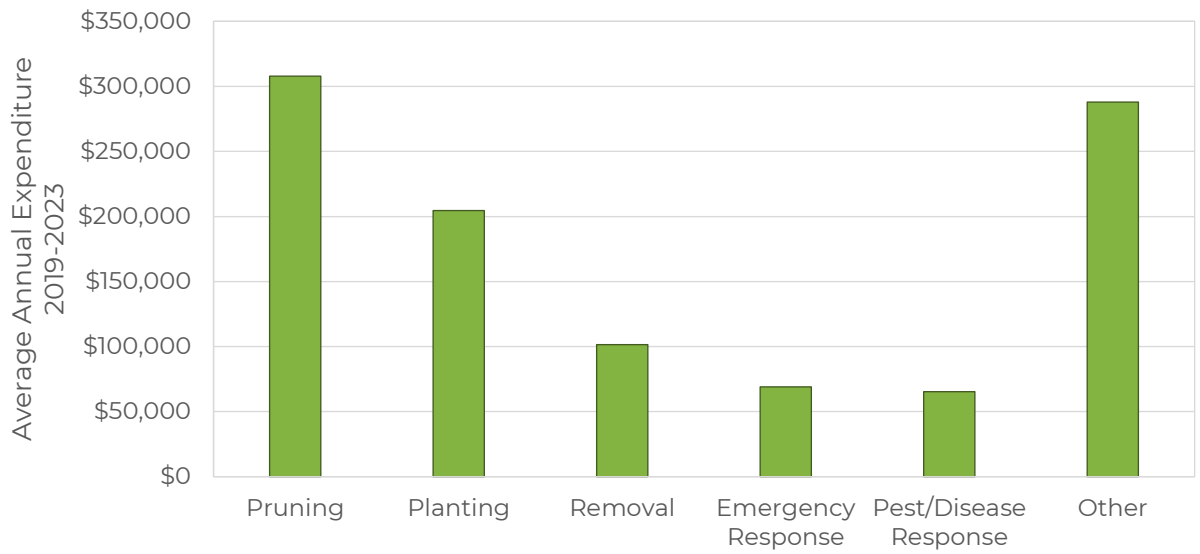


Figure 31. Average annual Forestry Division expenditures by activity, 2019–2023.

Table 15. Contractual pruning expenditures by year, 2019–2023.

YEAR	CONTRACTUAL PRUNING
2019	$200,000
2020	$200,000
2021	$200,000
2022	$219,384
2023	$300,000
AVERAGE	$223,877

Forestry Plans, Policies, and Documents

The following written plans, policies, and documents are maintained by the City or the Forestry Division regarding tree care:

Tree Management Standards and Best Management Practices Manual (2010): Written standards for arborist licensing, pruning, removal, pesticide application, and tree protection. The Forestry Division would like to update this manual.

Emerald Ash Borer Management and Response Plan (2020): Details a three-year treatment plan for the city's ash trees; procedures for detection, management, and tree replacement; and projected impacts.

Approved Street Trees List: Species guidance for street trees that are planted by property owners, developers, and landscapers in the public right-of-way.

Parks Department Storm Damage to Urban Forest Rating Policy: Describes how storm damage is assessed by city quadrant and prioritized. The Forestry Division would like to update this policy.

Forestry does not yet have the following plans or programs:

- Urban Forest Management Plan
- Risk Management Program
- Public Tree Maintenance Program
- Tree Planting Plan

Forestry Service Requests

The Forestry Division received an average of 131 requests per year from 2019–2023 via Access Fort Collins, the city's online service request portal (table 16). An additional 1,453 requests per year were sent via the Division's email address. The Forestry Division also responds to service requests that are sent via phone and email to individual staff members; these requests have not been historically tracked.

Table 16. Forestry service requests from the public, 2019–2023.

YEAR	ACCESS FC INCLUDING COUNCIL SARS	FORESTRY@FCGOV.COM EMAIL
2019	71	
2020	124	
2021	209	
2022	121	1,475
2023	131	1,430

Requests via all channels of contact are routed to specific staff members based on topic. The most common requests relate to tree planting, insect and disease, maintenance, private tree issues, and arborist licensing. Pruning and removal requests are sent to Crew Chiefs, who specialize in specific topics. Emergency requests are typically routed directly to the City Forester, Assistant City Forester, or Senior Forestry Supervisor.

The typical response time for requests is within one year; a small number of larger projects and tree replacement requests are completed within two years. With a move toward a five-year pruning rotation, Forestry has been increasingly responding to pruning requests with education about the city's pruning rotation, attempting to defer individual requests until an entire neighborhood can be scheduled and pruned at once.

Challenges of the existing system include multiple avenues of contact, which can create duplicate requests if residents reach out via more than one channel with their request.

Wood Waste Program

The Forestry Division has worked to be zero waste since 2009 by diverting all wood waste material from landfills. The Division works with local wood workers to repurpose quality wood waste from the public tree inventory into value-added products. Other wood waste is provided as mulch to the general public at two locations. Residents can recycle private tree materials at city and county drop-off points and privately managed waste facilities. The City of Fort Collins is a member of the Urban Wood Network, a national network of urban wood professionals and stakeholders.

Future Tree Canopy Growth

Tree canopy cover is projected for Fort Collins to the year 2040 under current tree planting practices, and tree planting is estimated for three possible tree canopy scenarios (table 17). By projecting 2011–2021 tree canopy trends and planting efforts into the future, Fort Collins is on a path to achieve 15.7% tree cover by 2040 (figure 32). Tree planting and preservation would need to significantly scale up to achieve 17%, 18%, or 20% canopy cover by 2040, involving the planting or preservation of 2,623–8,736 additional trees per year across public and private land. This would entail additional Forestry Division support for tree planting as well as strong community involvement to increase tree planting on privately owned land.

Based on Forestry expenditures from 2019–2023 of $490.55 per tree planted, annual planting budgets for each canopy scenario are estimated to be between $1.3 million–$4.3 million per year. Because growing citywide tree canopy involves both public and private tree planting, these costs would be borne by both city government and the private sector. Preservation of existing trees, such as through enhanced tree protection policies for private land, may be a more cost-effective way to achieve a higher canopy goal.

Table 17. Tree canopy cover, canopy acres, and estimated trees to be planted under current levels of public tree planting and three scenarios.

CANOPY COVER 2021: 6,396 ACRES (12.6%)	CANOPY ACRES 2040	CANOPY COVER 2040	TREE CANOPY CHANGE, ACRES (2024–2040)	ESTIMATED TREES TO BE PLANTED/ PRESERVED PER YEAR, WITH MORTALITY*	ESTIMATED ANNUAL PLANTING COSTS, PUBLIC + PRIVATE**
Current Planting	7,988	15.7%	1,592	538	$263,916
Scenario 1: 17% by 2040	8,643	17.0%	2,246	2,623	$1,286,701
Scenario 2: 18% by 2040	9,151	18.0%	2,755	4,661	$2,286,248
Scenario 3: 20% by 2040	10,168	20.0%	3,772	8,736	$4,285,342

* assumes 66 trees per acre
** based on average Forestry expenditure per tree planted, 2019–2023 ($490.55/tree)

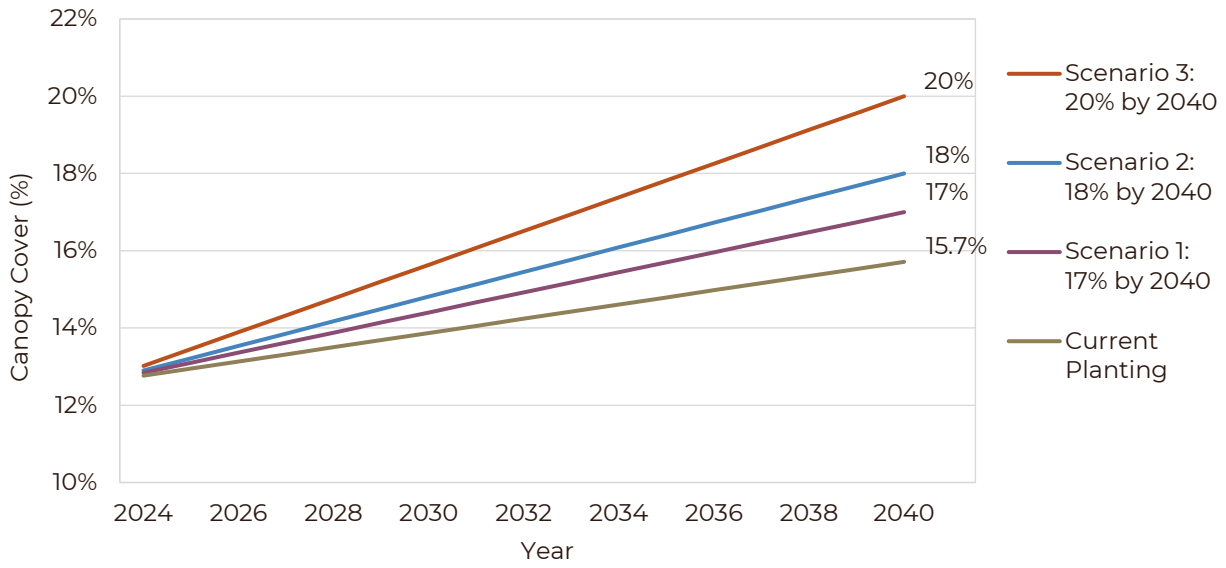


Figure 32. Predicted tree canopy cover under current levels of public tree planting and three scenarios.

OPERATIONAL ANALYSIS: SUMMARY OF FINDINGS

Fort Collins' Forestry Division provides a high level of service in the management of its public tree inventory. The city recently achieved the first year of a five-year pruning cycle, aided by an additional one-year budget allocation for storm response in 2021–2022 that supported additional pruning activities. This puts Fort Collins within a minority of U.S. cities that proactively manage their public tree inventory per urban forestry industry recommendations of a 5–10 year routine pruning cycle. The Division also recently achieved a level of planting that exceeds removals in 2022, aided by $100,000 in private donations for tree planting.

As the inventory grows, it will be necessary to scale Forestry Division operations and capacity to keep pace. As noted in the public tree inventory, public trees skew to younger size classes (see figure 14). As these trees grow into larger size classes, per-tree maintenance costs will increase over time.

Additional capacity will be particularly needed if Fort Collins wants to increase its rate of canopy growth over time. The City is on a path to achieve 15.7% tree cover by 2040, if the previous decade's trend continues. To increase canopy cover to 17%–20% would require the additional planting of or preservation of 2,623–8,736 trees per year across public and private lands. The costs of such an endeavor vary but, using Forestry's per-tree expenditure from 2019–2023 as a benchmark, costs are estimated to be $1.3 million–$4.3 million per year. Enhanced tree protection and preservation provides an alternative to tree planting to achieve the City's canopy goal.

The Forestry Division is currently fully staffed and has identified needed capacity in grant writing, plan review, and operations. Additional staff capacity in plan and permit review will become especially necessary with any future adoption of an expanded land use code and any additional policy changes for tree preservation and protection. To maintain a five-year pruning cycle as the urban forest grows, it will be necessary to add an additional operations crew and associated equipment. Additional operations capacity will help existing staff develop new skills and remain healthy in physically demanding positions by allowing for crew rotations among different tree activities.

The Forestry Division could benefit from closer tracking of resident requests and budget expenditure by tree activity. Such tracking expands the opportunities for reporting about tree activities relative to the City's Key Outcome Areas. It also provides opportunities to more closely track staff time and expenditures related to resident requests.

Detailed work plans are another method to make efficient use of personnel and budget. Enhanced data collection for the tree inventory to include maintenance needs and risk can help inform planning for the routine pruning cycle and reduce resident requests. Inventory data about vacant planting sites, combined with the priority planting and tree placement analyses, can be used to create annual planting plans to plant trees where they are most needed.

Forestry Division Contributions to a High Performing Government

Fort Collins' Forestry Division, housed within the Parks Department, provides a high level of service in the management of public trees.

Proactive Maintenance. The Division is among a minority of U.S. cities that maintain public trees on a routine pruning cycle. Routine maintenance is a safer and more cost effective alternative than reactive pruning that takes place in response to storm damage, emergencies, and public requests, saving the City up to 50% in pruning costs. The Division currently maintains public trees on a 5–7 year pruning cycle, with the goal of attaining a consistent five-year pruning cycle.

Data-Driven Management. The urban tree canopy assessment, inventory data, and other information that is presented in the *Urban Forest Strategic Plan* will be regularly updated to assist Forestry with informed decision making. The information in the Plan can also be used to inform policy updates for the strategic growth and protection of the urban forest.

Resident Involvement. Urban Forest Ambassadors are trained volunteers that assist the Forestry Division with inventory data collection. This program provides residents with an opportunity to learn more about their urban forest and contribute to its upkeep. Residents are also able to make requests related to public trees through Access Fort Collins. And more than 900 residents contributed their ideas to the creation of this Urban Forest Strategic Plan through participation in the planning process.

Integration with City Plans and Priorities. Trees and tree benefits are integrated into many City plans, including the City's strategic plan, and there are future opportunities to increase Forestry involvement in planning efforts. Implementation of this Urban Forest Strategic Plan will enhance the ways that urban forestry can be related to city Outcome Areas.

Sources: AECOM, 2013; Fort Collins 2024 Strategic Plan.

Community Engagement and Policy Integration

COMMUNITY FEEDBACK

Public engagement took place throughout the planning process to gather community input and feedback about Fort Collins' trees. Public engagement included a public survey and three public meetings. Forestry partnering entities were also invited to provide feedback in structured focus group meetings.

Public Survey

The Urban Forest Strategic Plan planning team released a public survey in fall 2023 that was open to public participation from September–December 2023. Nine hundred seventy-one (971) participants completed the survey, which included 14 questions (table 18).

Ninety-nine percent (99%) of respondents agreed or strongly agreed that trees are an important part of Fort Collins (figure 33), while 95% agreed that public trees are well cared for or somewhat well cared for (figure 34). There was mixed agreement about whether Fort Collins has the right number of trees or too few (figure 35).

In general, respondents favor public land for tree planting, including parks, streets, schools, and trails, over private property (figure 36). When asked about their support for various private tree protection mechanisms, including tree removal permits, tree replacement or payment-in-lieu, and increased education about tree protection standards during construction, most respondents (75%) supported increased education (figure 37), while approximately 40% of respondents supported stronger tree protection mechanisms. Twenty percent of respondents did not support stronger private tree protection policies.

Participants ranked the top three tree benefits as shade, urban heat island mitigation, and air quality improvements (figure 38). In an open-ended question about their hopes for the future of Fort Collins' urban forest, the most common response themes included hopes for a healthy urban forest, opinions about species selection, and a desire for more trees (figure 39; table 19).

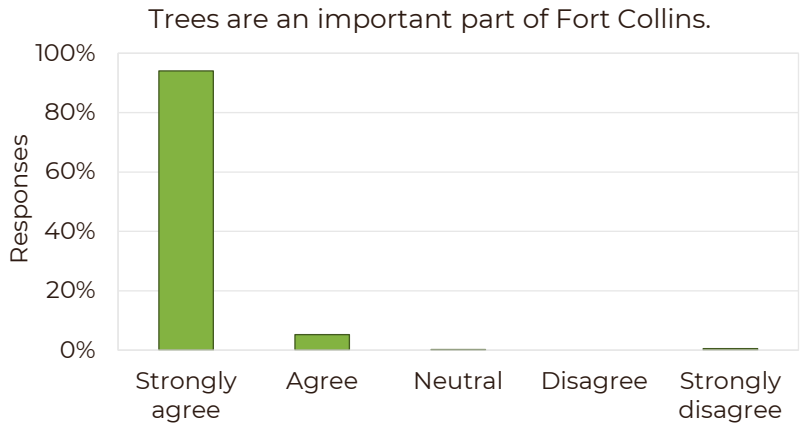


Figure 33. Responses to public survey question that asked participants to rate their agreement with the phrase, "Trees are an important part of Fort Collins" using a five-point Likert scale.

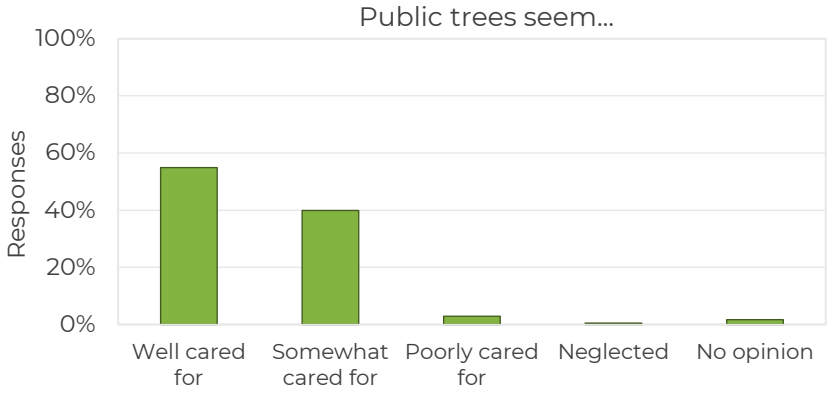


Figure 34. Responses to a public survey question that asked participants to complete the phrase, "Public trees seem..." with one of five response options.

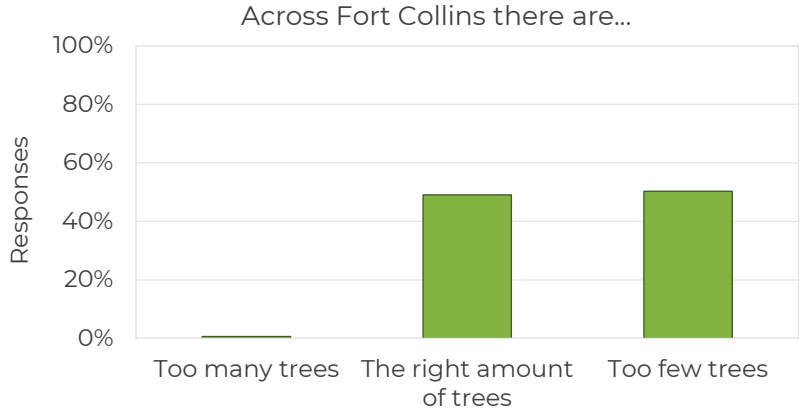


Figure 35. Responses to a public survey question that asked participants to complete the phrase, "Across Fort Collins there are..." with one of three response options.

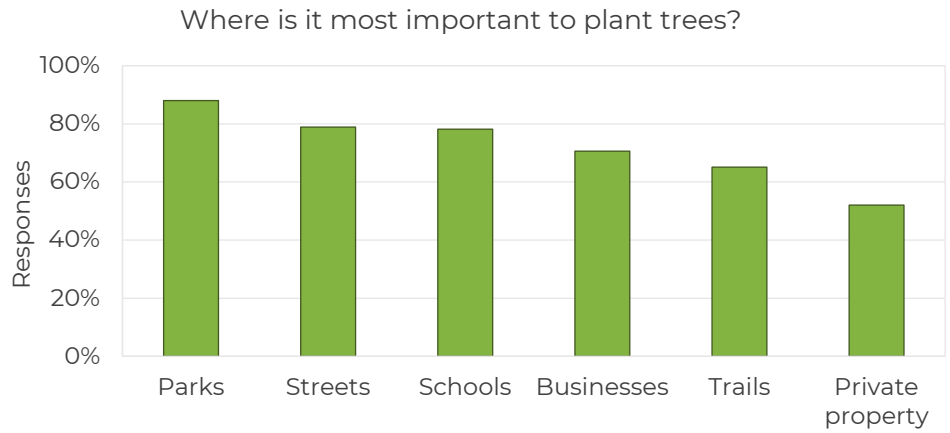


Figure 36. Responses to a public survey question that asked participants to answer the question, "Where is it most important to plant trees?", with the option to select multiple choices.

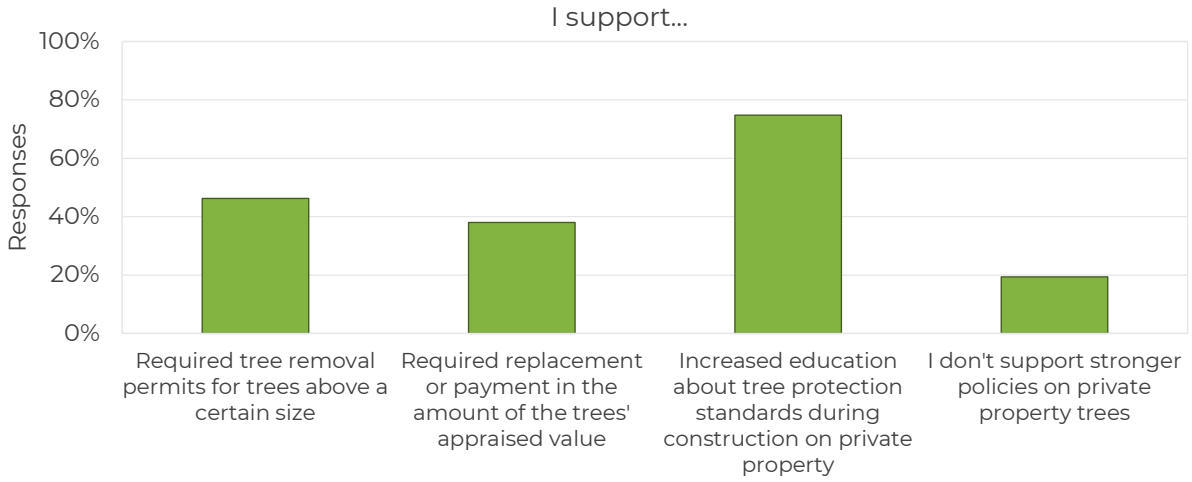


Figure 37. Responses to a public survey question that asked participants to complete the phrase, "I support..." with one of four response options.

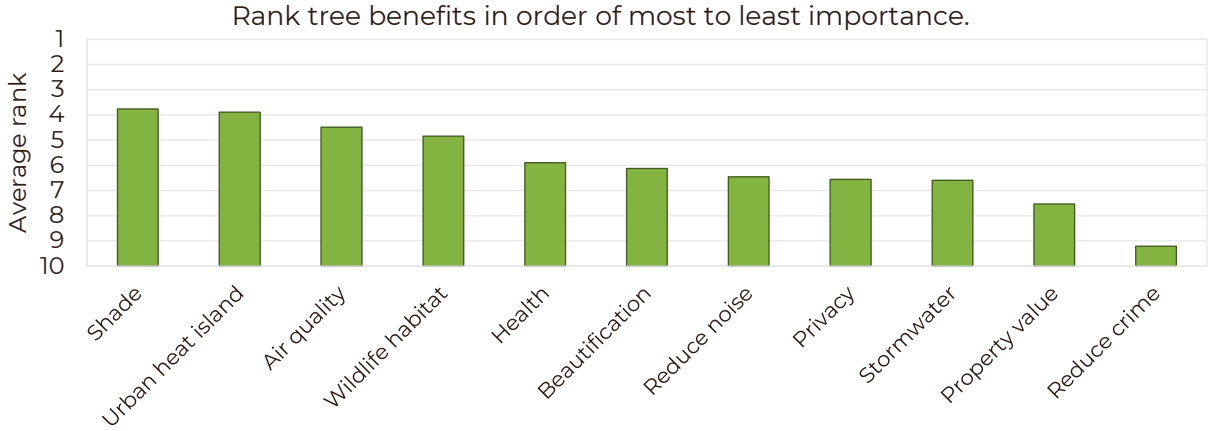


Figure 38. Responses to a public survey question that asked participants to rank tree benefits in order from most (rank 1) to least (rank 10) important.

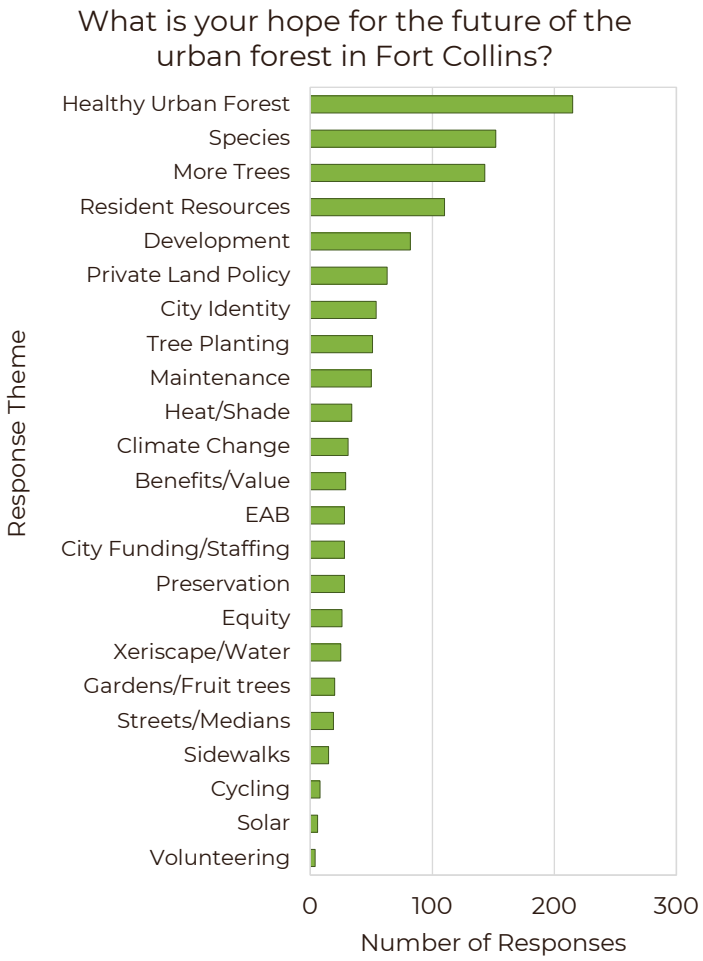


Figure 39. Responses to the open-ended question, "What is your hope for the future of the urban forest in Fort Collins?", categorized by theme. A response could be positive, negative, or neutral about a theme.

Table 18. Public survey questions and responses (971 participants).

QUESTION	RESPONSES*
Q1- Trees are an important part of Fort Collins.	**Strongly agree (94%)** Agree (5%) Neutral (0.2%) Disagree (0%) Strongly disagree (0.5%)
Q1- Having trees is worth the financial cost of maintaining them.	**Strongly agree (86%)** Agree (11%) Neutral (2%) Disagree (0.2%) Strongly disagree (0.5%)
Q1- Public street trees seem well cared for in Fort Collins.	Strongly agree (37%) **Agree (48%)** Neutral (11%) Disagree (3%)

QUESTION	RESPONSES*
	Strongly disagree (0.7%)
Q2- Across Fort Collins there are...	**Too few trees (50%)** The right amount of trees (49%) Too many trees (0.6%)
Q2- In my neighborhood there are...	Too few trees (39%) **The right amount of trees (60%)** Too many trees (2%)
Q3- Trees in the urban environment provide many known benefits to the community, some of which are listed below. To help us understand how to best maximize these benefits to meet community needs, please rank the benefits below from most important to yo...	Average rankings: Help reduce crime (9.2) Increase my property value (7.5) Reduce flooding/run-off (basement/property) (6.6) Screen and provide privacy from my neighbors (6.6) Protect us from noisy roads and highways (6.5) Help landscape and beautify my property (6.1) Improve my mental and physical health (6) Provide habitat for wildlife (4.8) Improve air quality (reduce air pollution) (4.5) Prevent the city from becoming a hotter and drier place (3.9) **Shade to help reduce temperatures and keep my house cool (3.8)**
Q4- Where is it most important to plant trees in Fort Collins? Please select your top five.	**Parks (88%)** Private property (52%) Retail/commercial areas (i.e., parking lots) (71%) Schools (78%) Streets (parkways and medians) (79%) Trails (65%) Other (6%)
	Strongly agree (84%) Agree (13%) Neutral (2%) Disagree (0%) Strongly disagree (1%)
Q5- Public trees are those which are grown between the curb and sidewalk, in street medians, in parks, cemeteries, golf courses, and other City facilities, and are maintained by the City. These public trees seem:	**Well cared for (55%)** Somewhat cared for (40%) Poorly cared for (3%) Neglected (0.5%) No opinion (2%)
Q6- How do you feel about the City of Fort Collins Forestry Division's response to tree-related requests in the community?	Very responsive (21%) Responsive (29%) **Neutral (46%)** Responsive, but not in a timely manner (3%) Not responsive (1%)
Q7- The City of Fort Collins is exploring a Heritage Tree Program. Heritage Tree Programs are developed to protect and maintain trees on both public and private property in the community that may be of special species, sizes, or have cultural or horticultural significance.	**I am in support of a Heritage Tree Program (54%)** I am not in support of a Heritage Tree Program (9%) I don't know enough to decide (37%)
Q8- As part of planning for the urban forest, the City of Fort Collins is assessing the need to preserve canopy on private property. Examples of preservation tactics include adding	Required tree removal permits for tree removal over a certain size of diameter (46%) Required mitigation standards to apply - which means requiring replacement or payment in the amount of the trees' appraised value (38%)

QUESTION	RESPONSES*
tree removal guidelines to the building permit process, home expansion,...	**Increasing education around tree protection standards during construction on private property (75%)** I don't support stronger policies on private property trees (19%)
Q9- What is your hope for the future of the urban forest in Fort Collins?	**Open response (see below)**
Q10- Do you live, work, or play in Fort Collins? Please select all that apply.	**I own a home here (77%)** I rent a home/apartment here (16%) I am visiting (2%) I work or go to school here (32%) I own a business here (10%) Other (5%)
Q11- What zip code do you live in?	**80526 (29%)** 80525 (26%) 80521 (20%) 80524 (17%) 80528 (7%) 80523 (0.3%) 80527 (0.1%) 80522 (0%) 80523 (0%) Decline to specify (0.5%)
Q12- How do you identify your race and/or ethnicity? Please select all that apply.	**White (798)** Hispanic/Latinx/Spanish Origin (38) Asian/ Asian American (19) American Indian/Alaska Native (13) Middle Eastern/ North African (6) African American/ Black (4) Native Hawaiian/Other Pacific Islander (3) African (0) Decline to specify (113) Prefer to self-identify (10)
Q13- What is your age?	75 and older (5%) **65-74 (21%)** 55-64 (19%) 45-54 (14%) 35-44 (18%) 18-34 (17%) 12-17 (0.1%) Under 12 (0%) Prefer not to say (5%)
Q14- How would you prefer to receive information from the City regarding the urban forest? Please select all that apply.	**Email (650)** City website (372) Social media (@ParksandRecFC) (282) Community events (253) Volunteer opportunities (209) Training or workshops (177) Mail (153)

Table 19. Public survey write-in comment themes and specific examples. Percentages reflect the proportion of comments that related to a theme out of 655 total comments. Comments could be categorized as fitting with more than one theme.

COMMENT THEME	EXAMPLES
Healthy/resilient/diverse/ beneficial urban forest; Grow & maintain the urban forest (15.7%)	"Resilient, diverse and thriving trees across Fort Collins." "We can continue to have a beautiful, well managed, resilient urban forest that will help us cool the city and combat climate change." "Keep maintaining the trees we have, while still advocating for more cover."
Species (11.5%)	"More and more trees. Especially ones that have natural defenses against disease and infestation in this particular climate (as well as a good guess on what our climate will be in the future)." "Wider diversity of tree species to guard against loss of canopy trees from pests or disease."
More trees (10.8%)	"Adding more trees to new construction neighborhoods and city parks." "Protection of existing trees and encourage and support new tree growth."
Financial & educational support for residents (8.4%)	"More trees become available to residents at reduced costs, especially to new neighborhoods where there are no trees." "Informing public of their responsibility to care for trees." "I hope to educate more people about the value of trees and be sure that when any development happens, trees and animal habitats are given much more consideration than seems to be the case in recent years."
Maintenance/ Preservation (6.5%)	"In general, I think trees are a good thing and should be maintained, preserved, and that more trees should be planted in areas where they are appropriate. When this becomes an issue of nuisance, private property rights, or detriment to public use, all factors should be considered (including value of the trees) before planting or removing trees. I hope that Fort Collins can continue to beautify our city by maintaining healthy trees, both public and private, and adding more in the right places." "For Fort Collins to have more trees, all of the trees well taken care of and the city be cleaner and habitants breathing fresher air and the city looking prettier and enchanting. For trees and nature areas to be preserved and taken care of and not destroyed and not for people to keep destroying them for construction. Protect prairie areas of the city too!"
Development (6.1%)	"I would love to see new developers put more thought in their landscaping- they put trees right up next to house and windows for curb appeal but don't take into consideration the size at maturity- so beautiful trees have to be removed." "When large trees are removed for redevelopment of a property, the city, the developer and landowner must take responsibility for the adequate care of young replacement trees. I see too many dying young trees in new developments in the city."
Private land policy (4.7%)	"..I love trees in our community, but dislike too much policy as that can often complicate things and create resentment between citizens and City departments. I'll support more carrots than sticks for tree issues." "I am all for increasing the canopy of Fort Collins, as long as the city is able to maintain the trees. I am concerned with our warming climate,

COMMENT THEME	EXAMPLES
	that increased canopy without proper maintenance, could lead to future potential fire hazards. I'm also concerned about private homeowners that don't maintain their trees causing that same issue. I'd like to see the city MORE involved in declaring dead private trees hazardous, and forcing homeowners to deal with the situation. Easier said than done I realize however."
City identity (4.1%)	"I hope that Fort Collins will become known as the leader in urban forestry and sustainability in the US." "The trees is Fort Collins are incredible. I moved here only 2 years ago and they're one of my favorite parts of the city."
Other (3.9%)	"It is not natural for a forest, urban or otherwise to exist on the land Fort Collins covers. At least recently (last 10000 years). That said, trees are great." "The city needs to be aware that due to the policy of suppressing small natural fires along the Poudre trail and not removing fallen trees but piling them up on the side of the trail, has created a potential for a huge fire hazard that would likely burn entire neighborhoods that are near by, such as Pateros Creek."
General positive (3.7%)	"We're new here and think this city is doing an incredibly good job at keeping trees and nature integrated into the city. Thank you." "Thanks for the forward thinking efforts from the city!"
Heat/shade (2.5%)	"More trees/shade along certain trails (like power and Cathy fromme) and sidewalks to encourage walking/biking and reduce car use." "More shady places to walk in summer."
Climate change (2.4%)	"Maintain a diverse urban forest w an eye toward climate change." "Increased tree canopy throughout the city. Focus on trees that are only the best climate-wise for the next 50+ years. This is an investment in our community to avoid big and costly problems due to climate change-induced heatwaves, droughts, floods, etc. We have a great start, but we must continue to prepare."
Emerald Ash Borer (2.1%)	"I'm very worried about the 70K ash trees and their future in light of the emerald ash borer invasion. I'd like to see a concerted effort to have them all inoculated against this destructive bug." "That we can keep up with planting trees to replace those which need to be removed, i.e., emerald ash borer and other pests which need to be proactively addressed."
Benefits/value of trees (2.1%)	"That trees will be valued for all that they contribute towards improved quality of life." "Science supports the following 1) Trees reduce temperatures 2) Trees increase mental health 3) Trees support more wildlife I hope we are able to develop a sustainable urban forest to help with the listed issues."
Funding/staffing (2%)	"That the forestry department continues to lead the way in the municipal arborist field with implementation of the highest quality and knowledgeable tree care providers in the state." "That we continue to support and fund good care for our trees!"
Equity (2%)	"Our underresourced neighbors are gifted more trees!!!" "More trees all around town but especially in lower income areas and areas that are largely developed (lots of concrete i.e. Parking lots, malls, etc.)."

COMMENT THEME	EXAMPLES
Tree planting (1.8%)	"I hope that the city can fill in any gaps that exist, by convincing property owners to plant more trees where there are currently too few. I also hope that the program continues indefinitely, or until there is some other self-sustaining program." "Support for young/growing trees. Continued planting."
Maintenance (1.7%)	"More trees and good maintenance." "Continued strong maintenance of trees especially larger sizes.."
Xeriscape/ water (1.5%)	"A canopy of trees that do well in this area and true xeriscape landscape throughout the city to replace turf and eliminate landscape with high water needs. Education to the general public about how to xeriscape and what trees to plant in this area of Colorado." "Probably the largest threat to our current city trees is the high cost of city water. I've seen many trees doing poorly or that have died because residents choose not to water their trees-likely because of the high cost of water. This will only become a larger problem as climate warms and dries."
Community gardens/ fruit trees (1.5%)	"That a park with numerous trees is added, perhaps fruit for public to harvest. This would be great on Precision and Cinquefoil instead of more apartments." "More urban fruit trees for urban foraging!"
Streets/ medians (1.2%)	"..And some trees between streets and sidewalks need to be pruned." "More trees along larger roads and in public shopping places. More trees between sidewalks and the road (including adding a buffer between sidewalks and roads to make pedestrians feel safer and make sidewalks more inviting)."
Preservation (1.1%)	"I hope that trees are watered more frequently to account for the higher temperatures that have become the norm during seasons when it hasn't been hot in the past, and that there are more efforts to save much older trees that are unhealthy, like the cottonwoods down by the river. I also hope that there will be more effort by developers to save as many trees as possible on lands that are slated to be razed." "For them to maintain the beauty of this town, and it's many trees, esp the older and more mature ones downtown on Oak, mountain, etc. And when clearing land to build new neighborhoods and homes, making it more difficult to remove existing trees too."
Sidewalks (0.9%)	"I think planting trees along the roadways, sidewalks and other paved area big mistake and just leads to unhealthy trees and root issues along cement walkways, path, roadways." "Trees between the sidewalk and street, and trees in medians are high priority because they are enjoyed by all citizens."
Cycling (0.6%)	"Important that trees are planted back from roads so that they have room to grow but don't present obstacles to seeing cars, bicyclers and animals. They should be properly trimmed for these reasons, too." "Plant trees along bike trails."
Solar (0.5%)	"Current and future rooftop solar panel owners should have their solar rights protected from encroaching shade from trees and from new development encouraged by changing city policies." "I would love to see more trees, but the type of trees should match the size of the property they are planted on. Fort Collins is blessed with a sunny climate which is good for home solar projects. Since we do not control the size of trees that people have, many home owners do not

COMMENT THEME	EXAMPLES
	have enough sun to justify any type of solar improvement. Fort Collins is trying to reduce its carbon footprint, poorly placed large trees reduce individuals ability to contribute."
Volunteering (0.2%)	"I am passionate about trees and would love to volunteer with the city to help with our forest canopy." "Home owners have the right to have none to many trees on their property. The city should not dictate what home owners do. Educating people on the benefits of having trees which are obvious to most people would help most. Providing saplings to plant or a volunteer group to plant trees on people's property that want them would also be helpful. Educating on the importance of deep watering at least once a month even through winter is crucial. A lot people do not take care of trees during the winter."
Meta (0.2%)	"Question #3 malfunctioned. Some replies didn't offer all the way up to 11 choices." "This survey is not only well conceived but so easy to use!!!"

Public Meetings

Public meetings were held on October 25 and 26, 2023, and March 2, 2024, and were attended by more than 150 members of the public. Participants left verbal and written comments and other feedback that expressed a variety of viewpoints about trees in Fort Collins (figure 40). Major themes from public comment are collected below.

Tree Benefits

- Shade, cooling, and wildlife benefits of trees were frequently mentioned.
- Several residents requested additional planting of edible fruit and nut trees.
- There is public interest and concern about water usage, indicating an opportunity for additional education and outreach regarding trees' role in conserving water, drought tolerant species selection, etc.

Species Selection

- Several participants spoke and left comments in support of native tree species.
- Many participants left opinions about the value and drawbacks of specific kinds of trees, e.g., oaks, cottonwoods, and talked about their favorite trees.
- There were a smaller number of comments that were skeptical of native species, for example, comments that questioned the role of native trees within a grassland ecosystem or that stressed adaptability over nativity.

- Several residents voiced support for more diversity in trees and shrubs that are planted in Fort Collins.
- Participants expressed interest in resources that would help them select appropriate tree species for specific sites, drought tolerant species, etc.
- Emerald ash borer has caused some concern about future pest and disease resilience and the plan for replacing ash trees that are removed in the future.

Forestry Division

- There was general support for the Forestry Division.
- Some participants are satisfied with the current level of funding for Forestry, while others wanted to see the Division grow.
- Many residents support expansion of volunteer opportunities, community involvement, and internships in Forestry.
- Several residents expressed concerns that tree establishment activities could be improved, e.g., watering, mulching, and increasing the survival of newly planted trees.

Tree Canopy

- A number of participants commented that commercial properties and streets are in greater need of additional tree planting/green space development.
- Many comments were made in support of building equitable tree canopy by strategically investing in tree cover within disadvantaged neighborhoods and/or in areas with low tree canopy.

Tree Policy

- A large number of comments at public meetings focused on the potential for new policies and ordinances that would strengthen protections for trees on private property. Comments were made both in support of, and in opposition to, such policies.
- There were a number of questions and comments that indicated that participants want to learn more about policy options to create an informed opinion.
- In response to discussion and written comments about private tree policy, there were several requests for separate, added engagement that focuses on this topic.

- While residents are divided about tree protection on private residential land, there was more general support for strengthening tree protection policies that govern large developments and commercial properties.

Resident Resources

- Homeowners would like to learn more about proper tree care.
- Cost is a difficulty many residents face when planting new trees. Tree care and removal costs are a burden to homeowners.
- There is strong support for additional resources for private property owners that support private tree protection, for example, financial resources, mitigation credits, and outreach and education. Support for resources may be in addition to, or in lieu of, mandates.
- There were a few requests about guidelines for preventing trees from blocking solar panels.

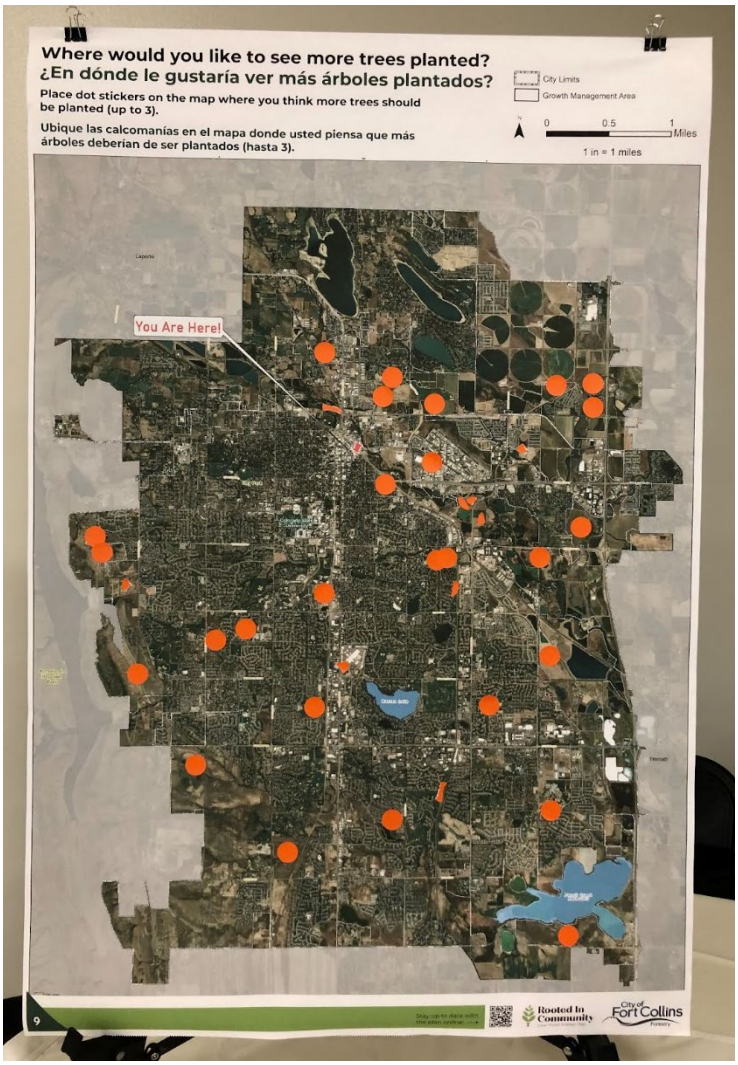


Figure 40. An interactive board from the October 25, 2023, public meeting.

Partner Focus Groups

In October and November, 2023, the City of Fort Collins held a series of partner focus group meetings with city departments/divisions and external partners to inform the development of Fort Collins' Urban Forest Strategic Plan. In total, representatives from more than 49 partner entities and branches of local government participated across ten focus group meetings.

Meeting Participants

City of Fort Collins Departments & Divisions

Cemeteries
Connexion
FC Moves
Forestry
Fort Collins 911
Gardens on Spring Creek
Golf
Light & Power
Natural Areas
Nature in the City
Neighborhood Services
Parks
Planning
Planning, Development, Transportation
Park Planning & Development
Police Services
Recreation
Streets
Utilities

External Partners

Arthur Irrigation Company
Bartlett Tree Experts
Bath Landscape Design & Irrigation Co.
BHA Design
Blue River Forestry & Tree Care
Broadcom Inc.
Colorado State University
CSU Extension
Davey Tree
Downtown Development Authority
Downtown General Improvement District
Fort Collins Tree Care Inc.
City of Greeley
Hartford Homes
HF2M Inc.
Housing Catalyst
Larimer and Weld Irrigation Company
Larimer County, Natural Resources
Lumen
Norris Design
Pleasant Valley and Lake Canal Company
Poudre Fire Authority
Poudre River Public Library District
Poudre School District
Ripley Design Inc.
SavATree
South Side Ditch Company
Transfort
Wisdom Tree Care
Zak George Landscaping

This section provides a description of major themes that arose from the ten meetings and the needs, issues, challenges, and opportunities that were identified with each theme.

Policies & Procedures

- **Create Explanatory Resources About City Policies and Procedures.** Stakeholders requested more plain-language written explanations and illustrations about city code to consolidate and convey information in various formats and to provide consistency in code implementation across staffing changes. Examples include tip sheets, best management practices manuals, and specifications.
- **Industry Standards.** City policy should refer to written standards that can be easily updated and that reflect industry best practices. Examples include standards for boring and utility clearance. Standards should be consistent for in-house versus contracted labor.
- **Code Enforcement.** Even with good tree policies on the books, both internal and external stakeholders noted that the City often lacks the resources to consistently monitor and enforce those policies. Examples were cited for development—both tree protection policies during construction and replacement of mature trees within developments.
- **Irrigation Standards.** Tree roots can be damaged by improper irrigation. There is a need for improved education, outreach, permitting, and Forestry department involvement related to good irrigation practices for trees.
- **Tree Metrics and Goals.** Stakeholders expressed uncertainty about what tree metrics and goals they should use for plans and to measure progress. For example, is the number of trees or canopy cover a more important metric?
- **Tree Replacement Policy for Subdivisions.** Developers would like to see an adjustment to the time frame for which they are responsible for tree survival after new developments are completed. Tree care becomes the responsibility of homeowners after they move into their houses. In practice, mature trees are often not being replaced by developers per city code unless there are HOA funds to replace them.

City and Stakeholder Coordination

- **Good Camaraderie and Culture.** Both internal and external stakeholder groups noted existing camaraderie among different City departments that touch trees and between the City and several external partners. They noted an intentional effort toward development of personal relationships that facilitates communication and collaboration. Communication and partnership with Forestry is established with many organizations and is performing well.
- **City Interdepartmental Coordination.** Stakeholders noted several opportunities for improved coordination among city departments; examples included adding more departments to sidewalk repair maps, collaborating on a compost program that is under development, and adding Forestry to planning teams for other City plans.

- Stakeholders in development and construction noted a need for more City interdepartmental coordination and communication on tree species, planting locations, and tree protection requirements, particularly between the departments of Zoning and Forestry.
- An informal Veg Team was established in the past two years with representation from different departments that manage vegetation to discuss shared management objectives and goals. It meets 2-3 times per year. The Veg Team grew from a need for more formal policy, e.g., during plan review.

- **Collaboration With and Among External Partners.** Stakeholders named several examples where the City could facilitate broader conversations about urban forestry with and among external partners. Examples include:
  - Facilitate a regional meeting that brings together tree care companies and foresters to share information and respond to emerging threats.
  - It was noted that the City has a good working relationship with Colorado State University on the maintenance of trees on properties adjacent to CSU campus. The City and CSU coordinate on maintenance and treatment contracts for trees in shared spaces.
  - There is an opportunity to expand the CSU partnership model to other partners who steward large tracts of land or campuses. Potential engagement topics include tree management, planning, and planting on campus and adjacent properties and setting an example for other businesses in Fort Collins.
  - The City, Poudre Schools, and CSU all operate annual Arbor Day celebrations that are good opportunities to reach the public. There is some coordination on annual celebrations to set annual themes. This may be an opportunity for further coordination.
  - The Cities of Greeley and Fort Collins noted opportunities to collaborate more, for example, to share resources and information. Greeley has a City plant database with hydrozone as a filter criterion that could be useful in Fort Collins.
- **Consistent Messaging.** Coordination with partners to provide consistent messaging on topics such as EAB, cutting for solar, and property management.

Public Education & Outreach

- **Strong Public Support for Trees.** Trees are largely viewed as assets by community members, partner organizations, and elected officials. City council recently declared trees to be “living infrastructure”.

- **Trees as Infrastructure.** A potential drawback to strong community support for trees is that they can be viewed as simplified or undervalued assets, which misses the complexity of their management needs as infrastructure. For example, residents may complain when trees are removed due to poor health. This is an opportunity for more education and outreach.
- **CSU Extension.** The Extension service receives a lot of questions/feedback about trees from residents and has started programs to address this, e.g., a Master Gardener program that provides free tree expertise to residents.
- **Xeriscaping.** Stakeholders noted a need for more public education about tree establishment and watering in a xeric environment. It is difficult to grow trees in Fort Collins relative to other places in the U.S.
    - Homeowners, HOAs, and irrigation companies could all be better educated about proper tree watering practices.
- **Public Notice.** The City could improve its communication to the public about its own activities; examples given include planned tree maintenance and removals, if there are alternatives to mitigation planting in suboptimal locations, planting permits, and ROW designation.
- **Homeowner Rights and Responsibilities.** Homeowners may not be adequately educated about their rights and responsibilities for trees in their yards and within the ditch easement, alleys, and street ROW.
    - Home buyers within new developments may need more education about tree benefits and care to promote survivorship of newly planted trees. Involving them earlier in the homebuying process to teach and gather input regarding species and location of trees that will be planted in their yards may promote survivorship.
- **Infrastructure Conflicts.** Ditch easements and alleys are often sites for utility conflicts, which arise from poor management of trees and uncertainty around rights and responsibilities for maintenance. At the same time, utilities may have misconceptions about how trees impact infrastructure. There is an opportunity for better education to the public and within utilities companies.

Right Tree In The Right Place

- **Species Selection.** Tree species diversity can be challenging in Fort Collins due to its high desert climate and a growing emphasis on water conservation. Several needs for support with species selection were noted:
    - Species recommendations for naturalized buffers to boost habitat and capture stormwater. Importance of native/cottonwood forests along rivers for wildlife and enjoyment by people.
    - Ensuring minimum species diversity and adequate Forestry involvement, particularly for new developments.

- Balancing species requirements with design and aesthetic preferences. Tree planting palettes are limited and shift often, which is a source of frustration for developers and landscape designers. They would like to see more consideration for design within new developments.
- Mitigation planting recommendations.
- Limited species in streetscapes, but parks present an opportunity to diversify plantings. Expanded plant palettes for parks.
- Limited space downtown where planting spaces are small.

- **Planting Locations.** On a topic that closely relates to species recommendations, stakeholders are looking for more guidance from the City on proper planting locations.
  - Trees along trails are hard to establish (i.e., solitary/exposed) and maintenance is difficult, which can create conflict within departments.
  - Clarification on responsible parties at different planting locations, for example, along utility ROWs.
  - In sites that cycle through site plans > tree planting > dead tree > required replant—does failure to establish mean that the location isn't appropriate for a tree, or does it require a different kind of tree and/or different management? How is the city handling sites with repeated tree failure?
  - Downtown is very well served by many organizations that include trees in their programming and budgets. Perhaps other parts of Fort Collins are in need of similar investment.
- **Sourcing Trees.** Stakeholders noted that it is becoming increasingly hard to find new species or hardy ones due to development pressure and increased tree planting. Local shortages require ordering from more distant wholesale nurseries. This can affect plant hardiness and species diversity.
- **Costs.** Tree maintenance costs are burdensome to landowners.

Trees and Other Infrastructure

- **Ditch Easements.** The rules and stewardship of the land without ownership along ditch easements were brought up in several stakeholder conversations. Trees that are not adequately maintained pose a risk to both residential structures and ditches. Conflicts arise because maintenance of trees within ditch easements is the responsibility of the homeowner; however, ditch companies are responsible for the delivery of water. The City is limited in their authority to regulate ditch easements.
  - Homeowners may not be adequately educated about their rights and responsibilities for the ditch easement.

    - Trees are often not intentionally planted in the easement and are often not well maintained.
    - There's conflicting information about how tree roots impact ditch embankments—do they stabilize them or deteriorate them? Opportunity for better education.

- **Alleys.** Alleys have abundant trees that are often not well managed, which creates conflicts with utilities. The rights and responsibilities of homeowners, the City, and utilities with regard to tree care was noted as a point of confusion for all three groups.
- **Traffic Calming.** CSU and the City share a joint interest in trees as traffic-calming measures, which can be linked to their Vision Zero programs to eliminate traffic fatalities. Fort Collins is a leading city in the U.S. in bike use and bike safety. CSU has examples of vegetated medians on their campus that they think should be replicated throughout the city to make better use of center turn lanes, promote bike safety, and reduce maintenance costs.
- **Street Conflicts.** A number of infrastructure conflicts with street trees were brought up in discussion. A recurring question was whether adjacent property owners have adequate information/resources to maintain trees in the street ROW.
- **Solar Infrastructure.** There is conflicting information for homeowners who are installing solar arrays about how much tree clearance is needed and which species are compatible with solar.
- **Bike Infrastructure.** Trees can block bike racks, and low-hanging branches are a concern over bike lanes. At the same time, low-stress bike networks are an effort to make ROW more bikeable and reduce conflict with cars; they could use more shade.

Threats to the Urban Forest

- **Emerald Ash Borer (EAB).** The City has an EAB management plan but does not have funding to remove trees that present a hazard to the ROW, which is the responsibility of adjacent property owners. EAB management in the ROW requires the City to increase enforcement of city codes.
    - There may be an opportunity to collaborate with contractors to offer payment plans to ease financial barriers.
    - There is a need for more EAB education/outreach to homeowners, renters, and HOAs. Also a need for different agencies to coordinate on EAB messaging.
- **Species Selection/Diversity.** Species lists should reflect the latest information about climate change, with adequate consideration for xeriscaping and resistance to pests/diseases.

- **Fire Safety.** Is there a need for public education about the placement of evergreen trees close to homes?
- **Water Use.** As the cost of water increases and the community reduces water use, it is important to provide adequate water to support trees. Some HOAs may be limited in the dues they can collect to support tree watering.

CITY CODE REVIEW

City code provides a regulatory framework for the protection, preservation, planting, and care of public and private trees. Fort Collins' Code of Ordinances (2023) and Land Use Code (2023) were reviewed in January 2024 using a set of criteria from the 2016 Municipal Tree Census (Hauer & Peterson, 2016) and International Society of Arboriculture Ordinance Guidelines (Swiecki & Bernhardt, 2001; table 20). Any changes to City code after January 2024 are not reflected in this code review.

The review identifies several areas where existing code could be strengthened, including the following recommendations:

- Reference the *Tree Management Standards and Best Management Practices* manual within city code. The manual contains procedures and policies related to arborist licensing, pruning, and other tree activities that the city has relied on since 2010 but that are not referenced in city code. Referencing the manual and providing instructions for updating it ensures that its use will persist across staffing and leadership changes.
    - Update the manual to comply with current best management practices.
- Establish an insect/disease control strategy, and/or reference external documents such as the *Emerald Ash Borer Management and Response Plan* that describe authority, procedures, and policies for pest and disease control.
- Expand tree protections:
    - Extend tree protection to prohibit damage to trees that are required to be preserved or protected.
    - Provide credits or incentives for tree preservation.
    - Establish penalties for damage or removal of trees that are to be preserved, protected, or saved.
    - Expand tree protections that currently only apply to development to additional scenarios.
- Encode the existing wood waste program and Tree Fund to preserve existing programs and resources across any future changes in leadership.

Table 20. City code review. Matrix is adapted from Municipal Tree Care and Management in the United States (Hauer, 2014).

TOPIC	ADDRESSED	CHAPTER & SECTION	COMMENTS
Credentials			
Requires certified arborist for paid private tree work			
Requires Certified Arborist for public tree work	(X)	CO 27-17	This is included in the Tree Management Standards and BMP document. CO 27-17 allows for the City Manager to implement written rules. A recommended improvement is to mention this document within city code.
Requires licensing of private tree care firms	X	CO 27-34–40	
Defines official authority for public tree management	X	CO 27-17	
Public Tree Management and Protection			
Establishes/Authorizes City Forester to regulate public trees	X	CO 27-17	
Establishes/Authorizes City position (e.g. Mayor, City Administrator, DPW Director) to regulate public trees	X	CO 27-17	
Establishes a community Tree Board or Commission			
Defines public trees			
Requires annual community tree work plans			
Identifies formula for determining monetary tree value	(X)	LUC 3.2.1 I-7	Applies only to development
Establishes responsibility for public tree maintenance (e.g. City, adjacent property owner)	X	CO 24-42, 27-17, 27-57	Responsibility for public trees is implied but not directly stated
Requires regular public tree maintenance	X	CO 27-57	
Requires particular types of maintenance (e.g., pruning)	X	CO 27-58	
Requires adherence to ANSI A300 standards and best management practices	(X)	CO 27-17	Tree Management Standards and BMPs
Establishes permit system for work on public trees	X	CO 27-33	
Requires payment of fees for the removal of public trees			
Establishes provisions for penalties for non-compliance	X	CO 27-59–62	
Restricts tree removal on public property			Permit required; see next line

TOPIC	ADDRESSED	CHAPTER & SECTION	COMMENTS
Permit or approval required for tree removal, pruning or excavating near public trees	X	CO 27-31–32	
Requires protection of public trees during construction, repairs or utility work	X	LUC 3.2.1 G	
Prohibits damage to public trees (e.g. attaching ropes, signs, wires, chemicals, storing materials, excavation etc.)	X	CO 27-19	
Establishes provisions for trimming for overhead utility line clearance			
Restricts burning of solid wood waste			
Establishes a wood utilization program			Recommended Improvement
Establishes an insect/disease control strategy			Recommended Improvement
Prohibits tree topping	(X)	CO 27-17	Tree Management Standards and BMPs
Regulates abatement of hazardous or nuisance trees on private property	(X)	CO 27-18(c)	
Regulates removal of dead or diseased trees	X	CO 27-58	
Tree Fund			Recommended Improvement
Tree Planting			
Regulates tree species which may or may not be planted on private property (approved tree list)	X	CO 27-18 LUC 3.2.1 D-4, I-2, I-8	
Requires tree planting around and within parking lots	X	LUC 3.2.1 D, E-4–5	
Requires replacement of removed publicly owned trees	X	LUC 3.2.1 D-2-d	Applies only to development
Permits public tree planting - beyond the right-of-way	X	LUC 3.2.1 D-2-b	
Requires tree plantings around new developments (see also trees in parking lots)	X	LUC 3.2.1 D, D-1-c	
Regulates tree species which may or may not be planted on public property (approved tree list)	X	CO 27-18 LUC 3.2.1 D-1-c, I-8	
Private Tree Protection and Preservation			
Restricts tree removal on private property			
Permit or approval required for tree removal on private property			
Requires preservation of trees during development on private property	X	LUC 3.2.1 F	
Prohibits damage to preserved/protected trees			Recommended Improvement
Prohibits damage or removal of trees on another person's property			

TOPIC	ADDRESSED	CHAPTER & SECTION	COMMENTS
Inventory of trees on site required	X	LUC 3.2.1 F	
Identification of forests/woodlands required			
Specific species and/or size tree regulated (e.g. heritage/significant trees)	(X)	LUC 3.2.1 F	Applies only to development
Location of Critical Root Zone/Dripline required	X	LUC 3.2.1 G-7	
Minimum canopy cover requirement set			
Identification of riparian buffers, natural areas, preservation zones	X	LUC 3.2.1 A, M	
Tree protection/preservation plan required	X	LUC 3.2.1 C	
Identification of prohibited activities in dripline/critical root zone	X	LUC 3.2.1 G-3	
Tree protection fencing required	X	LUC 3.2.1 G-3	
Location/type of other tree protection measures (e.g. root pruning, aeration, vertical mulching, trunk protection, soil protection, irrigation,) on development plans (e.g. site plans, construction plans, etc.)	X	LUC 3.2.1 G, G-7, J-2	
Provide credits/incentives for tree preservation			Recommended Improvement
Landscape plan with proposed landscaping and mitigation trees to be planted	(X)	LUC 3.2.1 C	
Requires Grading plan to include protected/preserved trees			
Utility plan with trees to include protected/preserved trees	X	LUC 3.2.1 K	
Tree planting requirements for removal of regulated trees	X	LUC 3.2.1 F, F-1	
Fee in Lieu of planting mitigation trees	X	LUC 3.2.1 F	
Tree mitigation survival requirements	X	LUC 3.2.1 I-4–6	
Fine for removal of regulated trees			Recommended Improvement
Penalties established for damage and removal of preserved/saved trees			Recommended Improvement
Bonding to ensure required trees are planted	X	LUC 3.2.1 I-4	
Bonding utilized to discourage tree removals			
Other Ordinances of Note			
Defining 'City Forester'	X	CO 27-16	
Alley ROW maintenance	X	CO 27-31	
Right of entry	X	CO 27-56	
Tree spacing	X	LUC 3.2.1 D-1-c	

TOPIC	ADDRESSED	CHAPTER & SECTION	COMMENTS
Visual clearance	X	LUC 3.2.1 L	
Requirement of ROW planting	X	LUC 3.2.1 D-2-a, D-2-c	
ROW tree spacing from infrastructure	X	LUC 3.2.1 D-2-a, D-2-c, K	
Minimum species diversity for development plans	X	LUC 3.2.1 D-3	
Minimum sizes for trees planted	X	LUC 3.2.1 D-4–5	
Buffering requirements	X	LUC 3.2.1 E-1	
Water conservation requirements	X	LUC 3.2.1 E-3	
Required maintenance for development landscape	X	LUC 3.2.1 I-5	

HERITAGE TREE PROTECTION

Heritage Trees, sometimes also called Landmark or Significant Trees, are mature trees that receive special recognition and protection due to their ecological, cultural, and/or historic significance. The designation of heritage tree status acknowledges the outsized benefits that these trees provide to their communities and seeks to protect them from damage, removal, and neglect. Typically, protections are either reinforced through community outreach exercises including education, mapping, and storytelling, or required by policy or ordinance.

Mature trees provide many benefits to communities, including cleaner water, cooler and cleaner air, improved human health outcomes, increased safety, and positive effects on business and commerce. The value of some of these benefits can be quantified based on avoided costs—for example, trees that cool the air help nearby residents save on energy costs. However, most of the demonstrated benefits from trees are not currently quantifiable, and many heritage tree designations are founded on preserving access to a diverse species or the emotional connection to specific trees that serve as a backdrop to community events and key historic moments.

Preservation

The Land Use Code references “significant trees” as being at least 6 inches DSH and requires their preservation “to the extent reasonably feasible”.

Heritage Tree Programs

To develop suggestions for Fort Collins’ Forestry Division as it considers options for increased tree preservation and protection, DRG reviewed the existing programs for heritage or landmark trees of 24 municipalities. Cities were identified based on internet searches for “heritage tree”, “landmark tree”, “remarkable tree”, and “significant tree” terms along with “program” or “ordinance”; they were also identified by other municipal partners and from references contained within resources about heritage tree programs.

In general, existing heritage tree programs can be characterized into two basic structures: voluntary programs, where trees are nominated for heritage status based on ecologic, cultural, and/or historic significance; and mandatory programs, where trees are automatically enrolled into a heritage tree program once they reach a certain size. Several cities combine aspects of voluntary and mandatory programs.

Examined Programs

Austin, TX
Charlotte, NC
Corvallis, OR
Fernandina Beach, FL
Fort Worth, TX
Glenview, IL
Lakewood, WA
Manitou Springs, CO
Menlo Park, CA
Nashville, TN
Palo Alto, CA
Pittsburgh, PA
Portland, OR
Sacramento, CA
Salem, OR
San Luis Obispo, CA
San Mateo, CA
Santa Cruz, CA
Seattle, WA
Sonoma, CA
Telluride, CO
Washington, DC
Westmont, IL
Whitemarsh, PA

Voluntary Heritage Tree Programs

Thirteen cities with voluntary heritage tree programs were reviewed. Voluntary programs are those in which public and/or privately owned trees may be nominated for recognition as heritage trees; trees are not automatically enrolled. All the reviewed programs applied to trees on public land, and all programs allowed for nomination of trees based on local landmark status or cultural/historical significance in addition to, or instead of, size and species constraints.

Seven of 13 cities' heritage tree programs restrict the removal of designated trees. Two cities (Telluride and Seattle) have city codes with detailed restrictions governing heritage trees once designated.

Seven programs map or describe the trees for the public; four cities share heritage tree characteristics via an interactive map such as an ESRI StoryMap.

Summary of 13 Voluntary Programs

- Requires property owner consent (100% of programs examined)
- Nomination criteria includes social factors (cultural or historical significance, local landmark; 100% of programs)
- Mapped locations shared with the public (62%)
- Restricts removal (54%)
- Requires certified arborist assessment before or after designation (38%)
- Heritage tree status maintained across land transfers (46%)
- Shared via an interactive web map (31%)
- Provides public maintenance funds (15%)
- Maintenance requires a permit (15%)

Mandatory Heritage Tree Programs

Thirteen municipal ordinances were reviewed in which trees of a certain size are automatically enrolled in a heritage tree program, thereby protecting the tree from removal or significant damage. Seven of these cities additionally permit designation of a heritage tree based on cultural or historic significance. None of the programs reviewed applied to park lands only.

In one city (Sonoma, CA), the city assumes maintenance and removal responsibility for heritage trees, regardless of location. In the other twelve cities, a permit is required to remove a heritage tree. Most of these cities waive the permit requirement if the tree is hazardous. Eleven cities require mitigation planting and/or a fee-in-lieu for heritage trees that are removed.

Summary of 13 Mandatory Programs

- Prohibits removal and damage (100% of programs reviewed)
- Minimum size requirement (100% of programs). Median = 15 inches DSH (range 8–50 inches DSH)
- Permit required for removal (92%). Permit often waived if tree is hazardous (69%).
- Mitigation required (85%)
    - Planting required: varies in number of stems, by inch, etc (85%). Sometimes there are species requirements (62%).
    - Relocation required (8%)
    - Fee-in-lieu (77%): varies from $250 flat fee to value calculated from basal area
- Species requirements for heritage tree designation (46%)
- Fee for removal (15%; separate from mitigation requirements)
- Requirements vary by land type (15%): in two cases, small residential properties were exempted, or public/private/developed land had different requirements

Trees Contribute to Neighborhood & Community Vitality

Trees Enhance Streetscapes. Trees beautify streets and encourage residents to spend time outdoors. Trees along streets and sidewalks help to slow traffic and create more comfortable conditions for walking, biking, and public transit use.

Trees Improve Public Health. Trees provide opportunities for outdoor recreation, improve access to nature, and reduce stressors that impact vulnerable populations. People living in neighborhoods with more canopy cover have been shown to have better overall health, including lower rates of obesity, more social cohesion, less stress, and lower blood pressure. Trees significantly decrease the incidence of asthma and heart disease in a community and help residents feel more at ease. The primary mechanism for these effects arise from the ability of tree canopy to reduce air pollution, extreme heat, and stress. Residents are three times more likely to be physically active when they live in areas with high levels of trees and vegetation. A 2018 study showed that residents reporting poor mental health decreased by 63% within 18 months after vacant lots near their homes were planted with grass and trees.

Trees Provide a Sense of Community. Trees in neighborhoods contribute to a sense of community. In Fort Collins, oaks, pines, and cottonwoods have strong cultural significance. Tree canopy is often cited by residents as one of the reasons they love living here.

Sources: Swift et al., 1997; Kuo, 2003; Ellaway et al., 2005; Ewing & Dumbaugh, 2009; O'Neil-Dunn, 2012; Donovan et al., 2013; Roe et al., 2013; Gilstad-Hayden et al., 2015; Ulmer et al., 2016; South et al., 2018.

CITY POLICY AND PLANNING FRAMEWORK

The City of Fort Collins is committed to continuously enhancing, improving, and innovating services for its community. To achieve this, various City and County departments collaborate in developing plans, studies, and strategies. A comprehensive assessment of selected City of Fort Collins plans, studies, and standards was conducted to evaluate the integration of tree preservation, protection, and planting efforts. The purpose of the review is to identify opportunities or gaps in these documents and provide recommendations that will improve Fort Collins's urban forest resource.

- Fort Collins Water Efficiency Plan (2015)
- Water Shortage Action Plan (2020)
- Fort Collins City Plan (2019)
- Fort Collins Emerald Ash Borer (EAB) Management and Response Plan (2020)
- Fort Collins Parks and Recreation Master Plan (2021)

- Fort Collins Our Climate Future Plan (2021)
- Fort Collins Strategic Plan (2022) - lists city council priorities
- Larimer County Internal Climate Action, Resilience, And Education (ICARE) Report (2023)

Ratings

trees not incorporated

trees incorporated but requires revision or implementation

trees fully incorporated & implemented

Fort Collins Water Efficiency Plan (2015)

Description: Presents the current state of Fort Collins' water supply system, demand, and management, as well as the opportunities and corresponding implementation principles to increase efficiency.

Opportunity/Gaps: Opportunity exists to promote urban trees' role in improving stormwater management, explore the impacts of water restrictions on trees, and include recommendations for ensuring trees receive adequate irrigation.

Recommendation: Publish an updated document to update community members on the city's water supply and current water efficiency efforts and provide efficient tree watering recommendations.

Water Shortage Action Plan (2020)

Description: The Water Shortage Action Plan outlines emergency restrictions to water use to manage Fort Collins's water supply in the event of projected shortages. The Plan includes restrictions to tree irrigation: watering trees is permitted under all levels of water restrictions, but under higher levels, trees must be hand-watered or drip/microspray irrigated to maximize efficiency.

Opportunity/Gaps: Tree watering best practices could promote further water conservation and tree health.

Recommendation: Update plan to include tree watering best practices, or consider a public outreach campaign to raise awareness of tree watering best practices in the event of water shortage. Require irrigation for public trees.

Fort Collins City Plan (2019)

Description: Shapes decision making and funding priorities over the next 10-20 years to implement the vision and goals gathered from community members.

Opportunity/Gaps: Trees offer numerous "co-benefits" not included in the plan that can serve as a crucial tool in achieving the city's goals, including: sequestering and storing carbon, reducing stormwater runoff, improving air quality, reducing energy usage through strategically planting trees around buildings, increasing pedestrian, cyclist, and driver comfort along streets, sidewalks, and bus stops by providing shade, providing food with the development of maintained food forests/orchards in parks and open spaces, and increasing a community's connectivity, involvement, safety, and attractiveness.

Recommendation: Creating and maintaining a safe, healthy and resilient urban forest is recognized as a guiding principle in meeting one of the Plan's core values of Environmental Health. Implementation of the Urban Forestry Strategic Plan will assist in meeting the goals of the City Plan.

Fort Collins Emerald Ash Borer (EAB) Management and Response Plan (2020)

Description: Reviews current EAB situation, the city's plan, and the challenges at a time when EAB had just been detected in the city.

Opportunity/Gaps: The implementation of the Urban Forest Strategic Plan's recommendations may relieve the deferred maintenance impacts and their negative consequences anticipated in the EAB Management and Response Plan.

Recommendation: Publish an updated document to inform the community on the current EAB distribution, the treatment's progress, and the future management plan.

Fort Collins Parks and Recreation Master Plan (2021)

Description: Envisions the future of parks and recreation, addressing needs and providing a strategic roadmap for the City to shape the system over the next 20 years.

Opportunity/Gaps: The Plan identifies the promotion of planting, preservation, and maintenance of canopy trees and native vegetation on public and private land as a key action in implementing the city's parks and recreation goals.

Recommendation: Coordinate the implementation of the Urban Forest Strategic Plan to assist in meeting the goals of the Parks and Recreation Master Plan.

Fort Collins Our Climate Future Plan (2021)

Description: Defines the city's goals for climate, waste, energy, community equity and resilience, along with their respective implementation strategies.

Opportunity/Gaps: One of the "next moves" action items identified in the Plan is the development of an Urban Forest Strategic Plan, and a progress metric of healthy natural spaces to be the city's tree replacement rate and percent canopy coverage. Trees could also be included in the goals relating to building an equitable and resilient community, reducing energy use, becoming carbon neutral, and increasing healthy local food sources.

Recommendation: Implementation of the Urban Forestry Strategic Plan will assist in meeting the goals of the Our Climate Future Plan.

Fort Collins Strategic Plan (2022)

Description: As a companion to the City Plan, the Strategic Plan outlines short- and mid-term objectives, influences the City's budgeting process, and guides the implementation of the City's services.

Opportunity/Gaps: Trees are identified as an integral piece of the "Neighborhood Livability & Social Health" strategic initiative, which precisely calls out the components needed for a healthy urban forest. Although trees' role in this category has broad implications, there is an opportunity to further incorporate urban forestry into other strategic initiatives.

Recommendation: Implementation of the Urban Forestry Strategic Plan will assist in meeting the goals of the Our Climate Future Plan.

Larimer County Internal Climate Action, Resilience, And Education (ICARE) Report (2023)

Description: Captures progress of County's climate goals since the adoption of the initial ICARE document in 2022, with intent to guide the forthcoming County Climate and Sustainability Plan. This plan, the completion of which is anticipated in 2024, aims to address climate change and lessen impacts on community members with innovative mitigation and adaptation strategies.

Opportunity/Gaps: There is opportunity to include the planting, maintenance, and preservation of trees into the County's goals.

Recommendation: Collaborate with the Larimer County Climate and Sustainability Plan process to ensure integration and mutual reinforcement between the Urban Forest Strategic Plan's priorities, recommendations, and actions, contributing to the sustainable development and progress of Larimer County.

COMMUNITY ENGAGEMENT & POLICY INTEGRATION: SUMMARY OF FINDINGS

Findings from the community engagement process demonstrate that the people of Fort Collins value trees and understand the myriad ways that trees enhance quality of life in the city. Feedback that was gathered from the public survey and three public meetings indicate that residents are invested in the ongoing management of Fort Collins's trees and the ways that the City will help ensure tree canopy preservation and growth into the future.

Residents are particularly interested in resources that will help them be effective stewards of tree canopy. Examples of resources that were requested include opportunities to volunteer and intern with Forestry; education and information about species selection, including drought tolerant, climate adapted, and native species; opportunities to provide input into citywide forestry management, such as shaping the diversity and species composition of the urban forest; helping to recognize and manage pests and diseases; becoming educated about proper tree care; and having access to financial resources to help defray costs associated with tree maintenance.

Feedback from Forestry Division partners, both internal and external to City government, underscored the collaborative nature of Forestry staff and the high level of expertise and service that they provide. Suggestions from these meetings focused on building efficiency in partnerships and increasing the number of resources that can assist partners with their own tree management. Suggested resources include plain-language explanations of city code and policy, improved consistency of code enforcement, tree species recommendations, information about tree best management practices including care and irrigation, clarification about responsibilities, and resources that can be shared with clients and the general public. Several suggestions also centered on better integrating urban forestry and the Forestry Division into existing and future planning efforts that relate to climate resilience and city priorities.

A review of existing code, policies, and plans highlighted possible areas where the City can enhance tree protection and preservation. Protection and preservation are important strategies for canopy growth over time, both because a majority of tree canopy is contained on land that is not city-owned, and preservation is more effective (and cost effective) than relying on tree planting alone. Private property protections are a topic of particular interest to the general public, with strong opinions on multiple sides. In general, there seems to be stronger existing support for tree protections that affect development, large tracts of land, and large redevelopment projects than for ordinances that would affect private residential property. Many residents expressed a need for more information before taking a

position. Further engagement would be needed to accurately gauge public support for any enhanced protection measures. It is recommended that the City conduct additional, focused engagement on the topic of tree protection ordinances, particularly those that apply to private residential property.

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